



INDUSTRIAL COMMISSION OF NORTH DAKOTA
CLEAN SUSTAINABLE ENERGY AUTHORITY

Governor
Kelly Armstrong
Attorney General
Drew H. Wrigley
Agriculture Commissioner
Doug Goehring

Clean Sustainable Energy Authority Technical Committee

January 13, 2026 9:00 AM

Bank of North Dakota Room #238

1200 Memorial Highway, Bismarck, ND

Or Microsoft Teams

[Join the meeting now](#)

Or call in (audio only)

[+1 701-328-0950,,741400534#](tel:+17013280950,741400534)

(approximately 9:00 am)

- I. Call to Order and Determination of Quorum and Opening Comments – *Rep. Glenn Bosch and Sen. Dale Patten, Co-Chairs*

(approximately 9:10 am)

- II. **Consideration of January 16th, 2024 Technical Committee Meeting Minutes** (Attachment 1)

(approximately 9:15 am)

- III. Project Management and Financial Reports – *Jordan Kannianen* (Attachment 2)

- IV. Summary of Project Infrastructure Needs

- a. Claire Vigesaa, ND Transmission Authority
- b. Duane Poole, Department of Water Resources
- c. Justin Kringstad, ND Pipeline Authority

(approximately 9:40 am)

- V. Presentation from North Dakota Pipeline Authority – *Justin Kringstad* (Attachment 3)

(approximately 9:55 am)

- VI. **Declaration/Consideration of Conflicts of Interest**

(approximately 10:00 am)

- VII. Review of Grant Round 5 Applications

(Applications Summary – Attachment 4, Technical Reviews Summary – Attachment 5)

- a. C-06-A – Hybrid Service Rig; Submitted by Foremost Well Service; Total Project Costs: \$3,000,000; Amount Requested: \$1,500,000 grant (Attachment 6)
- b. C-06-B – Lithium for Clean Energy Delivery: Demonstration from Produced Water; Submitted by Sustainable Projects Group Inc. - SPGX; Total Project Costs: \$19,047,839; Amount Requested: \$9,523,919 grant (Attachment 7)
- c. C-06-C – ND Lithium-Ion Battery Manufacturing Plant; Submitted by Packet Digital, LLC; Total Project Costs: \$100,827,845; Amount Requested: \$2,297,376 grant, \$18,842,659 loan (Attachment 8)
- d. C-06-D – The Forge Project; Submitted by AmeriCarbon Forge, LLC; Total Project Costs: \$100,000,000; Amount Requested: \$40,000,000 loan (Attachment 9)



- e. C-06-E – The Forge Project: Rare Earths and Critical Materials Integration; Submitted by Ore Spring Materials, LLC; Total Project Costs: \$4,500,000; Amount Requested: \$2,250,000 grant (Attachment 10)
- f. C-06-F – Northern Plains Nitrogen – Nitrogen-based Fertilizer Plant; Submitted by Northern Plains Nitrogen, Inc.; Total Project Costs: \$2,200,000,000; Amount Requested: \$20,000,000 grant (Attachment 11)
- g. C-06-G – Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for Dakota Spirit AgEnergy; Submitted by Harvestone Low Carbon Partners; Total Project Costs: \$94,513,473; Amount Requested: \$20,000,000 loan (Attachment 12)
- h. C-06-H – AirPlant Two: Flagship Synthetic Aviation Fuel Facility; Submitted by Twelve Benefit Corporation; Total Project Costs: \$152,000,000; Amount Requested: \$10,000,000 grant (Attachment 13)

Recess for Lunch

(approximately 12:30pm)

Return to Order

Consideration of motion to enter Executive Session pursuant to N.D.C.C. 54-63.1-06 and 44-04-19.2

- i. *Review of Confidential Information* (Confidential Attachments 14-18)

VIII. Report on Economic Review Results– *Kelvin Hullet* (Confidential Attachment 19)

IX. Discussion and Completion of Scoring Sheets

(approximately 1:45 pm)

Meeting Returns to Open Session

X. **Vote on Feasibility Recommendations and any Potential Conditions**

XI. Review of January 29th, 2026 Clean Sustainable Energy Authority Meeting Agenda (Attachment 20)

XII. Other Business

XIII. Adjournment

***Bold items require Committee action.**



Minutes of a Meeting of the Clean Sustainable Energy Authority Technical Review Committee

Held on January 16th, 2024 at 9:00 a.m.

BND Missouri River Conference Room, 1200 Memorial Highway, Bismarck, ND

Present: Sen. Dale Patten, Chair
Rep. Glenn Bosch
Rachel Retterath
Josh Teigen
Dave Glatt
Lynn Helms
Justin Kringstad
Clair Vigesaa
Charles Gorecki
Todd Steinwand
Rich Garman
Tom Oakland
Courtney Heiser
Al Christianson
Kelvin Hullet
Reice Haase
Erin Stieg

Also Present: Not all attendees are known as this meeting was held through Microsoft Teams.

Sen. Dale Patten called the meeting of the Clean Sustainable Energy Authority Technical Review Committee to order at 9:00 a.m.

San. Patten mentioned that there is a quorum present in this meeting.

It was moved by and seconded by that the January 16th, 2023 agenda be approved as presented. The motion carried unanimously.

It was moved by and seconded by to approve the July 18th, 2023 meeting minutes as presented. The motion carried unanimously.

Mr. Reice Haase, Industrial Commission Deputy Executive Director, provided the committee with a report on Industrial Commission activities and a summary of the 2023 legislative session actions which relate to the Clean Sustainable Energy Authority.

Mr. Haase provided a financial summary as follows:

There are currently 10 active projects. \$44.3 million in grant dollars have been awarded, \$15.6M of that has been paid to date, with the exception of the Bakken Energy de-obligation/ hydrogen bucket. Cash available for grants is \$30.4 million.

Mr. Haase also provided a project highlight of the Valence project, which was funded by CSEA, that reduced over 155,000 tons of CO₂ emissions and generated \$31.3 million in additional tax revenue to the state. It was noted that the amount of tax revenue surpassed the available grant dollars in the program currently.

Sen. Patten requested the members to declare any conflicts of interest, to which **(there were none-OR)** _____ and _____ responded. Mr. Steinwand declared that Bank of North Dakota currently has loans with Bushel, Inc., and Rainbow Energy Center. Mr. Gorecki stated that his agency works closely with Minnkota Power Cooperative and HydroStrat GP.

It was moved by Sen. Patten and seconded by Lynn Helms to allow a vote from Bank of North Dakota representative Todd Steinwand and SERC Designee Charles Gorecki.

On a roll call vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. The motion carried unanimously.

The review of applications began: There were nine applications in total, and all had positive technical reviews.

C-05-A Clean H₂ and N-fertilizer Production Facility

- \$125 million loan request
- One technical reviewer rated this project as favorable, and one reviewer rated the project as questionable.
- Mr.
- Mr.

C-05-B Spiritwood Fertilizer Project

- \$125 million loan request
- There were two technical reviewers for this application, both rated the project as questionable.
- The risks that were noted were high production costs & scaling risks.
- Mr.
- Mr.

C-05-C “Green” Pig Iron Production Facility

- \$12 million grant request
- Two technical reviewers rated this project as questionable, and one reviewer rated it as favorable.
- The concerns noted were a lack of details regarding the quantity of iron that could be reclaimed and lack of off-take partners.
- Mr.
- Mr.

C-05-D Unlocking the Full Potential of Produced Water

- \$5 million grant and \$25 million loan request
- All three technical reviewers rated this project as favorable.
- The risks that were noted were potential Radionuclides found in produced water and remaining questions about economic feasibility.
- Mr.
- Mr.
- Mr.

C-05-E Blue Ammonia Facility

- \$10 million grant request
- All three technical reviewers rated this project as favorable.
- The risks that were noted were
- It was mentioned that
- Mr.
- Mr.

C-05-G Dickinson Renewable Fuel Facility Expansion

- \$10 million grant request
- All three technical reviewers rated this project as favorable.
- There was discussion
- Mr.
- Mr.

C-05-H Energy Storage Technology for Lithium-Ion Batteries

- \$4 million grant request
- All three technical reviewers rated this project as favorable.
- The risks that were noted were
- Mr.
- Mr.

C-05-I Grand Power North Dakota Battery Manufacturing Plant

- \$10 million grant and \$17,355,992 loan request
- One technical reviewer rated this project as favorable, one reviewer rated the project as fair, and one rated it as questionable.
- The reviewer noted that
- Mr.
- Mr.

C-05-J Carbon Convert Prototype

- \$500,000 grant request

- All three technical reviewers rated this project as questionable.
- The risks that were noted were
- Mr.
- Mr.

C-05-K Cerilon GTL

- \$20 million grant and \$80 million loan request
- All three technical reviewers rated this project as favorable.
- The reviewer
- Mr.
- Mr.

C-05-L NDeV Flare Gas Mitigation Project

- \$3 million grant and \$10 million loan request
- All three technical reviewers rated this project as questionable.
- The reviewer
- Mr.
- Mr.

Sen. Patten asked for a motion to be made to enter into executive session to discuss confidential information.

A motion was made by Mr. and seconded by Ms. that under the authority of the N.D.C.C. 54-63.1-06 and 44-04-19.2.1 that the Clean Sustainable Authority Technical Review Committee enter into an executive session for the purpose of considering Clean Sustainable Energy confidential information.

On a roll call vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Clair Vigesaa, Charles Gorecki and Todd Steinwand all voted aye. The motion carried unanimously.

Sen. Patten stated that the Clean Sustainable Energy Authority Technical Committee is entering into executive session to discuss confidential information. He stated that only CSEA members and ND Industrial Commission staff will be present during executive session. Any formal action will be taken in open session. Sen. Patten reminded those present that the discussion must be limited to the announced purpose which is projected to last approximately 1 hour.

The executive session began at a.m.

The Meeting Closed to the Public for Executive Session Pursuant to NDCC 54-63.1-06 and 44-04-19.2.1.

CLEAN SUSTAINABLE ENERGY AUTHORITY TECH COMMITTEE EXECUTIVE SESSION

Present:

Sen. Dale Patten
Rep. Glenn Bosch
Todd Steinwand
Courtney Heiser
Justin Kringstad
Dave Glatt
Lynn Helms
Rachel Retterath
Al Christianson
Josh Teigen
Tom Erickson
Clair Vigesaa
Reice Haase
Erin Stieg

Executive session ended at p.m. and reconvened in open session.

Voting results are as follows:

C-05-A:

- Average
- Mr.

A motion was made by Mr. and seconded by Ms. to recommend funding the C- 05-0A Clean H₂ and N-fertilizer Production Facility with the added condition for the \$5.529 million grant request.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-B:

- Average

A motion was made by Mr. and seconded by to recommend fully funding C-05-B Spiritwood Fertilizer Project for the \$5 million grant and \$25 million loan request.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-C:

- Average
- Mr.
- Mr.

A motion was made by Mr. [redacted] and seconded by Ms. [redacted] to recommend funding the C-05-C “Green” Pig Iron Production Facility with the condition that they secure an industry partner before contracting.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-D:

- Average

A motion was made by Mr. [redacted] and seconded by Mr. [redacted] to recommend fully funding C-05-D Unlocking the Full Potential of Produced Water for the \$150M loan request.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-E:

- Average
- Mr. [redacted]

A motion was made by Mr. [redacted] and seconded by Mr. [redacted] to recommend partial funding C-05-E Blue Ammonia Facility, with the added condition.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-G:

- Average
- Mr. [redacted]

A motion was made by Mr. [redacted] and seconded by Mr. [redacted] to recommend funding C-05-G Dickinson Renewable Fuel Facility Expansion, for the \$5 million grant and \$50 million loan request.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, and Todd Steinwand all voted aye. Charles Gorecki abstained from voting. Motion carried.

C-05-H:

- Average
- Mr. [redacted]
- Mr. [redacted]

A motion was made by Mr. [redacted] and seconded by Mr. [redacted] to recommend partial funding for C-05-H Energy Storage Technology for Lithium-Ion Batteries, with the added condition.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, and Todd Steinwand all voted aye. Charles Gorecki abstained from voting. Motion carried unanimously.

C-05-I:

- Average
- Ms.
- Mr.

A motion was made by Mr. and seconded by Ms. to recommend funding C-05-I Grand Power North Dakota Battery Manufacturing Plant, with the added conditions of adequate financial and technical information provided to the committee.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-J:

- Average
- Mr.

A motion was made by Mr. and seconded by Mr. to recommend partial funding C-05-J Carbon Convert Prototype, with the added condition.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-K:

- Average
- Mr.

A motion was made by Mr. and seconded by Mr. to recommend partial funding C-05-K Cerilon GTL, with the added condition.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

C-05-L:

- Average
- Mr.

A motion was made by Mr. and seconded by Mr. to recommend partial funding C-05-L NDeV Flare Gas Mitigation Project, with the added condition.

On a roll vote Rachel Retterath, Josh Teigen, Dave Glatt, Lynn Helms, Justin Kringstad, Clair Vigesaa, Charlie Gorecki, and Todd Steinwand all voted aye. Motion carried unanimously.

Other Business

- There was discussion
- Sen. Patten

With no further business, Rep. Bosch adjourned the meeting at p.m.

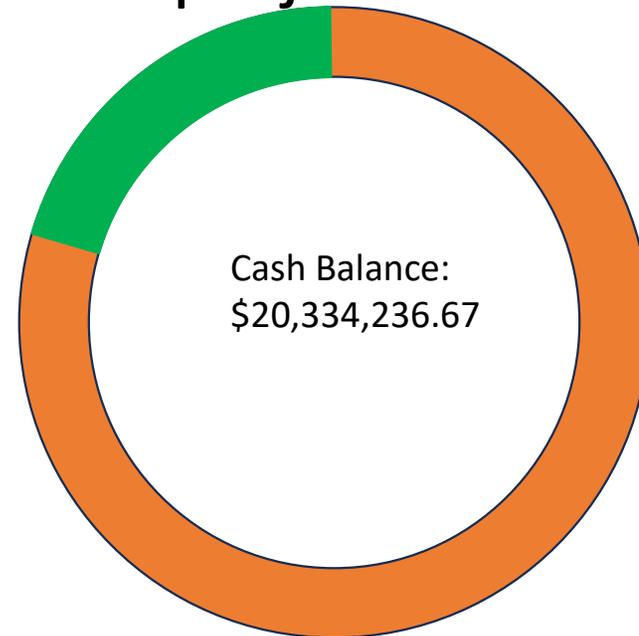
Rep. Glenn Bosch, Co-chairman

Sen. Dale Patten, Co-chairman

Current Status

20 Cumulative Projects
\$74.5M in total grant awards
\$15.4M in returned or withdrawn
\$545.5M loaned
\$6.2B project value

Uncommitted
Cash Available:
\$3,923,910.13



Outstanding
Commitments/
Expenses:
\$16,410,326.54

**Clean Sustainable Energy Authority
Project Management Update (January 2026)**

| Contract Number | Project | Project Sponsor | Status | Original Grant Award | Total Spend To Date | Remaining Grant Commitment | Total Project Costs | Projected End Date |
|-----------------|-------------------------------|------------------|--|----------------------|---------------------|----------------------------|---------------------|--------------------|
| C-03-09 | Enerplus Geothermal Power | Chord | Were expected to make progress in 2025, but no Status Reports were received. | \$ 1,098,500 | \$ 150,251.00 | \$ 948,249.00 | \$ 2,197,000 | 7/1/2026 |
| C-04-10 | Farm Traceability Dashboard | Bushel | Progress towards software development. | \$ 3,500,000 | \$ 968,343.76 | \$ 2,531,656.24 | \$ 12,265,250 | 12/31/2026 |
| C-04-11 | Produced Water 2 | Wellspring Hydro | Refining unit in Texas. Received final report last week. | \$ 5,000,000 | \$ 3,285,282.83 | \$ 1,714,717.17 | \$ 250,000,000 | 12/31/2026 |
| C-05-12 | Green Pig Iron | Scranton Metals | | \$ 7,000,000 | \$ 7,000,000.00 | \$ - | \$ 27,000,000 | 12/31/2025 |
| C-05-14 | Lithium Battery Manufacturing | Dakota Lithium | Construction ongoing. No Status Reports | \$ 2,000,000 | \$ 584,295.87 | \$ 1,415,704.13 | \$ 10,250,000 | 3/31/2028 |
| C-05-15 | GTL FEL-3 | Cerilon | received. | \$ 9,500,000 | \$ - | \$ 9,500,000.00 | \$ 3,600,000,000 | 3/31/2026 |

Total Remaining
Commitment: \$ 16,110,326.54

North Dakota Natural Gas Overview

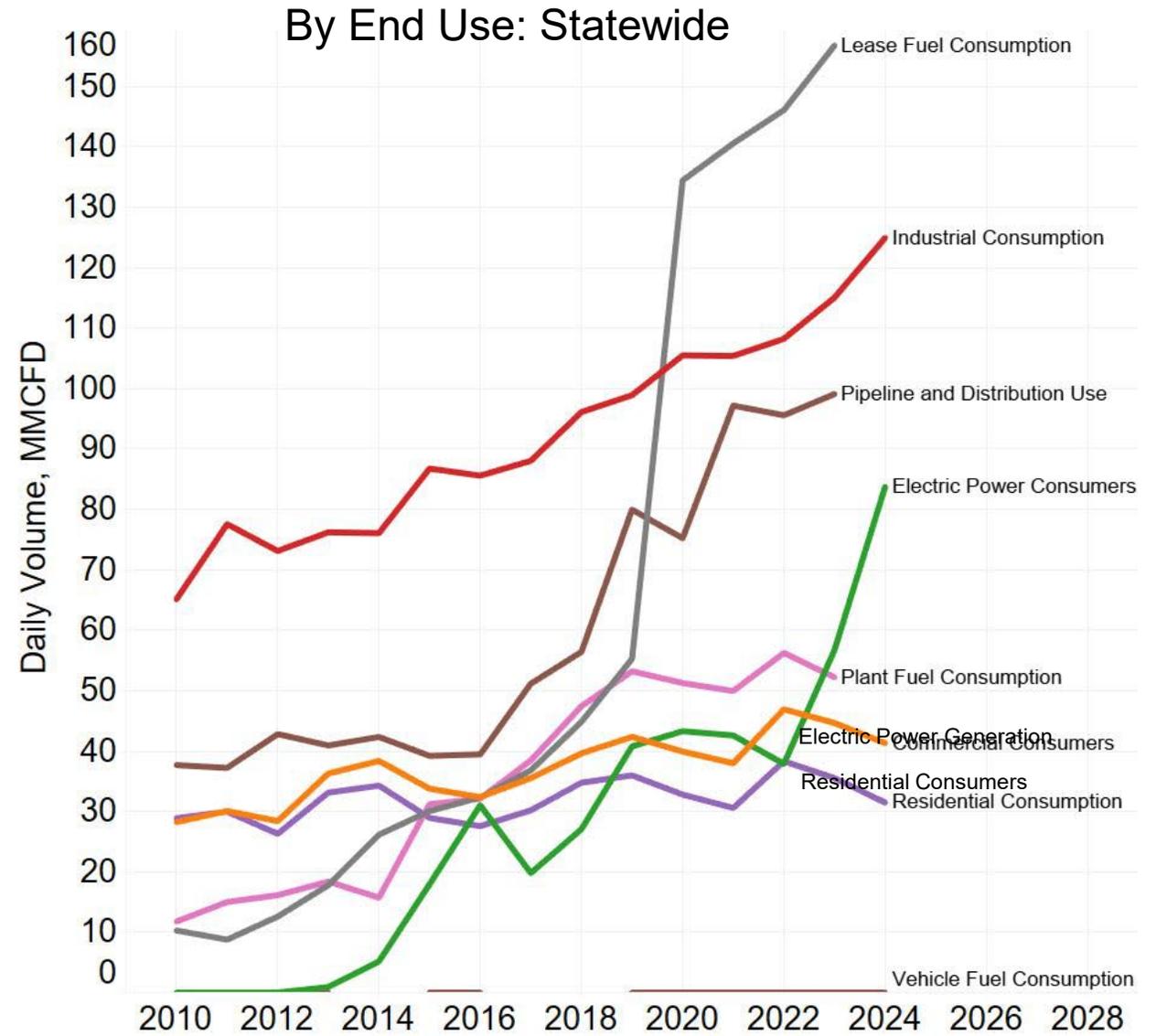
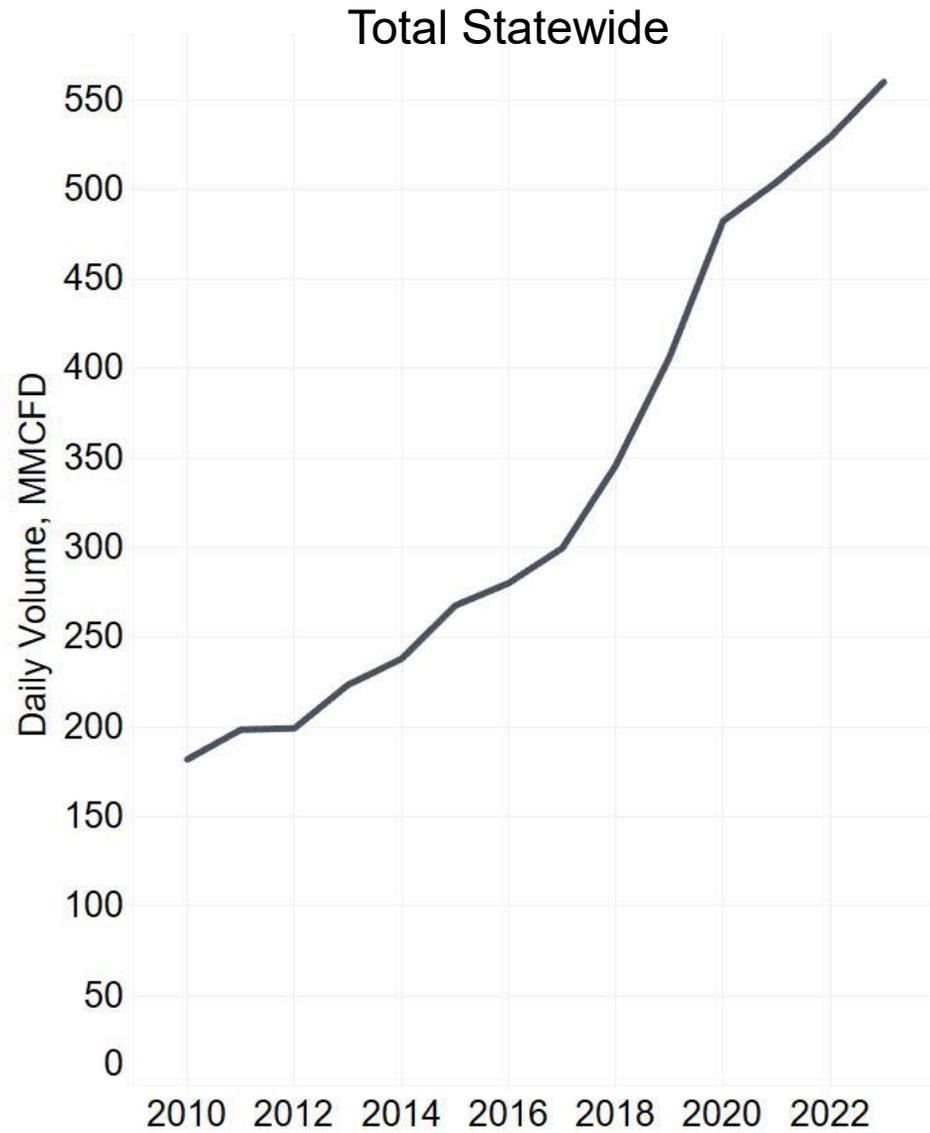


Image: Library of Congress

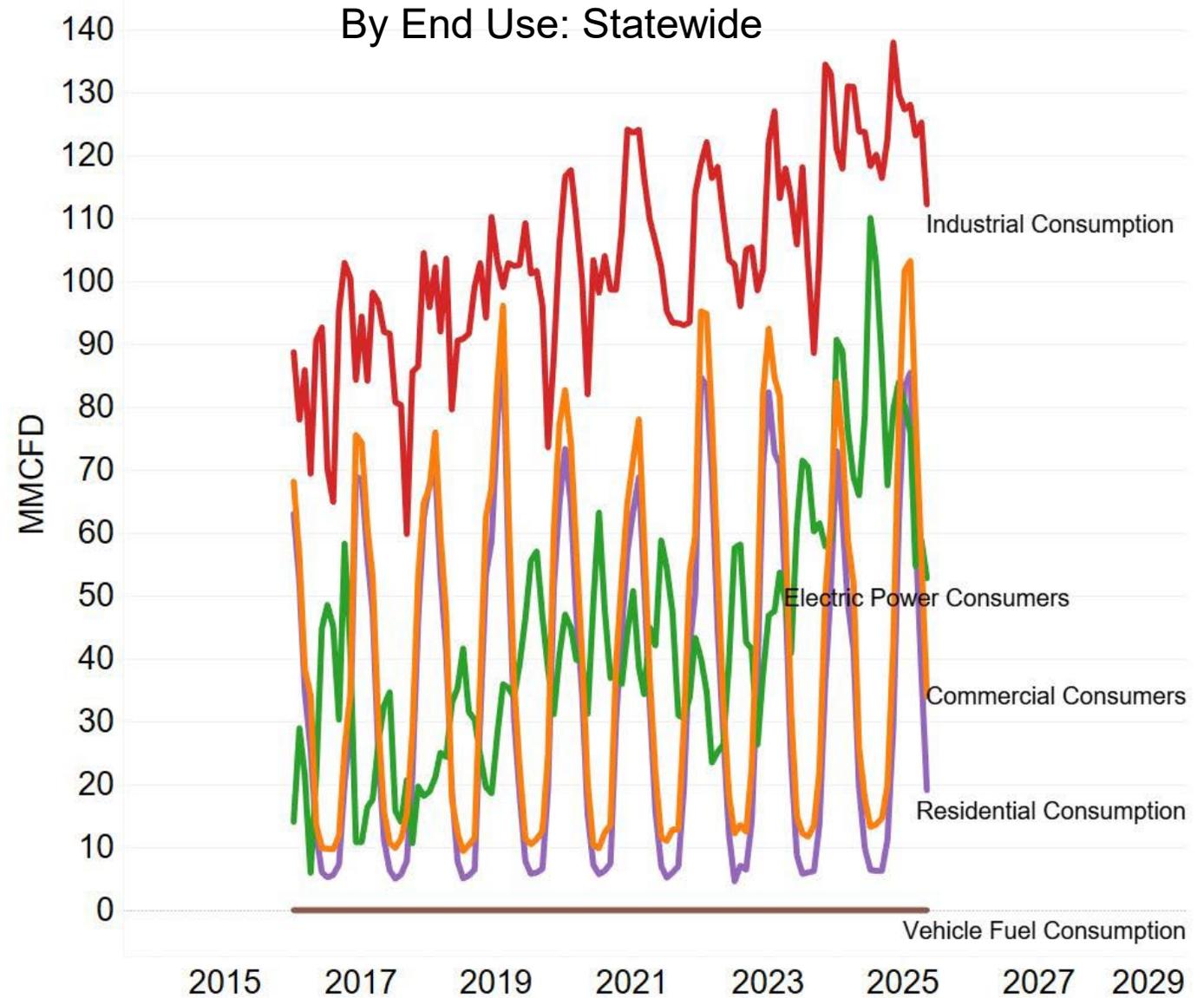
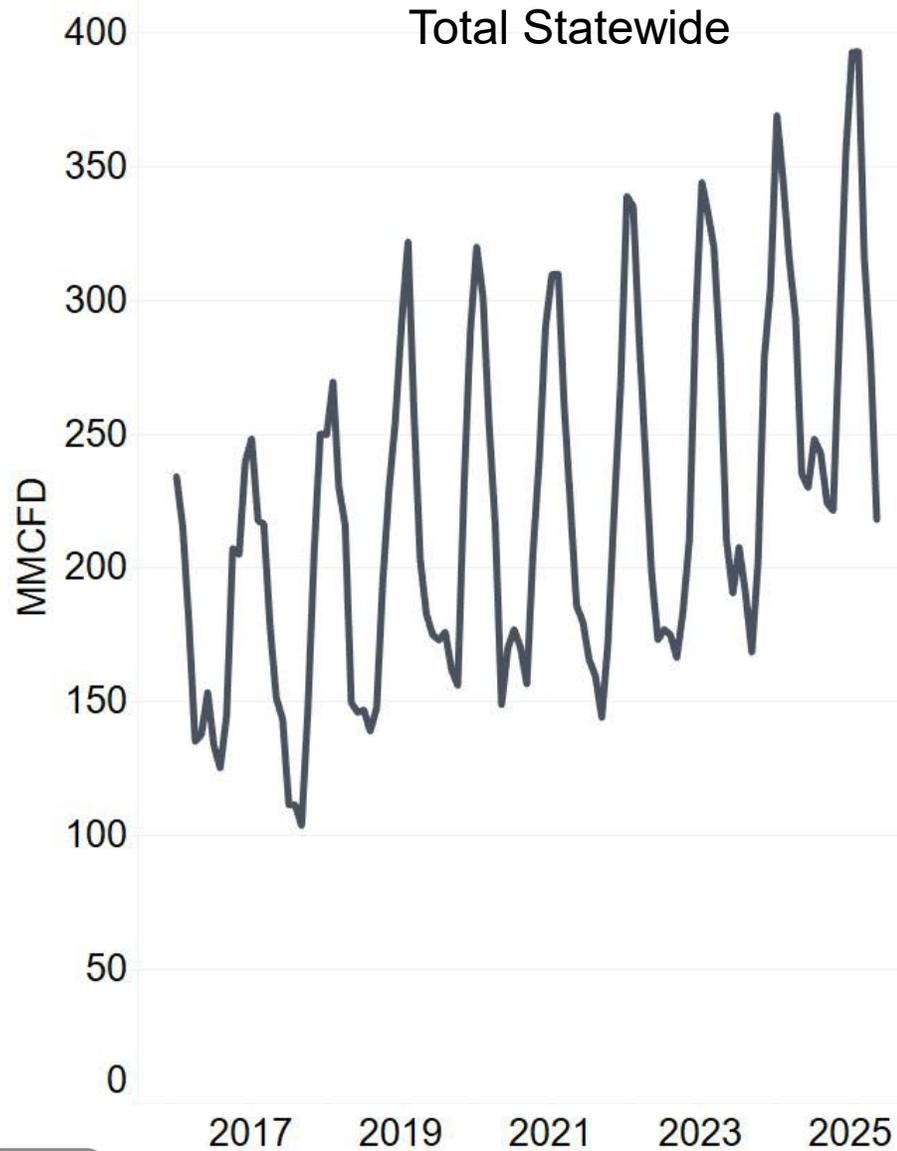
January 13, 2026



North Dakota Gas Consumption (Annual)



Non-Midstream Consumption (Monthly)



Regional Gas Demand Outlook Changing Rapidly

AI Agenda

Two AI Developers Are Plotting \$125 Billion Supercomputers

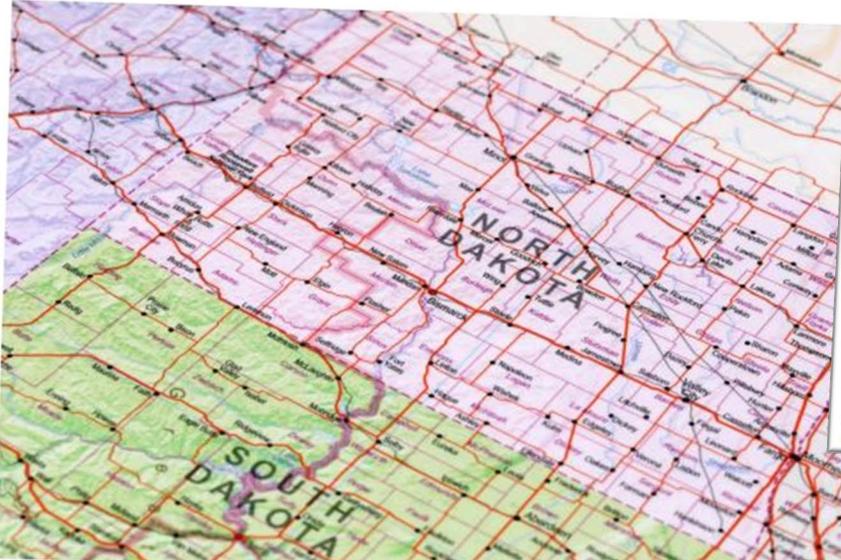


Photo via Adobe Stock

Company announces plan for \$3 billion data center north of Fargo

By JEFF BEACH - AUGUST 18, 2025 11:50 AM



A rendering of the planned data center near Harwood, North Dakota. (Courtesy of Applied Digital)

North Dakota Monitor

Company proposes to upcycle Minnesota iron mine waste in central North Dakota

\$10M in state funding awarded to effort to produce low-carbon pig iron

By JEFF BEACH - FEBRUARY 8, 2024 5:00 AM



North Dakota Monitor

Natural gas conversion project near Williston also includes carbon capture

By JEFF BEACH - JUNE 17, 2024 5:00 AM



A rendering of a natural gas-to-liquids plant proposed at Williston, North Dakota, by the Canadian company Cenion. (Courtesy of Cenion)

North Dakota Monitor

North Dakota green lights natural gas power plant

By JEFF BEACH - AUGUST 8, 2025 4:30 AM



A rendering of a natural gas power plant proposed in North Dakota. (Courtesy of Basin Electric)

North Dakota Monitor

The Information

Sep 3, 2024, 7:00am PDT

Developers of artificial intelligence say they need bigger and bigger data centers to concentrate processing power so that it produces better versions of the technology.

The companies are notoriously secretive about the details of those plans, though, which is



A Complete Natural Gas Solution



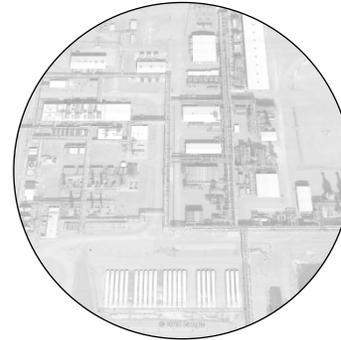
Production

- Technology
- Markets
- Forecasting



Gathering

- Capacity
- Connections
- Compression



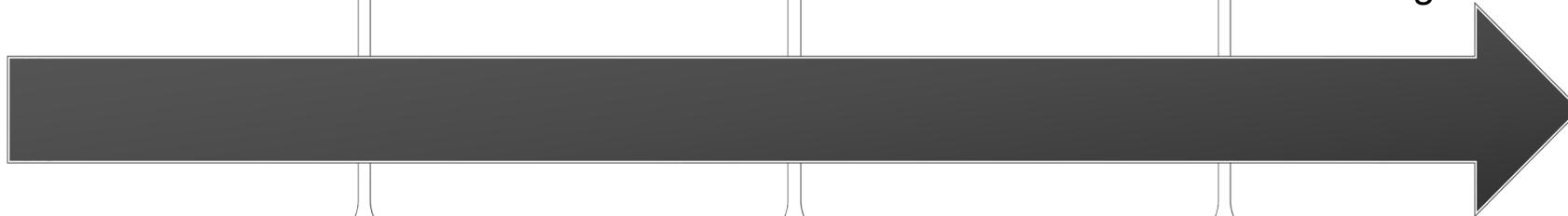
Processing

- Capacity
- Location
- Configuration

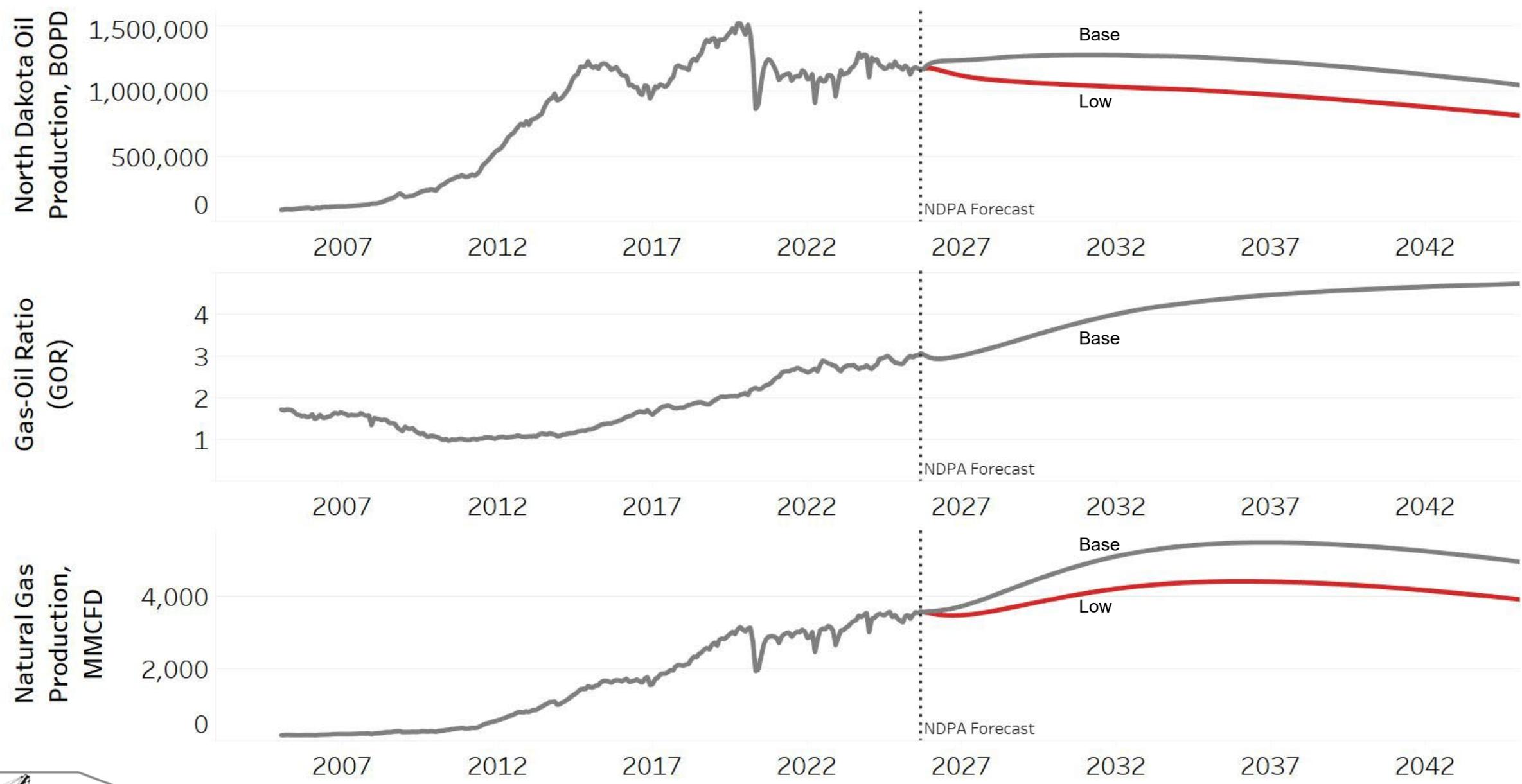


Transmission

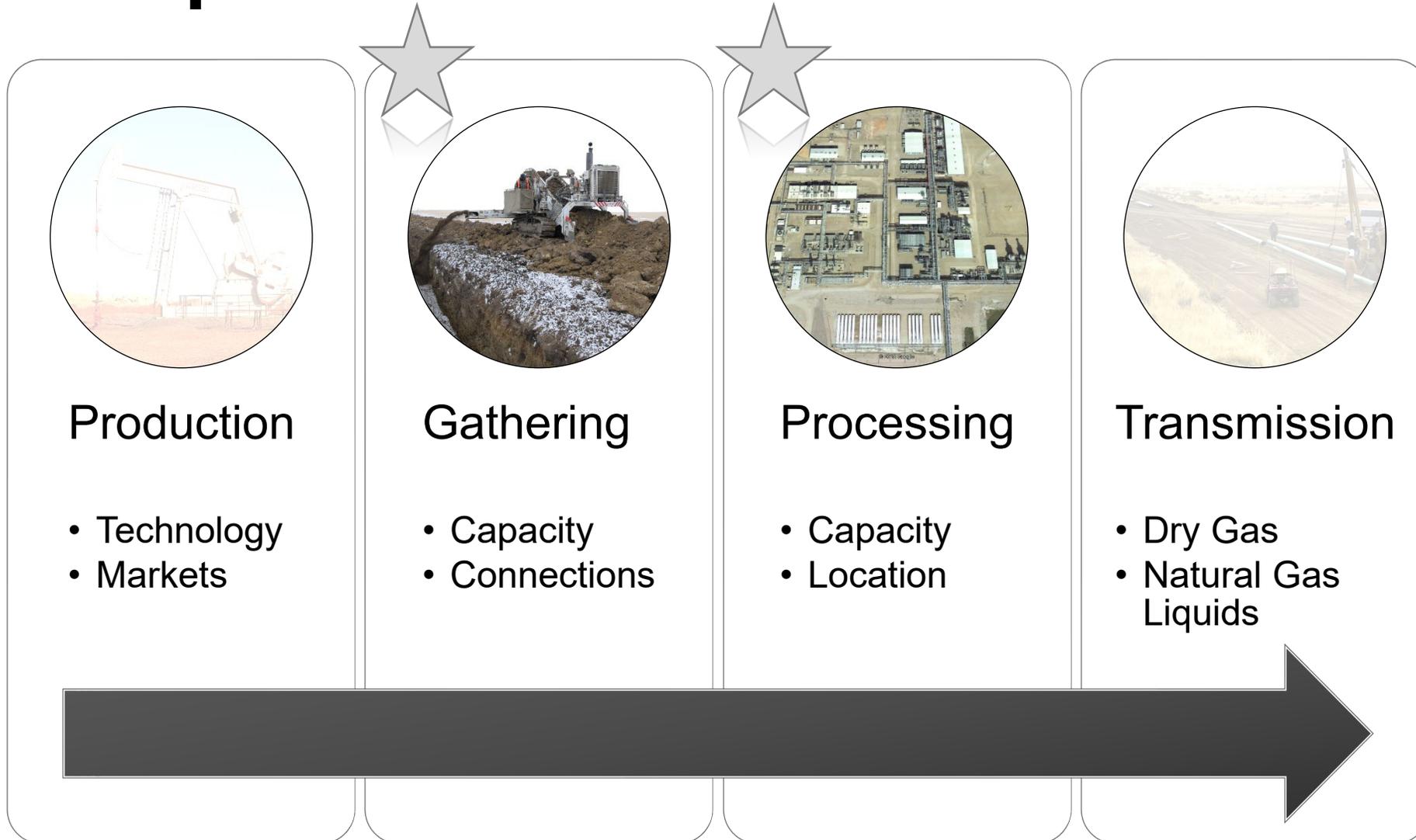
- Dry Gas
- Natural Gas Liquids
- Storage



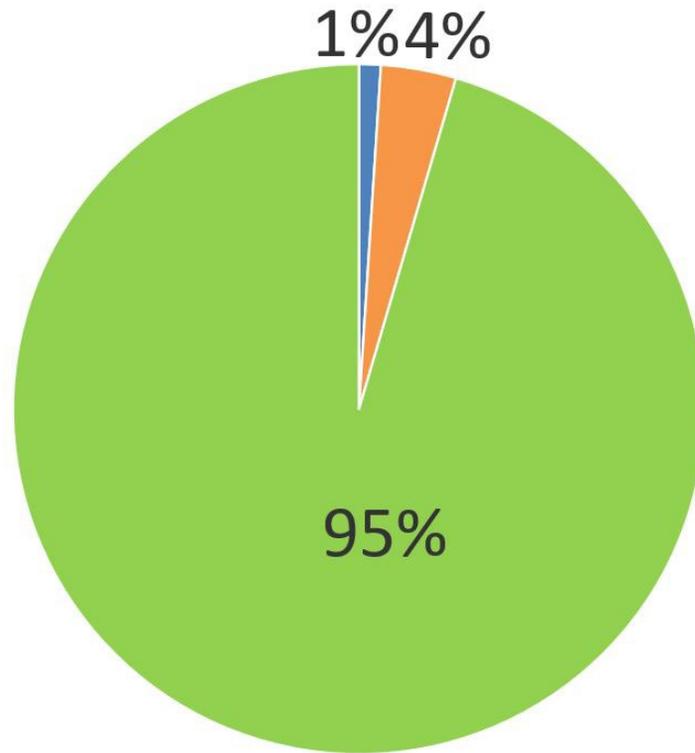
ND Production Forecast: EIA Price Deck



A Complete Natural Gas Solution



Solving the Flaring Challenge



Statewide

GREEN – % of gas captured and sold
Blue – % flared from zero sales wells
Orange – % flared from wells with at least one mcf sold.

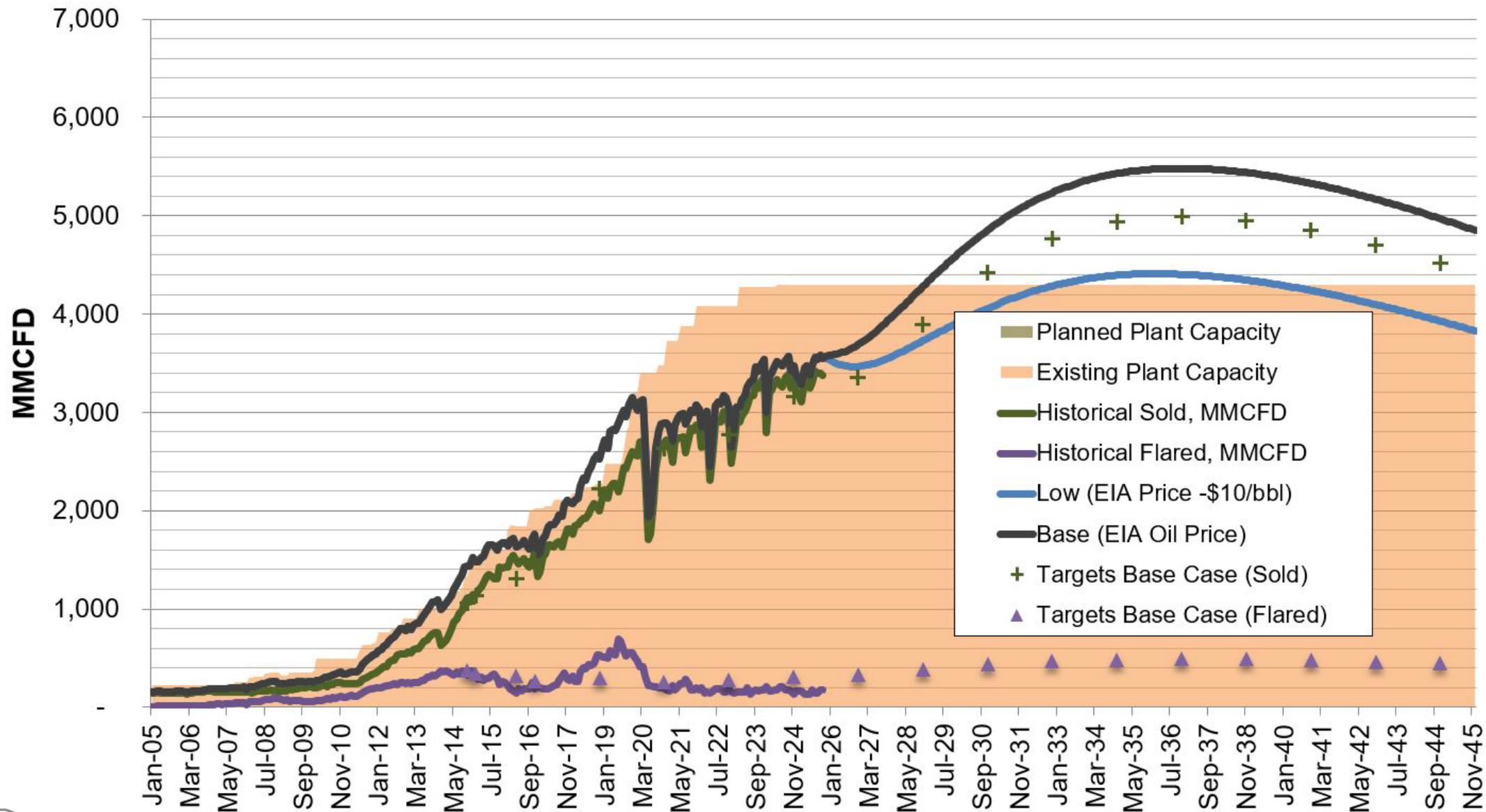
Simple Terms

Blue – Lack of pipelines
Orange – Challenges on existing infrastructure

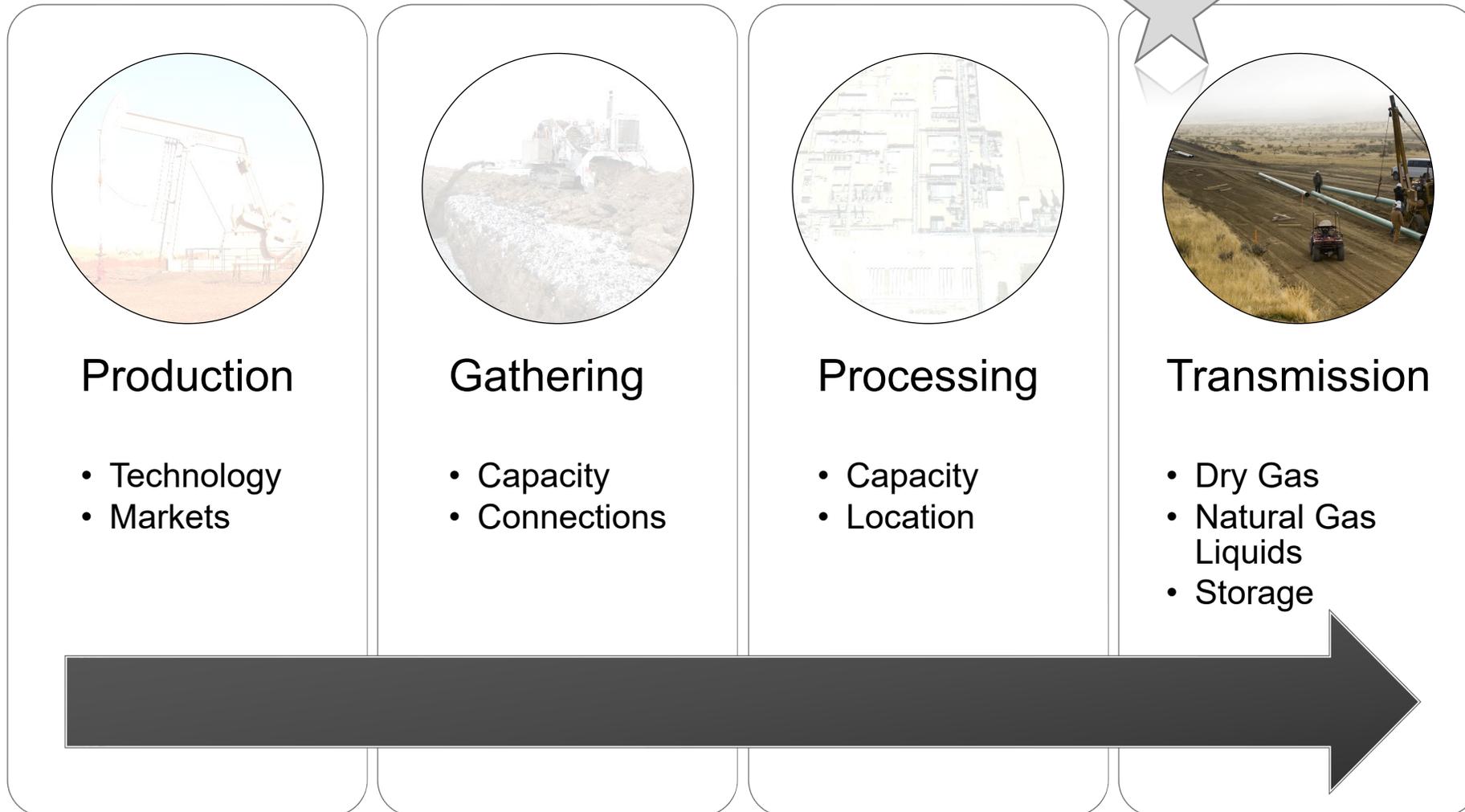
Oct. 2025 Data – Non-Confidential Wells



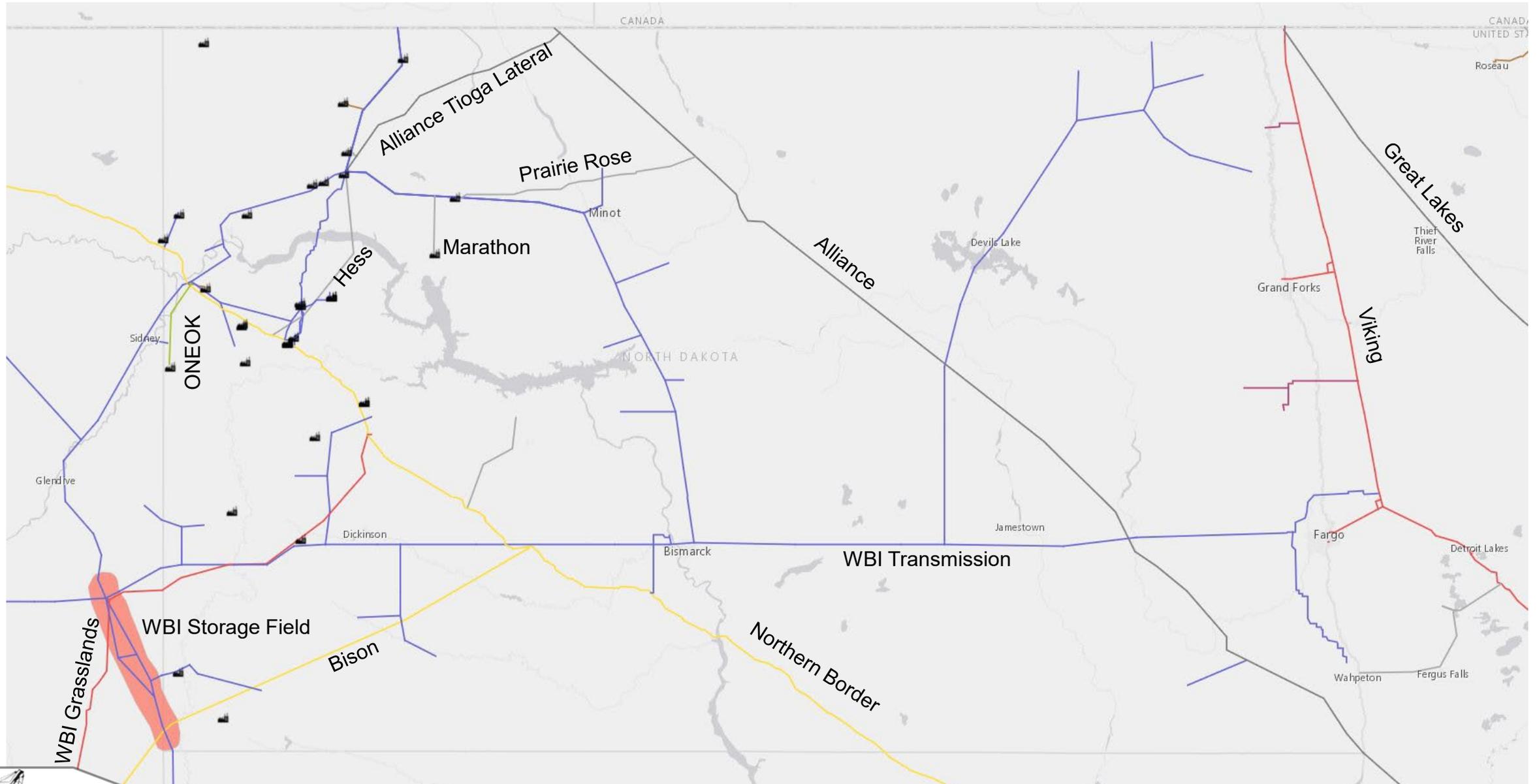
North Dakota Gas Processing Outlook



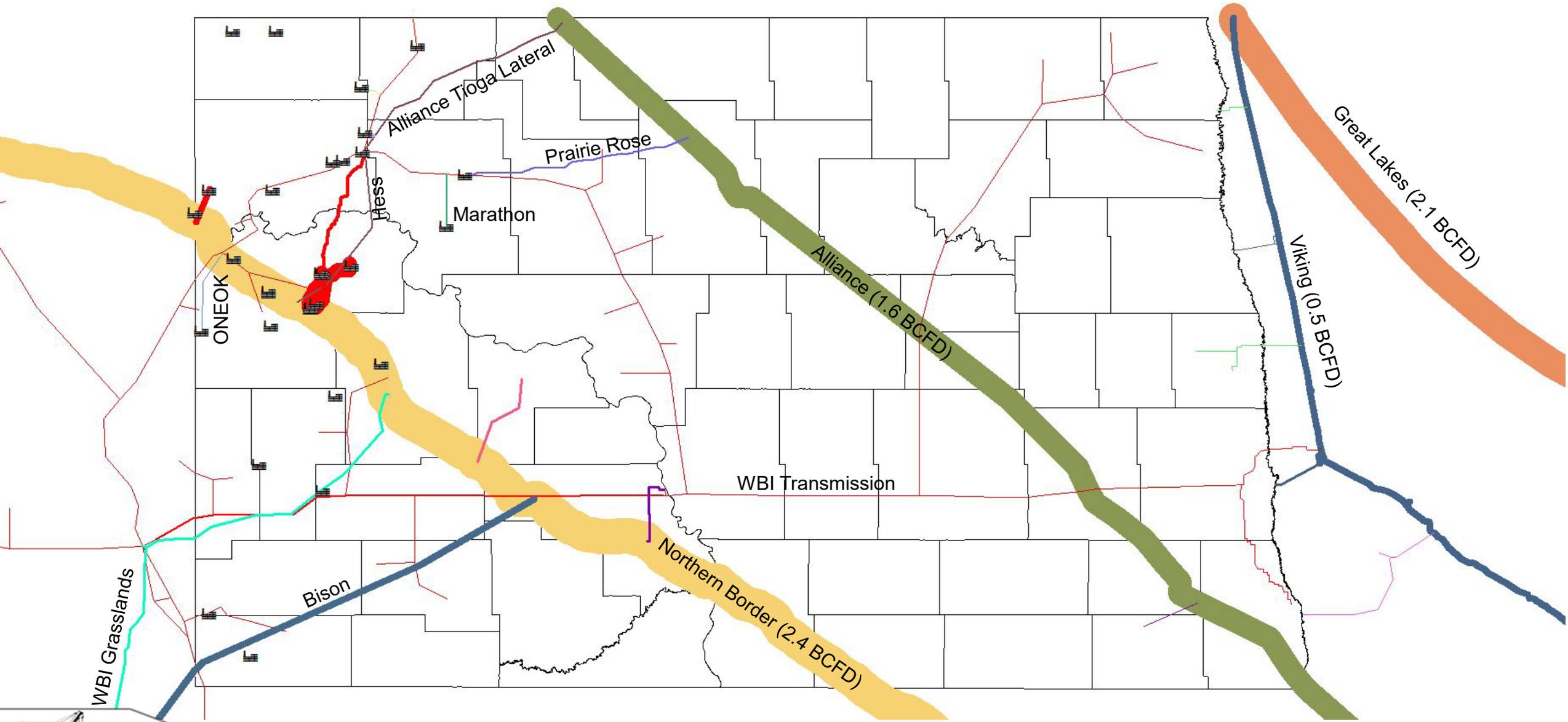
A Complete Natural Gas Solution



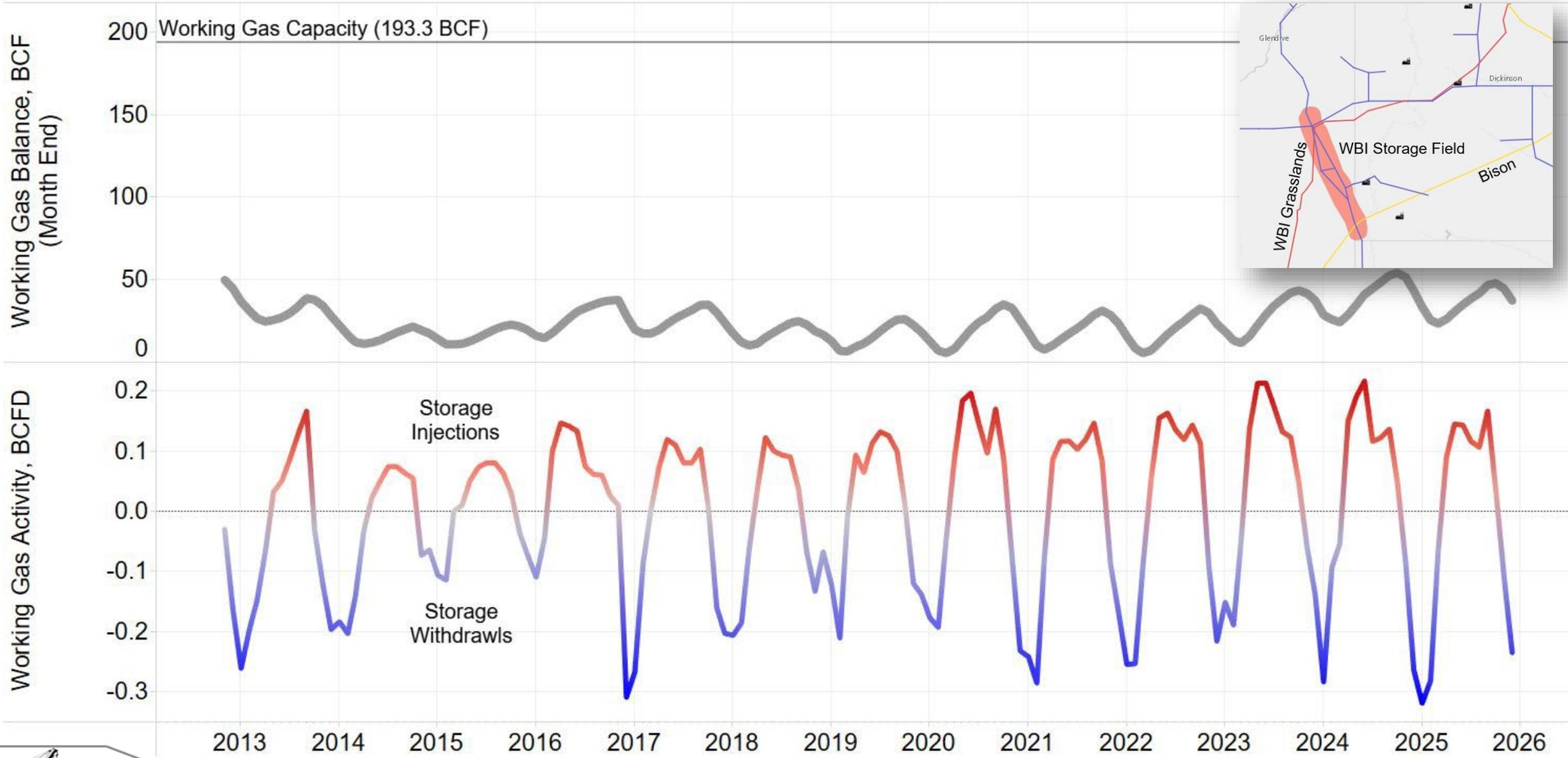
Major Residue Gas Pipeline Infrastructure



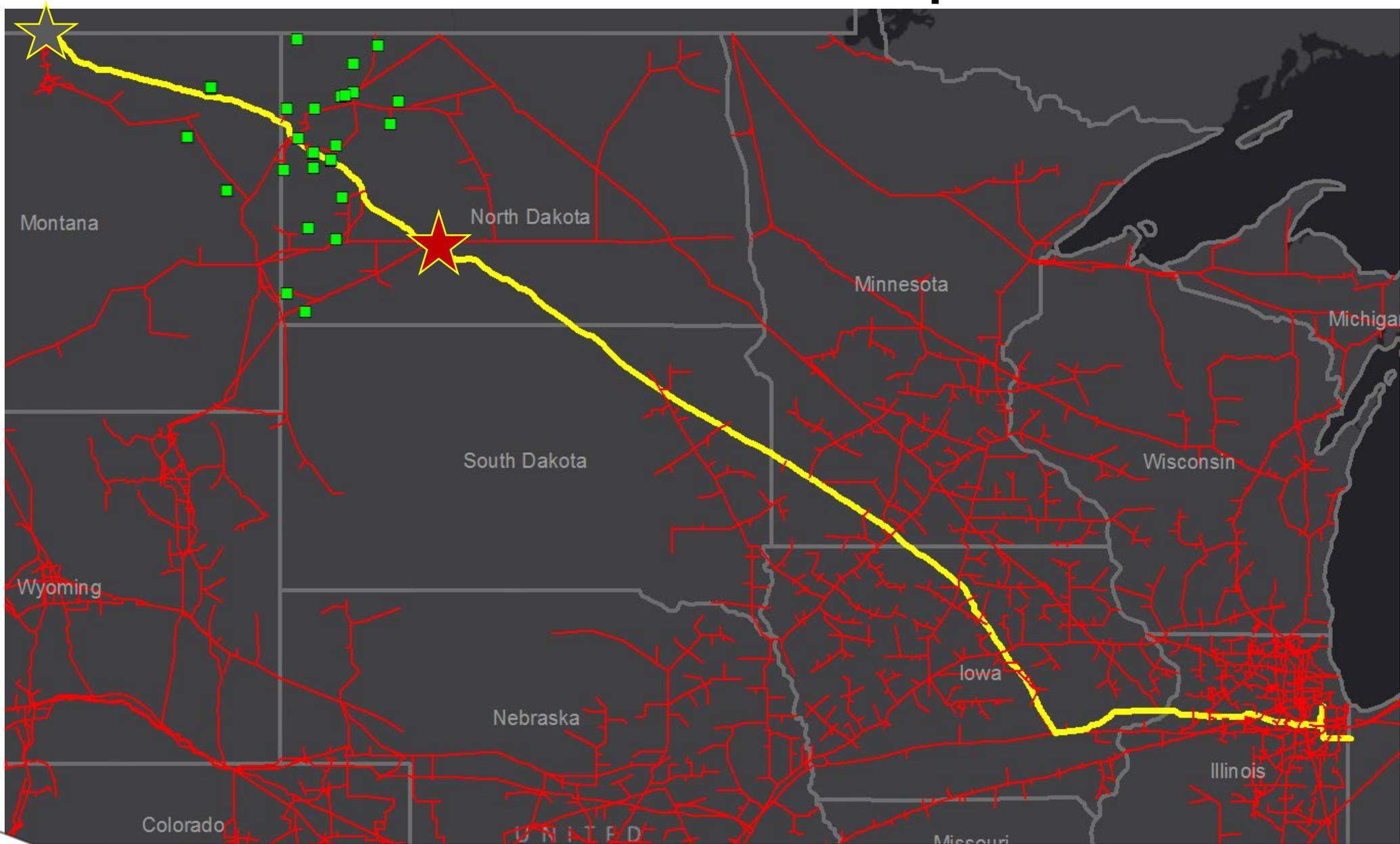
Residue Gas Pipeline Capacity Visualization



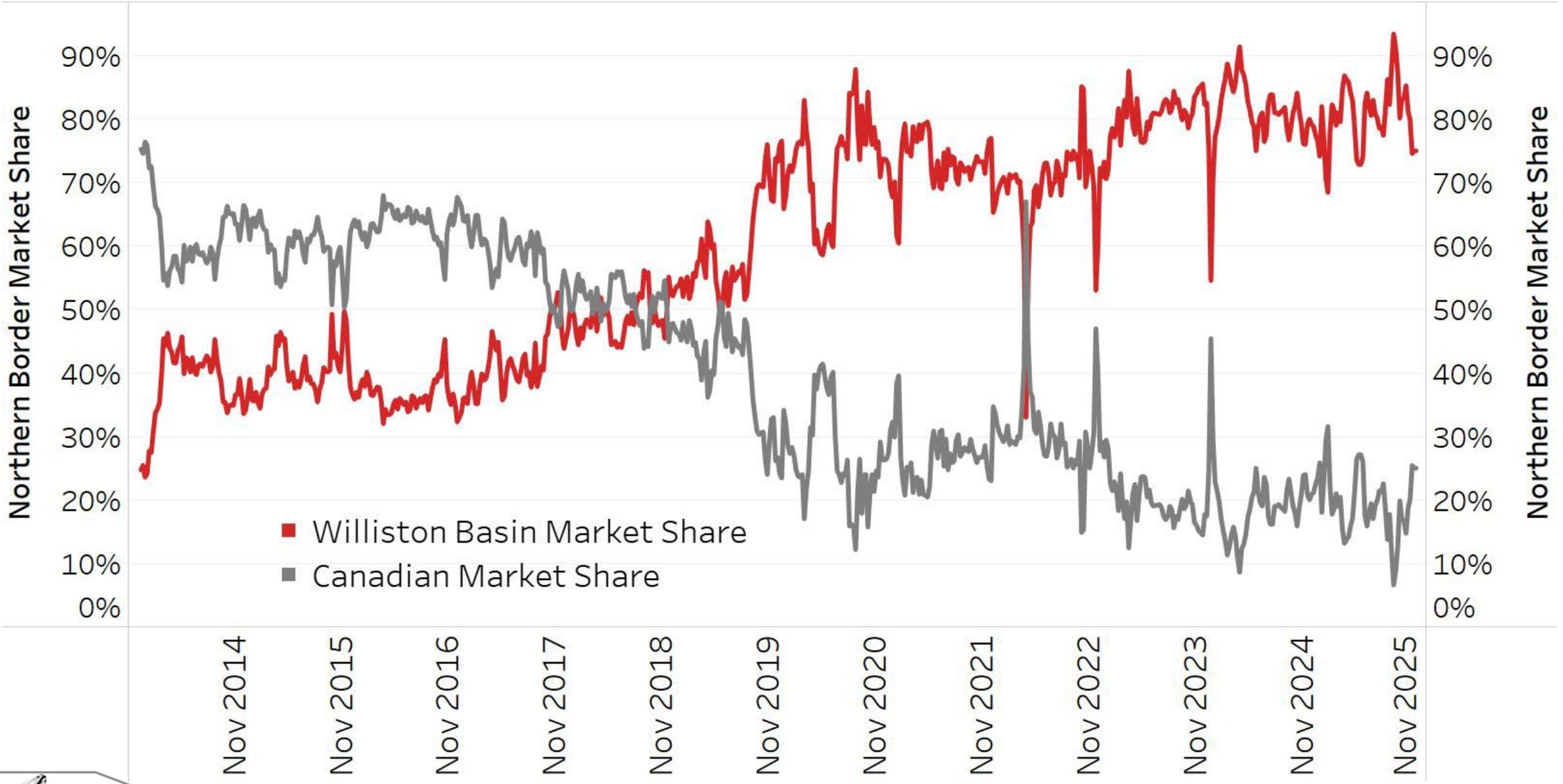
Residue Gas Storage – WBI Energy*



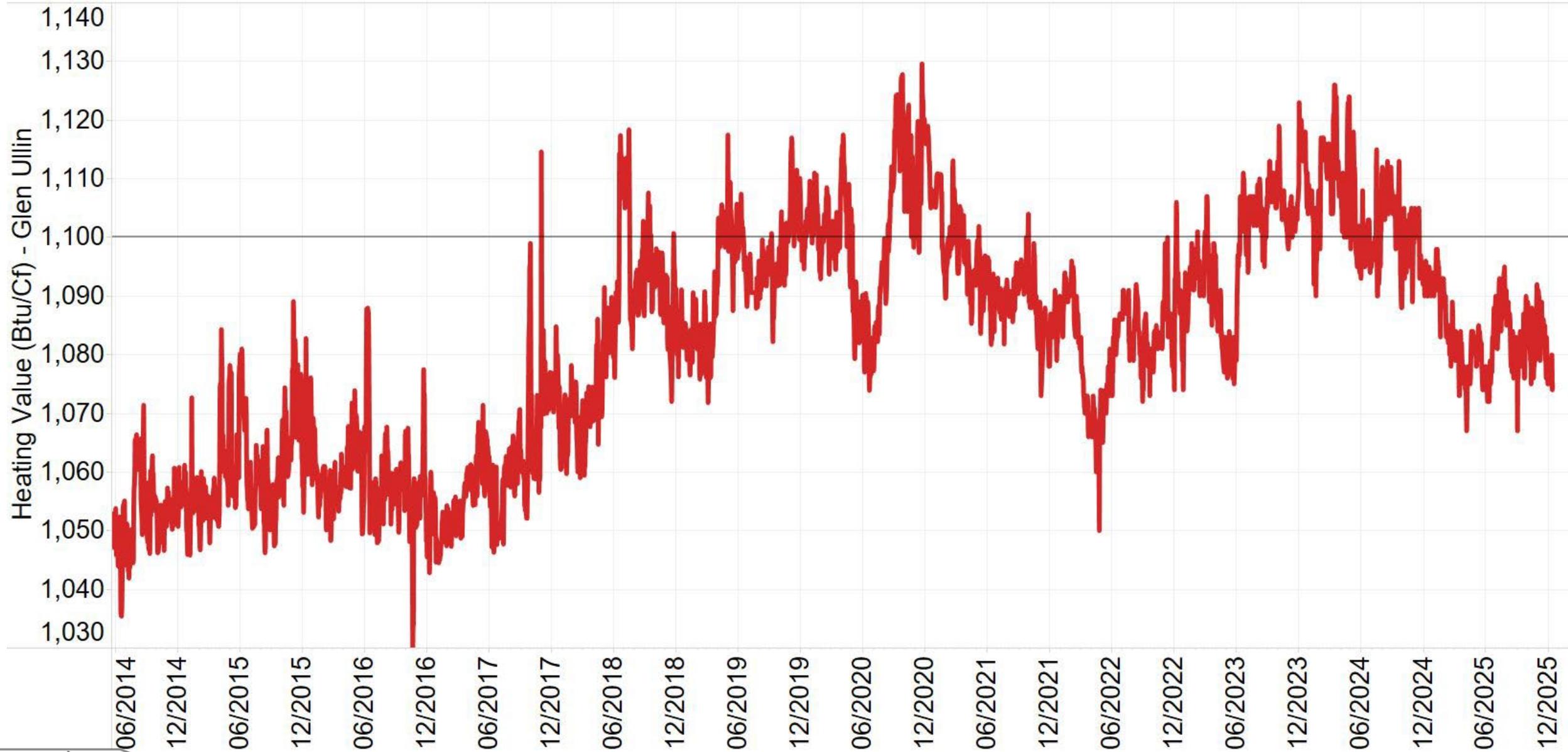
Northern Border Pipeline



Northern Border Pipeline Market Share



Northern Border BTU at Glen Ullin, ND



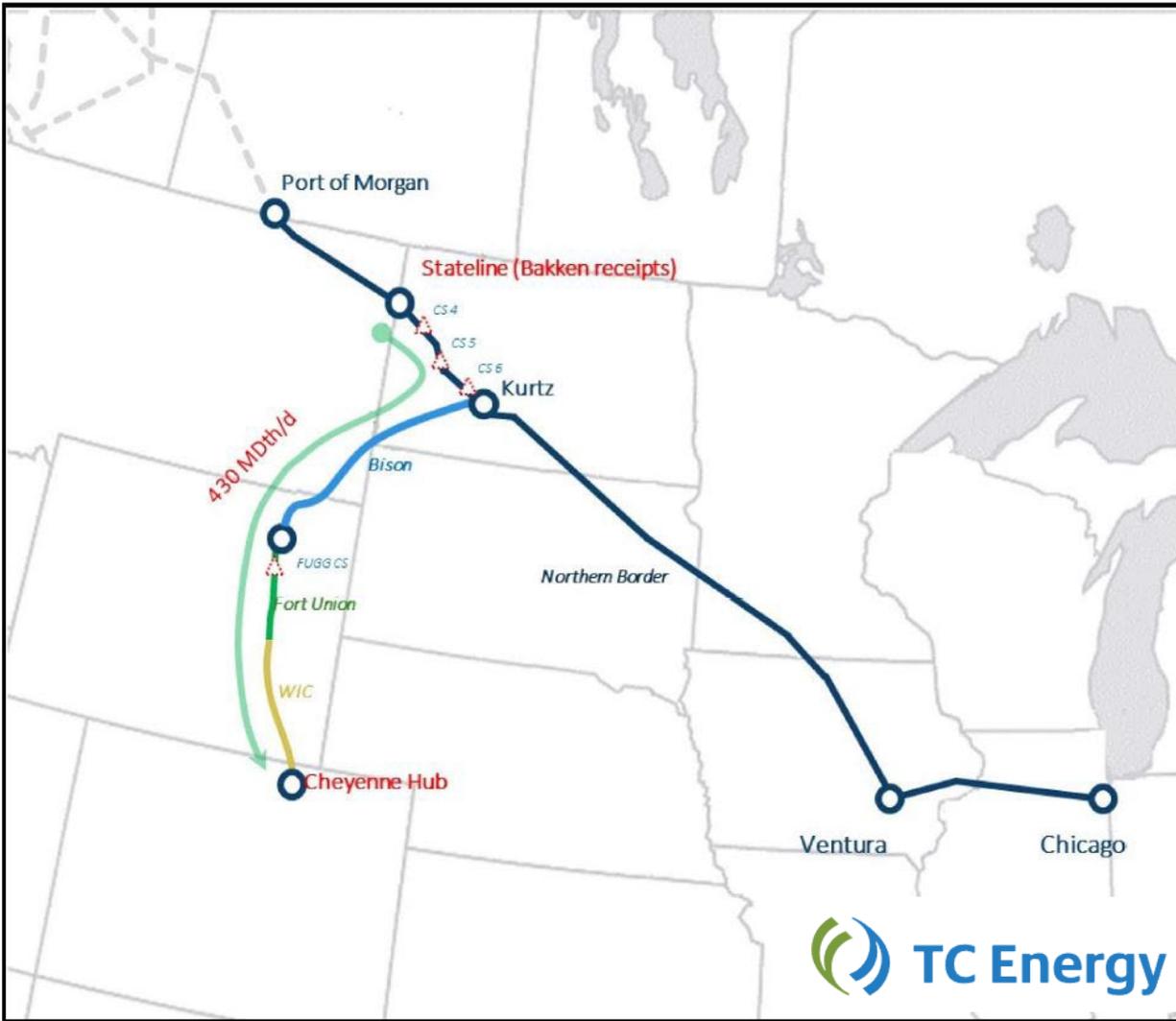
TC Energy / Kinder Morgan: Bakken xPress Project

Project Highlights

- Non-binding open season April 4 - May 6, 2022
- Binding Open Season: June 1-30, 2023
- Three compressor upgrades in North Dakota
- Reverse the idle Bison Pipeline (30" – 302 Mile)
- Capacity 300,000 Dth/Day (430,000 Offered)
- March 2026 targeted in-service date
- Fort Union Gas Gathering and Wyoming Interstate Company provide further transport to Cheyenne hub.
- Seeking commitments 10yrs or Longer
- \$555 million: \$347 Replacement/\$208 Expansion

Proposed Rates

- NBPL/Bison \$0.45/Dth + Fuel/Elec to WIC/FUG Interconnect
- WIC/FUG to Cheyenne \$0.30/Dth + Fuel/Elec
- Anchor Shipper Minimum: 50,000 Dth/Day



Options Beyond 2026: The 5 “C’s”

Construction (Interstate)

- Long-haul Pipe to New or Expanded Markets

Compete

- Price Canadian Volumes to Flow Elsewhere

Compression

- Increase Capacity on Existing Interstate Systems

Consumption

- Intra Region Gas Demand Expansion

Contraction

- Reduce E&P Activity to Meet Limited Gas Options



Options Beyond 2026: The 5 “C’s”

Construction (Interstate)

- Long-haul Pipe to New or Expanded Markets

Compete

- Price Canadian Volumes to Flow Elsewhere

Compression

- Increase Capacity on Existing Interstate Systems

Consumption

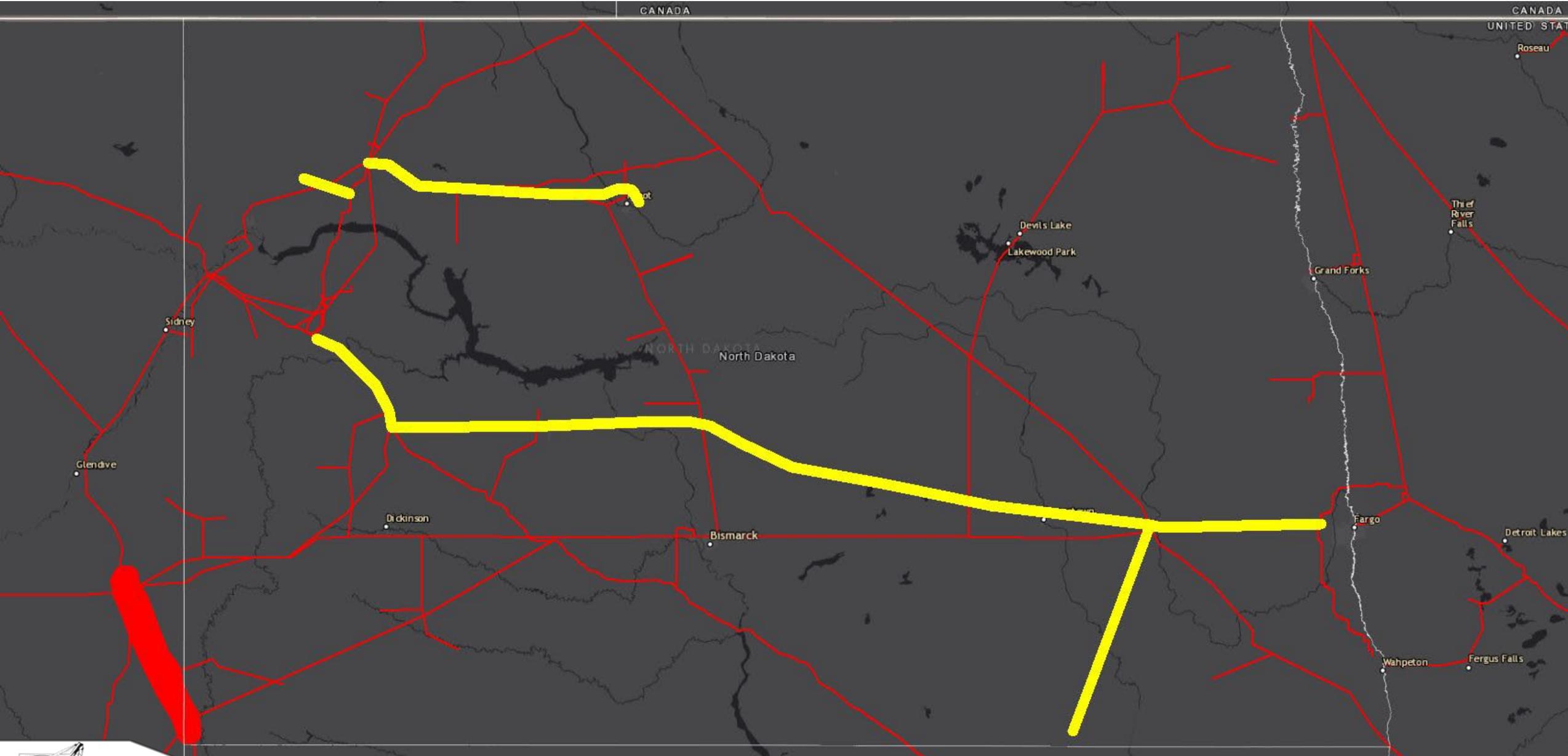
- Intra Region Gas Demand Expansion

Contraction

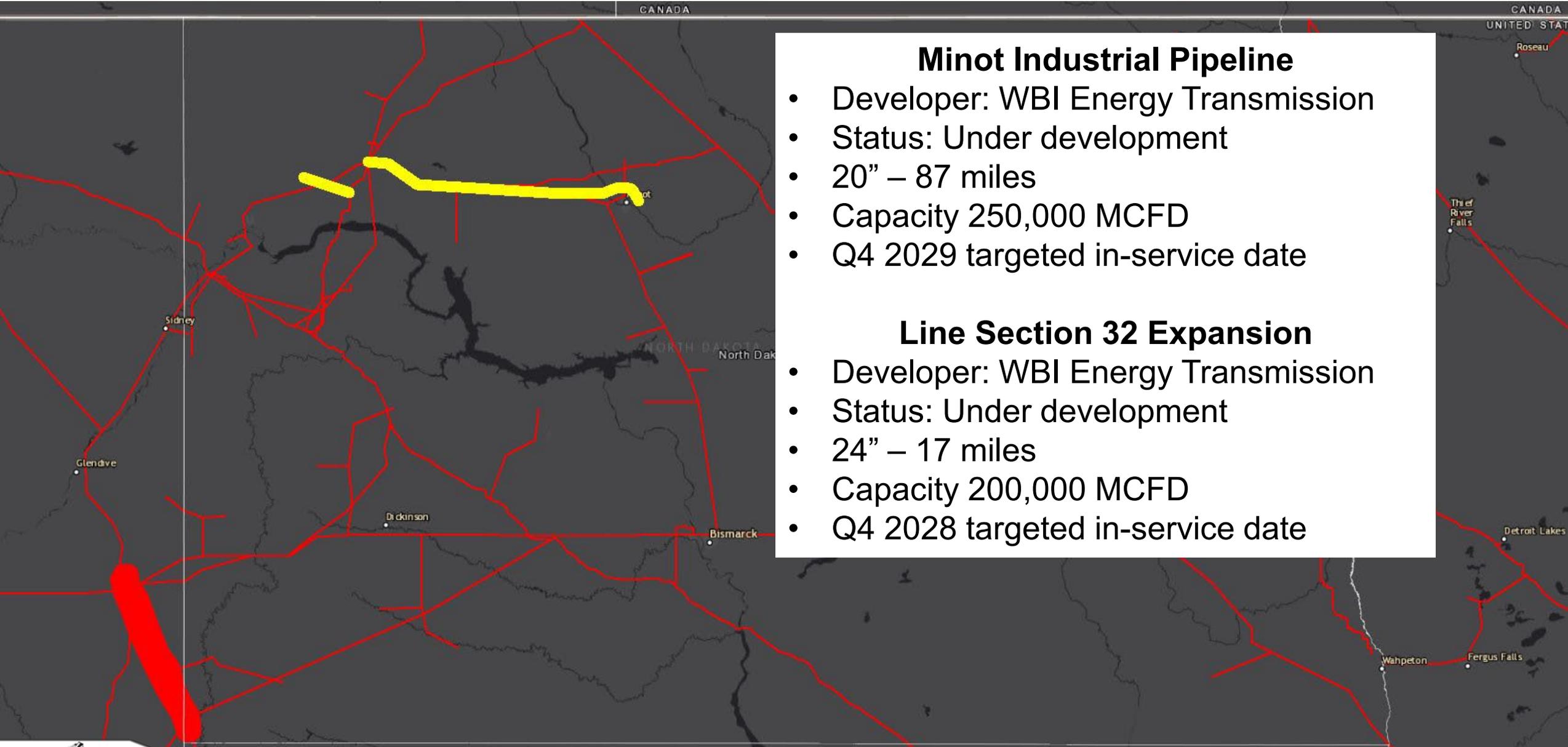
- Reduce E&P Activity to Meet Limited Gas Options



Beyond 2026: Gas Transmission Projects



Beyond 2026: Gas Transmission Projects



Minot Industrial Pipeline

- Developer: WBI Energy Transmission
- Status: Under development
- 20” – 87 miles
- Capacity 250,000 MCFD
- Q4 2029 targeted in-service date

Line Section 32 Expansion

- Developer: WBI Energy Transmission
- Status: Under development
- 24” – 17 miles
- Capacity 200,000 MCFD
- Q4 2028 targeted in-service date



WBI Energy: Proposed Bakken East Project

Natural Gas Pipeline Project Highlights

- Non-binding open season Dec 16 – Jan 31, 2025
- 455 Miles: 36", 30", & 20" Pipe
- Proposed Capacity (East) 1,000,000 Dth/Day
- Phase 1 (West) : Nov 2029 targeted in-service
- Phase 2 (East) : Nov 2030 targeted in-service
- Seeking commitments 20yrs or Longer

Estimated Rates

- \$0.85 to \$0.90/Dth + Fuel/Electric/Commodity
- Anchor Shipper Minimum: 100,000 Dth/Day
- Foundation Shipper Minimum: 250,000 Dth/Day





Bakken East – Preliminary Work

- 98% permission to survey received for 350 mile mainline
- 95% permission to survey received for Spiritwood Lateral
- 53% permission to survey received for Ellendale Lateral

- 285 miles of wetland and general habitat surveys completed
- 220 miles of cultural surveys and staging yards completed
- 290 miles of special status species surveys completed
- 258 miles of civil surveys completed

Bakken East Major Milestone Schedule



Intensity Infrastructure Partners Proposed Pipeline



Phase 1 Project Highlights

- Non-binding open season Feb 3 – Mar 7, 2025
- 136 Miles: 36" Pipe
- Proposed Capacity 1,100,000 Dth/Day
- July 2029 targeted in-service
- Seeking commitments 10yrs or Longer

Phase 1 Estimated Rates

- Sub- $\$0.40/\text{Dth}$ + Fuel/Electric/Commodity
- Anchor Shipper Minimum: 100,000 Dth/Day
- Foundation Shipper Minimum: 250,000 Dth/Day

Phase 2 Project Highlights

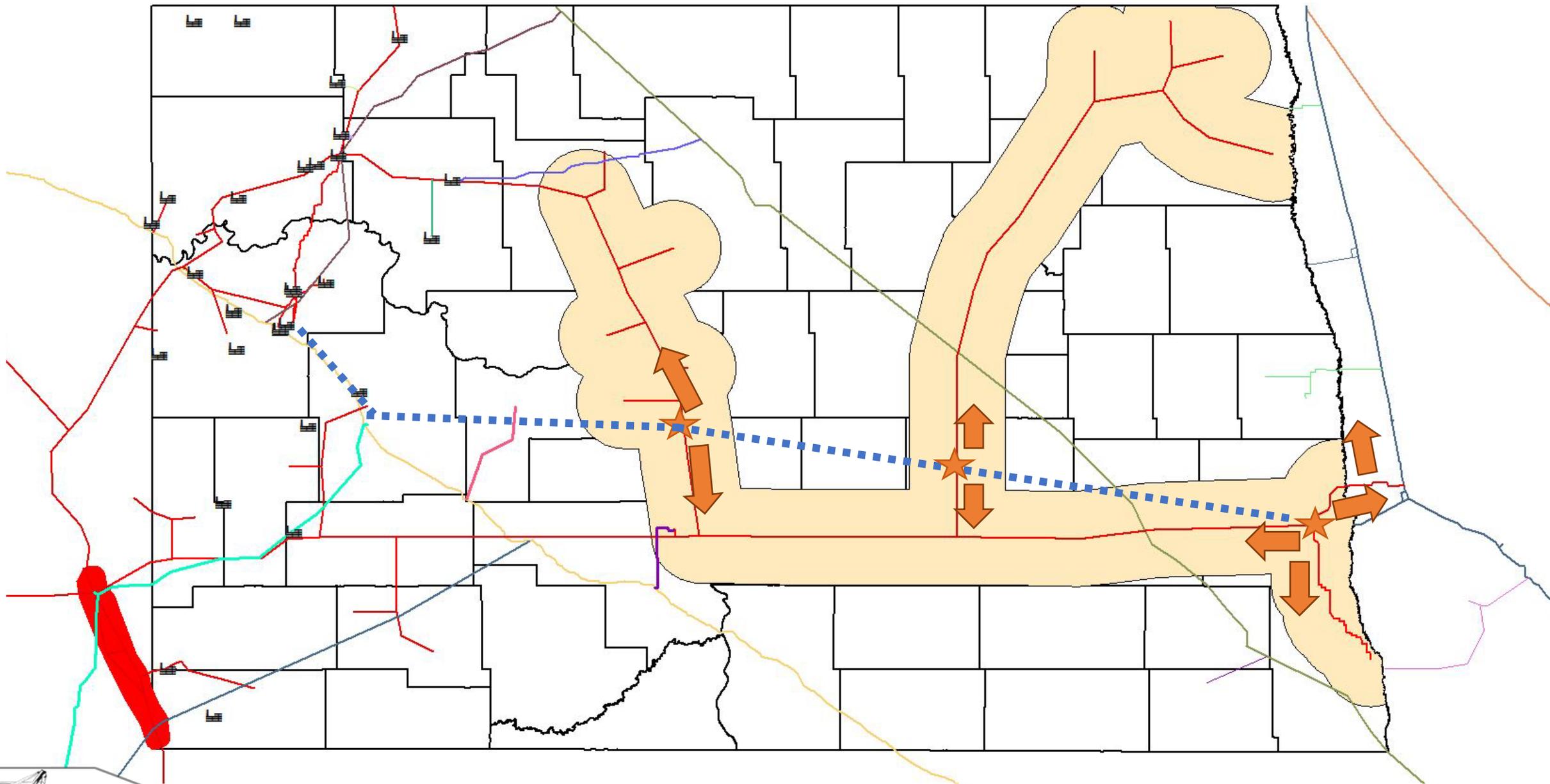
- Non-binding open season Apr 17 – May 23, 2025
- 208 Miles: 30" Pipe
- Proposed Capacity 430,000 Dth/Day
- January 2030 targeted in-service
- Seeking commitments 10yrs or Longer

Phase 2 Estimated Rates

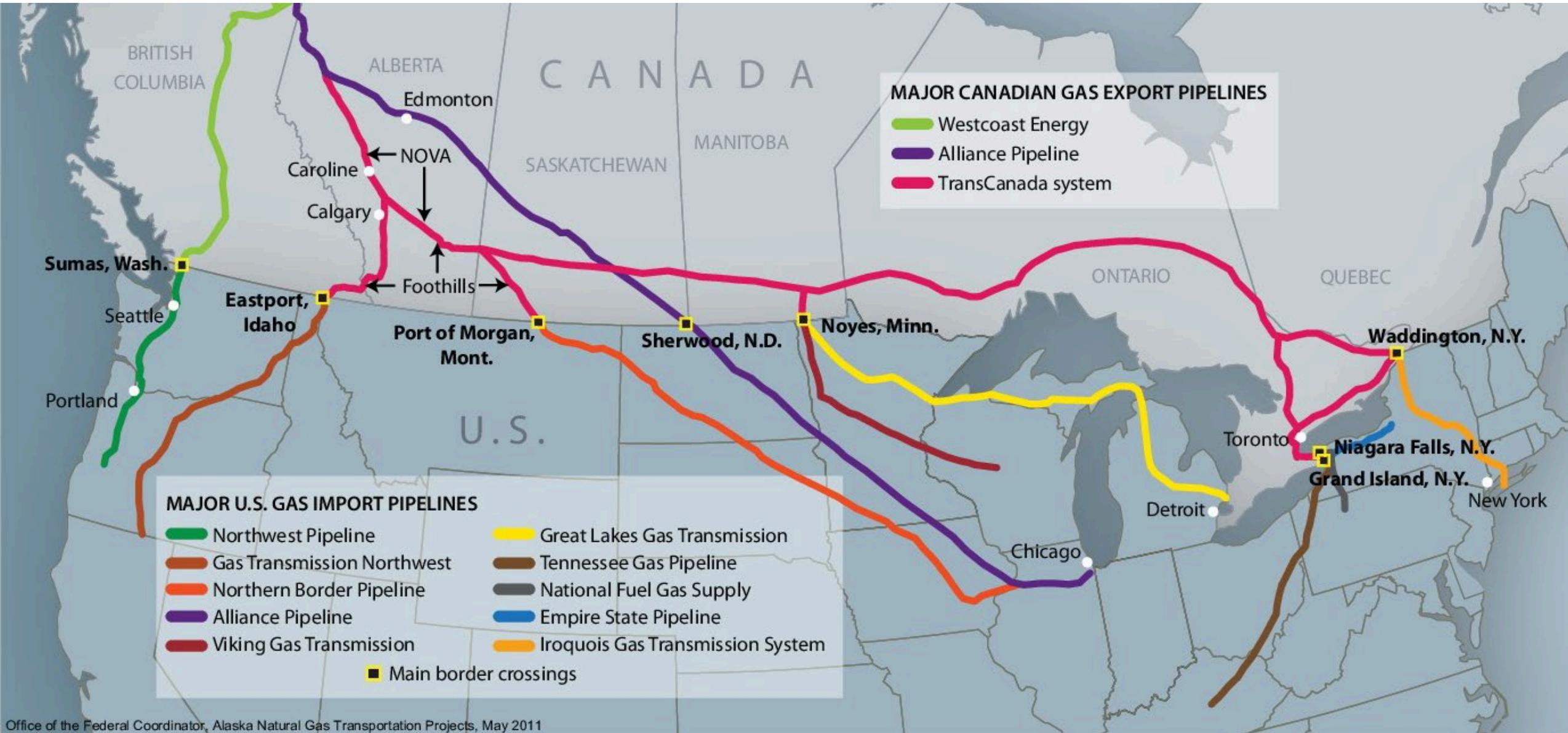
- $\$0.80/\text{Dth}$ + Fuel/Electric/Commodity
- Anchor Shipper Minimum: 100,000 Dth/Day
- Foundation Shipper Minimum: 250,000 Dth/Day



Going East: Statewide Benefits of Interconnections



Canadian Gas Pipeline Connectivity



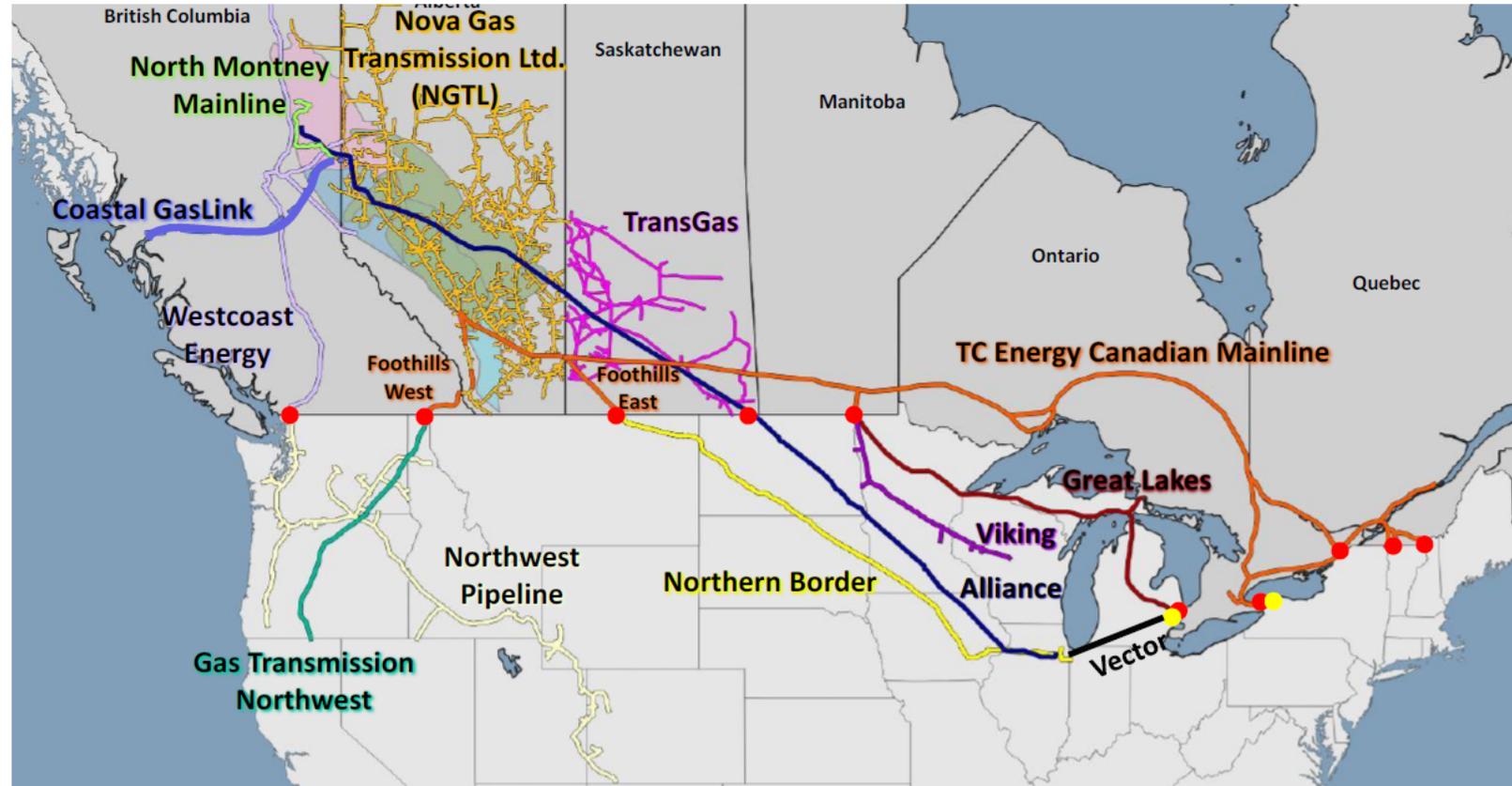
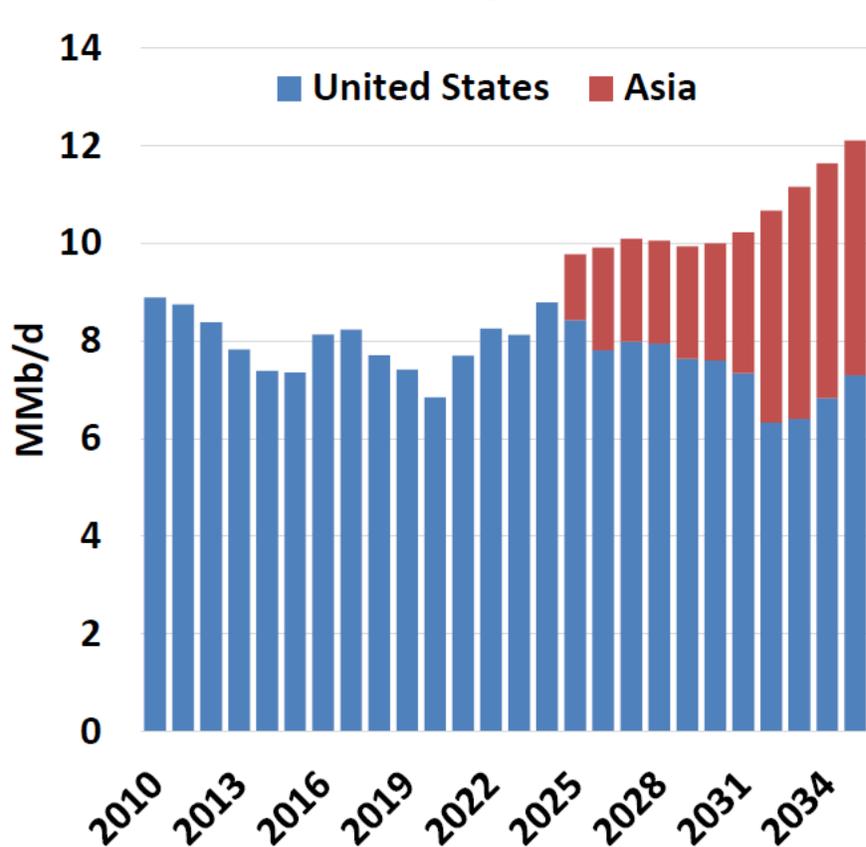
Office of the Federal Coordinator, Alaska Natural Gas Transportation Projects, May 2011



Natural Gas Exports and Export Options

- Gas production growth is insufficient to meet a combination of LNG export needs, Alberta demand growth and sustaining pipeline exports.

NG Exports by Destination

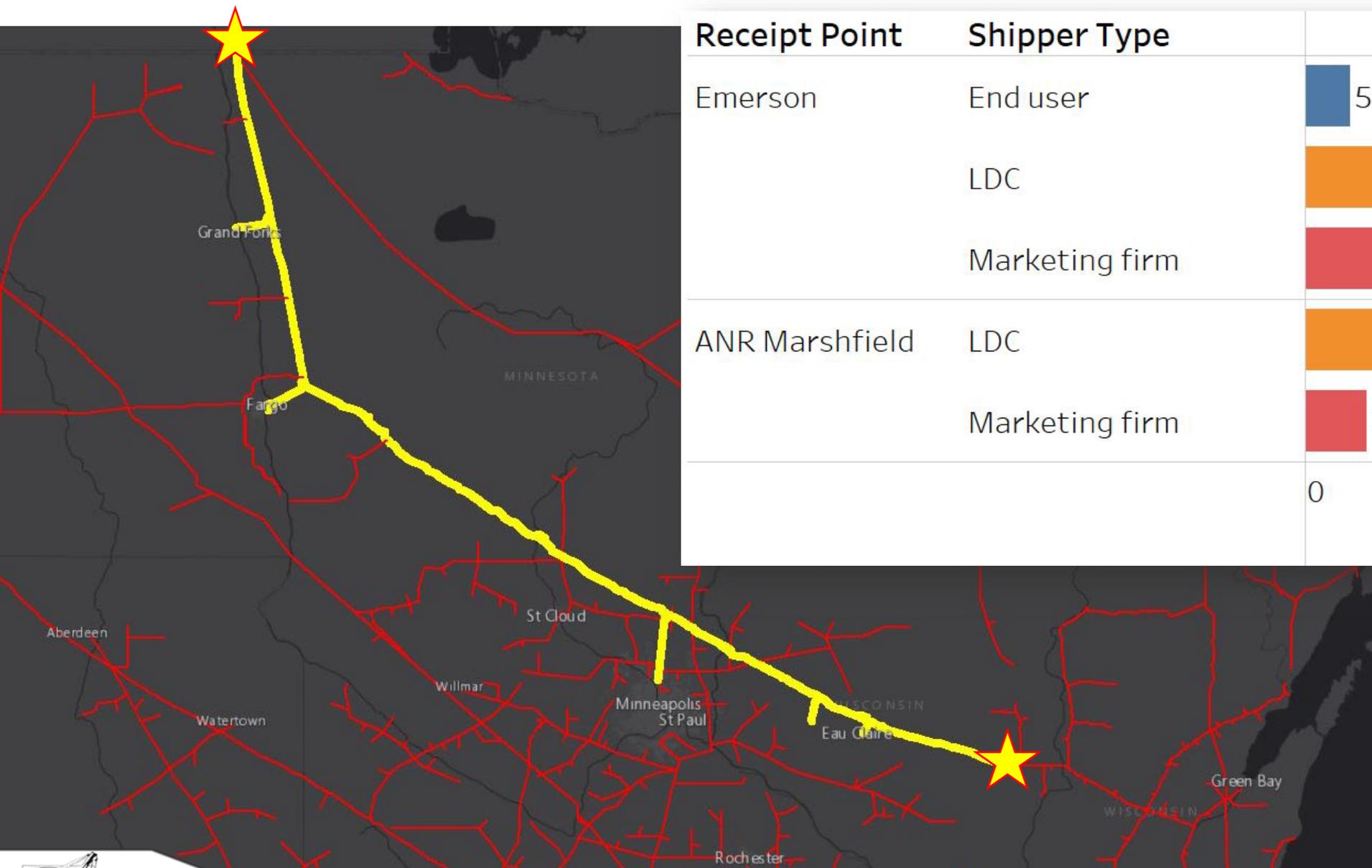


- Potential end result is a reduction in gas pipeline exports to the U.S. as LNG and Alberta demand will take precedence.

Eastern North Dakota Interstate Pipeline Interconnection Options



Viking Pipeline Shipper Mix: 2025



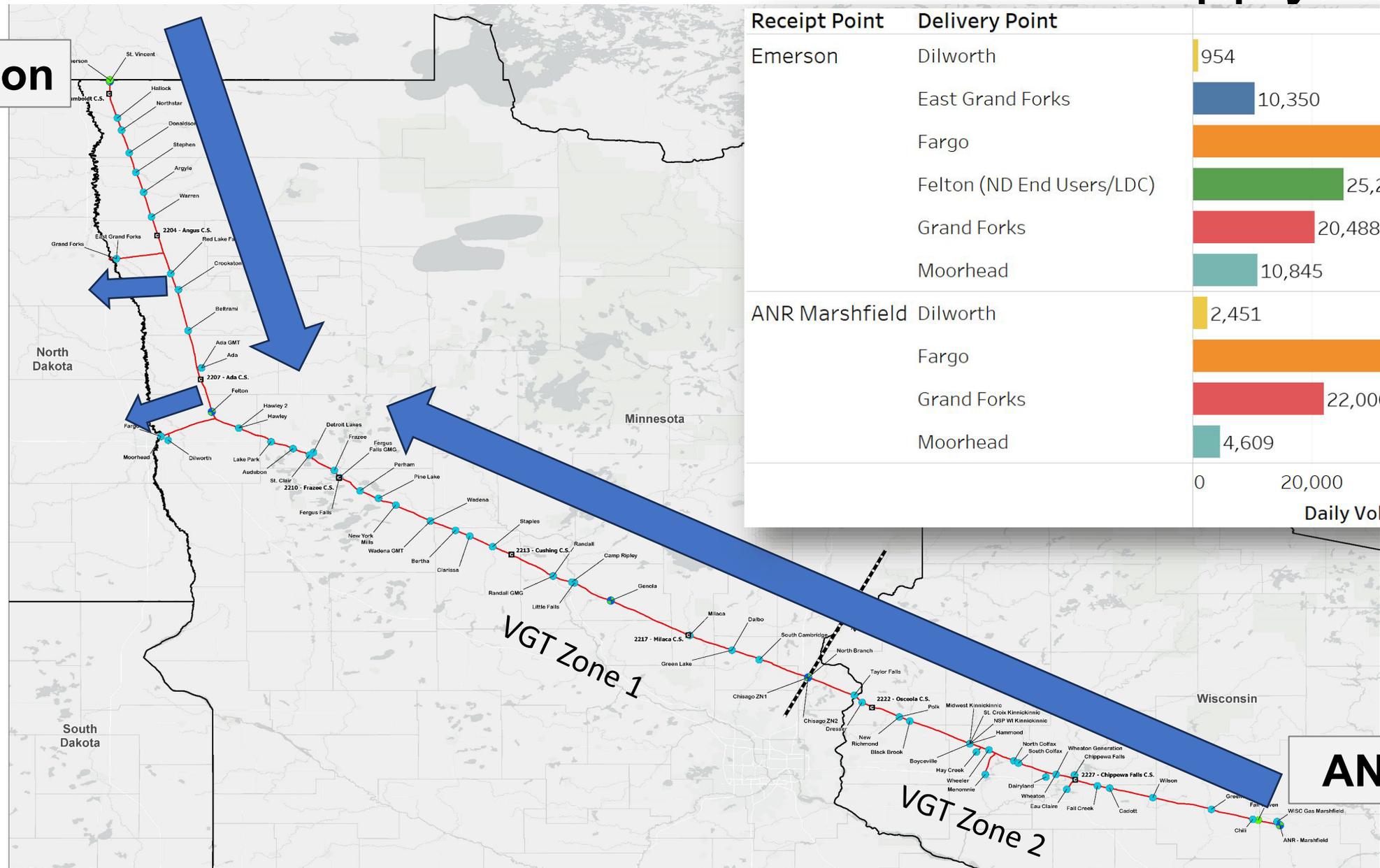
| Receipt Point | Shipper Type | Daily Volume, Dth |
|----------------|----------------|-------------------|
| Emerson | End user | 55,235 |
| | LDC | 388,257 |
| | Marketing firm | 132,148 |
| ANR Marshfield | LDC | 125,713 |
| | Marketing firm | 76,000 |
| | | 0 200,000 400,000 |

Daily Volume, Dth



Current Eastern North Dakota Gas Supply

Emerson

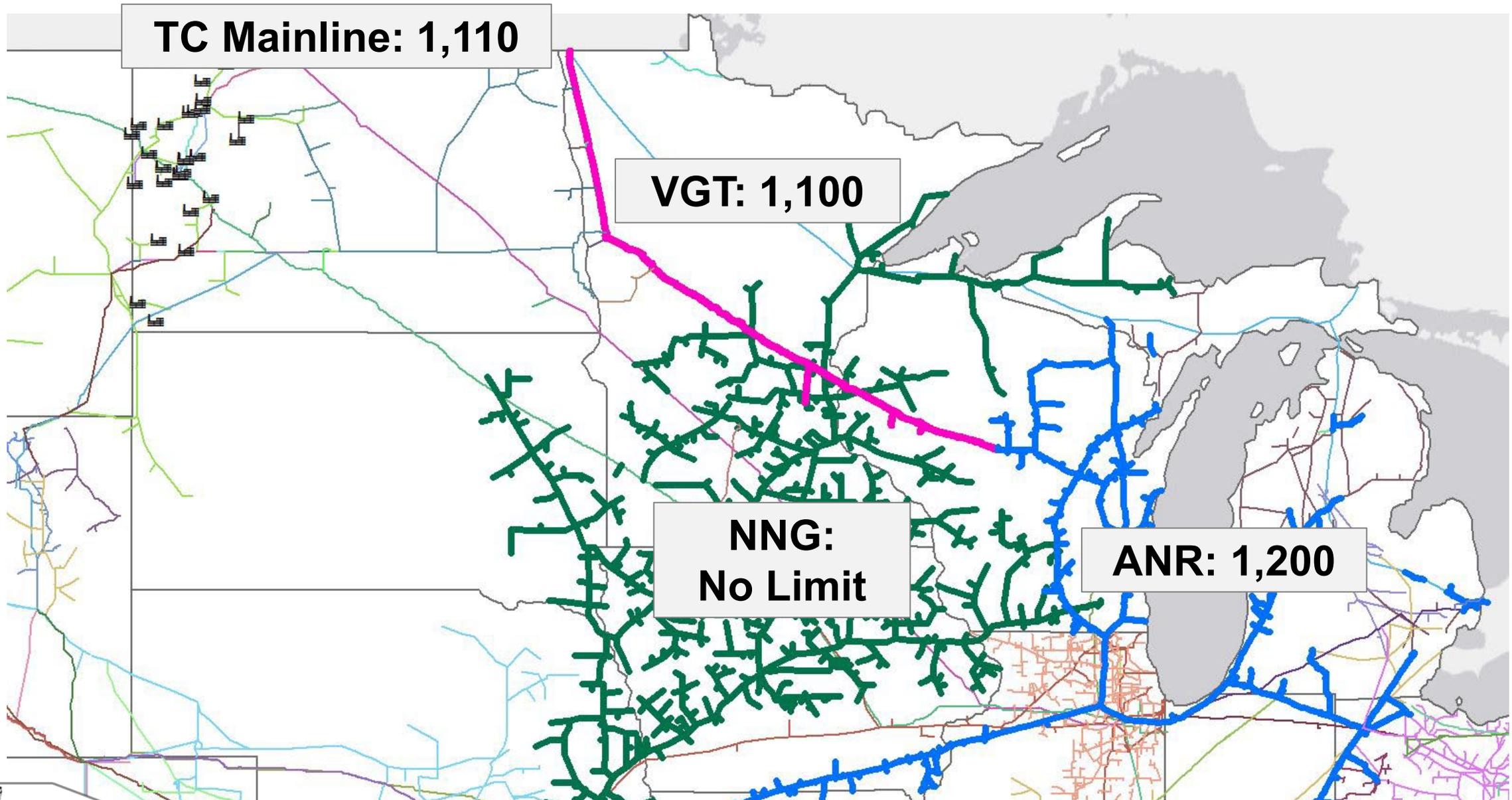


| Receipt Point | Delivery Point | Daily Volume, Dth |
|----------------|---------------------------|-------------------|
| Emerson | Dilworth | 954 |
| | East Grand Forks | 10,350 |
| | Fargo | 44,568 |
| | Felton (ND End Users/LDC) | 25,250 |
| | Grand Forks | 20,488 |
| ANR Marshfield | Moorhead | 10,845 |
| | Dilworth | 2,451 |
| | Fargo | 50,118 |
| | Grand Forks | 22,000 |
| | Moorhead | 4,609 |

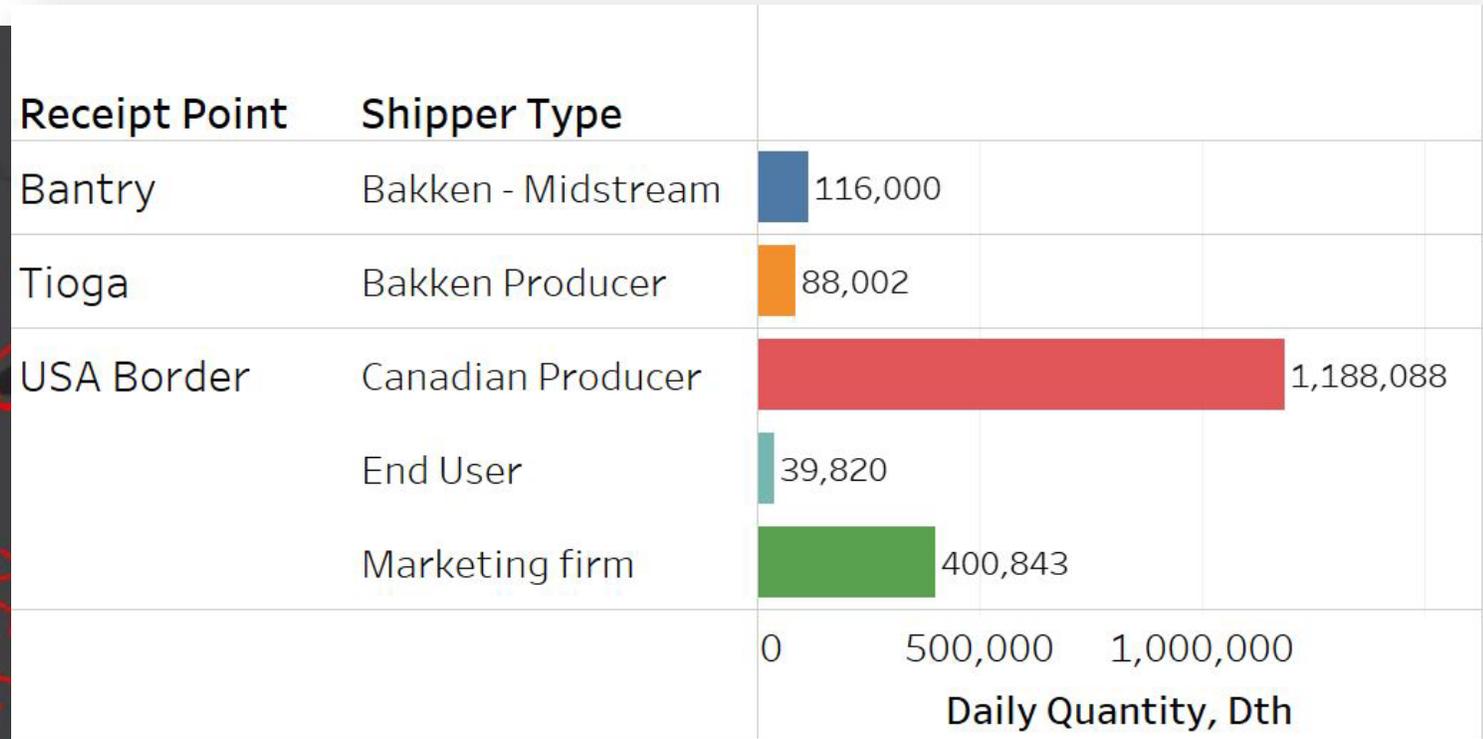
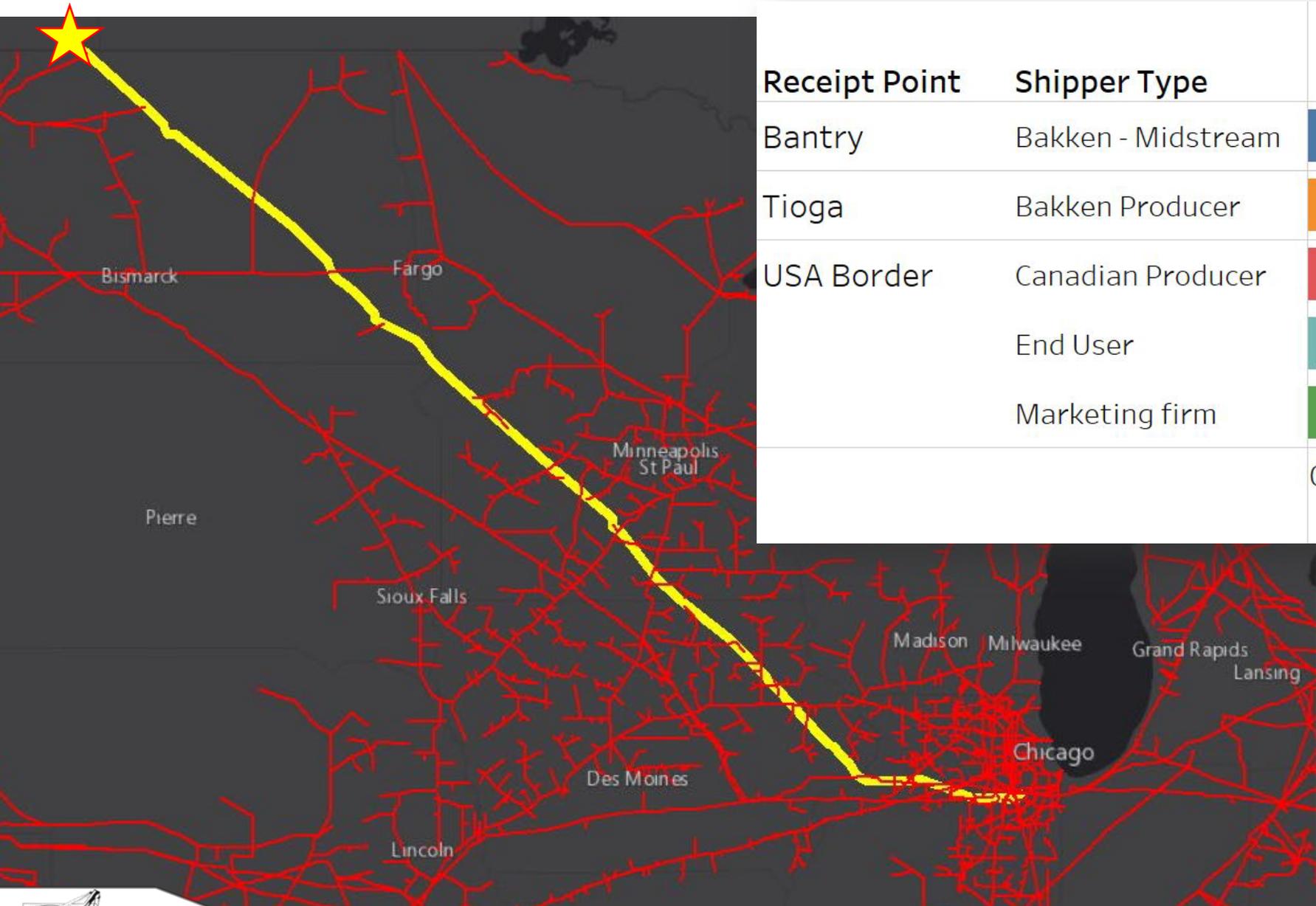
ANR



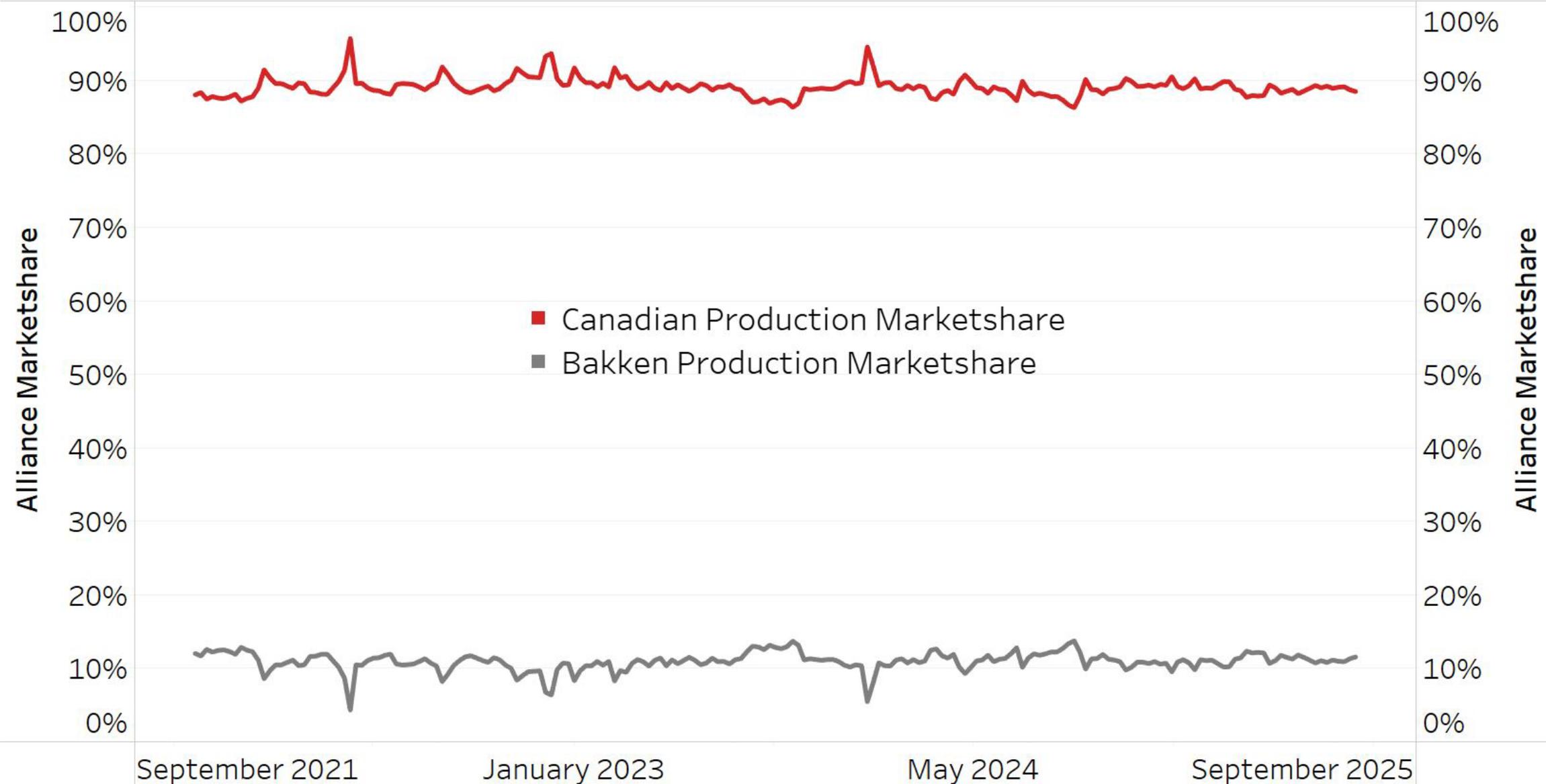
The Need to Modernize Viking's BTU Limit



Alliance Pipeline US Shipper Mix: 2025



Alliance Pipeline Market Share: ~1.6 BCFD Capacity



Signing Up For Pipeline Capacity

Shippers Types



Producers/Midstream



Marketing Firms



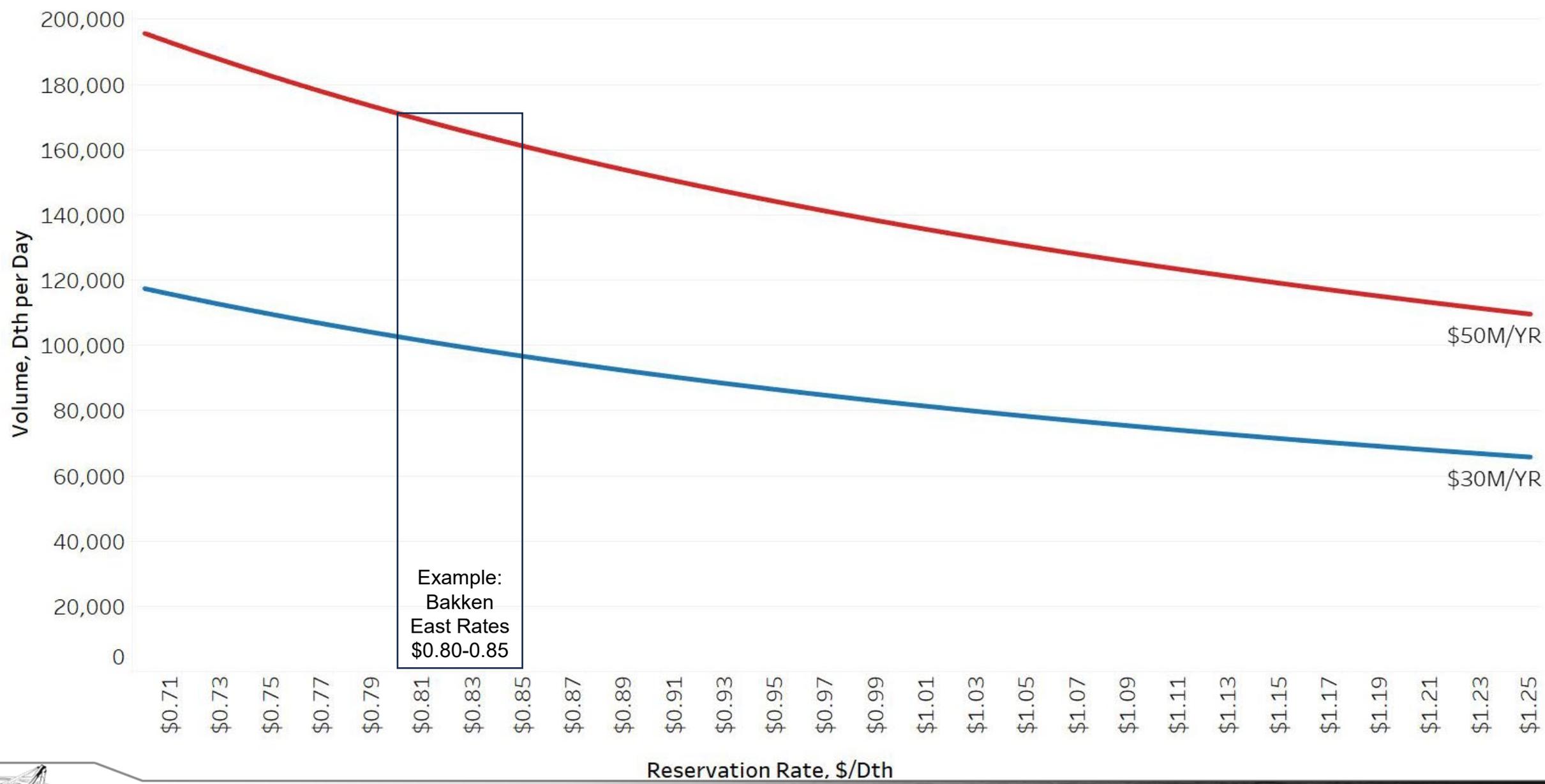
Industrial Consumers/LDC



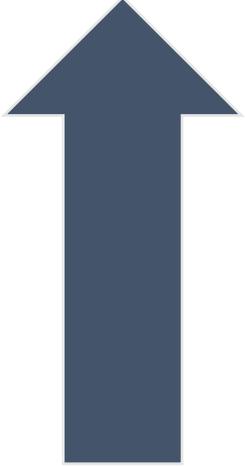
State of North Dakota (PA/IC)



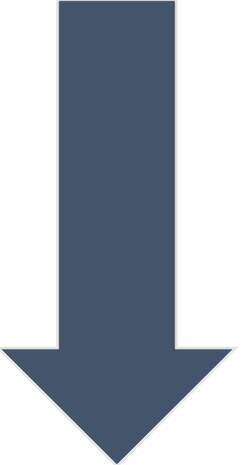
Capacity and Reservation Rate



How Will NDPA Manage Contracted Capacity?



Most
Desirable



Least
Desirable

Release capacity to replacement shipper(s)
in increments greater than one year at
FERC required rate structure

Release capacity to replacement shipper(s)
in increments less than one year at bid
rates (*Limited by 54-17.7-04 Subsection 3*)

Release of capacity to an asset manager for
an appropriate term length

Pay obligated precedent agreement rates
until a release or asset management
agreement is established



Contact Information

Justin J. Kringstad, Director
North Dakota Pipeline Authority

600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

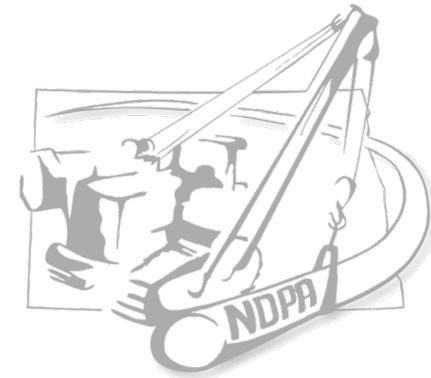
Phone: (701)220-6227
E-mail: jjkringstad@ndpipelines.com



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Call before you dig.**

Website:

www.northdakotapipelines.com



Tech. Review
Avg. Score (of
315)

| Project # | Project Title | Applicant | Project Description | Grant Request | Loan Request | Project Total | |
|-----------|--|--|---|---------------|--------------|---------------|-------|
| C-06-A | Hybrid Service Rig | Foremost Well Service | Hybrid-electric retrofit of Kremco 600 rig. Demonstrate 24/7 operation with major reductions in diesel consumption, emissions, and fuel costs. Establish a replicable retrofit model. | \$1,500,000 | \$0 | \$3,000,000 | 213 |
| C-06-B | Lithium for Clean Energy Delivery: Demonstration from Produced Water | Sustainable Projects Group Inc. - SPGX | Lithium extraction from oil & gas produced water. Construction of a demonstration facility. 408-ton lithium carbonate equivalent (LCE)/year facility. | \$9,523,919 | \$0 | \$19,047,839 | 271.5 |
| C-06-C | Packet Digital - ND Lithium-Ion Battery Manufacturing Plant | Packet Digital, LLC | Continue now-under-way construction of 80,000 sq ft lithium-ion battery cell manufacturing and research facility in Fargo. Will produce high-power and high-energy-density pouch cells for defense and aerospace systems. | \$2,297,376 | \$18,842,659 | \$100,827,845 | 303 |
| C-06-D | The Forge Project | AmeriCarbon Forge, LLC | Construction of first US commercial-scale facility near Underwood producing Eco-Pitch, a coal-tar-pitch from ND lignite, along with carbon byproducts. 15k tons of Eco-Pitch & 15k tons carbon byproducts annually. | \$0 | \$40,000,000 | \$100,000,000 | 268.5 |

| | | | | | | | |
|-------------------|---|--------------------------------|--|--------------|--------------|-----------------|-------|
| C-06-E | The Forge Project: Rare Earths and Critical Materials Integration | Ore Spring Materials, LLC | Integrate Eco-Pitch carbon manufacturing with REE and CM recovery technologies. Establish a scalable, co-located platform at Forge site near Underwood. | \$2,250,000 | \$0 | \$4,500,000 | 252 |
| C-06-F | Northern Plains Nitrogen (nitrogen based fertilizer plant) | Northern Plains Nitrogen, Inc. | Construct nitrogen-based fertilizer plant west of Grand Forks which would produce up to 1.1 million short tons of urea and 65,000 short tons anhydrous ammonia. Use Bakken natural gas as feedstock via Viking pipeline. | \$20,000,000 | \$0 | \$2,200,000,000 | 241 |
| C-06-G | Deployment of Carbon Dioxide Capture, Transport, and Storage for Dakota Spirit AgEnergy | Harvestone Low Carbon Partners | Capture and liquify CO2 emissions from Dakota Spirit AgEnergy ethanol facility, transport to Blue Flint Sequester facility in Underwood, and permanently sequester in Class VI storage well. 250,000 metric tons/year. | \$0 | \$20,000,000 | \$94,513,473 | 283.5 |
| C-06-H | AirPlant Two: Flagship Synthetic Aviation Fuel Facility | Twelve Benefit Corporation | Co-locate synthetic aviation fuel plant near industrial CO2 source in eastern ND, utilizing waste CO2 to produce fuels and chemicals. | \$10,000,000 | \$0 | \$152,000,000 | 216 |
| Totals | | | | \$45,571,295 | \$78,842,659 | \$2,673,889,157 | |
| Available Funding | | | | \$3,923,000 | \$50,000,000 | | |

CSEA Grant Round 6 Technical Review Summary

C-06-A Hybrid Service Rig, Foremost Well Service

Grant Request: \$1,500,000

Loan Request: \$0

Total Project Costs: \$3,000,000

Average Technical Review Score: **213/315 (Fair)**

Selected Technical Reviewer Comments:

This project will have limited short term impact on the ND economy, but has a lot of potential long term impact.

The source and in-kind contribution of the Kremco 600 rig is not provided.

The manufacturing facility and jobs are not in North Dakota, but are in Red Deer, Alberta.

The project budget is realistic but relies 100% on CSEA related funding. The source of the Kremco 600 rig as in-kind contribution needs to be included.

The application contemplates a “hybrid” rig but does not incorporate fuel consumption or emissions from the charging of the batteries. Similar electric converted equipment for oilfield services does improve emissions but does not completely eliminate all fuel usage as there is a power generation requirement that should be considered in a complete package.

The proposal does not adequately address the power source for the batteries to run the rig. This makes the environmental impact tough to determine. There is mention of an auxiliary generator, and power recovery from regenerative braking, but no insight into what fuel would be consumed or power recovered to determine overall benefit.

As presented in the application, the strategic partnerships look to be great.

As a reviewer I would recommend that the project is technically sound. Other oilfield service equipment has successfully benefited from electrification, but often times the real-world emissions benefit is slightly less than planned. That said, the safety and economic benefits are typically more than planned with the added intelligence that comes with electrification.

C-06-B Lithium for Clean Energy Delivery: Demonstration from Produced Water, Sustainable Projects Group, Inc.

Grant Request: \$9,523,919

Loan Request: \$0

Total Project Costs: \$19,047,839

Average Technical Review Score: **271.5/315 (Good)**

Selected Technical Reviewer Comments:

A detailed listing of major equipment was not provided with the application (pumps, piping, motor control centers, etc), although the budget was very specific in dollars needed. A further breakdown of the major equipment and costs would have added to the grant application's rating.

There should have been more detail in the main categories listed on the milestone chart. There is one project associated expense labeled project owner cost which is \$425,000 each (\$850,000). There is not any explanation of what is included in this. Also, contingency for this project is just over \$3 million. On small projects a contingency of 17% is usually required. On a large project like this, if all the components and equipment have been investigated, a \$1 million contingency should be sufficient.

The project is partnering with an existing well pad in McKenzie County which will expedite the ability to construct the lithium extraction pilot project. The company officers seem to have good experience in initiating new projects. The availability of the local construction workforce could impact the schedule unless early construction bids are let before the main construction season (May – November) for the outside work.

Considering this is a pilot project proposal, I think this SPGX proposal is a good one. From the contract proposal, it states that all the technologies are proven and they have already lined up an existing well site to construct this well site. Matching funds are high, and budget breakdown is minimal. But this is a pilot project, which if successful, could be a good addition to the strategic and financial security of North Dakota and the US. I recommend going forward with funding this grant.

This project appears to be technically sound, and the personnel cited in this proposal appear to be well experienced in the processes outlined. I only have 2 issues that I would like to have further clarification on. First is the contingency. The cited dollar amount of the contingency needs to have discussion. \$3 million of a project that is \$19 million indicates a great amount of error in the estimation. Also, it does not seem to be proper to have the

state of North Dakota responsible for the requestor's mistakes in forecasting. Second is the requestor wanting a grant to have North Dakota pay for half of their project. The two existing sites in North Dakota had an economic payback period of less than 2 years. Now, if the requestor is short on capital to do this entire project, then the requestor should request a loan from the CSEA with an agreed to payback schedule.

C-06-C ND Lithium-ion Battery Manufacturing Plant, Packet Digital, LLC

Grant Request: \$2,297,376

Loan Request: \$18,842,659

Total Project Costs: \$100,827,845

Average Technical Review Score: **303/315 (Good)**

Selected Technical Reviewer Comments:

It is clear that the project team knows what is needed for the technology, equipment, and material for the manufacture of their lithium-ion battery cell production facility. Per the proposal, the majority of the equipment is already ordered. Less certain is the supply chain for the raw material of lithium which is targeting the use of lithium carbonate from North Dakota oil field brine. While pilot projects are proposed and the technology to recover this lithium is known, full scale lithium carbonate production facilities still need to be built. This project should help stimulate the creation of those lithium carbonate production projects.

This project is of strategic importance to the US, as it will strengthen the domestic supply chain for high-energy lithium-ion batteries. The project will also support the continued leadership of North Dakota's UAS industry and will benefit the State's oil and gas and lignite industries, who will be supplying much of the feed stock for the production facility. The proposal's budget and timetable are achievable, and the management team looks solid. In order for this project to succeed, it will need to be developed hand-in-hand with those local industries (oil and gas, lignite, Talon, etc.) that will need to build facilities that will produce the feedstock needed for this lithium-ion battery production plant. I recommend that this project be approved.

The largest flaw is the lack of clarity of how the request funding is to be utilized within this project. The cited categories listed in the provided table are very generic. The other thing overlooked was not citing the frequency of progress reports to the North Dakota Industrial

Commission Clean Sustainable Energy Authority. So, once the detailed progress report frequency is agreed to and the specifications of how the \$2.3M grant and the \$18.8M loan were going to be spent, I would strongly recommend funding this project as it is solid science and essential to our national security.

The project is already under construction and is forecast to start small-scale production by the end of 2026. Should the pilot production prove successful, full-scale production is expected to begin in 2030. This project would further grow the leading role North Dakota has in the UAS industry and would benefit the oil and gas industry and lignite industry and grow a high tech workforce. This project is also a national strategic imperative to grow the domestic lithium-battery industry versus relying on overseas sources like China.

C-06-D The Forge Project, AmeriCarbon Forge, LLC

Grant Request: \$0

Loan Request: \$40,000,000

Total Project Costs: \$100,000,000

Average Technical Review Score: **268.5/315 (Good)**

Selected Technical Reviewer Comments:

The Forge project presents clearly articulated objectives that are well aligned with the Clean Sustainable Energy Authority's goals, primarily via diversification within the broader lignite industry (sustainable energy) and a >90% emissions reduction (clean) compared to conventional coal tar pitch production. Co-production of rare earth elements or other critical minerals, if successful, would further align the project as these commodities are essential components in many clean energy technologies.

The project as proposed would immediately produce 250–300 construction jobs and flows of \$25-\$30 million annually during startup. Once in service, 50 full-time operating positions and sales of approximately 30,000 tons of pitch and carbon by-products annually would be significant additions to North Dakota's economy.

The construction and operation of a functional pilot-scale coal liquefaction pitch production unit in West Virginia supports AmeriCarbon's expertise in the materials and equipment required for a successful scale-up in North Dakota in concert with the Worley Group.

The project would utilize novel technologies to create an entirely new sub-industry in the state utilizing traditional energy resources (lignite) to create products which, although non-energy (coal tar pitch and carbon by-products), would serve to diversify and strengthen the overall lignite energy ecosystem.

A three-page section of the proposal describes managerial approach and oversight, breaks-down responsibilities, and lists evaluation points (stage-gates & milestones). It would be nice to see the evaluation points identified more clearly on the timeline.

The project management plan is clearly structured and well defined. Budgeting projections are as reasonable as can be expected, while strong partner connections and a coherent milestone chart supports effective project execution.

I found the proposal to be well written and comprehensive. Previous research & pilot-testing at the demonstration facility in Morgantown, WV has validated technical

feasibility, is providing data to inform the scale-up process, and has allowed technical challenges to be identified and addressed. A key engineering partner has offices in Bismarck and near the demonstration facility in West Virginia.

Another result of the proposal could be the development of a repeatable commercial design model to be used at other sites.

The proposal was well-constructed, and the project looks to be technically sound, leveraging technology proven at the pilot scale and large, diverse market for potential lignite-derived products. The final product mix/identified buyers were somewhat ambiguous, but the adaptability of the process to make a variety of end products would surely be an asset in a swiftly changing marketplace.

AmeriCarbon and its partners seem to have the technical expertise in place to continue to scale its process into a commercial-scale facility, thus I would recommend funding the project.

C-06-E The Forge Project: Rare Earths and Critical Materials Integration, Ore Spring Materials, LLC

Grant Request: \$2,250,000

Loan Request: \$0

Total Project Costs: \$4,500,000

Average Technical Review Score: **252/315 (Good)**

Selected Technical Reviewer Comments:

The technologies have the potential to provide additional opportunities for North Dakota lignite, and the project should help optimize integration into an existing mine and power plant.

The necessary demonstration systems are available for the project and have all been proven in prior work.

The Ge/Ga & REE value proposition needs to be quantified to confirm the economic boost to the Americarbon process. Pending a successful project there should be great economic development potential.

Should the technical assessments performed during this project produce data favorable for commercialization, the technologies deployed would represent a world first in recovery of several critical mineral commodities from coal or coal by-products. This would potentially improve clarity on the economics for recovery of these commodities in other lignite feedstocks around the state.

It is very likely the project will achieve its tasks as listed, which are technical studies and assessments to evaluate the viability of REE-CM co-production with lignite pitch, assuming the timely construction of the commercial lignite pitch plant itself.

In addition to the robust partnerships aligned in support of the pitch manufacturing facility, Ore Spring Materials/AmeriCarbon's partnership with the UND College of Engineering and Mines and Microbeam Technologies include the country's foremost experts in REE/CM extraction from lignite.

The project appears technically sound in large part based on the extensive experience of each participant. It proposes a relatively complex integration of coal tar pitch manufacturing and REE-CM extraction with no guarantee of realized REE-CM production, but it does aim to provide much-needed data on the economic feasibility of REE-CM extraction from lignite at scale.

The successful demonstration of REE and CM recovery integration with AmeriCarbon's Eco-Pitch carbon manufacturing process is unlikely to amount to significant economic impacts for ND in the immediate term. There is potential for more significant scaling in the medium term alongside REE/CM-extraction facilities or additional coal tar pitch facilities, and this project could in turn produce the additional data to support the economic feasibility of such facilities.

Successful REE-CM co-production alongside another viable economic product (tar pitch) is a potential gateway to standalone REE-CM production from other feedstocks in the state, and thus I recommend funding the proposal as a significant step toward commercialization for lignite-hosted rare earth elements and other critical minerals in North Dakota.

Good proposal targeting new value opportunities for utilizing North Dakota Lignite. The Americarbon technology has shown promise in previous projects and this work should move it toward commercialization while evaluating the potential for integration with REE recovery. This reviewer would recommend the presentation briefly include:

- A discussion on the potential amount/product value vs. cost for including the REE & Ge/Ga recovery from the ash resulting from the carbon manufacturing process.

- A discussion on the likelihood of commercial application pending a successful project.

C-06-F Nitrogen-based Fertilizer Plant, Northern Plains Nitrogen, Inc.

Grant Request: \$20,000,000

Loan Request: \$0

Total Project Costs: \$2,200,000,000

Average Technical Review Score: **241/315 (Good)**

Selected Technical Reviewer Comments:

The applicant did not follow the instructions “*and an explanation of which of these costs will be supported by the financial assistance and in what amount*”. Just \$5 million for start-up costs and \$15 million for long lead time items. The cited budget only covered \$65 million of a \$2.2 billion project. The final investment decision (FID) is not conducted until the 4th quarter of 2026, after the FEED study is completed.

The overall project is going to be extremely valuable to the local area and the entire state of North Dakota. However, I do not believe that it qualifies for the \$20 million grant from the Clean Sustainable Energy Authority as there is no new science involved in this project. Consequently, I would not be in favor of funding this request.

The technical processes being used in the proposed urea and ammonia production facility are proven and being cojoined to produce a facility with the latest emissions controls that are expected to result in the NPN facility being the most efficient fertilizer plant of its size in North America (i.e. the emissions per ton of product will be the lowest). In addition, there will be a significantly lower carbon footprint of the NPN fertilizer since the local farmers will not have to transport fertilizer from the remote domestic and overseas fertilizer production facilities.

This detailed proposal for obtaining North Dakota grant funds is money that is well-spent if the FEED study over 2025 and 2026 results in moving forward with the proposed \$2.2 billion urea and ammonia fertilizer production facility near Grand Forks. Such a facility would have significant financial benefit to the North Dakota agriculture sector by having much lower cost nitrogen-based fertilizer, as well as to the North Dakota oil and gas sector if Bakken natural gas is used in the facility.

C-06-G Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for Dakota Spirit AgEnergy, Harvestone Low Carbon Partners

Grant Request: \$0

Loan Request: \$20,000,000

Total Project Costs: \$94,513,473

Average Technical Review Score: **283.5/315 (Good)**

Selected Technical Reviewer Comments:

I believe this proposal is technically sound.

This project proposal demonstrates a fully developed project plan and budget with most contractors already selected.

This project will demonstrate commercial scale medium distance carbon dioxide transportation. This technology will be important for many renewable fuel facilities as well as the first phase of conventional EOR and second phase of unconventional EOR.

The project demonstrates a likely positive impact on the state's economy by securing the long-term viability of the ethanol facility, creating ~25 new trucking jobs, and protecting corn demand for local producers. However, the proposal focuses heavily on economic benefits and the *gross* volume of CO₂ sequestered (250,000 tons). It notably fails to address or calculate the emissions generated by the diesel truck transport required to move this CO₂. Without an analysis of the transport emissions, the *net* environmental impact—a core metric for CSEA—is not fully quantified.

The proposed project is technically sound and presents a high likelihood of success due to the applicant's proven track record and the utilization of an existing, permitted Class VI storage asset. The partnership with the EERC and the high level of private matching funds (approx. 80%) significantly de-risk the financial and regulatory aspects of the proposal. The "virtual pipeline" concept is innovative and could provide a vital blueprint for stranded ethanol assets across the state.

However, the proposal contains a notable gap in its impact analysis: it fails to calculate or deduct the emissions generated by the truck fleet required to transport the CO₂. While the gross sequestration volume (250,000 tons) is significant, the lack of a lifecycle analysis (LCA) for the transport phase obscures the true *net* environmental benefit. Despite this oversight, the project's strategic value to the state and its readiness for commercialization merit a strong recommendation for funding. The project economics are totally dependent

on federal tax policies that may encounter resistance at various administration levels resulting in project delays.

C-06-H AirPlant Two: Flagship Synthetic Aviation Fuel Facility, Twelve Benefit Corporation

Grant Request: \$10,000,000

Loan Request: \$0

Total Project Costs: \$152,000,000

Average Technical Review Score: **216/315 (Good)**

Selected Technical Reviewer Comments:

The proposal has very few technical details of the process. No heat/material balances, power needs, water needs, natural gas supply, and very little on the LCA to support claims of low-carbon intensity products. The methodology used in an LCA is very important to the outcome. Where was the box drawn around the process?

The proposers state many of the necessary agreements are in place, however more letters of support from these partners would have helped greatly to show the strength of the partnership and prove existence of the same.

The technology seems like it would meet the goals. However, not a lot of detail was provided on the technology and it is hard to assess the complete impact with out knowledge of power requirements, efficiently, emissions from the plant (there will be some), FT technology being used, plan for power when renewables are not online The process is interesting, however, thermodynamically challenged dragging CO2 back up the mountain. Many more details need to be shared as previously mentioned in my comments. Heat/material balances, independent LCA details, offtake agreements, a strategy for power when renewables are not available. How does this affect the LCA? What are the boundaries on the LCA?

This is a very sound project that should eventually be funded if possible. The problem is that Twelve Benefit Corporation (Twelve) is in the beginning states of plant design.

According to **CSEA – 2.03 Projects eligible for a CSEA loan** - Projects in any phase of a FEED study are not eligible for a loan. The \$80,000,000 loan was removed from the application leaving only the \$10,000,000 grant. Now, the North Dakota Industrial Commission Clean Sustainable Energy Authority Program Guidelines does not specifically address using grants for feed studies. However, Twelve has their own engineering department to conduct their feed studies. It's like paying Twelve for their own engineering staff to find a project that they can profit from. I believe this whole application should be discarded until Twelve has their internal feed studies completed. Note that the Timetable,

Budget, Business Plan, Budgeted Projection, Resumes, Historical Financial Statements or Loan/Loan Guarantee Applications pages were not included with this application.

I believe this is a company that needs to be scrutinized when they reapply for funding. The grant request for \$10 million should have been adequate for a FEED study given that they have already built one in Washington. I'm not sure how you can spend \$152 on a FEED study for something you already engineered once. I cannot support this proposal at this time.

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

| | |
|--------------------------|---|
| <input type="checkbox"/> | Application |
| <input type="checkbox"/> | Transmittal Letter |
| <input type="checkbox"/> | Tax Liability Statement |
| <input type="checkbox"/> | Letters of Support (If Applicable) |
| <input type="checkbox"/> | Confidentiality Request |
| <input type="checkbox"/> | Business Plan (Appendix) |
| <input type="checkbox"/> | Historical Financial Statements (3 years) (Appendix) |
| <input type="checkbox"/> | Budgeted Projections (Appendix) |
| <input type="checkbox"/> | Loan/Loan Guarantee Application (if Applicable, Appendix) |
| <input type="checkbox"/> | Other Appendices (If Applicable) |

When the package is completed, send an electronic version to sustainableenergy@nd.gov

For more information on the application process please visit:

<https://www.ndic.nd.gov/grant-programs/csea/clean-sustainable-energy-authority-applicant-information>

Questions can be addressed to the Industrial Commission at 701-328-3722.

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title: Hybrid service rig

Applicant: Foremost well service

Date of Application: 8/21/2025

Amount of Request
Grant: \$1,500,000

Total Amount of Proposed Project:
\$3,000,000

Duration of Project: 3 years

Point of Contact (POC): Brad Hartigan

POC Telephone: 320-293-6609

POC Email: Brad.Hartigan@Foremostwell.com

POC Address: 11104 30J st sw, Dickinson, ND
58601

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|--|--------------|
| Abstract | 1 |
| Project Description | 2-6 |
| Standards of Success | 7 |
| Background/Qualifications | 8-9 |
| Management | 10 |
| Timetable | 11 |
| Budget | 12-14 |
| Confidential Information | 15 |
| Patents/Rights to Technical Data | 16 |
| State Programs and Incentives | 16 |
| Loan/Loan Guarantee Application (if applicable) | |

ABSTRACT

CSEA Grant Request: \$1,500,000

Foremost Well Service LLC proposes to undertake the first hybrid-electric retrofit of a Kremco 600 rig in North Dakota. This project directly supports the mission of the Clean Sustainable Energy Authority under N.D.C. § 54-17-40 by advancing innovative technologies that reduce emissions, lower operational costs, and strengthen North Dakota's leadership in energy innovation.

The project will displace approximately 30,000 gallons of diesel fuel per rig per year, avoiding more than 340 metric tons of CO₂ emissions annually, based on EPA 2024 Emissions Factors. These reductions will result in fuel savings of approximately \$135,000 per rig per year, along with additional operational savings from lower oil consumption and reduced brake band replacements. In total, the hybridization is expected to save more than \$175,000 annually per rig while extending equipment life, reducing noise, and improving worker safety.

This retrofit demonstration will be executed by CARE Industries in partnership with Foremost Well Service LLC and deployed in continuous 24/7 oilfield operations in North Dakota. The project will create measurable local economic value through retrofit fabrication and workforce training, while establishing a scalable model that can be replicated across multiple rigs statewide.

By demonstrating technical, environmental, and economic success in the field, this project provides a pathway for widespread adoption of hybrid-electric retrofit technology in North Dakota's service rig industry, reinforcing North Dakota's position as a national leader in clean, sustainable energy innovation. The project is further strengthened by financing support from the Bank of North Dakota (BND), ensuring financial stability throughout implementation.

PROJECT DESCRIPTION

Objectives:

Retrofit one Kremco 600 trailered rig to a hybrid-electric configuration.

Demonstrate continuous 24/7 field operation with major reductions in diesel consumption, emissions, and fuel costs.

Establish a replicable retrofit model for multiple rigs, enabling industry-wide adoption in North Dakota

Methodology:

Engineering & Build Partner: CARE Industries will execute the retrofit, adapting commercially proven hybrid rig data to the Kremco 600 trailered platform.

System Integration: Install modular battery-electric drive system, traction inverters, HVDC panel, DC/DC converter, and charger module.

Hybrid Operation: Rig operates primarily on stored battery power with regenerative braking and block descent energy recovery; an on-board generator provides redundancy and extended runtime.

Monitoring & Diagnostics: Real-time monitoring of battery health, electrical systems, and performance metrics will support predictive maintenance and operational reporting.

Deployment: Upon commissioning, the rig will be deployed in North Dakota oilfield operations to validate fuel, emissions, and maintenance savings in real-world 24/7 conditions.

Facilities:

The retrofit project will utilize the fabrication and assembly facilities of CARE Industries Ltd. in Red Deer, Alberta. CARE operates modern fabrication shops with API 4F-certified manufacturing capability, welding bays, and assembly lines specifically designed for oilfield equipment. All retrofit modules will be fabricated, tested, and certified at this facility before delivery.

Final assembly, outfitting of field equipment, and commissioning will be conducted by Foremost Well Service LLC at its operational base in Dickinson, North Dakota. This ensures the Kremco 600 trailered rig is fully integrated and field-ready under North Dakota conditions, supported by Foremost's experienced mechanics and operators.

Resources:

The project team brings together Foremost Well Service, which contributes the Kremco 600 rig, field operators, mechanics, and training infrastructure, with CARE Industries, which provides engineering, fabrication, and commissioning resources.

To ensure maximum efficiency and performance, the retrofit will incorporate modern battery technology sourced from leading global manufacturers, delivering the latest advances in energy density, safety, and lifecycle performance. Central to the retrofit is an 800-horsepower electric motor engineered to power the draw works, replacing diesel-driven hoisting with fully electric operation. This enables significant reductions in fuel use, emissions, and mechanical wear during continuous rig service.

Financial resources are secured through a \$1.5M Clean Sustainable Energy Authority grant and a \$1.5M Bank of North Dakota loan, ensuring the \$3M project is fully funded. Additional support resources include operator training programs, emissions monitoring tools, and API/OSHA-compliant safety systems.

Techniques to Be Used, Their Availability and Capability:

The retrofit will apply commercially available hybrid-electric technologies adapted for service rig applications:

- Electric draw works drive system integration using an 800 hp electric motor.
- Regenerative braking to reduce brake band wear and recover energy.
- Hybrid auxiliary power systems to reduce idling and fuel use.
- Advanced control software and automation for seamless operator interface.

All components are readily available from established suppliers and will be engineered for compatibility with the Kremco 600 rig. CARE Industries has full capability to fabricate, assemble, and certify these components under API 4F standards, while Foremost Well Service provides operational validation in continuous oilfield service.

Environmental and Economic Impacts while Project is Underway:

During fabrication and retrofit, environmental impacts are minimal and limited to standard shop operations (welding, machining, testing) under existing environmental permits. Economic impacts during this stage are positive, including job creation in fabrication, assembly, and operator training.

Once deployed, the retrofitted rig will displace 30,000 gallons of diesel annually, reducing emissions by more than 340 metric tons of CO₂ per year, while lowering operating costs by approximately \$175,000 annually per rig.

In addition, Foremost Well Service will expand its workforce by 17 full-time positions to staff and operate the hybrid rig. These new roles include rig operators, and support staff, providing high-quality jobs in North Dakota's energy sector. The expansion strengthens local economies through wages, benefits, and secondary economic activity, while also enhancing the state's reputation as a hub for innovative, sustainable energy development.

Ultimate Technological and Economic Impacts:

This project represents the first hybrid-electric retrofit of a workover rig in North Dakota, establishing a technological benchmark that can be replicated across fleets. The demonstration will prove that hybridization is not only technically viable but also financially self-sustaining, with a payback period of less than two years through operational savings.

At scale, deployment across just 10 rigs would eliminate more than 300,000 gallons of diesel consumption annually, avoid over 3,400 metric tons of CO₂ emissions, and deliver cost savings exceeding \$1.75 million per year. Expanded statewide adoption has the potential to transform emissions performance in North Dakota's service rig fleet while strengthening the competitiveness of local operators.

Beyond fuel and emissions reductions, the project will generate durable economic benefits. Foremost Well Service will expand its workforce, creating new high-wage, full-benefit jobs for North Dakota residents, while CARE Industries contributes to regional manufacturing strength. This synergy ensures that both economic and environmental value are retained locally.

Most importantly, this project positions North Dakota as the national leader in sustainable oilfield service innovation, a state that embraces clean energy solutions without compromising on reliability, safety, or economic growth. The retrofit will serve as a replicable, scalable model for the broader oil and gas industry across North America, reinforcing the state's reputation for energy leadership well into the future.

Why the Project is Needed:

Service rig technology has remained largely unchanged since the 1980s. While drilling rigs and production systems have advanced significantly with digital controls, automation, and emissions-reduction technologies, service rigs continue to rely almost entirely on diesel-driven mechanical systems. This makes them one of the last areas of the oil and gas industry to undergo meaningful modernization.

The lack of innovation in service rig design has several consequences:

- High fuel consumption due to continuous diesel operation, even during idling or low-load tasks.
- Excessive emissions, with each rig burning ~30,000 gallons of diesel annually, generating more than 340 metric tons of CO₂.
- Increased maintenance costs, particularly frequent brake band replacement and engine oil changes, leading to downtime and higher operating costs.
- Missed opportunities for safety and ergonomic improvements, leaving rig operators exposed to higher noise, heat, vibration, and repetitive strain conditions that make long-term careers less sustainable.

This project addresses these gaps directly by deploying the first hybrid-electric retrofit for a service rig in North Dakota. The Kremco 600 trailered rig retrofit will:

- Demonstrate cleaner and more efficient technology applied to one of the most widely used—but least modernized—pieces of oilfield equipment.
- Significantly reduce operator exposure to noise, vibration, and exhaust, improving ergonomics and long-term workforce sustainability.
- Deliver verifiable fuel savings, emissions reductions, and maintenance improvements in continuous 24/7 operations.
- Serve as a platform for bolt-on electrification of auxiliary systems, multiplying the benefits beyond the rig itself:
 - Electric pipe wranglers powered directly from the rig, eliminating standalone diesel units.
 - Remote light plants tied into the rig's electric system, displacing portable diesel generators.
 - Each small diesel engine replaced typically consumes 10–30 gallons of fuel per day, equivalent to up to 111 metric tons of CO₂ per year eliminated per unit.

By proving technical performance, economic payback, emissions reductions, and better working conditions, this project ensures that service rigs the “workhorses” of the oil patch are no longer left behind in the evolution toward cleaner, safer, and more sustainable energy systems. Moreover, the retrofit provides a scalable platform for full site electrification, where every bolt-on module displaces another diesel engine and compounds North Dakota's environmental and economic gains

STANDARDS OF SUCCESS

The success of this demonstration project will be measured by verifiable performance data and its ability to serve as a replicable model for the broader service rig fleet. Specific standards of success include:

- **Emissions Reduction:**
 - Each retrofitted rig will displace 30,000 gallons of diesel annually, avoiding more than 340 metric tons of CO₂ per rig per year.
 - Additional bolt-on electrification (pipe wranglers, light plants, auxiliary engines) offers the potential to eliminate another 50–111 metric tons of CO₂ per unit annually.
- **Reduced Environmental Impacts:**
 - Lower diesel usage reduces particulate matter, NO_x, and noise pollution, directly improving air quality and community health in rural and urban service areas.
 - Extended maintenance intervals decrease oil consumption and waste (saving ~70% of oil change volume and reducing brake band waste by >70%).
- **Increased Energy Sustainability:**
 - Integration of an 800-horsepower electric draw works motor and modern battery systems demonstrates a pathway to hybrid-electric field operations.
 - Establishes a replicable framework for electrifying auxiliary rig functions, moving toward full-site electrification and reduced dependence on fossil fuel generators.
- **Value to North Dakota:**
 - Enhances the competitiveness and sustainability of the state's energy sector while reinforcing its reputation as a clean energy innovation leader.
- **Public and Private Sector Utilization:**
 - Public sector agencies (NDIC, CSEA) gain real-world emissions and cost data for policymaking and future incentive structures.
 - Private sector operators can replicate the retrofit model across their fleets, reducing costs and emissions at scale.
- **Commercialization Potential:**
 - CARE Industries and Foremost Well Service will establish a repeatable, commercial retrofit package that can be marketed to other operators in North Dakota and beyond.
- **Advancement of R&D and Technology:**
 - Demonstrates practical application of hybrid-electric drive systems in continuous 24/7 oilfield service.
 - Provides data for future research into battery systems, regenerative braking, and electrified auxiliary rig equipment.
- **Job Preservation and Creation:**
 - Maintains existing service rig operations while creating 17 new full-time positions for rig operators, mechanics, and support staff in North Dakota.
 - Supports skilled trades at CARE Industries' fabrication facilities.
- **Alignment with Program Mission:**
 - The project satisfies CSEA's mission by reducing emissions, advancing sustainable energy technology, and creating economic benefits for North Dakota residents.
 - Demonstrates how innovation in legacy oilfield equipment can simultaneously improve environmental performance and economic competitiveness.

BACKGROUND / QUALIFICATIONS

Applicant (Operator/Sponsor):

Foremost Well Service is a locally owned-and-operated oilfield services company headquartered in Dickinson, North Dakota. Established in 2016, Foremost operates 24/7 workover completions and production rig fleets including eight 550-series rigs and two 750-series rigs delivering expert services such as completions, production, drill-outs, clean-outs, down-hole pumping, and more (foremostwellservicellc.com).

Foremost's operations are built on a culture of safety and reliability, with rigorous hazard identification, API-compliant safety procedures, and strong adherence to OSHA and NDIC regulations. The company has earned a strong reputation for operational excellence by prioritizing safety, reliability, and efficiency in all phases of its field work.

Foremost Well Service LLC – Executive Leadership

Brian O'Toole, Founder and President, leads the organization with decades of deep field experience. His career spans drilling, pulling unit operations, and oilfield consulting, culminating in the establishment of Foremost during the industry downturn of 2015–2016. His leadership is rooted in real-world operational expertise and a steadfast commitment to employees, clients, and the long-term success of North Dakota's energy sector.

Brad Hartigan, a mechanic by trade, brings extensive experience in both drilling and workover operations. His technical background ensures practical, field-proven insights throughout every retrofit phase, with responsibility for mechanical integrity, operational execution, and ensuring continuous 24/7 field readiness.

Together, O'Toole and Hartigan align strategic oversight with day-to-day operational excellence combining real-world leadership and technical execution to ensure the success of this first-of-its-kind project.

CARE Industries Ltd. – Engineering & Fabrication Partner

CARE Industries, based in Red Deer, Alberta, is a premier manufacturer of drilling and workover rig packages, including masts, substructures, and pump systems—produced under API 4F certification—and fully supported through Level IV recertification and custom fabrication (careindustries.ca, cosssd.com). Founded in the late 1990s, CARE has earned accolades such as the New Exporter Award and Business of the Year Award, and holds an API Monogram license (4F-0108) for high-quality fabrication (oilmonster.com).

Mike MacKenzie, Vice President of Operations, joined CARE Industries in 2001 and brings over 25 years of manufacturing leadership. He oversees all manufacturing activities, including fabrication, welding, mechanical assembly, and quality assurance. A certified Welding Supervisor through the Canadian Welding Bureau (CWB) and an inter-provincial Journeyman Welder, MacKenzie also worked in power generation equipment manufacturing with Hitachi Canadian Industries, providing both technical breadth and strategic insight.

Brody St. Louis, Project Manager, joined CARE in 2011 with nearly 20 years of experience in welding and fabrication. He began his apprenticeship with Arnett & Burgess Pipeline Ltd before moving to CARE, where he now leads project planning, execution, and delivery. His deep fabrication knowledge and project management expertise ensure high-quality retrofit design and on-time completion.

Corporate Expertise & Technical Leadership

Together, Foremost and CARE combine local operational capacity with manufacturing excellence:

- Foremost brings deep field experience, safety leadership, and ND-based logistics.
- CARE provides rig-specific engineering, custom fabrication, quality assurance, and API-certified parts.

This joint management structure ensures tactical field expertise, accountable leadership, and manufacturing precision. Foremost directs day-to-day management and field deployment, while CARE provides engineering execution and technical support to deliver a first-of-its-kind hybrid-electric retrofit in North Dakota.

MANAGEMENT

The project will be managed jointly by Foremost Well Service and CARE Industries, leveraging complementary expertise in oilfield operations and engineering/fabrication.

- **Foremost Well Service – Project Lead**
 - Responsible for overall project management, coordination with NDIC, and compliance with state regulatory and reporting requirements.
 - Provides the Kremco 600 trailer rig to be retrofitted.
 - Oversee operator training, safety compliance, and integration of the hybrid-electric rig into continuous 24/7 field operations in North Dakota.
 - Maintains responsibility for quarterly and final reporting to NDIC, including validated data on fuel displacement, CO₂ reductions, and cost savings.
- **CARE Industries – Engineering & Fabrication Partner**
 - Responsible for engineering design, fabrication, and integration of hybrid-electric retrofit components.
 - Executes system assembly, quality assurance, and compliance with API 4F certification standards.
 - Provides technical support during rig integration and commissioning.
 - Assists with documentation, operator training, and technical validation of performance data.

The joint management structure ensures that the project benefits from both tactical field expertise and manufacturing precision. Foremost Well Service will direct day-to-day management and field deployment, while CARE Industries provides technical execution and engineering support together, these organizations provide the full range of expertise required to deliver a successful first-of-its-kind hybrid-electric retrofit in North Dakota, ensuring NDIC funding produces measurable, verifiable, and replicable results.

TIMETABLE

The proposed hybrid-electric retrofit will be executed over an estimated 36-month period, with key milestones as follows:

Narrative Milestones

- **Q1 2026 – Project Launch & Engineering**
 - Finalize engineering design package for Kremco 600 trailered retrofit.
 - Order long-lead components (electric drive systems, regenerative braking assemblies).
- **Q2–Q3 2026 – Fabrication & Assembly**
 - CARE Industries completes fabrication of retrofit modules.
 - Subsystem integration and quality assurance checks under API and OSHA standards.
- **Q4 2026 – Rig Integration & Testing**
 - Installation of retrofit package on Foremost rig.
 - Commissioning and functional validation of hybrid system.
 - Initial safety and performance testing under continuous operation.
- **Q1–Q2 2027 – Field Deployment & Data Collection**
 - Rig placed into 24/7 field service in North Dakota operations.
 - Ongoing monitoring of fuel consumption, emissions, and operational performance.
 - Quarterly reports submitted to NDIC.
- **Q3–Q4 2027 – Evaluation & Interim Reporting**
 - Comprehensive evaluation of economic and environmental results.
 - Submission of interim performance and financial reports to NDIC.
 - Demonstration project results shared with ND operators to encourage replication.
- **Q1–Q4 2028 – Extended Demonstration & Final Reporting**
 - Continuous demonstration; performance tracking (fuel, CO₂, uptime, safety).
 - Project wrap-up; data analysis; scalability assessment.
 - Final report and close-out presentation to NDIC

BUDGET

Funding for this project will total \$3,000,000, structured as a \$1,500,000 Clean Sustainable Energy Authority grant matched by a \$1,500,000 Bank of North Dakota loan. These funds will support the complete modernization of a Kremco 600 trailered service rig, with costs allocated to engineering design, component procurement, fabrication, final assembly, and continuous field deployment. The financing structure ensures full coverage of project expenses while balancing public investment with private-sector commitment.

The requested funds will directly support:

- Engineering and fabrication of the electric drive system, regenerative braking components, and auxiliary hybrid systems.
- Installation, integration, and testing of the hybrid retrofit on an active Kremco 600 trailer rig.
- Operator training, safety validation, and documentation to ensure reliable 24/7 field operations in North Dakota conditions.

The economic case for this demonstration is compelling:

- Each retrofitted rig will save more than \$175,000 annually in combined fuel, oil, and brake maintenance costs.
- The retrofit will displace approximately 30,000 gallons of diesel fuel per year per rig, avoiding over 340 metric tons of CO₂ annually (EPA 2024 Emissions Factors).
- When scaled across 10 rigs, the annual savings exceed \$1.75 million, with avoided emissions greater than 3,400 metric tons of CO₂.
- The payback period is projected at less than two years, making this technology both financially and environmentally sustainable.

CSEA funding will allow Foremost to validate this retrofit as a first-of-its-kind demonstration in North Dakota, producing verifiable data that will accelerate adoption across the state’s service rig fleet. By de-risking this initial deployment, NDIC funding ensures that long-term operational savings, workforce benefits, and emissions reductions will remain in North Dakota and support the state’s leadership in clean, sustainable energy innovation.

*Please use the table below to provide an **itemized list** of the project’s capital costs; direct operating costs, including salaries; and indirect costs; and an explanation of which of these costs will be supported by the financial assistance and in what amount. The budget should identify all other committed and prospective funding sources and the amount of funding from each source. **Please feel free to add columns and rows as needed.** Higher priority will be given to projects with a high degree of matching private industry investment.*

| Project Associated Expense | NDIC Grant | NDIC Loan | Applicant’s Share (Cash) | Other Project Sponsor’s Share | Total |
|---------------------------------------|-------------------|------------------|---------------------------------|--------------------------------------|--------------|
| Hybrid drivetrain modules & batteries | \$800,000 | \$800,000 | \$0 | \$0 | \$1,600,000 |
| Retrofit labor & assembly (CARE) | \$450,000 | \$300,000 | \$0 | \$0 | \$750,000 |
| Testing, certification & training | \$200,000 | \$200,000 | \$0 | \$0 | \$400,000 |
| Monitoring & data systems | \$50,000 | \$200,000 | \$0 | \$0 | \$250,000 |
| | | | | | |
| | | | | | |
| Total | \$1,500,000 | \$1,500,000 | \$0 | \$0 | \$3,000,000 |

Budget Justification:

Foremost Well Service LLC requests a Clean Sustainable Energy Authority (CSEA) grant of \$1,500,000 to complete the hybrid-electric retrofit of a Kremco 600 trailer rig. This funding will cover the design, fabrication, integration, and deployment of the retrofit package, executed by CARE Industries in partnership with Foremost.

The requested funds will directly support:

- Engineering and fabrication of the electric drive system, regenerative braking components, and auxiliary hybrid systems.
- Installation, integration, and testing of the hybrid retrofit on an active Kremco 600 trailer rig.
- Operator training, safety validation, and documentation to ensure reliable 24/7 field operations in North Dakota conditions.

Economic and environmental justification:

- Each retrofitted rig will save more than \$175,000 annually in combined fuel, oil, and brake maintenance costs.
- The retrofit will displace approximately 30,000 gallons of diesel fuel per year per rig, avoiding over 340 metric tons of CO₂ annually (EPA 2024 Emissions Factors).
- When scaled across 10 rigs, the annual savings exceed \$1.75 million, with avoided emissions greater than 3,400 metric tons of CO₂.

CONFIDENTIAL INFORMATION

This application does not contain confidential or proprietary information requiring redaction. Should any proprietary data be generated during the project (including technical specifications of the retrofit package), Foremost Well Service LLC and CARE Industries will provide NDIC with a clear, redacted public version of any reports or submissions.

All financial figures, emissions reduction estimates, and cost savings calculations contained herein are provided for public review and verification.

PATENTS/RIGHTS TO TECHNICAL DATA

No patents are required for the execution of this project. Foremost Well Service LLC and CARE Industries will utilize existing, commercially available technologies and components in the retrofit. Should any new intellectual property be generated as a result of this demonstration project, ownership and licensing will be determined in accordance with applicable North Dakota law and NDIC guidelines.

Any patents or rights that the applicant wishes to reserve must be identified in the application. If this does not apply to your proposal, please note that below.

STATE PROGRAMS AND INCENTIVES

The project has not received funding from other North Dakota state programs. No duplicative state support will be sought. The proposed retrofit demonstration will be funded through the requested CSEA grant of \$1,500,000, supported by a Bank of North Dakota (BND) loan. This ensures clear accountability, transparency, and alignment with the mission of the Clean Sustainable Energy Authority.

Appendix A – Business Plan

1. Current Operations

Foremost Well Service LLC, headquartered in Dickinson, ND, operates 8× 550-series rigs and 2× 750-series rigs providing completions, production, clean-outs, pump work, and other field services across the Bakken. Our focus is on 24/7/365 schedule, which ensures maximum availability but also drives high fuel consumption, maintenance costs, and CO₂ emissions.

This project represents a step-change in operations, applying hybrid-electric technology to one of our most critical assets: the Kremco 600 trailered service rig.

2. First Retrofit – Kremco 600 Hybrid Conversion

- Retrofit package designed and fabricated by CARE Industries, with final assembly and outfitting by Foremost Well Service in Dickinson.
- Core technologies:
 - 700 hp electric drawworks motor.
 - Modular battery systems from leading manufacturers.
 - Regenerative braking to reduce brake wear and energy waste.
 - Hybrid auxiliary power for reduced idling.
- Initial deployment into continuous field service in North Dakota.
- Rig will serve as the demonstration platform for emissions reductions, cost savings, and improved ergonomics.

3. Demonstration & Proof Phase

- Field monitoring over a 12–18 month period.
- Metrics tracked: fuel consumption, CO₂ reductions, oil changes, brake band replacement, uptime, and operator ergonomics.
- Quarterly reporting to NDIC with a final demonstration report documenting technical and financial results.
- Goal: establish a replicable, proven retrofit model.

4. Expansion Program

- Upon successful demonstration, Foremost will begin a fleet modernization program.
- Target: 1–2 retrofits per year, beginning with other Foremost 550-series rigs.
- Each retrofit compounds benefits: 30,000 gallons of diesel avoided per rig annually, 340 metric tons CO₂ avoided, \$175,000 in annual cost savings.

- Multi-year adoption builds operational scale, provides stable employment for rig crews, and supports local manufacturing through CARE Industries.

5. Long-Term Vision

- Fleet-wide conversion of Foremost rigs over the next decade.
- Auxiliary electrification: bolt-on systems such as pipe wranglers and light plants powered directly by the rig, eliminating small diesel gensets (each unit removes up to 111 metric tons of CO₂ annually).
- Foremost to position as the first ND-based operator with a hybrid-electric service rig fleet, delivering both economic competitiveness and ESG leadership.

10-15-2025

North Dakota Industrial Commission
ATTN: Clean Sustainable Energy Program
State Capitol – Fourteenth Floor
600 East Boulevard
Bismarck, North Dakota 58505

Dear Members of the Commission,

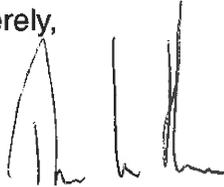
On behalf of Sustainable Projects Group Inc. - SPGX, I hereby submit our application for the Clean Sustainable Energy Authority (CSEA) grant for the project "Lithium for Clean Energy Delivery: Demonstration from Produced Water". We respectfully request grant funding in the amount of \$9,523,919 to support our total project cost of \$19,047,839.

Sustainable Projects Group Inc. - SPGX hereby provides a binding commitment to complete the project as described in the application should the Commission award the requested funding. We confirm that we have the technical, financial, and management capacity to execute the project, including managing all equipment installation, procurement, commissioning, and ongoing operations.

We also affirm to comply fully with all program requirements, including documentation of matching funds, reporting obligations, and ensuring all regulatory and environmental standards are met.

Thank you for your consideration. We are confident this project will significantly advance clean energy, environmental sustainability, and economic development in North Dakota.

Sincerely,

X 

Thomas Lund Hansen
CFO

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title: Lithium for Clean Energy Delivery:
Demonstration from Produced Water

Applicant: Sustainable Projects Group Inc. -
SPGX

Date of Application: 10-15-2025

Amount of Request

Grant: \$9,523,919

Loan: -

Total Amount of Proposed Project:
\$19,047,839

Duration of Project: 35 months

Point of Contact (POC): Kristina Muliulyte

POC Telephone: +4531530967

POC Email: kmu@lithiumharvest.com

POC Address: Tankedraget 7, 9000 Aalborg,
Denmark

TABLE OF CONTENTS

| | |
|---|-----------|
| Abstract | 2 |
| Project Description | 3 |
| Standards of Success | 11 |
| Background/Qualifications | 12 |
| Management | 13 |
| Timetable | 14 |
| Budget | 16 |
| Confidential Information | 17 |
| Patents/Rights to Technical Data | 17 |
| State Programs and Incentives | 17 |

ABSTRACT

Objective:

As the U.S. faces a growing gap between lithium demand and supply¹, Sustainable Projects Group Inc. (SPGX) has developed a proprietary process to extract lithium from oil and gas produced water. While each technology in the process is commercially proven, their integration into a full-scale extraction system is unprecedented. The next step toward commercialization is the construction of a demonstration facility in North Dakota, with key objectives including site preparation, equipment procurement, construction, commissioning, and establishing baseline data for future optimization. The project will support clean energy delivery through advancing domestic critical mineral supply, engage local contractors and suppliers, and establish North Dakota as a leader in sustainable lithium production.

Expected Results:

- Fully operational 408-ton of lithium carbonate equivalent (LCE)/year facility installed at the partner-provided site in ND.
- Upscale O&G energy production at the partner site by utilizing produced water – the industry’s waste stream.
- Established foundation for further private investment and commercialization.
- 12 new local full-time stable clean energy jobs and increased economic activity in ND.
- Strengthened North Dakota’s role in the clean energy and critical materials sectors.
- Support for sustainable energy production and delivery through a domestic lithium supply for batteries and renewable energy applications, providing approximately 480–640 MWh of battery energy storage systems (BESS) capacity per year—enough to power tens of thousands of homes.

Duration:

35 months

Total Project Cost:

\$19,047,839

Participants:

The project will be led and executed entirely by Sustainable Projects Group Inc. (SPGX), which will be responsible for overall project management, engineering, process design, procurement, commissioning, and operational execution of the demonstration plant. Specialized tasks, including construction, civil works, and electrical installations, will be performed by qualified subcontractors under SPGX’s oversight. All technical decisions, quality control, and integration of outsourced work will remain the responsibility of SPGX.

¹ Benchmark Mineral Intelligence Webinar “The Mines of Tomorrow - Lithium” <https://www.benchmarkminerals.com/events> 2024

PROJECT DESCRIPTION

Objectives:

As the lithium industry is poised for rapid expansion driven by the growth of clean energy production, both global and domestic lithium supply in the United States is projected to fall short of demand. SPGX has developed a proprietary process for lithium extraction from oil and gas produced water and sees an opportunity to contribute to clean energy production by building a lithium extraction facility from produced water in North Dakota.

While each technology in SPGX's process is commercially proven in the oil and gas (O&G) industry's water treatment, its integration into a full-scale lithium extraction system from produced water is unprecedented. The next critical step toward commercialization is the construction of the first demonstration plant. The company has secured a site location, established a local partner, and initiated permitting and fundraising activities. For the Clean Sustainable Energy Authority Program, SPGX proposes a project focused solely on the construction of the demonstration plant. This represents a critical step in the company's commercialization pathway. Key objectives of the project include:

- Prepare site.
- Procure necessary equipment and materials.
- Construct and commission the demonstration facility.
- Ensure the facility meets design specifications and safety standards.
- Establish baseline data for future optimization and efficiency validation.

Further optimization and efficiency validation of the plant will follow as the next step in the overall commercialization path, generating crucial technical knowledge under real-world conditions.

The demonstration facility in North Dakota will advance SPGX's proprietary lithium extraction process from produced water, supporting the growth of clean energy production through domestic critical mineral supply. The project will engage local contractors and suppliers, contributing to economic development and workforce opportunities in the state. By establishing a scalable and innovative approach to lithium production, the facility will position North Dakota as a leader in critical mineral development while promoting environmentally sustainable energy practices.

Methodology:

The proposed project will focus on the construction and commissioning of a demonstration-scale lithium extraction facility from oil and gas produced water in North Dakota. The methodology outlines how the project funds will be allocated and the specific tasks required to achieve the stated objectives. Each step aligns with project goals, regulatory requirements, and the intended contribution to sustainable energy production.

1. Site Preparation and Infrastructure Integration

Objective: Prepare the existing site in McKenzie County for the demonstration facility without disrupting ongoing operations.

Tasks:

- Clear and grade the northwest corner of the existing pad.
- Extend utilities (power, water, and communications) from existing infrastructure.
- Construct a foundation for building and equipment.
- Install piping connections for inflow and outflow to integrate with existing produced water systems.

Funds Allocation: Civil works, site preparation, utility extensions, and engineering oversight.

2. Equipment Procurement

Objective: Acquire and install the equipment necessary for lithium extraction, ensuring compatibility and safety.

Tasks:

- Procure commercially proven water treatment and lithium extraction equipment.
- Coordinate delivery schedules to align with construction milestones.
- Equipment inspection upon arrival.

Funds Allocation: Equipment purchase, shipping, and oversight.

3. Construction of Facility Building

Objective: Build the demonstration facility according to design specifications.

Tasks:

- Construct steel building and internal layout to house extraction equipment.
- Install structural supports, enclosures, and access platforms.
- Ensure compliance with occupational safety and building codes.

Funds Allocation: Construction labor, materials, safety inspections, contingency funds.

4. Installation of plant equipment

Objective: Install the demonstration facility equipment according to design specifications.

Tasks:

- Install equipment within the facility, including integration of pipelines and process systems.
- Install electrical components, cables and control system
- Conduct inspections and safety checks during installation.

Funds Allocation: Installation labor, materials, safety inspections, contingency funds.

5. Commissioning and Initial Process Testing

Objective: Ensure the facility operates safely and as designed, verifying that all systems are functional prior to full-scale operation.

Tasks:

- Conduct initial system startup and commissioning of equipment.
- Perform dry and wet test runs to confirm equipment functionality and process integration.
- Test control system, including critical safety interlockings
- Identify and resolve any operational issues.
- Verify that the facility meets design, safety, and regulatory standards.

Funds Allocation: Commissioning labor, contingencies, testing supplies, system checks, and troubleshooting.

6. Project Management and Oversight

Objective: Ensure timely and effective completion of all project tasks within budget, schedule and specs.

Tasks:

- Update and manage project schedule with milestones.
- Monitor budget, procurement, and progress of contractors.
- Conduct weekly project meetings and submit interim reports to the Commission.
- Ensure compliance with CSEA reporting and documentation requirements.

Funds Allocation: Project management labor, reporting, and administrative costs.

Anticipated Results:

Successful completion of the demonstration plant will verify the integration and functionality of SPGX's proprietary lithium extraction process under real-world conditions. This will enable the next phase of commercialization, during which operational performance and efficiency data will be collected and optimized. This project will bring tangible benefits to North Dakota by creating local employment opportunities during construction and commissioning, as well as training a skilled workforce for future plant operations. It will stimulate the local economy through the procurement of materials, services, and ongoing operational support, while providing valuable on-the-job experience in advanced clean energy and critical mineral technologies. By establishing a scalable and innovative lithium production approach, the project positions North Dakota as a leader in sustainable energy development, attracting further investment and reinforcing the state's role in supporting domestic critical mineral supply, which is essential for the growth of clean energy technologies and regional energy security.

The key deliverables of this project include completion of all site preparation and civil works, delivery and installation of major process equipment, construction of the facility building, and full mechanical and electrical integration of the lithium extraction system. The project completes with commissioning and a start-up readiness report, verifying that all systems meet design, safety, and regulatory standards.

Throughout the project, progress will be documented through regular internal updates and interim reports submitted to the Clean Sustainable Energy Authority in accordance with program requirements.

Facilities:

The project will be hosted and supported by the Partner in McKenzie County, North Dakota, as shown in Figure 1 of the Appendix section “Supporting Items to the Application.” The Partner, who operates the existing site, will provide access to produced water and pad utilities. This location is ideal due to its direct access from the main road. Furthermore, no dwellings are located within five hundred feet of the project site, in accordance with local regulations. This has been verified by Highlands Engineering & Surveying, PLLC.

The lithium extraction facility will be erected on the northwest corner of the existing pad. Due to the sufficient size of the current pad, no expansion or additional land acquisition is required. Figure 2 of the Appendix section “Supporting Items to the Application” shows the proposed facility location along with the existing gun barrels and injection pumps.

The total produced water volume across the partner’s operational site is estimated to reach approximately 108,000 barrels per day (bbl/d), all transported through the extensive produced water gathering system established in the Bakken area (see Figure 3 of the Appendix section “Supporting Items to the Application”). Of this total, 48,000 bbl/d will be allocated to the project well. The current produced water volume from the project well is 15,000 bbl/d, which is sufficient to support the demonstration facility. Furthermore, the planned expansion ensures a clear pathway toward commercial-scale deployment. The lithium extraction demonstration can be constructed at the well without modification to existing infrastructure. From the gun barrels, which perform final treatment of the produced water prior to re-injection, a pipeline will be installed to connect to the lithium extraction facility, while a return pipeline will transport treated process water back to the gun barrels for re-injection. Traffic flow on the pad has been assessed, and construction of the new facility will not obstruct operations. Service trucks will retain full access to both the existing facility and the lithium extraction unit.

As shown in Figures 4 and 5 of the Appendix section “Supporting Items to the Application.”, the project will involve the construction of the foundation, steel building, and utility extensions from the existing facility, along with additional piping for inflow and outflow. Power and water supply will be provided from the existing on-site network. Construction is expected to take approximately 17 months, including civil works, steel building and equipment installation.

The facility is designed to initially process up to 15,000 bbl/d of produced water for lithium extraction, corresponding to a demonstration-scale unit. It represents approximately 14% of the site’s total planned inflow. The design allows for future facility scale-up to a 48,000 bbl/d capacity that ensures a direct pathway toward commercial operation of 1,374 tons of LCE a year.

Resources:

The project will leverage a combination of technical, human, and material resources to ensure the successful completion of the demonstration facility. Key resources include:

1. **Site and Infrastructure:** The project will be hosted on an existing produced water disposal pad operated by a local partner. The site provides ample space for the facility, with existing pad utilities. The availability of this infrastructure enables rapid construction and integration of the lithium extraction system without requiring land acquisition or major modifications to existing operations. The proposed feedstock—produced water from the site—has been tested and validated, demonstrating a viable business case. A detailed review is provided in Figure 8 of the Appendix section, “Supporting Items to the Application.”

2. **Equipment and Technology:** All major process equipment, including commercially proven water treatment and lithium extraction units, will be procured from established suppliers. Equipment is readily available, and specifications have been verified to ensure compatibility with the demonstration-scale process. Integration of these technologies within a single facility represents the primary demonstration goal of the project.

3. **Human Resources:** The project team will include engineers, project managers, and technicians from SPGX with expertise in water treatment, lithium extraction, and industrial construction. Local contractors and labor will be engaged for civil works, steel building erection, and utility connections, ensuring both project feasibility and local workforce participation. Project leadership has prior experience in managing demonstration-scale clean energy projects, providing confidence in timely execution.

4. **Materials and Consumables:** Construction materials for foundations, steel building, piping, and utility extensions are available locally or through regional suppliers, minimizing delays.

Overall, all project resources are readily available, capable, and aligned with the project timeline and objectives. The combination of a prepared site, proven equipment, skilled personnel, and local contractor engagement ensures that the demonstration facility can be constructed, commissioned, and tested effectively within the proposed schedule.

Techniques to Be Used, Their Availability and Capability:

The process of the demonstration-scale lithium extraction facility consists of the following main steps:

1. Pre-treatment:

To protect the DLE adsorption material, produced water is first cleaned of solid particles, emulsified oil, and grease. This step removes ~95% of suspended solids and oil/grease, producing a small amount of sludge that will be safely disposed of.

2. Direct Lithium Extraction (DLE):

Lithium ions are selectively adsorbed onto an active material, then released by washing to produce a lithium-rich solution. Adsorption was chosen over membranes, solvent extraction, or ion-exchange due

to its maturity, commercial availability, proven scalability, and not need any chemicals. The DLE system is capable of processing 15,000 bbl/day with a projected lithium recovery of >90%.

3. Cleaning:

The lithium-rich brine still contains impurities such as boron, magnesium, and other divalent ions that are removed. Design capacity is 15,000 bbl/day with targeted impurity removal of >99%.

4. Precipitation and Drying:

The concentrated solution is converted to Li_2CO_3 by adding Na_2CO_3 in a crystallizer. The precipitated Li_2CO_3 is washed, dewatered, centrifuged, dried, micronized, and packaged. Production capacity at demonstration scale is 408 tonnes/year, with targeted product purity >99.5% Li_2CO_3 , the purity needed for battery manufacturing.

5. Auxiliary Services / Balance of Plant:

Auxiliary systems provide necessary utilities and process support, including:

- Ultrapure water RO unit
- Clean water RO unit

Together, these techniques represent a fully integrated lithium extraction process that can be validated at demonstration scale, establishing the foundation for subsequent optimization and commercial deployment.

A generalized summary of techniques to be used in the project and their availability and capability is summarized in Table 1. A more detailed process description can be found in the Appendix section “Supporting Items to the Application” pages 4-6.

| Process Step | Technique / Equipment | Purpose | Availability | Capability / Metrics |
|-------------------------------------|--|--|--|--|
| <i>Pre-treatment</i> | Clarification and Filtration Unit Operations | Remove suspended solids, oil, and grease | Commercially available from multiple suppliers | Removes ~95% solids/oil; capacity 15,000 bbl/day |
| <i>Direct Lithium Extraction</i> | Adsorption | Selective lithium extraction from brine | Mature commercial technology; multiple suppliers | Continuous operation; lithium recovery >90%; |
| <i>Cleaning</i> | Multiple Water Purification Technologies | Remove Mg/Ca and boron, concentrate | Commercially available | Impurity removal >99%; |
| <i>Precipitation & Drying</i> | Solid Product Processing Unit Operations | Produce Li_2CO_3 product | Commercially available equipment | Target purity >99.5% Li_2CO_3 ; output 408 tonnes/year |
| <i>Auxiliary / Balance of Plant</i> | Water Treatment Unit Operations | Supply water for washing and the general process | Commercially available | Produces required water continuously and supports continuous operation |

Table 1 Project techniques summary

Such a proposed process is highly competitive from environmental and cost points of view. As presented in Figure 6 of the Appendix section “Supporting Items to the Application”, it can deliver a highly competitive Opex, placing us on the low end of the cost curve (Figure 1).

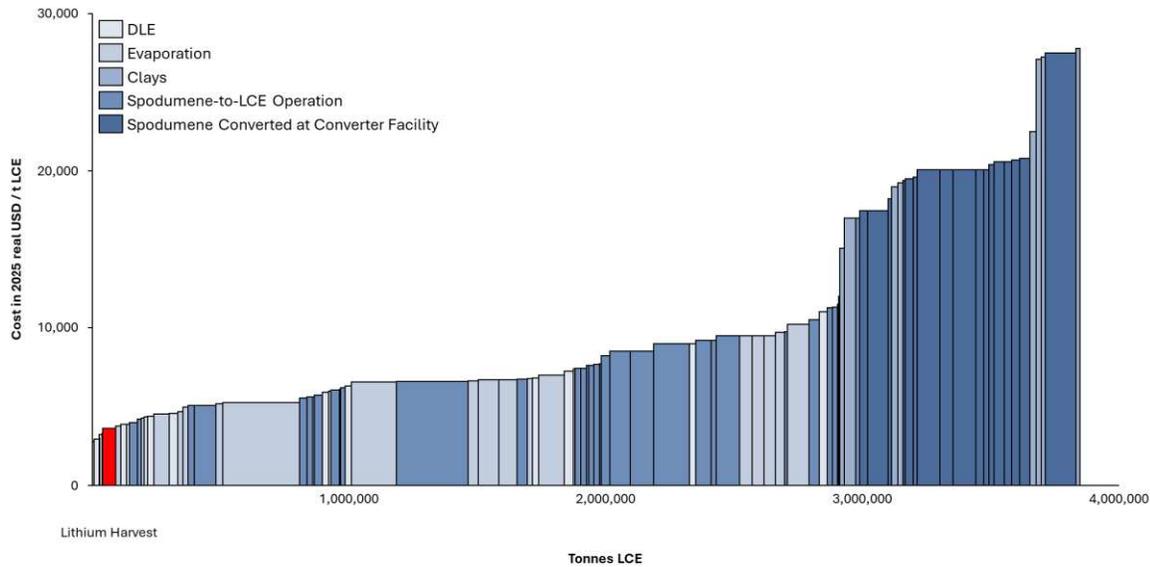


Figure 1 Lithium Cost Curve, Source: Benchmark Minerals Intelligence, Internal research, Investors materials

Additionally, compared to the conventional lithium extraction methods, it delivers significant environmental benefits as listed in Table 2.

| | SPGX Solution | Solar Evaporation Brine Extraction | Hard Rock Mining | SPGX Solution: Environmental impact reduction |
|--------------------------------------|----------------------|---|------------------------------|--|
| Lithium feedstock | Produced water | Continental brine | Rock / spodumene | Utilization of process waste instead of raw feedstock |
| Average footprint per mt of LCE | 61 ft ² | 39,352 ft ² | 3,605 ft ² | Significantly smaller natural land disturbance |
| Environmental impact | Minimal | Soil and water contamination | Soil and water contamination | Zero discharge operation, any residual waste is disposed of only following the highest environmental standards |
| Freshwater consumption per mt of LCE | 22,729 gallons | 118,877 gallons | 20,341 gallons | Up to 5 times reduced freshwater consumption |
| CO2 footprint per ton of LCE | Neutral | 3.1 tonne | 20.4 tonne | 3.1-20.4 tonne lower CO2 footprint per ton of LCE |

Table 2 SPGX's process environmental benefits summary, Source: International Lithium Association and internal process engineering studies

Environmental and Economic Impacts while the Project is Underway:

During construction and commissioning, the project will be designed and managed to minimize environmental impacts while generating positive economic effects for North Dakota. Environmentally, the facility will utilize an existing produced water disposal pad, avoiding land acquisition and minimizing disturbance to surrounding areas. Construction activities will follow standard best practices to control dust, noise, and runoff, and all waste materials will be managed according to local and federal regulations. The project's design ensures that no emissions or discharges beyond permitted limits will occur, and integration with the existing produced water system avoids additional strain on local water resources.

Economically, the project will create employment opportunities for local contractors, laborers, and technical personnel during construction, steel building erection, utility extensions, and equipment installation. Local procurement of construction materials, equipment, and services will provide direct economic benefits to regional suppliers and vendors. Additionally, the project will build local technical capacity by engaging workers in advanced water treatment and lithium extraction processes, supporting workforce development and future operations. Overall, while the demonstration facility is under construction and commissioning, the project will stimulate the local economy, provide hands-on experience in a high-tech clean energy sector, and do so with minimal environmental disruption.

Ultimate Technological and Economic Impacts:

Completion of the demonstration facility will mark a critical advancement toward the commercialization of SPGX's proprietary process for lithium extraction from produced water. This project will deliver the first fully constructed and commissioned demonstration-scale facility, validate the integration of modular process units, and confirm compatibility with existing produced water infrastructure. While optimization and performance validation will follow in the next project phase, this facility establishes the physical and operational foundation required to transition the technology from pilot-scale research toward commercial deployment.

Technologically, the facility will demonstrate that lithium can be efficiently extracted from oilfield-produced water using an integrated system of proven water treatment technologies. Designed to process approximately 15,000 barrels of produced water per day, the plant represents a scalable model for future commercial facilities of up to 48,000 barrels per day. Completion of the project will advance the technology readiness level from TRL 6 to TRL 9, demonstrating readiness for full process testing and optimization. The project, therefore, represents a key step toward enabling domestic lithium recovery that supports clean energy production and delivery.

Economically, the project will generate immediate benefits through local job creation and procurement of materials and services within North Dakota. Construction and commissioning are expected to employ 30-50 local temporary workers, with additional indirect benefits for regional suppliers and contractors. Beyond construction, the facility will serve as a platform for training local personnel in lithium extraction operations, preparing a workforce for future commercial sites. Over time, replication of similar facilities across the Bakken region and the whole US could represent investments of \$18–25 million per site,

contributing to economic diversification, job creation, and strengthened energy sustainability within the state.

Why the Project is Needed:

The growing demand for clean energy production and supply has intensified the need for a secure, domestic lithium supply to support energy storage and grid reliability. Currently, U.S. lithium production is limited¹ to a single commercial operation of 5,000 tons of LCE by Albemarle in Nevada², creating dependence on imports and constraining clean energy expansion. North Dakota's oilfields generate large volumes of produced water, representing an untapped resource for sustainable lithium recovery.

SPGX's proprietary process offers a new pathway to extract lithium from produced water using proven treatment technologies. However, this integration has not yet been demonstrated on scale. The proposed project is therefore essential to construct and commission the first demonstration facility, establishing the foundation for future testing, optimization, and commercialization. This initiative will turn an existing industrial byproduct into a valuable clean energy resource while creating local jobs, supporting economic diversification, and positioning North Dakota as a leader in sustainable energy, supporting innovation.

STANDARDS OF SUCCESS

- ***Emissions reduction.***

Implementation of the lithium extraction demonstration facility is expected to minimize environmental emissions, with anticipated reductions of up to 20.4 tons in CO₂ emissions compared to conventional lithium extraction (the CO₂ emissions reduction based on green energy use).

- ***Reduced environmental impacts.***

The proposed process reduces environmental impact by valorizing O&G waste streams before their disposal, producing lithium carbonate without contributing to land degradation, extensive land use, or toxic waste generation as in conventional lithium extraction.

- ***Value to North Dakota.***

A successful demonstration will position North Dakota as a leader in sustainable lithium production from produced water. The project will stimulate local economic activity, create 12 direct and multiple indirect jobs, engage local contractors, and support the development of a skilled workforce in advanced clean energy technologies.

- ***Explanation of how the public and private sector will make use of the project's results, and when and in what way.***

The project will generate technical knowledge and operational insights that can be shared with both public and private stakeholders. This information will support future commercial-scale deployment, guide policy and investment decisions, and increase awareness of sustainable lithium recovery methods.

- ***The potential commercialization of the project's results.***

Demonstrating the integrated facility will lay the foundation for the next phase of testing, optimization, and eventual commercial deployment. A successful demonstration is expected to accelerate commercial readiness within 2-3 years, enabling additional facilities in North Dakota and other U.S. basins.

² Reuters "Exclusive: Trump wants..." 2025 <https://www.reuters.com/business/autos-transportation/trump-administration-seeks-equity-stake-lithium-americas-amid-loan-talks-2025-09-23/>

- ***How the project will enhance the research, development, and technologies that reduce environmental impacts and increase the sustainability of energy production and delivery of North Dakota's energy resources.***

The project validates an innovative process for lithium extraction from produced water, reducing reliance on imported lithium and contributing to the development of critical minerals that support clean energy production and delivery.

- ***How it will preserve existing jobs and create new ones.***

The project will create immediate construction and commissioning jobs and will train local personnel for future operational roles, supporting workforce continuity and building capacity for commercial-scale operations.

- ***How it will otherwise satisfy the purposes established in the mission of the Program.***

By advancing the construction of a demonstration facility for sustainable lithium extraction, the project directly supports the CSEA mission to develop large-scale technologies that reduce environmental impacts, increase energy sustainability, and strengthen North Dakota's leadership in clean energy and critical mineral production.

BACKGROUND/QUALIFICATIONS

SPGX is a water-technology company developing and commercializing sustainable lithium extraction processes from water-based resources. The company's patented process integrates proven, commercially available water treatment and separation technologies into a single, efficient system for producing battery-grade lithium with minimal environmental impact. The process has been validated through extensive engineering design, bench-scale and desktop verification, demonstrating full readiness for deployment. The commercial availability of the individual process units reduces the overall technical risk.

The next step toward commercialization is the construction and commissioning of a 408-ton-per-year lithium carbonate demonstration facility in North Dakota. This plant will recover lithium from oil and gas produced water and serve as the foundation for subsequent operational campaigns. The project does not focus on technology validation, but on establishing the physical and operational infrastructure necessary for full-scale deployment. The plant design is complete, and major equipment items have been specified and quoted for cost estimation. All required permits have been initiated and are pending only final approvals. By structuring development in phases, SPGX aims to manage risk effectively, maintain execution control, and ensure smooth progression toward commercial operation.

The SPGX team combined holds +20 years of experience in water treatment and executive management:

Sune Mathiesen – CEO and Co-founder. Prior to co-founding SPGX, Sune served as CEO, President, and Director of LiqTech International and held senior roles at Provital, Broen Lab, and GPA Flowsystems. He has overseen the sale, construction, and management of over 400 industrial water treatment systems across private and public sectors. Sune provides overall leadership, strategic direction, and capital-raising support for the company and projects.

Paw Juul – CTO and Co-founder. Paw previously served as CEO of LiqTech Water and co-founded Provital in 2009. With a M.Sc. in Biomedicine and extensive experience in membrane and produced water treatment technologies, he has developed several proprietary systems and automated control algorithms

installed in more than 400 industrial plants. Paw will act as the project's Technical Lead, responsible for plant design, process integration, and technical execution.

Thomas Lund Hansen – CFO. Thomas holds a M.Sc. in Chemical Engineering and an MBA from IESE. His experience includes developing large-scale natural resource projects for Rio Tinto and BHP, as well as management consulting with McKinsey & Company on sustainability and life cycle assessment initiatives. He has contributed to global standards for product carbon footprinting (PAS2050).

Internal SPGX resources, such as process and mechanical engineers, will be utilized where appropriate in project execution as well.

This experienced team combines strong technical expertise, operational capability, and financial management, ensuring the successful delivery of the project and establishing a foundation for subsequent demonstration and commercial-scale deployment.

MANAGEMENT

SPGX will manage and oversee the project using a structured project management framework to ensure that all objectives are met on schedule and within budget. Key elements of management and oversight include:

Project Leadership: A designated site based and fully allocated Project Director will be responsible for overall coordination, reporting, and communication with the funding agency. Each major task will have a Task Lead accountable for execution, technical performance, and timely completion, while overall project oversight will be provided by the Project Technical Lead.

Project Planning and Scheduling: A detailed Gantt chart and milestone schedule will guide project activities, which will be updated and expanded from the suggested timetable in this application after the proposal is granted. Key milestones will include procurement of equipment, plant construction, commissioning, and initial operational testing.

Regular Monitoring and Reporting: Weekly internal progress meetings to track tasks, identify bottlenecks, and implement corrective actions. Monthly management reviews to evaluate overall progress, resource allocation, and budget status. Yearly or Half-year (depending on contract conditions agreed with Clean Sustainable Energy Authority) interim reports submitted to the Commission, summarizing technical progress, expenditures, and any deviations from the schedule.

Evaluation Points / Performance Metrics: Completion of major tasks by predefined milestones. Actual expenditure compared to planned costs. Verification that each system component meets design specifications and operational targets. Adherence to environmental, health, and safety regulations. Identification and mitigation of potential risks affecting schedule, cost, or technical outcomes.

Corrective Actions: Deviations from the plan will trigger a corrective action review, with adjustments to schedules, resources, or methodology to ensure objectives are achieved. Contingencies have been considered in both project time and budget allocations.

This management approach ensures the project is executed efficiently, progress is measurable, and objectives—including successful commissioning of the demonstration plant—are achieved within the proposed timeline.

The project organizational chart is presented in Figure 2.

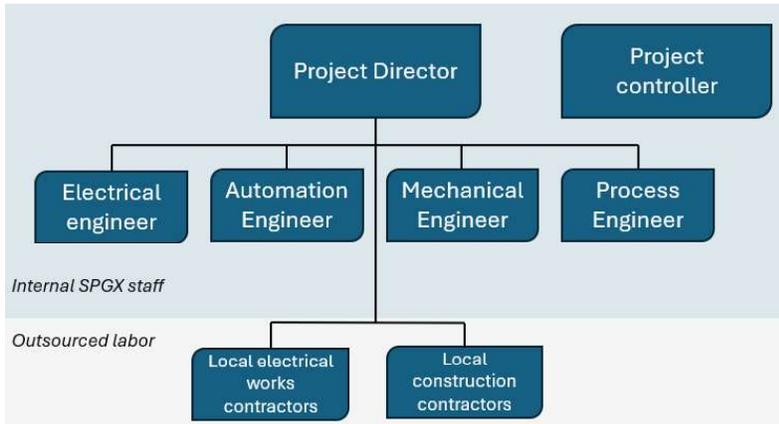


Figure 2 Project organization structure

TIMETABLE

A visualization of the proposed project timeline, including prior and consequent work estimates, is presented in Figure 3. Parallel execution of project tasks will help minimize project duration. Varying equipment lead times allow installation to start before all items are delivered.

While a detailed project schedule setting forth the starting and completion dates, dates for completing major project tasks/activities, and proposed dates upon which the interim reports will be submitted are detailed in Table 3. All scheduled dates may be adjusted depending on the completion of the grant agreement, in the event that the proposal is awarded.

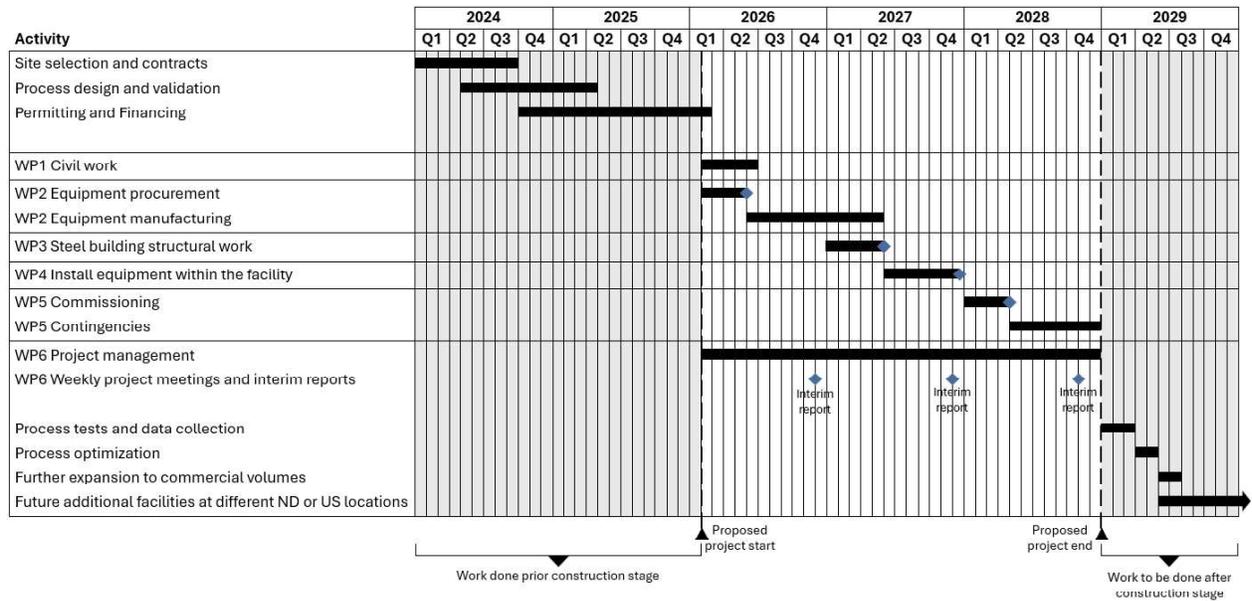


Figure 3 Project schedule

| Task | Start Date | Completion Date |
|--|------------|-----------------|
| Total project | 02-01-2026 | 12-31-2028 |
| Civil work | 02-01-2026 | 07-01-2026 |
| Equipment procurement and manufacturing | 02-01-2026 | 05-31-2027 |
| Steel building construction | 01-01-2027 | 05-01-2027 |
| Equipment installation | 06-01-2027 | 12-15-2027 |
| Commissioning | 01-01-2028 | 04-01-2028 |
| Interim report 1 | - | 12-15-2026 |
| Interim report 2 | - | 12-15-2027 |
| Interim report 3 | - | 12-15-2028 |

Table 3 Project timetable

BUDGET

| Project Expense | Associated Grant | NDIC Loan | Applicant's Share (Cash) | Other Project Sponsor's Share | Total |
|------------------------------------|-----------------------|-----------|--------------------------|-------------------------------|---------------------|
| Pre-treatment equipment | \$808,136.79 | - | \$808,136.79 | - | \$1,616,274 |
| DLE equipment | \$1,464,639.29 | - | \$1,464,639.29 | - | \$2,929,279 |
| Cleaning | \$743,793.60 | - | \$743,793.60 | - | \$1,487,587 |
| Precipitation and drying | \$1,094,665.00 | - | \$1,094,665.00 | - | \$2,189,330 |
| Auxiliary systems/Balance of plant | \$606,718.56 | - | \$606,718.56 | - | \$1,213,437 |
| Tanks | \$151,424.50 | - | \$151,424.50 | - | \$302,849 |
| Control system | \$395,000.00 | - | \$395,000.00 | - | \$790,000 |
| Electrical work onsite | \$325,000.00 | - | \$325,000.00 | - | \$650,000 |
| Construction | \$1,648,237.50 | - | \$1,648,237.50 | - | \$3,296,475 |
| Analysis instrumentation | \$75,000.00 | - | \$75,000.00 | - | \$150,000 |
| Freight | \$269,817.50 | - | \$269,817.50 | - | \$539,635 |
| Contingencies (17%) | \$1,516,486.55 | - | \$1,516,486.55 | - | \$3,032,973 |
| Project owner cost | \$425,000.00 | - | \$425,000.00 | - | \$850,000 |
| Total | \$9,523,919.29 | - | \$9,523,919.29 | - | \$19,047,839 |

The requested funding is essential to complete all aspects of the demonstration plant, including site preparation, procurement of major process equipment, mechanical and electrical installation, commissioning, and project management. Each expense directly supports the construction and operational readiness of the facility.

If less funding is available than requested, the project's objectives, including completion and commissioning of a fully operational demonstration facility, would not be achievable within the proposed schedule. While the facility could still be constructed, the timeline would likely be significantly extended beyond that outlined in the project plan.

The project will be fully matched with internal capital from SPGX, covering 100% of the non-CSEA funding portion, and 50% of the total project cost. Documentation of the company's available capital and commitment to support this project will be provided before disbursement, in compliance with CSEA 3.02.

CONFIDENTIAL INFORMATION

All information requested to be treated confidentially was placed in the separate Appendix document provided together with the main application document named "SPGX Application Appendix_CONFIDENTIAL" including the request for confidentiality.

PATENTS/RIGHTS TO TECHNICAL DATA

SPGX (the applicant) holds Patent No. DK181523 for the process used in this project, and has a pending U.S. patent for the same process. All intellectual property generated as part of this project—including inventions, improvements to the patent process, technical data, trade secrets, and any software or documentation—will remain the property of SPGX.

SPGX acknowledges that any inventions or patents developed under the Program will be subject to the provisions of CSEA-6.03 and CSEA-6.04. SPGX will retain full ownership of all intellectual property developed through the project. The State of North Dakota will have a non-exclusive, royalty-free right to practice such inventions for governmental purposes, and the applicant will make commercially reasonable efforts to offer North Dakota manufacturers fair market-value, royalty-bearing licenses to use any resulting technology, as required by the Clean Sustainable Energy Authority program.

STATE PROGRAMS AND INCENTIVES

SPGX has not participated in any programs or received incentives from the State of North Dakota within the last five years.



October 15, 2025

North Dakota Industrial Commission
ATTN: Clean Sustainable Energy Program
State Capitol – 14th Floor
600 East Boulevard
Bismarck, ND 58505-0840

Dear Clean Sustainable Energy Program,

Packet Digital is submitting the enclosed grant/loan application to request funding in support of the Clean Sustainable Energy Project, “Packet Digital LLC – North Dakota Lithium-Ion Battery Cell Manufacturing Plant” in the amount of **\$21,140,035 (\$2,297,376 Grant, \$18,842,659 Loan)**. Construction began in October 2024 at an 80,000-square-foot warehouse in Fargo, North Dakota, with commissioning and pilot production scheduled for June 2026 and full-scale production beginning in August 2026. The facility will have an initial production capacity of 24 MWh annually (approx. 2,000 cells per 8-hour shift), scalable up to 120 MWh annually (up to 15,000 cells per day). This project will create 60 direct construction jobs and sustain 33-100 long-term operations and engineering roles, with average salaries exceeding \$71,500. For this \$101 million project, Packet Digital has currently secured \$75 million in financing.

The development of high-performance US made Li-Ion battery cells for autonomous systems satisfies an Executive Order 14017 on strengthening U.S. supply chains and fulfills the 2025 National Defense Authorization Act (NDAA) requirement for domestic sourcing of critical defense components. End-to-end U.S. ownership of lithium-ion battery manufacturing is essential for national security, economic resilience, and the safety of the American people. The reliable, high-energy batteries produced by this facility will power a new generation of clean, sustainable Unmanned Aircraft Systems (UAS) and other autonomous technologies across air, space, ground, and underwater domains.

Should you have questions, I can be reached at 701-365-4421 or terri.zimmerman@packetdigital.com.

This letter sets forth a binding commitment on behalf of Packet Digital to complete the project as described in the application. We appreciate your consideration and continued support of North Dakota’s clean energy and advanced manufacturing initiatives.

Sincerely,

A handwritten signature in blue ink, appearing to read "Terri", is written over a light blue horizontal line.

Terri Gunn Zimmerman, CEO
Packet Digital, LLC
3241 University Dr. S
Fargo, ND 58104

Clean Sustainable Energy Authority
North Dakota Industrial Commission

Application

Project Title:

**Packet Digital – North Dakota Lithium-Ion
Battery Manufacturing Plant**

Applicant:

Packet Digital, LLC

Date of Application:

October 15, 2025

Amount of Request

Grant: \$2,297,376

Loan: \$18,842,659

Total Amount of Proposed Project:

\$100,827,845

Duration of Project:

36 months - Jan 1, 2023, to Dec 31, 2026

Point of Contact (POC):

Terri Zimmerman

POC Telephone:

701-365-4421

POC Email:

terri.zimmerman@packetdigital.com

POC Address:

3241 University Dr., Fargo ND 58104

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|--|-------------------|
| Abstract | 4 |
| Project Description | 5 |
| Standards of Success | 14 |
| Background/Qualifications | 15 |
| Management | 16 |
| Timetable | 17 |
| Budget | 19 |
| Confidential Information | 20 |
| Patents/Rights to Technical Data | 20 |
| State Programs and Incentives | 20 |
| Loan/Loan Guarantee Application (if applicable) | Appendix H |

ABSTRACT

Objective: Packet Digital proposes to establish an end-to-end lithium-ion battery cell manufacturing and research facility in Fargo, North Dakota. This project directly supports Executive Order 14017 and Executive Order “Unleashing American Drone Dominance”, the National Defense Authorization Act of 2025, and the mission of the North Dakota Clean Sustainable Energy Program by onshoring critical supply chain capabilities, reducing reliance on foreign sources of energy technology, and positioning North Dakota as a national hub for sustainable, advanced energy manufacturing.

The 80,000-square-foot Fargo facility, now under construction, will produce high-power and high-energy-density pouch cells for defense and aerospace systems. Operations will include material receiving, testing, assembly, formation cycling, quality assurance, and packaging. A co-located R&D center will develop next-generation chemistries - silicon-composite anodes with University of North Dakota (UND), NMC cathodes with rare earth element doping in partnership with UND, WellSpring Hydro, and Talon Metals, and graphene and synthetic graphite derived from North Dakota lignite with Energy & Environmental Research Center (EERC) - ensuring local resources and research play a central role in the U.S. battery supply chain.

Currently, over 95% of drone batteries are imported, mostly from China. Starting in 2027, the NDAA prohibits DoD contractors from sourcing Chinese-made cells. This project provides the secure, domestic alternative defense contractors need, serving customers such as Lockheed Martin, Anduril, Sierra Nevada, Griffon Aerospace, the U.S. Navy, and the U.S. Air Force and more.

Expected Results: The expected output at launch in July 2026 is approximately 2,000 cells per 8-hour shift (~24 MWh annually), with the facility designed for scalability to 15,000 cells per 24 hours (~150 MWh annually) by 2029, to produce high-performance pouch cells for uncrewed aircraft systems (UAS) and other defense and commercial applications and develop next generation batteries to maximize the utilization of local raw materials. These production capabilities will be supported by advanced cell attributes, including: **Energy density:** 250 - 350 Wh/kg, **Discharge rates:** 5 - 20C, **Operating temperature:** - 40 °C to +60 °C, **Applications:** drones, satellites, submersibles, light ground vehicles.

Construction began October 2024 and will be completed by June 2026. All permits are secured, contractors selected, and equipment procured. The project will create 33–100 skilled long-term jobs with average annual salaries over \$71,500, while supporting 60 construction jobs and building a lasting clean-energy manufacturing base in North Dakota.

Duration: The battery cell plant factory will be commissioned by July 2026, pilot runs are planned for Q3 of 2026, and production ramp up by Q4 2026.

Total Project Cost: \$100,827,845, financed through public and private sources, including: \$17 M CSEA loan, \$24.3 M bank financing, \$10 M Navy grant, \$14.8 M equity, \$5.4 M SBA 504, \$3.2 M Dakota Business Lending NMTC, and is requesting an additional \$21.1 M from CSEA and \$5 M from NDDF.

Participants: Packet Digital, US Navy, Rainbow Energy, NDSU, UND, EERC, WellSpring Hydro, Talon Metal, US Airforce Research Laboratory, Toyota and Lockheed Martin.

Impact: This project will strengthen U.S. energy security, reduce foreign dependence, and anchor a clean-energy technology ecosystem and supply chain in North Dakota, integrating local research (UND, NDSU, and EERC) and resources into national defense and commercial supply chains while creating high-wage jobs and advancing sustainable innovation.

PROJECT DESCRIPTION

Objectives:

The Packet Digital – Packet Digital - project is designed to directly support Executive Order 14017, which calls for the onshoring of critical supply chain components for advanced technologies, including lithium-ion batteries (Fig. 1), and the Executive Order *Unleashing American Drone Dominance* accelerating domestic drones manufacturing capability. It also responds to the National Defense Authorization Act of 2025, which prohibits Department of Defense contractors from sourcing batteries from China starting in 2026, and it advances North Dakota’s vision of becoming a national leader in both clean energy and unmanned aerial systems (UAS) technology.

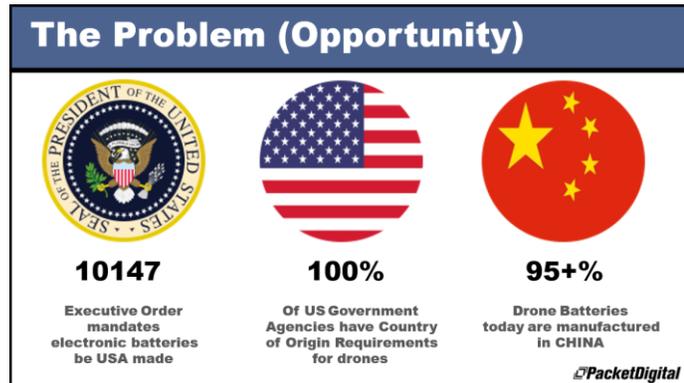


Figure 1: The Problem

Building on two decades of innovation at Packet Digital, a Fargo-based leader in smart batteries, charging systems, and fleet battery management, Packet Digital is constructing a lithium-ion battery cell manufacturing and research facility in Fargo, North Dakota. Construction began in October 2024, with completion expected in June 2026 and operations beginning in July 2026. The facility will provide end-to-end capabilities, including raw material receiving and storage, electrode preparation, cell assembly, formation cycling, quality assurance, compliance testing, and final packaging and shipping. A dedicated R&D center within the facility will develop next-generation chemistries, including silicon-oxide anodes, nickel-manganese-cobalt cathodes, and rare earth element applications, with a specific emphasis on maximizing the use of North Dakota’s raw materials and university research partnerships.

This capability is essential to the national defense and energy security of the United States. Lithium-ion batteries are integrated into nearly every Department of Defense platform, from soldier-carried communications equipment to drones, munitions, and satellites. Yet, more than 95% of drone batteries are currently imported, primarily from China, raising both supply chain and cybersecurity risks. Military platforms increasingly require batteries that not only deliver high performance but also communicate real-time system data. Ensuring that such critical power sources come from trusted domestic suppliers is vital to protecting U.S. defense systems from adversarial vulnerabilities.

The project requires approximately \$100 million in public and private financing to complete facility improvements, acquire manufacturing equipment, develop advanced production processes, and scale next-generation chemistries. The facility is projected to achieve profitability and positive cash flow within four years of full production.

Lithium-ion batteries are not only indispensable to defense applications but also to the future of the U.S. economy. They power electric vehicles, drones, munitions, soldier communications, and reconnaissance systems - technologies that are reshaping transportation, energy, and national security. However, the U.S. currently produces only about 1% of global lithium supply and less than 10% of global cell manufacturing capacity, according to the Department of Energy. With global demand projected to grow more than 500% by 2030, the establishment of a domestic cell production facility is vital to ensuring U.S. competitiveness, energy independence, and security.

The impact on North Dakota will be substantial. The project will create 50 construction jobs and between 33–100 long-term skilled manufacturing and engineering positions, with average annual salaries exceeding \$71,500. It will anchor a clean energy manufacturing ecosystem in the state, drive tax base growth, and expand workforce training opportunities through partnerships with the University of North Dakota, North Dakota State University, and the Energy & Environmental Research Center (EERC).

Finally, this project will serve as a measurable driver of U.S. competitiveness. By 2030, global demand for lithium-ion batteries is projected to grow by over 500%, yet the U.S. currently produces less than 10% of global cell capacity. By establishing this domestic facility, Packet Digital will reduce reliance on imports, accelerate the commercialization of advanced battery chemistries in partnership with WellSpring Hydro, Talon Metal, UND and EERC, strengthen U.S. national security, and position North Dakota as a national hub for clean, sustainable energy innovation.

Methodology: The Packet Digital project will establish a flexible, scalable, and secure lithium-ion battery cell manufacturing facility in Fargo, North Dakota. The methodology integrates facility design, equipment procurement, compliance, workforce development, advanced R&D, and phased commissioning to ensure the project is delivered on time and aligned with the objectives of energy sustainability, national security, and economic impact for North Dakota.

Facility Design and Production Flow: The facility has been designed to provide an end-to-end domestic supply chain for high-power, high-energy-density pouch cells. The production line will support:

- **Cell sizes from 3–30 Ah**, Thickness: 3 to 12 mm, Width: 43 to 100 mm, Length: 80 to 200 mm.
- Throughput of **2,000 cells per 8-hour shift at launch (~24 MWh annually)**, scalable to **15,000 cells per day (~120 MWh annually)**.
- Each manufacturing stage - electrode preparation, coating, calendaring, stacking, electrolyte filling, formation cycling, and testing - will be equipped with highly automated systems to maximize quality, consistency, and yield. The manufacturing process in Packet Digital factory is summarized in Fig. 2.
- Clean/dry room environments maintained at **- 40 °C dew point** will allow for compatibility with multiple chemistries, including **NMC, LCO, LFP, and advanced Si-C composites**.

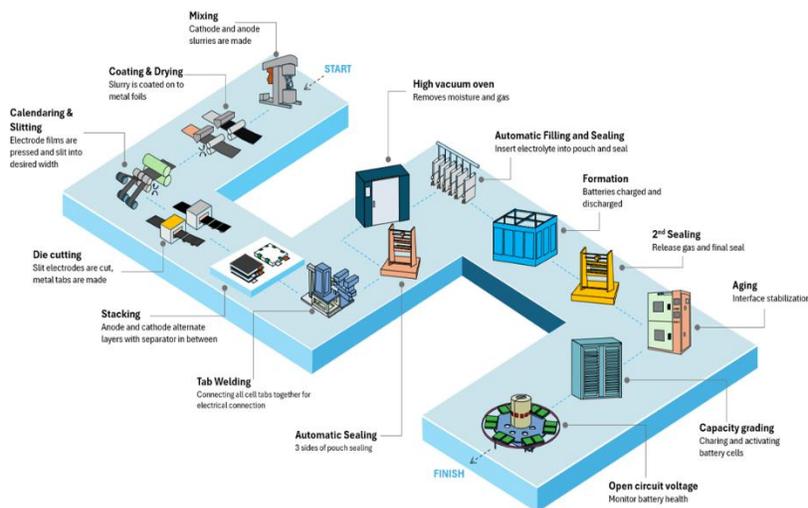


Figure 2: Packet Digital Li-ion cell manufacturing process process

Advanced R&D in house: A dedicated R&D center within the facility will ensure long-term innovation and technology transfer. Focus areas include:

- Next-gen silicon composite anodes and NMC cathodes to increase energy density and power density in collaboration with the University of North Dakota, WellSpring Hydro, and Talon Metal,
- Graphene-enhanced materials and synthetic graphite sourced from North Dakota lignite byproducts, in collaboration with both EERC and UND,

- Novel electrolytes to improve cycle life and thermal stability, aim of increasing the cycle life by 150% of the current specification and expanding the working temperature range to -50 °C to + 60 °C.
- Smart manufacturing AI algorithms for predictive maintenance and defect reduction.

Compliance and Safety: All facility design requirements were developed in collaboration with design firms specializing in lithium-ion battery manufacturing as well as local contractors and regulatory authorities to ensure full compliance with safety, environmental, and construction standards. Packet Digital has partnered with multiple professional consulting firms to support each aspect of the design and construction process, including YHR (Architectural), Sandman (Structural), MBN (Civil), KFI (Fire Detection and Protection), and CMTA (Electrical, Mechanical, and Plumbing). These partners have been instrumental in defining the plant layout, integrating process and equipment design requirements, and implementing all applicable codes and regulations. A summary of the technical and regulatory requirements used to initiate the design process is provided in the table below.

| Category | Item | Requirements and Parameters |
|---|--|---|
| 1. Production line capacity requirements | 1.1 Chemical platform | The manufacturing facility will need to be compatible with current and future development cell chemistries for Lithium-ion Batteries for drone and UAS applications, that provides extremely high power and high energy density. Cathode can be compatible with: pure LCO, LFP, NCM and high Nickel NMC. Anode can be compatible with Graphite and Graphite + Silicon/SiO/Si composite. |
| | 1.2 Production capacity requirement | (1) Starting at 2,000 pcs/8hrs (2) Expanding capability to 5,000 pcs/8hrs |
| | 1.3 Compatible size and capacity of the production line | The manufacturing line will be able to produce cells with following dimensions and capacity range: Dimensions: Thickness: 3 to 12 millimetres, Width: 43 to 100 millimetres, Length: 80 to 200 millimetres Capacity range: 3Ah to 30Ah |
| | 1.4 Flexible design needs of production line | Able to manufacture multiple pouch cell formats to meet customer needs. |
| | 1.5 Expansibility | The manufacturing capability would start with small capacity and production could be ramped up later by procuring more manufacturing equipment. |
| 2. Plant data and related requirements | 2.1 Plant size and existing layout | Drawings, survey of the building existing conditions. |
| | 2.2 Requirements for Fire protection standards | Fire protection standards required by the City of Fargo |
| | 2.3 Compressed air/Nitrogen configuration | Local regulation related to the use of Nitrogen gas. |
| | 2.4 Power distribution capacity and requirements | Energy/power consumption estimation for the plant, given the availability voltage ranges of 120V, 277V, and 480V 1-3 phases at the plant site. Temperature and humidity distribution in Fargo around the year. |
| 3. Equipment & materials requirements | 3.1 Requirements for manufacturing equipment and auxiliary equipment | Requirements for Manufacturing equipment and Auxiliary equipment |
| 4. Other related laws, regulations and licenses | 4.1 Air emission, water discharge | Investigate required air emission and water discharge permits |
| | 4.2 The treatment of hazardous waste, chemical substance and defective cells | Investigate the required regulations for treatment of hazardous waste, chemical substances and defective cells |
| | 4.3 Radioactive sources | In battery equipment, β -RAY are used in coating machine for anode, and X-RAY is used after stacking process. Local special requirements regarding the procurement and use of these radioactive sources. |
| 5. Certification systems | 5.1 Management system certification | Management system certification |
| 6. Software system | 6.1 Management software | Software for collecting and analyzing data collecting during the raw materials analyzing and manufacturing processes. |

Design: Technical data has been created to establish the target cell models with performance indicators reaching the levels for energy and power density requirements for unmanned aircraft, including cell formula, materials standards, material supplier lists, manufacturing instructions, standard operating

procedures, quality control plan, and failure modes and effects analysis (a step-by-step approach for identifying all possible failures in design, manufacturing process, and the manufactured product). The design of the production line and the process flow of battery production were optimized, considering the capacity, volume, power, **clean/dry room area** - which is the most **critical and expensive investment** - and airflow requirements of each piece of equipment, and expected output, functional module distribution, and overall plant layout (Fig. 3).

Local authorities have been supporting the Packet Digital battery cell plant project since the very beginning by providing comments and discussions on the requirements, allowing us to optimize our factory design. Packet Digital has secured all permits, including an air emission permit exemption (emissions are well below regulatory thresholds). The facility voluntarily complies with the latest fire codes for lithium-ion manufacturing, has completed a Dust Hazard Analysis, and incorporates advanced fire detection and dust collection systems. These measures ensure a safe, sustainable, and regulation-compliant operation. The final permit was issued in June 2025.

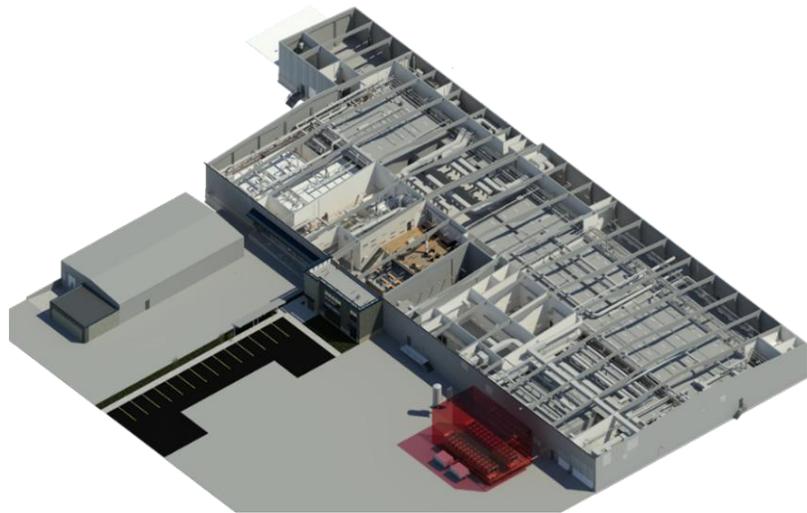


Figure 3: Packet Digital battery cell plant -3D rendering

Equipment Selection and Procurement: Packet Digital finalized procurement of over 125 pieces of equipment in April 2025, including:

- Auxiliary equipment: dehumidifiers, air handling units, dust collection systems, boiler, chiller, compressed air system, vacuum system, nitrogen system, waste gas treatment system, NMP recovery system, and heat recovery system.
- Performance and material testing systems: Cyclers (low and high current up to 600 Amps), thermal chambers, a full set of UN 38.3 testing equipment, SEM/EDS, particle size analyzer, surface area measurement, thermal camera, etc.
- Segmented automatic manufacturing line: mixers, coaters, calendaring/ splitting machines, die cutting machines, stacking, welding, packaging, X-ray machine, filling, sealing, formation, second sealing, and capacity grading machines.

This equipment was selected based on performance, automation capability, and cost efficiency. Factory Acceptance Tests (FATs) are conducted by Packet Digital representatives before shipment. Installation and commissioning will be completed with vendor technicians and Packet Digital engineers by **June 2026**. Fig. 4 shows the overall equipment layout inside and outside the plant.

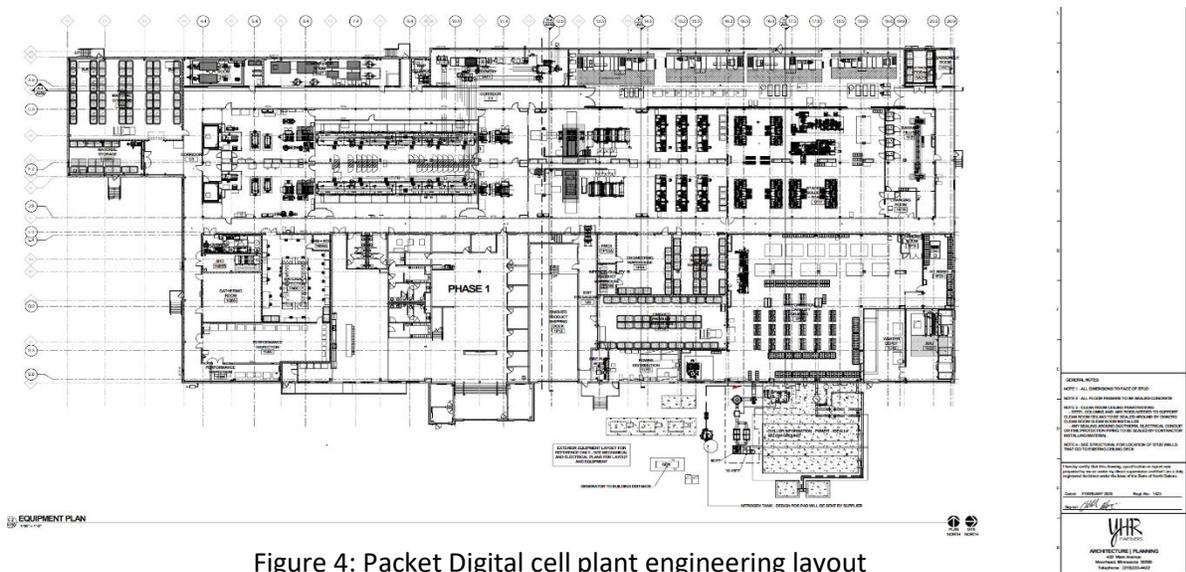


Figure 4: Packet Digital cell plant engineering layout

Workforce Development: Personnel - including design engineers, production managers, technicians, and quality control specialists - will be trained throughout the equipment installation and pilot production phases. Partnerships with NDSU, UND, and NDSCS will ensure workforce pipelines and opportunities for student internships and research collaborations.

Pilot and Mass Production: Two pilot production runs will validate yield, safety, and performance metrics, with verification periods for energy density (≥ 250 Wh/kg), cycle life (≥ 500 cycles), and thermal performance. Upon successful verification, the facility will transition to mass production in October 2026, initially operating one shift per day before expanding to three shifts, five days per week.

Updated Packet Digital project progress through October 2025: Fig. 5 summarizes the main progress of our project, which includes both manufacturing and R&D facilities.

Evaluation and Success Metrics:

Project success will be measured at defined checkpoints:

- Construction Completion (June 2026): Facility fully built, inspected, and commissioned.
- Pilot Production (Q3 2026): Verification of output, yields, and energy density.
- Mass Production (Oct 2026): 24 MWh annual capacity achieved.
- Scale-up (2028–2029): Expansion to 120 MWh annual capacity.
- Workforce Development: Hiring of 33 - 100 full-time employees, averaging \$71,500 annual salary.

| Items | Percentage | Status | Timeline to |
|---|------------|-------------|-------------|
| Factory Engineering Design: Construction design | 100% | Finished | June 2025 |
| Clean/Dry room Construction Design | 100% | Finished | Feb 2025 |
| Obtain necessary permits from related authorities | 100% | Finished | June 2025 |
| Manufacturing Equipment Ordering progress | 100% | Finished | April 2025 |
| MEP Equipment Ordering Progress | 60% | Ontrack | Oct 2025 |
| Factory Construction | 50% | Ontrack | Dec 2025 |
| Clean/Dry room Procurement/Construction | 30% | Ontrack | March 2026 |
| MEP Construction | 25% | Ontrack | April 2026 |
| Equipment Installation and Commissioning | 0% | Not Started | Mar 2026 |
| Pilot Run | 0% | Not Started | Jun 2026 |
| Project Acceptance | 0% | Not Started | Oct 2026 |
| R&D center starts to operate | 80% | Ontrack | April 2026 |

Figure 5: Packet Digital cell plant project status –Oct 2025

- Sustainability: Emissions kept below regulatory thresholds, waste managed via best practices, and local materials integrated into the supply chain.

This structured methodology ensures that Packet Digital will deliver a world-class, sustainable, and secure lithium-ion manufacturing facility that achieves technical, economic, and environmental objectives while creating lasting value for North Dakota.

Anticipated Results: Anticipated results is an end-to-end Li-Ion battery R&D and manufacturing facility in North Dakota to produce the best-in-class extreme high power and high energy density batteries for autonomous systems, creating a domestic UAS supply chain, reducing dependence on foreign adversaries. This will position North Dakota as a national leader in defense and clean energy manufacturing. Upon award Packet Digital will conclude the construction process and commence the equipment installation and commissioning, staffing and training of personnel, pilot production runs, verification, and ultimately mass production, operation, and ongoing maintenance of the facility. Packet Digital expects to begin operations of the proposed cell factory within 12 months of funding approval. Prior to single shift operation, the battery cell team will expand from currently 6 to 33 employees. At three shifts of operation, our manufacturing and R&D facilities will create up to 100 high-paying jobs for the local communities. Fig. 6 provides an overview of the ongoing construction at our cell plant.

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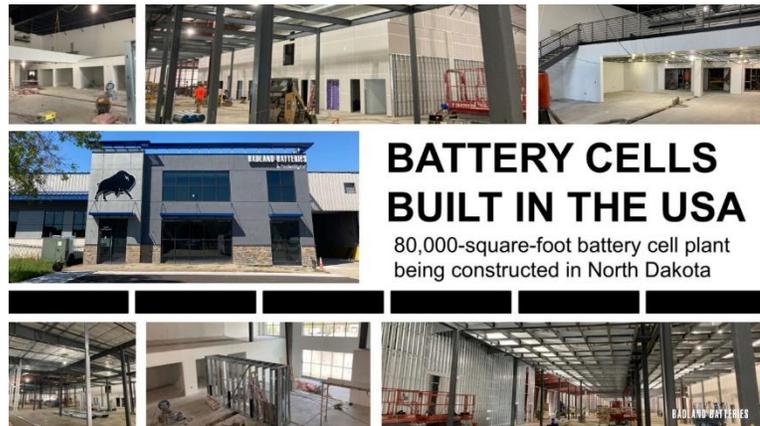


Figure 6: Packet Digital cell plant construction update

Multiple advanced material research and development projects in collaboration with UND, WellSpring Hydro, and Talon Metal will also be initiated. These projects aim to combine Li_2CO_3 from oilfield brine, a byproduct of oil production (WellSpring Hydro), Rare Earth Elements (REEs) including Cobalt (UND), and Nickel based material (Talon Metal) and coal (EERC) to synthesize Cathode materials such as Lithium Cobalt Oxide and Lithium Nickel Manganese Cobalt Oxide and Anode materials such as synthetic graphite and graphene. These materials provide an excellent opportunity for partnership to create a local critical material supply chain for our cell factory. Fig. 7 explains Packet Digital's supply chain strategy in collaboration with local companies and out-of-state customers.

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Facilities: The 80,000 sq ft. new cell manufacturing plant is currently under construction at 1358 39th N, Fargo, ND, which is relatively close

Supply chain – A state effort



Figure 7: Packet Digital Supply strategy

to Packet Digital’s engineering and prototyping location on University Drive South, and to their 25,000 sq ft. manufacturing and assembly plant on 7th Ave North. The facility is purpose-built to support the manufacturing process required for cell assembly and supports expansion through a modular expansion model. The building will include engineering/administrative, multiple material warehouses for different types of materials, engineering warehouse, mechanical, and auxiliary rooms. The heart of the facility is a 29,000 sq ft. high-performance clean/dry room housing current and next generation cell manufacturing, material testing facility, cell performance testing facility - including brand new equipment to perform UN 38.3 test on cells - and a 7,000 sq ft R&D center for material study and cell prototyping located at the same address.

Resources: Packet Digital will call upon its experienced resources, developed partnership resources, and its geographic location.

Expertise – Packet Digital has been working on power solutions since its inception 22 years ago and with decades of experience building high performing power solutions for military and consumer solutions and is acutely aware of current and future requirements. Currently, Packet Digital is developing the power safety standards for the US Navy Fleet for batteries, charging, stowage, and transport, as well as developing power solutions with the US Air Force to be deployed in space, in addition to multiple commercial and battery customers. Packet Digital has a broad range of customers to draw upon for requirements capture. Packet Digital has battery and engineering expertise and is adding additional battery chemistry capabilities.

Developed Partnerships – Packet Digital has established a robust network of strategic partnerships to support the design, commissioning, and operation of the new lithium-ion battery cell manufacturing facility in Fargo, North Dakota. These collaborations provide technical expertise, material supply, workforce training, and testing capabilities essential to the project’s success. Letters of support have been secured from the U.S. Navy, U.S. Air Force Research Laboratory, Rainbow Energy, Lockheed Martin, EERC, WellSpring Hydro, Talon Metals, Toyota, UND, and NDSU.

Defense and Industry Partnerships: Collaboration with the U.S. Navy, U.S. Air Force, Lockheed Martin, Toyota, and other commercial partners enables direct alignment of the facility’s design and production requirements with Department of Defense and commercial customer standards. These partnerships accelerate the definition of performance specifications, support technology validation, and ensure secure, U.S.-based supply of mission-critical batteries for defense and commercial applications.

Raw Material & Supply Chain Partnerships: Packet Digital is forming strategic collaborations with WellSpring Hydro, Talon Metals, and Rainbow Energy to establish a domestic, sustainable materials supply chain for high-performance battery production. These partnerships will provide lithium carbonate, “Green Nickel™”, cobalt, and rare-earth materials while reducing dependence on foreign sources and leveraging North Dakota’s resource capacity. Through these collaborations, Packet Digital will secure key raw materials, streamline logistics, and support the emergence of a vertically integrated battery manufacturing ecosystem in North Dakota.

Research & Academic Partnerships: Packet Digital is collaborating with the UND, NDSU, and EERC to strengthen R&D, workforce development, and local resource utilization. UND contributes expertise in energy storage systems, advanced materials, and lithium-ion battery technologies, as well as access to its state-of-the-art material testing facility and workforce joint development. Joint research will focus on integrating locally derived materials - such as silicon oxide/composite, and rare earth elements from North Dakota lignite, NMC cathode materials - into next-generation cell chemistries. NDSU provides state-of-the-art laboratory and testing facilities, supporting prototype validation, reliability testing, and materials characterization for high-performance battery cells. EERC brings experience in extracting rare

earth elements and producing synthetic graphene from lignite. Packet Digital will collaborate to test and incorporate EERC-developed materials into cell development. Together, these partnerships will accelerate innovation, develop North Dakota's clean-energy workforce, and anchor a sustainable battery technology ecosystem in the region.

Commercial Partnerships: Packet Digital's long-standing relationships with Lockheed Martin, Anduril, Kraus Aerospace, PteroDynamics, Shield AI, L3Harris, and Skyways bring both commercial and defense-sector expertise to the requirements development process. These customers represent strong early demand for U.S.-made, high-performance lithium-ion cells and are expected to support significant production volumes once the Fargo facility becomes operational.

Geographic Locations – The Packet Digital manufacturing facility is located in an industrial zone in Fargo, North Dakota, with direct access to Interstate 29 and rail infrastructure, enabling efficient transportation of raw materials and finished products. North Dakota provides an ideal environment for battery manufacturing. The state offers abundant industrial land, a cool climate that supports thermal control during production, and a business-friendly regulatory environment. It has also made significant, synergistic investments in Uncrewed Aircraft Systems technology, including designation as one of the seven FAA national UAS test sites and participation in the U.S. Department of Transportation's UAS Integration Pilot Program. North Dakota is also among the first states to deploy statewide Beyond Visual Line of Sight network, reinforcing its leadership in autonomous systems. As a leading energy-producing state, North Dakota is actively investing in domestic raw material processing, which Packet Digital will leverage to strengthen the regional battery supply chain. The presence of NDSU and the UND - both with advanced research programs in battery science and energy systems - provides a steady pipeline of technical talent and a foundation for continued innovation and workforce development.

Techniques to Be Used, Their Availability and Capability: While lithium-ion battery cell manufacturing is complex, it is a well-established process supported by a mature global supply chain and proven production methodologies. Each cell chemistry presents unique design and manufacturing challenges; for UAS applications, cells must combine high power density for takeoff and landing with ultra-low weight for extended flight duration.

To address these requirements, Packet Digital has established technical partnerships with leading domestic and international battery producers, ensuring access to state-of-the-art process knowledge, training, and equipment commissioning support during the factory ramp-up phase. The Fargo facility will employ specialized cathode and anode formulations, optimized for high-rate performance and thermal stability. A proprietary electrolyte system will enable safe, high-discharge operation under demanding conditions. The manufacturing process integrates Standard Operating Procedures - over 200 in total - covering electrode coating, electrolyte injection, cell assembly, formation cycling, inspection, and quality assurance. Each process incorporates in-line quality control and failure-mode analysis, ensuring consistent output and traceability.

Partnering with leading battery manufacturing companies provides Packet Digital with a solid foundation to safely start and ramp up its production technology. In parallel, Packet Digital is developing in-house R&D capabilities to advance proprietary cathode, anode, and electrolyte chemistries. The company's cell technology roadmap (Fig. 8) defines annual development milestones through 2030,

positioning Packet Digital and Packet Digital as leaders in UAS battery innovation and domestic cell manufacturing.

Packet Digital is a highly experienced producer of very high energy density battery packs and has attained up to 10X the cycle life of most drone batteries available today with smart power management capabilities and patented unique algorithms with proof points including:

- A 30 – 40% increased performance/efficiency for **Lockheed Martin** with 10X cycle life
- Software that automatically manages battery health of fleet of batteries for **Bell Helicopter** for commercial 100-pound payload UAS
- High efficiency batteries for **Anduril**, a DoD contractor for border protection
- Extended endurance from 90 minutes to 15-18 hours on **US Marine Corps** program
- Achieved multi day flight for **OSD Operational Energy Office**.
- Enhanced reliability and doubled endurance on Talon (UAS platform) for **NAVAIR**
- Designing battery for space power beaming for **Northrop Grumman SSPIDR** and designing next generation power solution for **AFRL** and their suppliers for small spacecraft.
- Designing battery for a sea glider drone that flies and submerges for 6 months for **NRL**.
- Developing drone batteries and chargers for the **Navy fleet**.

In addition, Packet Digital has built a team with experts in battery cell chemistry and will continue to add to their team additional personnel with experience in battery manufacturing, production, and QA/QC.

Environmental and Economic Impacts while Project is

Underway: The Packet Digital team has been actively working with State officials and local authorities in identifying the potential impacts on the environment, such as air emissions during operation, wastewater discharge, and utilities consumption and in partnership with leading experts it was determined our project has very little impact on the environment. Air emissions are well below the limit so that it is exempt from permitting. The facility requires a small amount of water and gas supply during operation.

From an economic point of view, we are working with multiple trades (local engineering consultants) and construction workers in developing the new facility, resulting in 100's of thousands of labor hours during the construction phase. In the first three years into production, this manufacturing plant will require over 200,000 hours of labor from current and future hires, with a go-forward rate of approximately 120,000 hours per year.

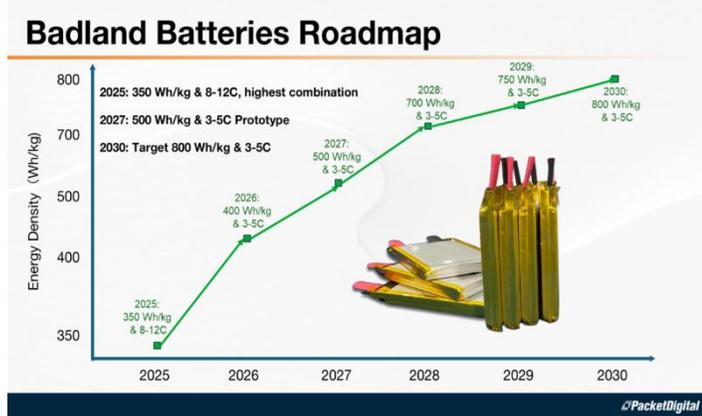


Figure 8: Packet Digital cell technology road map



Figure 9: Packet Digital customers



Ultimate Technological and Economic Impacts: This project will create the foundation for a center for excellence, a battery technology innovation center in North Dakota. The need for lighter, safer, and more powerful battery technology is a never-ending journey. By providing leading technology from a US source with end-to-end supply chain ownership it is our goal to push the boundaries of battery technology and research, development, and delivery faster than anyone in the market. Packet Digital will create clean sustainable energy jobs, wealth, and tax revenues for North Dakota. The cell plant will attract and retain talent to North Dakota. Packet Digital will promote the efficient, economic, and environmentally sound development and use of North Dakota's energy resources, materials, and products to maximize the market potential for clean sustainable energy resources and associated byproducts.

Why the Project is Needed: This effort is essential to support a critical national security issue and enable us to produce critical components of battery production for the US military in the United States. In addition, this project has a solid business case: the \$8 billion drone battery market is growing at 20.4% CAGR and is expected to grow to \$42 Billion in 2034. With a large growing market, the strong push for US made solutions, the demand from our military and commercial customers for US made cells, and Packet Digital's battery expertise, this plant will achieve profitability and be cash flow positive in four years.

Packet Digital brings more than a decade of experience in advanced power and energy solutions, supporting both military and commercial applications. Over the past 11 years, the company has built strong relationships with defense and industry partners and assembled a proven leadership team capable of executing complex technology programs and ensuring the success of this project. This funding, when combined with private funding, will enable Packet Digital to execute on this critical project for our national security and the safety and independence of the American people.

STANDARDS OF SUCCESS

The success of the Packet Digital project will be measured by its ability to deliver clear environmental, economic, job creation, and technological benefits for both North Dakota and the United States.

Emissions Reduction and Environmental Impact: At the foundation of this project is the commitment to reducing emissions and minimizing environmental impacts. By establishing a domestic manufacturing facility for lithium-ion cells, the company will eliminate the need for overseas shipping of imported batteries, which today make up more than 95% of the drone power supply chain and are predominantly sourced from China. This reduction in transport alone is expected to save hundreds of metric tons of carbon dioxide annually. Furthermore, the new facility will utilize energy-efficient production systems, including NMP recovery, heat recovery, and AI-driven quality control and predictive maintenance, which together will reduce waste, optimize equipment use, and further decrease the overall energy footprint compared to legacy facilities abroad.

Increased Energy Sustainability: Another measure of success lies in the project's contribution to energy sustainability. Packet Digital will produce advanced lithium-ion cells with higher energy density and longer lifespans, meaning fewer replacements are needed over the lifetime of defense and commercial platforms. This durability reduces waste while improving mission readiness. The integration of silicon anodes, high-nickel cathodes, and novel electrolyte systems in second-generation products will represent a step-change in performance, while the use of locally sourced graphene from Lignite mines in North Dakota strengthens material sustainability and creates a vertically integrated, resource-efficient supply chain.

Value to North Dakota: The project also carries significant value for the state of North Dakota. With a capital investment of \$100 million, the manufacturing facility represents one of the largest clean energy infrastructure projects in the region. It generates 60 direct construction jobs during the buildout phase

and sustains between 33 and 100 permanent high-skill positions once the plant is in full operation. These positions, which average salaries above \$71,500 annually, will provide strong, stable employment opportunities that will retain skilled workers in the state while attracting new talent. Workforce training partnerships with North Dakota State University, the University of North Dakota, and the North Dakota State College of Science will prepare students and workers for careers in advanced clean energy manufacturing, positioning the state as a hub for lithium-ion battery expertise. In addition, partnerships with Rainbow Energy, Wellspring Hydro, and Talon Metals will promote vertical supply chain integration, enabling the use of locally sourced raw materials in Packet Digital's products. This collaboration strengthens North Dakota's role in the domestic energy supply chain and reinforces its leadership in clean, secure, and sustainable energy development.

Public and Private Sector Utilization: A further standard of success is the adoption of the facility's products by both public and private sector customers. On the public side, the U.S. Navy and Air Force will begin integrating the cells into defense platforms as soon as 2026, in compliance with the National Defense Authorization Act of 2025, which prohibits the use of Chinese batteries in defense applications. Major defense contractors, including Lockheed Martin, Anduril, Sierra Nevada, Griffon Aerospace, and Kraus Aerospace, have already expressed interest in the plant's output and are anticipated to become early adopters. On the private side, commercial drone fleets and aerospace companies will benefit from the high energy density and reliability of these cells, with pilot deployments expected to begin in 2026 and large-scale adoption following in 2027.

Commercialization Potential: Commercialization potential represents another benchmark for project success. By establishing the first U.S.-based cell manufacturing facility dedicated to drone and defense applications, Packet Digital will capture a critical share of the domestic market while opening opportunities to expand into adjacent markets such as renewable energy storage. Projections show the facility will achieve profitability within four years of operations.

Advancing Research and Development in North Dakota: The project will have an impact on research and development within North Dakota. Packet Digital will strengthen ongoing collaborations with NDSU, UND, EERC, WellSpring Hydro, and Talon Metals to pioneer advancements in cathode and anode materials, novel electrolytes, and AI-driven smart manufacturing. These partnerships will accelerate the development of technologies that both reduce the environmental impacts of energy production and improve the sustainability of energy delivery systems in the state.

Job Preservation and Creation: Finally, success will be measured in terms of job preservation and creation. The facility will preserve high-technology positions currently at Packet Digital while creating 33 - 100 new permanent roles in Fargo. Beyond direct employment, the project is expected to generate indirect jobs across supply chains, construction, logistics, and services, producing a multiplier effect that will deliver sustained economic benefits for North Dakota.

Alignment with Program Mission: Taken together, these outcomes demonstrate how the Packet Digital project fulfills the mission of the Clean Sustainable Energy Program: reducing environmental impacts, leverages North Dakota's natural resources and byproducts: graphene, synthetic graphite, rare earth elements, and lithium carbonate, enhancing energy sustainability, creating new economic opportunities, and strengthening U.S. national security.

BACKGROUND/QUALIFICATIONS

Packet Digital is an engineering firm with over two decades of experience in designing and building power management solutions for autonomous systems and has market leading military and commercial customers. Packet Digital has developed patented innovative algorithms that bring advanced power system performance to many applications. Packet Digital has integrated these algorithms into smart batteries and secured a patent for our Smart Batteries that have extended life. We have also developed innovative algorithms for our Maximum Power Point Tracking power system for unmanned aerial

systems (UAS). One of the key differentiators of our technology is that it offers active power savings, meaning the circuitry does not have to be put into sleep mode to save power. This is critical in UAS applications because of the importance of maintaining full functionality while in flight. With our technology, we have extended battery life 400% in wireless sensors, 40% in a portable radio for the military, and reduced power consumption by 20% in data center servers. We are bringing expertise to building power efficient systems and intelligent power management algorithms for autonomous systems in the air, space, ground, and underwater.

After Packet Digital's success with military radios, the US Marine Corp called on Packet Digital in 2014 to extend endurance in an existing UAS platform. Packet Digital built high performance battery systems and a Maximum Power Point Tracking System and successfully extended the flight times of the UAS from 90 minutes to 15-18 hours. Following this program, the Office of the Secretary of Defense called on Packet Digital for further innovations to extend flight times through the night and Packet Digital's power systems successfully enabled multiple days of flight time on this military UAS program. The visibility from these programs enabled Packet Digital to begin securing commercial customers. In collaboration with Lockheed Martin, Packet Digital improved power efficiency by 30% and cycle times to 10X of any battery Lockheed had ever worked with. Today, Packet Digital has contracts to set the battery and charging and safety standards for UAS power solutions for the US Navy Fleet (adding 5 new drone manufacturers as customers), to create power solutions for the Airforce Research Laboratory's space efforts, and with multiple commercial companies including Anduril, Lockheed Martin, Kraus Aerospace, Pterodynamics, L3 Harris, Shield AI, Skyways, and Textron Systems. All of Packet Digital's customers are seeking a US made end-to-end battery solution including battery cells from Packet Digital.

Packet Digital has a very experienced team including key personnel:

Terri Zimmerman, Experienced CEO | Board Member | Leader with a demonstrated history of success with 30 years of working in the power, batteries, application-specific integrated circuits, software, unmanned systems industries. Strategic financial leader experienced at assessing, planning, and implementing large-scale projects with key alliances raising more than \$600 Million in capital. Industry Chairperson of Research Institute of Autonomous Systems. Appointed by three governors to state economic development boards. Previous experience at Deloitte & Touche and C-Level executive at Great Plains Software.

Andrew Paulsen, CTO. Mr. Paulsen has led the development of new products and technologies since 2005. Extensive research, testing, and product development expertise in the batteries, power algorithms and power electronics, including air and ground based solar powered vehicles, batteries & electronics, and other technologies enabling electrification and autonomy.

Matt Steele, Director of Operations. 15+ years designing and manufacturing advanced electronics with an education in engineering and business.

Peng Liao, PhD, Director of Cell R&D, 23+ years of experience in Auto, Mobile, and Aviation batteries - R&D and mass production lines at leading battery facilities.

Tan Nguyen, PhD, Director of Battery Cell Plant, 15+ years of experience in standing up R&D and manufacturing facilities in Li-Ion batteries.

Matt Sather, Director of Marketing, 12+ years of sales, marketing, and vendor management in the UAS and E-Commerce market.

Other participants in the project include:

The US Navy is a key participant in the project providing both expertise and requirements as well as funding. The US Navy is funding a separate project for standardized batteries to be utilized in the Navy Fleet for all UASs. For this project, the Navy will provide matching dollars of \$9,996,000 for engineering labor, facility improvement, and inventory costs.

WellSpring Hydro, Talon Metal, and Rainbow Energy will provide raw materials and UND will assist in synthesizing cathode materials and anode Silicon composite materials. Packet Digital will provide prototype cells at our R&D facility to test and quantify the performance of the raw materials.

MANAGEMENT

Packet Digital has established a management and oversight structure designed to ensure that this project is executed on schedule, within budget, and with full alignment to its objectives.

Project Oversight

The project will be directed by Terri Zimmerman, CEO of Packet Digital, who will provide executive oversight of financing, customer engagement, and strategic alignment. Andrew Paulsen, CTO, and Peng Liao, Director of Cell R&D, will oversee cell design, R&D progress, and compliance with defense performance standards. Tan Nguyen, Director of Cell Plant, will oversee technical elements of the project, including, timeline, technology transfer, personnel hiring plan, construction progress in coordination with different trades, equipment procurement, installation, commissioning, and transition to full production.

To ensure accountability, a dedicated Program Management Office (PMO) was established within Packet Digital. The PMO coordinates daily/weekly activities, met with General Contractor and Sub-contractors weekly, tracks progress against schedule and budget, and reports monthly to the executive team and quarterly to the Board of Directors.

The project is managed according to industry best practices in systems engineering and program management, including:

- Baseline scheduling and Gantt tracking of milestones from construction through mass production.
- Earned Value Management (EVM) techniques to track budget adherence and progress.
- ISO 9001 / AS9100 quality management systems, ensuring traceability and compliance with aerospace and defense requirements.
- Risk management protocols, with identification, mitigation, and escalation processes in place for technical, financial, or operational risks.

Weekly internal reviews will track short-term deliverables, while monthly stakeholder reviews will assess broader progress. The Clean Sustainable Energy Authority administrators will be provided with updates on progress against milestones, and risks addressed.

Continuous Improvement

Moving forward into operation, Packet Digital will employ a continuous improvement process using data from AI-driven quality control systems. Process metrics such as yield, defect rates, and downtime will be reviewed weekly, ensuring proactive improvements and alignment with DoD and commercial customer requirements. Through this structured management approach, coupled with transparent reporting and clearly defined evaluation points, Packet Digital will ensure that the project is carried out efficiently, meets its technical and commercial objectives, and delivers measurable benefits to North Dakota and the United States.

TIMETABLE

The project is structured around phased milestones, with each phase including measurable evaluation points to track progress and success. The left most green bar indicates the quarter when a task in the project started and the right most bar for a task indicates the quarter in which we expect the work to complete. The completed items are in green, while items to be completed are in blue.

The project will be evaluated against a series of defined checkpoints, including:

Construction Milestone (Q3 2024–Q1 2026): Completion of 80,000 sq. ft. facility upgrades, including dry/clean rooms, warehouses, office expansion, and R&D center. Success will be measured by building inspection approvals and readiness for equipment installation.

BUDGET

The total development cost of the Packet Digital project is \$100,827,845, financed through a combination of public and private sources. This budget reflects the high degree of safety, automation, and environmental compliance required for lithium-ion cell manufacturing. The first column describes the expense, and the first row shows the contribution from different stakeholders.

| Expense | NDIC | Packet Digital | PD - Navy | Bank Sponsor | SBA 504 | NMTC | NDDF | NDIC-2 | NDIC-2 Grant | Sum Total | % |
|---------------------------------|---------------------|---------------------|--------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|-----------------------|-------------|
| Land/Building | \$1,470,000 | | | \$5,880,000 | | | | | | \$ 7,350,000 | 7% |
| Improvements | \$1,377,483 | \$237,459 | \$2,200,000 | \$12,463,500 | \$5,381,200 | | \$5,000,000 | \$12,794,389 | | \$ 39,454,031 | 39% |
| R&D | | | | | | | | | \$2,297,376 | \$ 2,297,376 | 2% |
| Interest | \$511,661 | \$848,543 | | | | | | | | \$ 1,360,204 | 1% |
| Fees | \$106,781 | \$138,062 | | | | \$868,103 | | | | \$ 1,112,946 | 1% |
| Equipment | \$7,305,400 | | | \$5,961,213 | | \$2,305,897 | | \$1,048,270 | | \$ 16,620,780 | 16% |
| Inventory | \$56,340 | \$2,419,868 | \$476,471 | | | | | | | \$ 2,952,679 | 3% |
| Technology, Consulting, Patents | \$6,172,335 | \$6,827,665 | | | | | | \$5,000,000 | | \$ 18,000,000 | 18% |
| 1st Yr Eng & Exp | | | \$620,000 | | | | | | | \$ 620,000 | 1% |
| 2nd Yr Eng & Exp | | | \$1,059,040 | | | | | | | \$ 1,059,040 | 1% |
| 3rd Yr Eng & Exp | | | \$3,228,988 | | | | | | | \$ 3,228,988 | 3% |
| 4rd Yr Eng & Exp | | \$4,360,300 | \$2,411,501 | | | | | | | \$ 6,771,801 | 7% |
| Total | \$17,000,000 | \$14,831,897 | \$9,996,000 | \$24,304,713 | \$5,381,200 | \$3,174,000 | \$5,000,000 | \$18,842,659 | \$2,297,376 | \$ 100,827,845 | 100% |
| % | 17% | 15% | 10% | 24% | 5% | 3% | 5% | 19% | 2% | 100% | |

Facility costs (Land/Building and Improvements): The Fargo facility is being designed to meet the stringent safety and performance requirements of lithium-ion battery production, including the construction of clean and dry rooms at - 40 °C dew point. These specialized environments, which account for a significant share of construction costs, are essential to ensuring both a safe workplace and the consistent quality of finished cells.

Equipment costs: The project requires highly specialized, automated equipment for electrode preparation, coating, calendaring, stacking, electrolyte filling, formation cycling, and testing. Equipment selection was made in consultation with experienced industry partners to ensure both safety and performance. All major equipment was procured in April 2025, and manufacturing is underway at supplier facilities. Delivery is expected by March 2026, followed by installation and commissioning.

Labor Costs: Personnel costs are phased in over the first three years of operation. Initial hiring focuses on engineers and technicians to support equipment installation and pilot production. Full workforce ramp-up to 100 skilled employees will occur as production scales. Average salaries are projected at \$71,500 annually, ensuring high-quality employment opportunities in North Dakota.

Technology Transfer: The budget includes provisions for technology transfer from partners, ensuring efficient startup and process optimization. In parallel, a dedicated R&D program will advance next-generation chemistries (SiOx, NMC, graphene-enhanced electrodes) and expand long-term production capability.

Financing Sources: The \$100,827,845 project is funded through a combination of secured and pending sources, including: \$17.0M – Clean Sustainable Energy Program loan (secured), \$24.3M – Private bank loan (secured), \$10M – Navy grant (secured), \$15M – Equity contributions from owners, \$5.4M – SBA 504 program (pending), \$3.2M – Dakota Business Lending NMTC program (secured), \$21M – Additional requests (this application), \$5.0M – NDDF request (pending).

Detailed project budgets have been created, providing further backing for the expenses we have documented and can be made available if needed.

The cost and complexity of this project is high and without funding near the requested levels it would be difficult for us to proceed with this much-needed capability.

CONFIDENTIAL INFORMATION

We are requesting that some of the information in our submittal package be kept confidential. Please see attached confidentiality request template.

PATENTS/RIGHTS TO TECHNICAL DATA

Packet Digital reserves the right to file patents related to the intellectual property generated from this proposal and will work with legal counsel to determine if additional patents could be filed. Our power management algorithms and methodology are protected by our patent portfolio. We also have copyrights and our registered trademarks include On-Demand Power®, PowerSage®, and Packet Digital®.

STATE PROGRAMS AND INCENTIVES

Below are the State Programs that we have participated in within the last five years:

Clean Sustainable Energy Authority – 2% Interest Loans program of \$17,000,000 starting from 2023.

North Dakota Development Fund – Revolving Working Capital Available Line of Credit of \$500,000 from 2006 to 2021– Paid off Feb 2, 2021.

North Dakota Development Fund and Bank of North Dakota (New Venture Fund) – Preferred Equity invested of \$999,999 Oct 19, 2009. On May 25, 2022, an agreement was made to commence repayment. Accrued dividend payment of \$300,000 has been paid, and payments to return equity to the state on term schedule have commenced – Current balance \$829,817.

Bank of ND Interest Rate Buydown– PACE Program – 3241 University Dr S, Fargo ND \$200,000 – May 4, 2021, running for 81 months.

Bank of ND Interest Rate Buydown – PACE Program – 704 38th St N, Fargo ND – commenced July of 2024

North Dakota Renewable Energy Council – Solar Soaring Phase I, II, III - \$1,225,000 - Feb 2017 – Aug 2017 – Naval Research Lab and US Marine Corp provided matching dollars for UAS power systems. The first extended endurance UAS power system built by Packet Digital.

North Dakota Renewable Energy Council – Portable Solar Array Modules Phase I & II – \$1,000,000 - May 2018 – Sep 2020 – DoD contractor and Naval Research Lab through Office of Secretary of Defense provided matching funds - last customer revisions occurred Sept 2023. Systems currently shipping to customers.



October 15, 2025

State of North Dakota
The Industrial Commission
Clean Sustainable Energy Authority Program
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Re: The Forge Project – Application for Loan Funding

Dear Members of the North Dakota Industrial Commission and the Clean Sustainable Energy Authority:

AmeriCarbon Forge, LLC (“AmeriCarbon Forge”) is pleased to submit this application for grant and loan funding under the Clean Sustainable Energy Authority (CSEA) program for The Forge Project, a first-of-its-kind commercial manufacturing facility to produce Eco-Pitch™ — a patented and proprietary engineered coal tar pitch derived from North Dakota lignite coal.

The Forge Project will establish a new value-added industry in North Dakota, transforming a locally abundant natural resource into high-performance carbon materials used across industrial, infrastructure, and defense applications. The facility will be located near the Falkirk Mine and Coal Creek Station, leveraging regional energy and mining infrastructure to maximize efficiency and economic impact.

AmeriCarbon’s proprietary Liquid Carbon Process converts lignite into Eco-Pitch™, a clean, carbon-rich material that can be further refined for applications ranging from EV battery anode binders to asphalt binders and specialty defense carbon products. When operational, The Forge Project will:

- Establish North Dakota as a national hub for advanced carbon manufacturing.
- Create dozens of high-value jobs in McLean County and generate long-term economic benefits across the regional supply chain.
- Provide a foundation for integration with rare earth element (REE) recovery operations led by AmeriCarbon’s affiliate, Ore Spring Materials, LLC, strengthening domestic critical-materials supply chains.

AmeriCarbon Forge will be a joint development effort between AmeriCarbon Enterprises, LLC and NACCO Industries, Inc., combining advanced technology leadership with deep North Dakota operating experience. The total project cost is estimated at \$80–100 million, with approximately 20% equity and 80% debt anticipated.



(888) 367-1650



www.americarbon.com



3001 City View Drive
Morgantown, WV 26501

This transmittal letter sets forth a binding commitment on behalf of AmeriCarbon Forge, LLC to complete the project as described in the accompanying application if the North Dakota Industrial Commission approves the requested funding under the CSEA program.

We appreciate the Commission's continued support for innovation in lignite-based energy and manufacturing and look forward to the opportunity to bring this transformational project to life in North Dakota.

Sincerely,

AmeriCarbon Forge, LLC
By AmeriCarbon Enterprises, LLC, its Manager



Greg Henthorn
Chief Business Officer

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

| | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Application |
| <input checked="" type="checkbox"/> | Transmittal Letter |
| <input checked="" type="checkbox"/> | Tax Liability Statement |
| <input checked="" type="checkbox"/> | Letters of Support (If Applicable) |
| <input checked="" type="checkbox"/> | Confidentiality Request |
| <input checked="" type="checkbox"/> | Business Plan (Appendix) |
| <input checked="" type="checkbox"/> | Historical Financial Statements (3 years) (Appendix) |
| <input checked="" type="checkbox"/> | Budgeted Projections (Appendix) |
| <input checked="" type="checkbox"/> | Loan/Loan Guarantee Application (if Applicable, Appendix) |
| <input checked="" type="checkbox"/> | Other Appendices (If Applicable) |

When the package is completed, send an electronic version to ndicgrants@nd.gov

For more information on the application process please visit:

<https://www.ndic.nd.gov/grant-programs/csea/clean-sustainable-energy-authority-applicant-information>

Questions can be addressed to the Industrial Commission at 701-328-3722.

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title:

The Forge Project

Applicant:

AmeriCarbon Forge, LLC

Date of Application:

October 15, 2025

Amount of Request

Grant: N/A

Loan: \$40,000,000

Total Amount of Proposed Project:

\$100,000,000

Duration of Project:

2 years

Point of Contact (POC):

Greg Henthorn, Chief Business Officer

POC Telephone:

304-685-6017

POC Email:

greg.henthorn@americarbon.com

POC Address:

3001 Cityview Drive
Morgantown, WV 26508

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|--|-----------|
| Abstract | 1 |
| Project Description | 2 |
| Standards of Success | 24 |
| Background/Qualifications | 26 |
| Management | 30 |
| Timetable | 32 |
| Budget | 33 |
| Confidential Information | 34 |
| Patents/Rights to Technical Data | 34 |
| State Programs and Incentives | 34 |
| Loan/Loan Guarantee Application (if applicable) | |

ABSTRACT

Objective:

AmeriCarbon Forge, LLC requests a \$40 million CSEA loan to fund the construction, commissioning, and startup of the first U.S. commercial-scale facility producing Eco-Pitch™—an engineered coal-tar-pitch manufactured directly from North Dakota lignite using AmeriCarbon’s patented Liquid Carbon Process (LCP). Located near Underwood in McLean County, the facility will deliver a domestic, lower-carbon supply of binder and impregnating pitch for infrastructure, industrial/defense, and advanced-materials markets while reducing greenhouse-gas emissions by more than 90% versus conventional supply chains. The project advances from completed FEL-3 into full execution with Worley as engineering/EPC-M partner and leverages data from AmeriCarbon’s operating pilot plant to de-risk scale-up.

Expected Results:

- ✓ Commercial operation of a ~100 TPD plant (~30,000 tons/year total output: ~15,000 tons Eco-Pitch™ and ~15,000 tons carbon by-products).
- ✓ Verified >90% GHG reduction versus conventional coal-tar-pitch production; compliance with ND DEQ permitting.
- ✓ Product qualification of binder and impregnating grades across infrastructure (e.g., asphalt), industrial/defense, and specialty markets.
- ✓ Execution of MOUs/LOIs covering a majority of initial Year-1 Eco-Pitch™ volumes; staged customer validation continues.
- ✓ Job creation: ~250–300 construction jobs and ~50 full-time operating positions in McLean County.
- ✓ Bankable execution: 90-day performance demonstration at nameplate throughput; modular scope enables phased specialty add-ons.

Duration:

Two years (engineering completion to construction, commissioning, and startup), but may extend to three years.

Total Project Cost:

Planning basis of \$100 million TIC (application), structured as a modular program in the range of \$80–\$100 million to accommodate customer-driven specialty units and prudent contingency.

Participants:

Applicant: AmeriCarbon Forge, LLC (JV of AmeriCarbon Enterprises, NACCO Industries, and other investors). Engineering/EPC-M: Worley. Key partners and validators include University of North Dakota (feedstock integration), market validation collaborators (e.g., SDSU, VertX), and site collaborators (e.g., North American Coal, Rainbow Energy).

PROJECT DESCRIPTION

Objectives:

AmeriCarbon Forge, LLC has been formed as a joint venture among AmeriCarbon Enterprises, LLC, NACCO Industries, Inc., and other investors and stakeholders to implement the **Forge Project**: to construct, commission, and operate our nation’s first commercial scale facility to manufacture coal tar pitch, a critical carbon feedstock for industrial, infrastructure, and defense applications, directly from coal using AmeriCarbon’s proprietary Liquid Carbon Process. The commercialization of this strategic innovation has been supported over the past 5+ years by private investment, federal funding, and R&D efforts, as well as four projects funded in part by the North Dakota Industrial Commission under the Lignite Research Council program.

AmeriCarbon’s Liquid Carbon Process converts lignite coal into its proprietary carbon pitch product, Eco-Pitch™, a 100% domestically sourced coal tar pitch. Eco-Pitch is a critical material for manufacturing advanced carbon products. AmeriCarbon operates our nation’s only pilot-scale manufacturing facility using a continuous, non-combustible process. This approach reduces greenhouse gas emissions by more than 92% compared to traditional methods, contributing to a sustainable manufacturing pathway consistent with the objectives of the Clean & Sustainable Energy Authority (CSEA).

This proposal seeks \$40 million from the CSEA loan program to fund the design, construction, and operation of its commercial-scale facility (“Facility”) in McLean County, North Dakota that will process 30,000 tons per year of lignite coal into Eco-Pitch various by-products. The Facility will scale up production of Eco-Pitch to address applications in industry, infrastructure, and defense.

Product Description

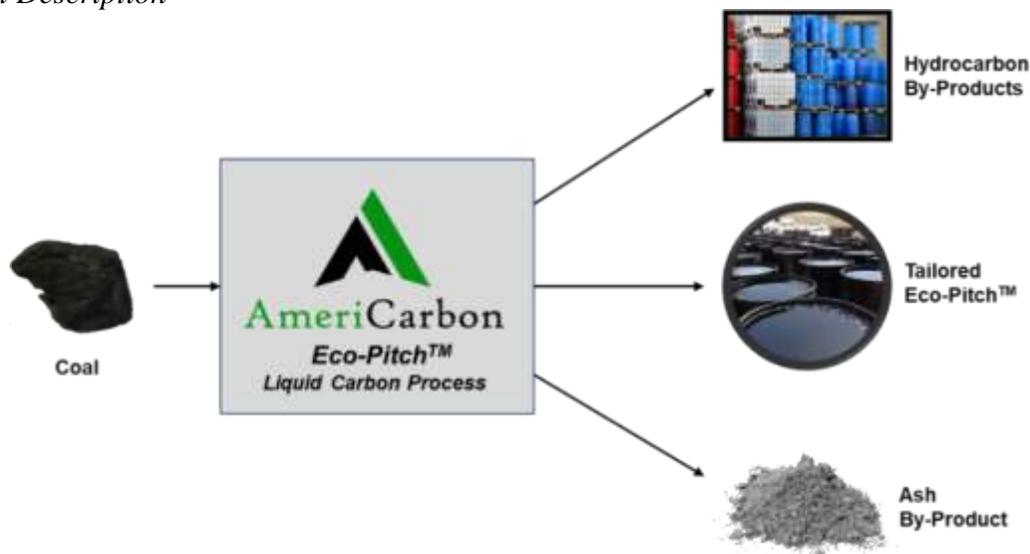


Figure 1. Simplified Diagram of AmeriCarbon’s patented and proprietary Eco-Pitch Liquid Carbon Process.

Eco-Pitch, AmeriCarbon’s patented and proprietary carbon pitch product, is a 100% domestically sourced alternative to traditional coal tar pitch. Eco-Pitch plays a vital role in both the binder pitch and impregnating pitch functions required in the manufacture of various carbon products. AmeriCarbon’s process has multiple unit operations that produce a tailored carbon pitch that has several advantages over current industrial supplies:

- ✓ Enables the United States to develop a domestic supply chain while reducing industrial reliance on China and other Asian countries
- ✓ Reduces greenhouse gas emissions by more than 92% compared to existing supplies
- ✓ Tailorability allows for attaining superior properties such as high strength-to-weight, radar absorbency, electrical conductivity, and/or thermal conduction
- ✓ Efficiency of process allows AmeriCarbon to compete on price
- ✓ The ash by-product is a source of concentrated rare earth elements (REEs)

Tailored Eco-Pitch Products

Eco-Pitch is a family of engineered coal-tar-pitch materials whose rheology and composition can be tuned for multiple end use applications across infrastructure, industrial/defense, and advanced-materials markets. Eco-Pitch serves broadly as (i) binder pitch for asphalt pavements, carbon electrodes, carbon fiber composites, and graphite anodes; and (ii) impregnating pitch to densify and strengthen pre-formed carbon/graphite parts used in refractories, electrodes, blocks, aerospace components, and high-temperature equipment. The two primary commercial forms highlighted below—binder and impregnating grades—reflect current market pull and ongoing customer validation, while the same tunability supports specialty variants (e.g., mesophase grades for premium carbon foams and composites) as demand evolves.

Binder Pitch: Eco-Pitch is engineered as a high-performance binder pitch used across a range of advanced carbon and infrastructure applications. In addition to its role in synthetic and natural graphite anode production for energy storage applications, Eco-Pitch serves as a key binder in the manufacture of carbon electrodes, carbon fiber composites, and asphalt and pavement materials. As a binder, Eco-Pitch provides the critical adhesive and structural functions that hold particulate or fibrous materials together, delivering the required strength, stability, and durability for demanding industrial and construction environments. Its formulation can be tailored to achieve specific viscosity, softening point, and flow characteristics, ensuring optimal performance whether used in high-temperature industrial processes or long-life infrastructure applications such as asphalt paving and roofing.

Impregnating Pitch: In its impregnating form, Eco-Pitch is used to fill the pores and voids of pre-formed carbon or graphite structures, significantly enhancing their density, strength, thermal conductivity, and durability. This capability is essential not only for electric-vehicle battery anodes, but also for graphite electrodes, carbon blocks, refractories, and advanced carbon composites used in aerospace, metallurgy, and infrastructure applications. By optimizing penetration and flow characteristics, Eco-Pitch enables uniform impregnation and superior material performance under high-temperature and high-stress conditions. Its formulation can be tailored to meet a wide range of industrial specifications, supporting both emerging energy technologies and established carbon-intensive manufacturing sectors.

Both forms of Eco-Pitch offer significant environmental advantages over traditional coal tar pitch, including a greater than 92% reduction in greenhouse gas emissions. This makes Eco-Pitch a key material for decarbonizing materials supply chains while contributing to the development of a fully domestic, sustainable production process for advanced carbon products.

By-Products

In addition to producing Eco-Pitch at an approximate yield of 50%, AmeriCarbon's manufacturing process also produces various by-products that add considerable value to the overall product output streams. It can be generally stated that the Eco-Pitch process produces product and by-product revenue 10-100 times greater than its combined feedstock and waste disposal costs. The following is a brief description of the by-products produced in the Eco-Pitch process:

- **Creosote.** This complex mixture of hydrocarbon oils can be derived from three sources: coal, wood, and creosote bush. It is used to produce a variety of products including treated wood, carbon black, and various medicines. Creosote produced from coal (traditionally, via distillation of coal tar) is the primary source of wood preservatives and carbon black production.
- **Naphthalene.** A valuable aromatic hydrocarbon, naphthalene is widely used in the production of plastics, resins, and insecticides, and serves as a key intermediate in the synthesis of other industrial chemicals such as phthalic anhydride. Naphthalene is also employed in the manufacture of mothballs and as a solvent in various applications. Its production as a by-product of the Eco-Pitch process adds significant value by supporting diverse industrial uses, while contributing to the overall efficiency of AmeriCarbon's carbon conversion technology.
- **Anthracene Oil.** Anthracene oil is a complex mixture of polycyclic aromatic hydrocarbons, with anthracene as a key component. It is commonly produced as a by-product during the distillation of coal tar. Anthracene oil is used in the manufacture of carbon black, dyes, and certain types of resins, and is also a precursor for anthraquinone, an important intermediate in the production of dyes and pigments. In addition, anthracene itself can be further processed for use in the production of high-performance carbon materials.
- **Concentrated Ash with Rare Earth Elements (REEs).** Depending on the composition, coals can hold an appreciable amount of REEs, many of which are on the U.S. government's list of critical materials. As industry develops financially viable solutions for extracting REEs from coal, this presents potential future upside from the ash produced in the Eco-Pitch process.

The Eco-Pitch process is highly adaptable; it should be noted that different configurations of the process may have different by-products; final selection of by-products will depend on a number of factors, including processing conditions and type of pitch made. By-products can also be adjusted based on market conditions for the various by-products and their derivatives. This aspect of the AmeriCarbon process is analogous to commercial coal tar distillers that separate and provide a variety of hydrocarbon products depending on various factors. The ability of the Eco-Pitch process to control a number of chosen parameters enables AmeriCarbon to modify both primary product and downstream by-product distribution to maximize profits and/or adjust to market forces. This

inherent flexibility provides an economic robustness that greatly enhances the competitiveness of the Eco-Pitch process and AmeriCarbon’s market positioning.

Project Impact

The proposed facility will have a manufacturing capacity of 30,000 tons of carbon products annually, split into 15,000 tons of Eco-Pitch (for both binder and impregnating pitch applications) and 15,000 tons of carbon byproducts. The facility will provide product optionality, enabling flexibility in production outputs to meet market demands. AmeriCarbon’s Liquid Carbon Pitch (LCP) Process is proprietary and patented.

The Forge Project will achieve the following objectives, offering significant advantages over traditional coal tar pitch production:

- Uses lignite coal as a primary feedstock, avoiding reliance on coking oven by-products from steelmaking.
- Reduces greenhouse gas emissions by over 92% compared to conventional methods.
- Low-temperature, non-combustible process minimizes harmful emissions and reduces environmental impact.
- Supports a diverse range of carbon applications, including synthetic graphite, battery electrodes, carbon fiber, and asphalt binders.
- Supports economic growth in McLean County by creating high-wage manufacturing and engineering jobs.

Figure 2 is a schematic diagram of the LCP process, illustrating the main unit operations and material flows.

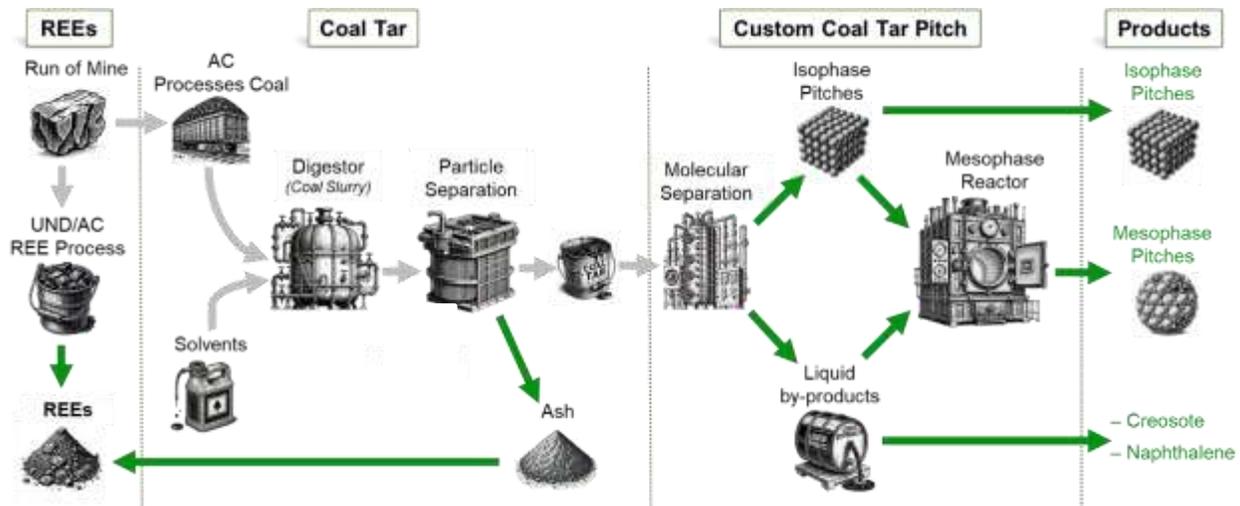


Figure 2. Schematic diagram of AmeriCarbon’s patented and proprietary LCP process.

Possible Integration with Rare Earth Element and Critical Mineral Technologies

Separate from the currently proposed project, AmeriCarbon is collaborating with the University of North Dakota's College of Engineering and Mines (UND-CEM) to strengthen the value chain between lignite utilization and advanced carbon manufacturing. UND's REE pilot plant produces carbon-rich feedstocks through its pre-combustion processes developed for rare earth element (REE) and critical mineral (CM) extraction. These carbon materials—derived from leached lignite and humic acid residues—can be processed directly in AmeriCarbon's Liquid Carbon Process (LCP) to create high-value carbon pitches and graphitic materials. In turn, AmeriCarbon's process supports UND's mission by creating a downstream use pathway for its REE-extraction residues, ensuring full valorization of lignite resources. UND and AmeriCarbon are also collaborating on premium carbon and graphite development, including bench-scale graphitization and electrochemical testing of high-purity carbon materials for battery and defense applications. Together, these efforts form a closed-loop system that transforms lignite into both carbon products and purified mineral streams while anchoring innovation within North Dakota's research and industrial ecosystem.

In addition, AmeriCarbon's LCP process produces an ash by-product that can serve as a feedstock for Microbeam Technologies, Inc., whose proprietary separation systems can extract and concentrate REEs and critical minerals from carbon-rich residues. While REE recovery is not part of the Forge Project's base case, this compatibility positions AmeriCarbon's operations to integrate seamlessly with Microbeam's technology as those systems commercialize.

Although AmeriCarbon's core technology and financial model do not depend on REE or CM revenues, the company's partnerships with UND and Microbeam demonstrate how North Dakota's lignite resource base can support a vertically integrated, zero-waste manufacturing ecosystem—producing critical carbon materials, recoverable REEs, and value-added co-products within the state.

Methodology:

The design, development, and financing of The Forge Project follow a standard, stage-gate industrial development process for large-scale chemical and materials manufacturing facilities. Having completed FEL-0, FEL-1, and FEL-2, AmeriCarbon is now finalizing FEL-3 under contract with Worley Group, funded in part by the North Dakota Industrial Commission's Lignite Research Council. Upon completion of FEL-3, AmeriCarbon will have achieved Front-End Engineering Design (FEED) maturity, positioning the project to advance into execution, construction, and startup under the proposed CSEA loan.

FEL-3 and Design Basis. The FEL-3 study being executed by Worley provides an AACE Class-3 estimate of total installed cost ($\pm 15\%$ accuracy) and includes full process flow diagrams (PFDs), piping and instrumentation diagrams (P&IDs), detailed equipment lists and specifications, a 3D model, and a Level-2 project schedule. The engineering package also establishes the design basis for key process units, long-lead equipment identification, constructability reviews, HAZOP and risk assessments, and preliminary procurement strategies. Worley's team brings both global project-execution experience and a local North Dakota presence (Bismarck office), supported by

specialized engineering resources from its Charleston, West Virginia office near AmeriCarbon's pilot plant.

Transition to Execution and Construction. Upon completion of FEL-3 and Authorization for Expenditure (AFE) approval, AmeriCarbon will move directly into detailed design, procurement, and construction. Worley is anticipated to continue in a detailed engineering and EPC-M role, managing design finalization, procurement of long-lead equipment, and field engineering support. The construction phase will be managed under AmeriCarbon's Project Management Office (PMO) using proven work-package control systems and milestone tracking consistent with AACE Class-2 standards at the time of award. Key activities will include:

- ✓ **Site preparation and civil works** at the Underwood, ND location near the Falkirk Mine and Rainbow Energy's Coal Creek Station;
- ✓ **Equipment fabrication and delivery**, with long-lead items such as reactor trains, distillation columns, and condensers ordered immediately upon funding;
- ✓ **Modular assembly and installation** of process trains to shorten field schedules and minimize winter downtime;
- ✓ **Utility integration** leveraging adjacent industrial infrastructure for power, water, and logistics; and
- ✓ **Pre-commissioning and commissioning**, including dry-out, functional testing, and performance verification.

Commissioning and Startup. Startup and performance testing will be led by AmeriCarbon's technical operations team with direct participation from Worley commissioning engineers. AmeriCarbon will implement a structured Start-Up Readiness Review (SRR) and 90-day performance demonstration to validate throughput, product specifications, and emissions performance. This process ensures a safe and efficient transition to steady-state operations and early delivery of commercial product.

Integration of Pilot Data. AmeriCarbon's Morgantown pilot plant, capable of processing multi-ton quantities of lignite per day, provides the engineering data underpinning scale-up. The pilot's instrumentation and control data are directly informing Worley's design basis, reducing process uncertainty and ensuring scalability. Ongoing pilot enhancements are aligning operating parameters with commercial design, providing verified kinetic and thermodynamic data to support process guarantees and emissions validation.

Execution Oversight and Risk Mitigation. AmeriCarbon will maintain overall project control through its PMO, supported by Worley's project controls, cost management, and construction-management systems. Formal stage-gate reviews—Design Readiness Review (DRR), Procurement Readiness Review (PRR), and Startup Readiness Review (SRR)—will be used to verify deliverables before progressing to each phase. Risk management will include continuous HAZOP and QRA updates, contingency tracking, and schedule assurance reviews to maintain execution discipline and budget fidelity.

Outcome. This methodology ensures a seamless transition from engineering design through construction, commissioning, and startup—delivering a fully operational 100-tons-per-day commercial facility capable of producing 30,000 tons of carbon products annually. The process integrates proven engineering practices with validated pilot data and a world-class execution partner, providing CSEA reviewers with clear confidence in both technical feasibility and deliverability.

Anticipated Results:

The Forge Project will result in the successful construction, commissioning, and operation of the United States' first commercial-scale facility producing Eco-Pitch™, an engineered coal tar pitch manufactured directly from North Dakota lignite using AmeriCarbon's patented Liquid Carbon Process (LCP). Upon completion, the facility will achieve a throughput capacity of 100 tons per day—equivalent to approximately 30,000 tons of carbon products per year—and will demonstrate full-scale commercialization of a technology previously proven at AmeriCarbon's pilot facility.

Technical and Environmental Results

- ✓ **Demonstrated process performance.** Successful scale-up of the LCP technology by a factor of ten, validating design parameters and confirming reliability under continuous operation.
- ✓ **Emission reduction.** Verification of a >90% reduction in greenhouse gas emissions compared to conventional coal tar pitch production derived from coking by-products.
- ✓ **Product qualification.** Commercial-scale production of both binder and impregnating grades of Eco-Pitch™, meeting customer specifications across infrastructure, industrial, and defense markets.
- ✓ **Process adaptability.** Demonstration of flexible operation enabling product mix adjustments in response to market demand and customer specifications.

Economic and Commercial Results

- ✓ **Domestic supply chain creation.** Establishment of a fully domestic source of coal tar pitch, eliminating dependence on imported materials (primarily from China) and enhancing national energy and materials security.
- ✓ **Market penetration.** Execution of multiple offtake MOUs and LOIs covering a majority of initial production volumes, enabling revenue generation within the first year of operation.
- ✓ **Private investment leverage.** Activation of over \$40–50 million in private capital alongside CSEA's loan participation, reinforcing the project's commercial readiness and scalability.

- ✓ **Scalability and replication.** Development of a repeatable commercial design and execution model capable of deployment at other lignite or sub-bituminous coal sites in North Dakota and across the U.S.

Regional and Workforce Results

- **Job creation.** Approximately 250–300 construction jobs during the build phase and 50 full-time operating positions once in service, including high-wage roles in process operations, maintenance, and engineering.
- **Workforce development partnerships.** Continued collaboration with the University of North Dakota to develop training programs in process operations, instrumentation, and materials science.
- **Economic impact.** Significant payroll and in-state spend during operations, with substantial secondary economic activity across suppliers and service providers in McLean County.

Integration and Innovation Results

- ✓ **Resource efficiency.** Utilization of lignite and potential integration with UND’s pre-combustion carbon-feedstock program, supporting full resource valorization.
- ✓ **Circular economy opportunity.** Production of ash by-products suitable for Microbeam Technologies’ REE extraction platform, creating future value-add pathways for rare earth and critical mineral recovery.
- ✓ **Technology demonstration.** Development of a reference facility that positions North Dakota as a national hub for advanced carbon materials manufacturing and associated research partnerships.

Long-Term Impact

By establishing this first-of-its-kind manufacturing facility, the Forge Project will demonstrate how lignite—long valued for power generation—can anchor a new generation of low-carbon materials industries. The anticipated results include not only a successful commercial plant, but also a replicable industrial template for integrating carbon products, critical minerals, and sustainable process technologies within North Dakota’s evolving energy economy.

Facilities:

Proposed Commercial Plant Site

AmeriCarbon and its partners have identified a strategic location for the Forge Project near Underwood, North Dakota (Figure 4).



Figure 4. Planned location of the Forge Project near Underwood, North Dakota, outlined in blue.

The proposed site is situated near the following:

- Falkirk Mine, a significant lignite coal mining operation, and in proximity to key industrial infrastructures;
- *Rainbow Energy Center's Coal Creek Station*. This is North Dakota's largest power plant, known for its efficiency and substantial electricity generation capacity; and
- *Blue Flint Ethanol Plant*. Located just east of the Coal Creek Station, this facility has been operational for over a decade, producing ethanol and contributing to the region's biofuel industry.

The proximity to these facilities offers potential synergies, such as shared infrastructure and services, which can enhance operational efficiency and sustainability.

Pilot Plant: Foundation for Commercial Design

The design and operational strategies for the commercial facility are based on AmeriCarbon's operating pilot plant, located in Morgantown, West Virginia. This pilot plant stands as the only

facility in the United States capable of demonstrating the complete coal liquefaction process for producing advanced carbon materials, including Eco-Pitch.



Figure 5. AmeriCarbon's Research and Pilot Demonstration Facility in Morgantown, West Virginia.

AmeriCarbon's pilot plant is significant for the following reasons:

- *Process Validation.* The pilot plant has been instrumental in validating the technical feasibility of the Eco-Pitch production process, ensuring that each stage operates seamlessly and efficiently.
- *Data Collection for Scale-Up.* Comprehensive data gathered from pilot operations have been pivotal in informing the scale-up process, facilitating a tenfold increase in production capacity for the commercial plant.
- *Risk Mitigation.* Operating the pilot plant has allowed AmeriCarbon to identify and address potential challenges in a controlled environment, significantly reducing risks associated with scaling up to commercial production.



Figure 6. AmeriCarbon's pilot scale unit operations that underpin the LCP process.

AmeriCarbon's equipment includes: coal liquefaction & coker trains capable of processing 10 tons per day; capable of producing custom coal pitch, needle coke, and advanced carbon products; product separation and collection train; both trains are fully automated and managed by an industry standard computer / software system; six commercial hood laboratory with flame suppression and exhaust system; fully equipped for benchtop lab research and development. The facility is heavily instrumented and managed by a PLC control system with continuous monitoring.



Figure 7. AmeriCarbon's pilot scale and research equipment.

Worley Group Facilities

To ensure the successful translation of pilot-scale operations to a full-scale commercial facility, AmeriCarbon is collaborating with Worley Group, a globally recognized engineering firm. Worley maintains offices in Bismarck, North Dakota, and Charleston, West Virginia. While the Bismarck office provides valuable local insights and support, the Charleston office, given its proximity to the pilot plant, will play a crucial role in the engineering design process. Key activities include:

- *Pilot Plant Enhancements.* AmeriCarbon is investing capital into upgrading the pilot plant to align its operations more closely with the anticipated commercial design parameters. This harmonization is essential for accurate data collection and process optimization.
- *Integrated Design Approach.* Leveraging Worley's extensive experience and the empirical data from the pilot plant, the team will develop a robust engineering design that ensures scalability, efficiency, and reliability for the commercial facility.

Through strategic site selection, leveraging pilot plant insights, and collaborative engineering efforts, AmeriCarbon is well-positioned to establish a state-of-the-art Eco-Pitch manufacturing facility that meets the growing demand for advanced carbon materials while supporting regional economic development.

Resources:

The successful execution of the Forge Project to design, construct, and operate the commercial-scale Eco-Pitch manufacturing facility will require a comprehensive array of resources, including

financial investments, technical expertise, workforce capabilities, and strategic partnerships. This section outlines the key resources that will be utilized to complete the project.

Financial Resources

AmeriCarbon has secured significant financial commitments to support the project, contingent upon various factors:

- ✓ **NACCO Industries, Inc.**, parent company of The North American Coal Corporation, has made a contingent commitment to this project to be a joint venture partner in the commercial plant, providing a possible equity investment of \$6 million.
- ✓ **Hartz Capital, Inc.**, a New York based multibillion dollar private investment group with substantial holdings in energy and real estate, and longstanding relations with one of AmeriCarbon’s founding investors, has made a contingent capital commitment of up to \$10 million in equity investment.
- ✓ **Dickinson Group**, an investment group with substantial holdings in land, timber, and coal, and one of AmeriCarbon’s earliest and largest investors, has expressed an interest to add to its previous seven-figure investment in AmeriCarbon to support the Forge Project.
- ✓ **AmeriCarbon Enterprises, LLC** is prepared to contribute additional equity capital to the Forge Project as may be required to move the Forge Project forward, subject to board approval.

AmeriCarbon and NACCO have existing banking relationships that can be leveraged to secure commercial financing to provide required matching for the CSEA loan program. Our current planned capital stack for the \$80-100 million project is as follows:

| Source | Commitment | % of Total |
|---|---------------------|-------------------|
| Equity (20%) | \$16 – \$20 million | 20% |
| NACCO Industries | Up to \$6 million | |
| Hartz Capital | Up to \$10 million | |
| Dickinson Group & AmeriCarbon Investors | Up to \$4 million | |
| Debt (80%) | \$64 – \$80 million | 80% |
| CSEA | \$32-40 million | |
| Commercial debt | \$32-40 million | |

Technical Expertise and Engineering Support

AmeriCarbon will engage Worley Group, a global engineering, procurement, and construction (EPC) leader, to execute the FEL3 design and ensure that the commercial-scale plant is technically robust and commercially viable. Key engineering resources include:

- **Worley Group’s North Dakota Office.** Provides local coordination and insights to support regulatory compliance and stakeholder engagement.
- **Worley Group’s West Virginia Office.** Conducts the majority of detailed engineering and design activities, leveraging proximity to the pilot plant and extensive EPC experience.
- **AmeriCarbon’s Pilot Plant Team:** Provides critical technical expertise and operational insights to guide scale-up and design harmonization.

These combined resources will ensure that the project benefits from both local knowledge and cutting-edge engineering capabilities.

Data and Intellectual Property Resources

AmeriCarbon holds proprietary intellectual property related to its Eco-Pitch production technology. The data from its pilot plant operations provide invaluable insights into the performance, efficiency, and scalability of the process. This proprietary data will be used to inform the commercial design and ensure that all process parameters are optimized for large-scale production. Further, AmeriCarbon holds five patents in the United States and Canada: US# 11667852, 10301549, 9845431, 9534176; and CA# 3120884.

Techniques to Be Used, Their Availability and Capability:

The execution of The Forge Project—transitioning AmeriCarbon’s technology from the completion of front-end engineering design (FEL-3) prior to project launch, through construction, commissioning, and startup—will employ a suite of advanced engineering, modeling, quality, and project-execution techniques proven in large-scale industrial manufacturing. The objective is to ensure that the commercial facility operates efficiently, safely, and economically while achieving full environmental and technical compliance. Both AmeriCarbon and Worley Group have dedicated personnel and established systems in place to complete this work within the project timeline and performance objectives.

Process Modeling and Simulation

AmeriCarbon and Worley will continue to apply Aspen Plus® and Aspen HYSYS® simulations to refine process design and operating envelopes for the commercial facility. These tools—validated through pilot-scale operations—will be used to:

- ✓ Model integrated material and energy balances across all process units.
- ✓ Predict system performance and optimize reaction and separation conditions.
- ✓ Evaluate feedstock variability and its influence on product yield and quality.
- ✓ Develop dynamic models to support control-system tuning during commissioning.

This modeling work ensures data-driven design optimization and provides predictive tools to support startup and future expansion. Worley’s senior process engineers, with decades of experience in chemical and refining facilities, are already assigned to these tasks.

Engineering Design and Digital Delivery

During detailed engineering, Worley will employ 3D CAD and Building Information Modeling (BIM) to finalize plant layout, utilities, and access routes. The digital twin environment will integrate civil, structural, mechanical, electrical, and control disciplines, allowing clash detection, maintenance accessibility verification, and early constructability reviews.

Key design techniques include:

- ✓ 3D plant and piping models with equipment access and maintenance envelopes.
- ✓ Finite Element Modeling (FEM) for critical vessels and structural supports.
- ✓ Heat-integration optimization to minimize energy consumption.

The design output will culminate in an AACE Class-3/2 cost estimate and Level-2 schedule, enabling accurate procurement and construction planning.

Construction and Modularization

To shorten field schedules and mitigate weather and labor risks, the Forge Project will implement modularization and Advanced Work Packaging (AWP) best practices:

- ✓ Prefabricated skid-mounted process units and pipe racks fabricated off-site under controlled conditions.
- ✓ Preassembled utility modules and electrical buildings for rapid site installation.
- ✓ AWP methodology to define Construction Work Packages (CWPs) aligned with engineering and procurement deliverables.

Worley's construction management team—experienced in modular execution across petrochemical and power sectors—will lead these efforts from planning through field execution.

Risk Assessment and Safety Management

Safety and reliability will be embedded through industry-standard risk management frameworks:

- ✓ Hazard and Operability Studies (HAZOP) at 60% and 90% design.
- ✓ Quantitative Risk Assessment (QRA) to evaluate potential environmental and personnel hazards.
- ✓ Failure Modes and Effects Analysis (FMEA) for key process and mechanical systems.
- ✓ Startup Readiness Reviews (SRR) and Safe-Work permitting integrated into commissioning.

Worley's global Process Safety team and AmeriCarbon's Environmental, Health & Safety (EHS) group will jointly implement these reviews to ensure safe commissioning and sustainable operations.

Pilot Plant Data Utilization and Validation

AmeriCarbon's Morgantown pilot facility (10 TPD) provides the empirical foundation for process design and startup calibration. Techniques applied include:

- ✓ Continuous data logging and analysis of operational variables.
- ✓ Empirical scaling correlations for heat and mass transfer coefficients.
- ✓ Real-time comparison between pilot and commercial model predictions during commissioning.

This live data feedback will guide operating envelope definition and facilitate rapid troubleshooting during plant startup.

Quality Assurance and Control

Comprehensive QA/QC systems will ensure design integrity and construction quality:

- ✓ Vendor qualification and material certification for all pressure-boundary and rotating equipment.
- ✓ Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) of critical instruments and control systems.
- ✓ Documented inspection and test plans (ITPs) aligned with Worley's ISO 9001 and AWP standards.

AmeriCarbon's project management team will maintain direct oversight of Worley's QA/QC program through stage-gate reviews and performance audits.

Commissioning, Startup, and Performance Testing

Commissioning will follow a system-by-system turnover approach, supported by detailed checklists and readiness reviews. Activities will include mechanical completion verification, loop-checking, equipment calibration, and phased energization. AmeriCarbon's operations personnel—trained at the pilot plant—will work alongside Worley's commissioning engineers to execute the 90-day performance demonstration to verify capacity, product quality, and emissions targets.

Personnel and Resource Availability

Worley will formally allocate multidisciplinary teams from its Charleston, WV and Bismarck, ND offices, ensuring continuity from FEL-3 through detailed design and construction. AmeriCarbon's technical staff, project management team, and pilot-plant operators will provide continuous support and data validation throughout commissioning and startup.

In combination, these techniques provide a robust, industry-standard execution framework—supported by proven modeling tools, disciplined risk management, and modularized construction methods—that ensure the Forge Project can be delivered safely, on time, and within budget while meeting all technical and environmental objectives.

Environmental and Economic Impacts while Project is Underway:

The Forge Project will advance from engineering into full execution, construction, and commissioning of the commercial-scale Eco-Pitch™ manufacturing facility. During this period, AmeriCarbon will implement rigorous environmental management and community engagement practices while generating significant economic activity across North Dakota.

Environmental Impacts

The construction and commissioning phase will be conducted in accordance with all applicable state and federal environmental regulations, including those administered by the North Dakota Department of Environmental Quality (DEQ). Primary environmental considerations during this stage include site preparation, material handling, construction emissions, and waste management.

- ✓ **Construction footprint and controls:** The selected site near Underwood, ND, has existing industrial infrastructure and access roads, minimizing new land disturbance. Standard erosion-control and stormwater-management measures will be in place under an approved SWPPP (Stormwater Pollution Prevention Plan).
- ✓ **Air quality management:** Temporary construction-related emissions (dust, vehicle traffic, and equipment exhaust) will be controlled through dust suppression, low-emission construction equipment, and strict idling limits. Once operational, the facility will comply with air-permitting requirements and employ a non-combustible, low-temperature process that achieves a >90% reduction in GHG emissions compared with conventional coal-tar-pitch production.
- ✓ **Waste and water management:** Construction waste will be minimized through modular fabrication and off-site prefabrication. During operations, the process will use closed-loop water and heat-recovery systems, limiting both water withdrawal and discharge.
- ✓ **Sustainability by design:** The commercial facility will incorporate energy-efficient equipment, waste-heat recovery, and automation systems to reduce energy intensity per ton of product. AmeriCarbon and Worley are embedding sustainability and lifecycle considerations into the engineering and procurement process, ensuring environmental performance is verified before startup.

Through these measures, temporary construction impacts will remain localized and manageable, while long-term operation will contribute to measurable emissions reduction and cleaner industrial production.

Economic Impacts

The Forge Project will generate significant direct and indirect economic benefits throughout its three-year execution period:

- ✓ **Construction employment:** An estimated 250–300 skilled tradespeople and craft workers will be employed during peak construction, with additional demand for engineering, logistics, and field-support services.
- ✓ **Permanent workforce:** Approximately 50 full-time operating and maintenance positions will be created in McLean County once the facility is in service, representing high-wage, technical employment in manufacturing, engineering, and quality assurance.
- ✓ **Local and regional spending:** Construction and startup activities are projected to inject \$25–30 million annually into the local economy through wages, materials, housing, transportation, and contracted services.
- ✓ **Private investment leverage:** The project will deploy \$80–\$100 million in total capital investment—approximately half from private sources—supporting long-term economic diversification in North Dakota’s lignite region.

These economic impacts extend beyond direct employment, strengthening local supply chains, tax revenues, and regional workforce capabilities that will support future advanced-manufacturing projects.

Community Engagement and Planning

AmeriCarbon is maintaining open communication with local governments, labor organizations, educational institutions, and community stakeholders to ensure the project aligns with regional priorities and workforce development goals. Regular updates and information sessions will continue throughout construction and startup, promoting transparency and responsiveness to community feedback. AmeriCarbon’s approach emphasizes safe operations, environmental stewardship, and tangible economic opportunity for residents of McLean County and the surrounding region.

In summary, environmental impacts during project execution will be temporary and well-managed under established mitigation plans, while economic impacts will be substantial and lasting. The Forge Project will not only meet rigorous environmental standards but also serve as a catalyst for North Dakota’s transition toward a cleaner, diversified, and innovation-driven industrial economy.

Ultimate Technological and Economic Impacts:

The successful completion of the FEL3 engineering design for the commercial-scale Eco-Pitch manufacturing facility will have significant technological and economic impacts, both regionally and nationally. The project will demonstrate the ability to convert lignite coal—a resource abundant in North Dakota—into high-value carbon products using AmeriCarbon’s patented Eco-Pitch technology.

Technological Impacts

The commercial-scale facility will serve as a groundbreaking demonstration of how lignite coal can be transformed into advanced carbon products, including Eco-Pitch and valuable by-products. Traditionally, carbon pitch production has relied on by-products from coking ovens associated with steelmaking, which has made the United States heavily dependent on foreign imports, primarily from China. By establishing a commercial-scale facility using domestic lignite, this project will prove that the United States can independently produce high-quality carbon materials, thereby reducing reliance on foreign sources.

This project aligns with national priorities outlined in the March 20, 2025, Executive Order, “*Immediate Measures to Increase American Mineral Production*”, which emphasizes accelerating domestic production of critical minerals and materials essential to U.S. economic and national security interests. By advancing the conversion of lignite into high-value carbon materials such as coal tar pitch and mesophase pitch, this project directly supports the development of key inputs for aerospace, defense, and energy storage technologies. These applications are dependent on secure and sustainable sources of advanced carbon materials, and the proposed work represents a strategic opportunity to establish a domestic supply chain that meets this urgent need.

AmeriCarbon’s Eco-Pitch technology represents a paradigm shift in carbon product manufacturing. The process utilizes lignite coal as the primary feedstock, avoiding the need for coking coal and significantly reducing greenhouse gas (GHG) emissions by over 90% compared to conventional methods. This is achieved through a low-temperature, non-combustible process that minimizes harmful emissions and environmental impact.

The technology's ability to scale from a 10-ton-per-day pilot facility to a 100-ton-per-day commercial plant is an important demonstration of its scalability and robustness. This tenfold increase in capacity, while maintaining product quality and process efficiency, will showcase the practical viability of commercializing lignite-to-carbon production.

Furthermore, this facility will serve as a model for replicating similar projects across other lignite-producing regions, both within North Dakota and nationwide. By proving the technical and economic viability of this approach, AmeriCarbon will open the door for other domestic carbon product facilities, fostering innovation and technological leadership in carbon materials manufacturing.

Economic Impacts and Value to North Dakota

The long-term economic impacts of this project will be transformative for McLean County, the state of North Dakota, and the broader U.S. industrial base. Key economic impacts include:

- *Creation of a New Industry in North Dakota.* By converting lignite into carbon products, the project will lay the foundation for a new carbon materials industry centered in the region. This will support economic diversification beyond traditional coal mining and power generation.

- *Strengthening the Domestic Supply Chain.* The successful production of Eco-Pitch at a commercial scale will significantly reduce U.S. dependence on imported coal tar pitch, enhancing national security and economic resilience.
- *Job Creation and Workforce Development.* The construction and operation of the commercial facility will generate numerous high-wage jobs, including engineering, technical, and manufacturing roles. Workforce development initiatives will ensure that local residents have the skills needed to support ongoing operations.
- *Economic Multipliers.* By establishing a domestic supply chain for carbon products, the project will catalyze downstream industries such as defense, aerospace, and others. This will create opportunities for value-added manufacturing and attract investment into related industries.

The project will also leverage North Dakota’s abundant lignite reserves to create high-value carbon products, thereby transforming a traditionally low-value resource into a cornerstone of advanced manufacturing. This will not only create economic opportunities within the state but will also position North Dakota as a leader in innovative carbon technology.

Overall, the successful completion of this project will mark a pivotal step in transitioning from reliance on foreign coal tar pitch to a domestic, sustainable, and economically viable production model. By doing so, AmeriCarbon will contribute to the long-term stability of the U.S. carbon materials supply chain and drive economic growth through technological innovation.

Why the Project is Needed:

The Forge Project represents the commercial execution phase of AmeriCarbon’s initiative to establish the nation’s first large-scale facility for producing Eco-Pitch™, an engineered coal-tar-pitch material derived directly from North Dakota lignite. This facility is the critical next step beyond research and engineering design—transitioning a proven pilot-scale process into a fully operational manufacturing plant capable of supplying strategic carbon materials for industrial, infrastructure, and defense markets.

For decades, the United States has relied almost entirely on foreign imports of coal-tar pitch, with China supplying the majority of global demand. This dependency creates a significant supply-chain vulnerability for critical materials used in graphite electrodes, carbon composites, and defense applications. Eco-Pitch™ provides a domestic, lower-carbon alternative, enabling the United States to onshore production of materials that are foundational to multiple advanced-manufacturing sectors.

The Forge Project directly addresses three national and state-level imperatives:

- **Energy and materials security.** Establishing a domestic source of carbon pitch eliminates exposure to foreign supply disruptions and strengthens the resilience of U.S. defense and industrial supply chains.

- **Environmental performance.** AmeriCarbon’s patented Liquid Carbon Process (LCP) achieves a greater than 90 percent reduction in greenhouse-gas emissions compared to conventional processes based on steel-industry by-products, while also enabling efficient use of North Dakota’s abundant lignite resources.
- **Economic diversification.** By siting this facility in McLean County near the Falkirk Mine and Coal Creek Station, the project converts a legacy energy resource into a platform for advanced materials manufacturing, supporting high-wage technical jobs and a new value chain centered in North Dakota.

With completion of the FEL-3 design and validated pilot-plant data in hand, the technology and engineering risk have been substantially reduced. The requested CSEA participation will fund the construction, commissioning, and startup of the commercial facility, moving the project from design readiness to revenue-generating operations. This transition is essential to:

- ✓ Demonstrate commercial viability of the process at full scale and deliver market-qualified products under long-term offtake agreements.
- ✓ Catalyze follow-on investment for additional production modules and downstream carbon-product facilities within North Dakota.
- ✓ Anchor a domestic ecosystem for advanced carbon materials, complementing regional initiatives in rare-earth extraction, critical-mineral recovery, and sustainable manufacturing.

Ultimately, The Forge Project is needed to transform a decade of research, pilot testing, and engineering design into a commercial reality that advances North Dakota’s leadership in clean, sustainable energy and materials production. By doing so, it will strengthen national security, reduce emissions, and diversify the state’s economy for decades to come.

STANDARDS OF SUCCESS

The project intends to bolster the domestic production of advanced carbon products, a strategic sector in the United States poised for substantial growth. Leveraging lignite coal as a primary raw material, AmeriCarbon and its collaborators seek to onshore the supply chain for advanced carbon material applications, enabling the creation of valuable finished products while dramatically reducing greenhouse gas emissions compared to existing industrial processes.

This project and the McLean Plant will play a pivotal role in establishing the foundation for the emergence of commercial-scale manufacturing facilities in North Dakota, aimed at seizing the economic potential presented by the onshoring of advanced carbon product production. Serving as a cornerstone, the production of carbon pitch from lignite coal will unlock additional manufacturing prospects, where lignite-derived carbon pitch serves as the basis for further refinement into high-value carbon materials and products. Over time, this endeavor has the potential to attract substantial capital investment, generate thousands of sustainable jobs, and contribute to the reduction of greenhouse gas emissions within the U.S. manufacturing sector.

The long-term success of this project, therefore, will be measured by the following:

- *Commercial pitch production facilities.* How many commercial scale pitch production facilities will be located in North Dakota and in what time frame? Our hope is to invest additional capital and resources into expanding the capacity of the Forge facility.
- *Downstream manufacturing facilities.* How many additional advanced carbon products manufacturing facilities will be located in North Dakota that use carbon pitch as a feedstock, and what will be their economic impact? Our hope is that in the next decade, there could be a network of manufacturers locating in North Dakota, leading to hundreds of jobs during construction and facility operations.

In order to evaluate the success of the proposed project, specific criteria need to be completed:

- *Technical Milestones.* Completion of FEL3 engineering design in accordance with industry standards and norms, including the following
 - Updated site layout and plot plan.
 - Additional granularity regarding engineering and process design, specifying equipment sizes, configurations, and materials of construction.
 - Refined capital cost estimates, including equipment, installation, and commissioning costs.
 - Refined operating cost projections and financial analysis to validate project economics.
 - Refinement of construction and operational plans, including logistics and supply chain integration.
 - Updated comprehensive risk assessments and mitigation strategies.
 - Identification of critical equipment and long-lead items.
 - Updated process flow diagrams (PFDs), piping and instrumentation diagrams (P&IDs), and mass and energy balance calculations.
 - Safety and environmental compliance reviews, ensuring adherence to local, state, and federal regulations.

By meeting these standards of success, the project will not only advance the domestic production of advanced carbon products but also contribute to job creation, economic growth, and environmental sustainability in North Dakota and beyond.

BACKGROUND/QUALIFICATIONS

AmeriCarbon’s pioneering work in the development of advanced carbon products from lignite coal has been driven by a series of innovative projects that have progressively matured the technology from concept to commercial viability. The proposed project to complete the FEL3 engineering design for a commercial-scale Eco-Pitch manufacturing facility builds directly on the successes of prior projects and represents the next crucial step in transitioning from pilot-scale demonstrations to full-scale commercial production.

Origins of the Liquid Carbon Process and Early Developments
(Funded by AmeriCarbon)

The roots of AmeriCarbon’s proprietary and patented Liquid Carbon Process (LCP) date back to 2009, when a predecessor organization built a pilot-scale unit aimed at broad coal liquefaction applications. Recognizing the potential for carbon pitch production, AmeriCarbon re-engineered the facility to create the Liquid Carbon Process specifically for producing tailored isophase and mesophase coal pitch intermediates and needle cokes. Since then, the facility has successfully produced pitch from lignite, bituminous, and sub-bituminous coals and has also demonstrated the production of needle coke.

AmeriCarbon’s pilot facility, located in Morgantown, West Virginia, remains the only known coal liquefaction-based pitch production facility in the world. It comprises approximately 12,000 square feet and is equipped to support laboratory through pilot-scale research and development. This unique facility allows for the generation of directly scalable engineering data from applied research, enabling accurate translation to commercial-scale plant designs.

The Initial NDIC Project: Technical and Economic Feasibility Assessment
(Funded by NDIC, AmeriCarbon, and NACCO)

From January 2022 through June 2023, AmeriCarbon executed a project titled *North Dakota Lignite Coal-Based Pitch for Production of High-Value Carbon Products via AmeriCarbon Liquid Carbon Pitch (LCP) Process*, funded in part by the North Dakota Industrial Commission (NDIC). At the onset of that project, AmeriCarbon and its collaborators hypothesized that it would be technically feasible to convert North Dakota lignite coal into a coal tar pitch product. The project successfully demonstrated:

- Identification and quantification of specific market applications.
- Understanding of desired product specifications.
- Chemical formulation and process evaluation studies.
- Production of carbon products from lignite coal meeting market and customer specifications.
- Evaluation of by-products contributing to the commercial viability of the Liquid Carbon Process.
- Development of a techno-economic model that meets investor return thresholds.

This initial project validated the technical feasibility of producing carbon pitch from North Dakota lignite coal and laid the groundwork for subsequent engineering studies to advance the technology toward commercial scale.

Engineering Design of the Base Module
(Funded by AmeriCarbon)

Building on the successful demonstration of the Liquid Carbon Process, AmeriCarbon engaged an engineering design contractor in October 2022 to develop an optimized base module design for the production of Eco-Pitch, hydrocarbon by-products, and ash by-product. This engineering

effort, funded exclusively by AmeriCarbon, included the development of preliminary engineering designs for the base module, including equipment sizing and capital expense estimates. The effort also produced critical process flow diagrams (PFDs), piping and instrumentation diagrams (P&IDs), and mass and energy balance calculations.

This work culminated in the completion of the FEL2 engineering phase, conducted by Worley Parsons, which verified the technical and economic viability of the base module. These engineering studies established one of the key critical requisites for developing the commercial-scale McLean Plant.

*Second NDIC Project: Engineering Design of Asphalt and Graphite Modules
(Funded by NDIC, AmeriCarbon, and NACCO)*

In 2023, NDIC contributed funding support to a second project with AmeriCarbon, titled *Engineering Design and Feasibility Analysis for Commercial Graphite and Asphalt Manufacturing from Lignite-Derived Carbon Pitch*. This project initiated the engineering design and validated the economic viability of the asphalt and battery modules of the McLean Plant. Building on the earlier NDIC-funded effort, this project sought to advance the development of asphalt and battery-grade graphite derived from lignite coal using the patented/proprietary LCP process. These engineering advancements reinforced the technical potential of utilizing lignite-derived pitch for applications in both asphalt and graphite manufacturing, further supporting the commercial rationale for the McLean Plant.

*Third NDIC Project: Reactor Optimization Project: Enhancing Lignite Conversion Efficiency
(Funded by NDIC, AmeriCarbon, and NACCO)*

In 2024, AmeriCarbon was awarded funding from the North Dakota Industrial Commission (NDIC) for a targeted project aimed at optimizing the reactor design specifically for lignite coal conversion. This project was initiated in response to lessons learned from prior pilot-scale operations and early engineering studies, which identified the reactor as a critical component requiring enhanced performance to maximize yield and operational efficiency when processing lignite.

The primary objectives of the NDIC-funded reactor optimization project include:

- Conducting a comprehensive evaluation of the current reactor configuration to identify limitations and opportunities for improvement.
- Developing an optimized reactor design that maximizes lignite throughput while minimizing energy consumption and waste generation.
- Validating the new reactor design through prototype testing, ensuring it meets performance standards necessary for commercial-scale production.
- Generating high-quality lignite-derived pitch samples to validate product quality and consistency.
- Demonstrating the reactor's ability to achieve consistent and reliable operation under commercial conditions.

This optimization project is essential to the successful commercialization of the Eco-Pitch process, as it directly addresses technical challenges related to the scale-up from pilot operations to full-scale production. By refining the reactor design and enhancing its capability to process lignite efficiently, AmeriCarbon is positioning the McLean Plant to achieve high operational reliability and economic viability.

Historical Background of Coal Liquefaction and Carbon Pitch Production

Coal liquefaction technology has a long and storied history, dating back to the early 20th century when Friedrich Bergius developed direct coal liquefaction to convert lignite into fuel. Subsequent advancements included the Fischer-Tropsch process, which converted syngas from coal into liquid hydrocarbons. While these technologies were initially developed for fuel production, they also laid the foundation for producing coal tar, a key precursor to carbon pitch.

In the United States, significant coking oven capacity once supported steelmaking and provided coal tar pitch as a by-product. However, with the decline of domestic steel production and the closure of many coking ovens, the supply of U.S.-produced coal tar pitch has dwindled. Simultaneously, the rapid growth of advanced carbon materials has created unprecedented demand for high-quality carbon pitch.

AmeriCarbon recognized the opportunity to adapt coal liquefaction technology for intentional pitch production, addressing the supply chain vulnerabilities created by the decline of domestic coking capacity and the increased reliance on imports, primarily from China. Through innovative engineering and process optimization, AmeriCarbon has pioneered the conversion of lignite into high-quality carbon pitch, positioning the company to meet the burgeoning demand for advanced carbon products.

The Current Project: Completing FEL3 and Preparing for Commercialization

The current project will complete the FEL3 engineering design for the commercial-scale McLean Plant in McLean County, North Dakota. This phase will Front End Engineering Design (FEED) package required to advance to the Execution phase, including definitive process and equipment specifications, refined cost estimates, risk assessments, and operational plans. This FEL3 effort builds directly on the achievements of prior projects, further validating the technical and economic feasibility of converting lignite to carbon pitch at a commercial scale.

Qualifications

AmeriCarbon Team Members

AmeriCarbon has assembled a credentialed project team and has developed a portfolio of strategic alliances with innovative developers, research institutions, and industry partners. Its executives bring expertise in the technical subject matter of hydrocarbon conversion, advanced coal products, technology scaleup and commercialization, and business and project finance.

Our team contributes the following to the proposed project:

- Technical Expertise. The AmeriCarbon team is led by **David Berry**, who is serving as principal investigator for the project. Dave has numerous patents and patents pending through more than three decades of institutional research experience with the U.S. Department of Energy and U.S. Department of Defense that are focused on hydrocarbon conversion technologies. Dave has extensive experience from the laboratory through the pilot-scale and has surrounded himself with world class researchers and innovative thinkers which have contributed to AmeriCarbon's unique technology. **Dr. Chetan Tambe** will serve as a senior researcher during the project. Dr. Tambe has a decade of experience in process design and development with a focus on hydrocarbon liquid processing. **Steven Mascaro, PMP** is a senior process engineer and project manager with more than three decades of experience, principally with the U.S. Department of Energy.

- Scale Up Capability. AmeriCarbon's business executives have spent the majority of their decades-long careers working in the realm between laboratory scale research and industrial development. The skills required to commercialize technology through the pilot demonstration phase are invaluable and contribute to AmeriCarbon's special capabilities in technical innovation and application.

- Commercial Track Record. Implementing innovation at pilot and industrial scale requires experience in large commercial transactions and the ability to manage capital with discipline. These qualities are the hallmark of AmeriCarbon's financial and commercial team members, who have raised and managed several hundred million dollars in the energy and materials sectors. **Greg Henthorn** formally serves as AmeriCarbon's vice president of business development and will continue to lead these activities in addition to providing project management and business operations support for the project.

Worley Parsons Team Members

Art Lucas has built a record of engineering accomplishments within various engineering disciplines, with experience at MATRIC, Marathon Ashland Petroleum, Akzo Nobel, Sunoco Chemicals, and DuPont Chemicals. He has provided engineering support for propylene purification and polymerization, polymer extrusion technology, process debottlenecking, solid handling and material transfer operations. He also has experience in simulating chemical processes with engineering software to develop a complete understanding of system dynamics. Art has been heavily involved in the design and detailed engineering for a biodiesel plant based on novel continuous technology. Art has a BS in Chemical Engineering from West Virginia University Institute of Technology.

Note: Detailed resumes from AmeriCarbon and Worley Parsons are included in the Appendix.

MANAGEMENT

A description of **how** the applicant will manage and oversee the project to ensure it is being carried out on schedule and in a manner that best ensures its objectives will be met, **and a description of the evaluation points to be used** during the course of the project.

Management approach and oversight

AmeriCarbon will manage The Forge Project through an Owner-led Project Management Office (PMO) with Worley as the targeted engineering / EPC partner for execution, subject to final contracting at the conclusion of FEL-3. Governance will be provided by the AmeriCarbon Forge steering committee (JV principals) with decision rights at stage gates; day-to-day authority resides with the Project Director and PMO. Worley's role is anchored by its Charleston, WV chemicals center (with Bismarck, ND support) and is anticipated to continue from FEL-3 into detailed engineering, procurement support, construction management, and commissioning support per Worley's proposal and letter of support.

Organization and responsibilities

Owner (AmeriCarbon Forge PMO). Owns scope, budget, and schedule; approves stage-gates; manages financing and stakeholder engagement; leads EHS policy; integrates pilot-plant learnings; and accepts systems at Mechanical Completion (MC) and Provisional Acceptance (PA). The PMO issues the Project Execution Plan (PEP), Cost & Schedule Baselines, and Change Control (MOC) procedures.

Worley (anticipated EPC-M). Leads detailed design and interdisciplinary integration; provides project controls (Level-2 master schedule, cost reporting), procurement planning/expediting, constructability reviews, and commissioning support; delivers the **AACE Class-3** estimate and basis at FEL-3 handoff.

Operations (AmeriCarbon). Readies O&M procedures, staffing, and training (leveraging pilot operations) and leads commissioning & performance testing alongside Worley's commissioning team.

Execution controls and cadence. The PMO will implement an integrated control system aligned to the CSEA scoring emphasis on Methodology and Project Management (weights ×9 and ×6, respectively). Monthly reporting will track CPI/SPI (earned-value), commitments, forecast at completion, risk registers, safety KPIs, quality metrics, and progress to milestones; baselines are updated only via formal MOC.

Key management artifacts produced/maintained: Project Execution Plan; Project Basis of Design; Level-2 schedule; Class-3 estimate & Basis; Procurement Plan; Constructability Reviews; HAZOP/QRA/FMEA records; Commissioning Management Plan; and monthly status packages (engineering, procurement, construction, HSSE, and cost).

Design finalization and procurement management. At the FEL-3 to execution transition, Worley provides the FEL-3 deliverables (PFDs, preliminary P&IDs, equipment lists, requisition packages, discipline design criteria, early 3D model) and firm quotations for major long-lead equipment. During execution, procurement will issue purchase orders for long-lead items immediately after AFE, then progress through bid/award for bulk materials and construction subcontracts. Supplier expediting and FAT/SAT are embedded in the QA/QC plan.

Construction management and AWP. Field execution will use Advanced Work Packaging (AWP) with Construction Work Packages (CWPs) linked to engineering and procurement deliverables to open multiple work fronts and protect the critical path. Early works include site prep, utilities, and lay-down areas; construction focuses on modular installation, utility tie-ins, and system turnover by subsystem.

Safety, risk, and environmental management. The project adopts a zero-harm objective. Process safety is embedded through HAZOP, QRA, and FMEA at 60%/90% design and refreshed pre-start; SIMOPS, permit-to-work, LOTO, and override control are enforced during commissioning. Risk workshops are held at each gate; top risks, mitigations, and residuals are tracked in the risk register.

Commissioning, startup, and handover. A Commissioning Management Plan governs systemization, MC certificates, loop checks, energization, PSSR, Start-Up Readiness Review (SUR), and a 90-day performance demonstration at design throughput with product-quality verification and emissions confirmation. Handover includes asset registers, as-builts, O&M procedures, and spares.

Reporting and stakeholder engagement. AmeriCarbon will provide CSEA/NDIC with monthly progress reports (cost, schedule, technical, HSSE), milestone notices, and a close-out report at PA/FA, consistent with the Committee’s emphasis on clarity of management and timeliness. Coordination with local stakeholders and workforce partners will be continuous through construction and startup.

Evaluation Points (Stage Gates & In-Process Milestones)

| Gate / Milestone | Primary Evidence / Deliverable |
|-------------------------------------|--|
| G0 – FEL-3 Complete | FEL-3 package; AACE Class-3 estimate; Level-2 schedule; procurement plan; updated risk/HSE studies |
| G1 – AFE / Financial Close | Executed financing (incl. CSEA), updated baseline (cost/schedule), LOIs/MOUs status |
| M1 – Long-Lead Orders Placed | PO/expediting logs for critical equipment (reactor trains, columns, condensers, electrical rooms) |

| Gate / Milestone | Primary Evidence / Deliverable |
|---|--|
| M2 – Site Mobilization & Early Works | Mobilization plan; SWPPP; early-works completion package |
| M3 – Structural & Modular Installation 50% | AWP progress; CWP completions; QA/ITP stats |
| M4 – Mechanical Completion (MC) | MC certificates by subsystem; turnover dossiers |
| G2 – Pre-Start-Up Safety Review (PSSR) | PSSR package; SIMOPS plan; training records |
| M5 – Hot Commissioning & Ramp | Functional and performance tests; control-loop tuning |
| M6 – 90-Day Performance Test | Independent QA results for binder & impregnating grades; GHG verification; utilities balance |
| G3 – Provisional Acceptance (PA) | O&M handover, spares, as-builts, asset register |
| M7 – Market & Workforce KPIs (running) | Executed MOUs/LOIs; shipments; hiring/training records |

TIMETABLE



BUDGET

| Project Associated Expense | NDIC Grant | NDIC Loan | Applicant's Share (Cash) | Other Project Sponsor's Share | Total |
|-----------------------------------|-------------------|------------------|---------------------------------|--------------------------------------|---------------|
| Project CAPEX | | \$40,000,000 | \$20,000,000 | \$40,000,000 | \$100,000,000 |
| | | | | | |
| | | | | | |
| | | | | | |
| Total | | \$40,000,000 | \$20,000,000 | \$40,000,000 | \$100,000,000 |

A detailed financial model and equipment listing will be provided upon request, and subject to confidentiality restrictions.

CONFIDENTIAL INFORMATION

AmeriCarbon Forge, LLC hereby requests confidentiality for certain materials submitted in connection with this application pursuant to N.D.C.C. § 54-63-02 and the Clean Sustainable Energy Authority (CSEA) confidentiality procedures.

The confidential materials are provided under separate cover in clearly marked appendices labeled "Confidential – Not for Public Disclosure." These materials include:

- The AmeriCarbon Forge, LLC business plan, including strategic, commercial, and customer information;
- Historical and projected financial statements and tax returns;
- The Bank of North Dakota (BND) loan application and supporting financial documents; and
- Other proprietary and financial data containing trade secrets, commercial information, or competitive business details.

These materials contain information that is commercially sensitive and proprietary to AmeriCarbon Forge, LLC and its affiliates. Public disclosure would likely cause competitive harm by revealing internal business strategies, financial terms, and trade-secret information.

A separate Request for Confidentiality form has been submitted concurrently with this application, identifying the nature of the information to be protected and the basis for the confidentiality designation.

PATENTS/RIGHTS TO TECHNICAL DATA

AmeriCarbon holds several patents related to its proprietary Liquid Carbon Process (LCP) and the production of advanced carbon materials, including Eco-Pitch. These patents form the foundational intellectual property underlying the commercial-scale pitch manufacturing technology and related processes. All intellectual property rights will be retained by AmeriCarbon, subject to applicable North Dakota laws governing research and development projects funded in part by the North Dakota Industrial Commission (NDIC).

AmeriCarbon holds five patents in the United States and Canada: US# 11667852, 10301549, 9845431, 9534176; and CA# 3120884. AmeriCarbon’s intellectual property portfolio protects the core technologies necessary for converting lignite coal into high-value carbon materials. The patents encompass process innovations, reactor configurations, and methodologies for producing tailored pitch products and carbon intermediates.

Subject to existing law of the State of North Dakota, all intellectual property developed, utilized, or refined during this project will remain the exclusive property of AmeriCarbon. This includes any new methods, improvements, or technical advancements arising from the FEL3 engineering design work or related pilot plant activities.

STATE PROGRAMS AND INCENTIVES

AmeriCarbon’s affiliate, AmeriCarbon Products, LLC, has been the recipient of the following contracts through the Lignite Research Council and funded by the North Dakota Industrial Commission:

| NDIC Contract Number | Title | Term of Contract | NDIC Share |
|-----------------------------|---|--------------------------------|-------------------|
| Contract No. FY22-XCVII-241 | North Dakota Lignite Coal-Based Pitch for Production of High Value Carbon Product | January 2022 through June 2023 | \$550,000.00 |
| Contract No. FY23-102-251 | Engineering Design and Feasibility Analysis for Commercial Graphite and Asphalt Manufacturing from Lignite Derived Carbon Pitch | July 2023 through June 2025 | \$700,000.00 |
| Contract No. FY24-104-258 | Lignite Conversion Reactor Optimization for Commercial Carbon Pitch Manufacturing | July 2024 through January 2026 | \$743,800.00 |
| Contract No. FY25-107-264 | Commercial Plant Design Optimization: Lignite to Critical Carbon Materials | May 2025 through July 2026 | \$1,499,653 |

PUBLICATIONS - Selected

1. Ping Wang, Bret Howard, Nicholas Means, Dushyant Shekhawat, David Berry. "Coal chemical-looping with oxygen uncoupled (CLOU) using a Cu-based oxygen carrier derived from natural minerals". *Energies* 2019, 12, 1453, doi:10.3390/en12081453.
2. Daniel J Haynes, Dushyant Shekhawat, David A Berry, Amitava Roy, James J. Spivey, Effect of calcination temperature on the steam reforming activity of Ni substituted pyrochlore catalysts, Jun 2018 to *Applied Catalysis: A: Gen.*
3. Ping Wang, Nicholas Means, Bret Howard, Dushyant Shekhawat, and David Berry, The Reactivity of CuO Oxygen Carrier and Coal in Chemical-Looping with Oxygen Uncoupled (CLOU) and In-situ Gasification Chemical-Looping Combustion (iG-CLC), *Fuel* 217 (2018) 642-649.
4. M.W. Smith, D.A. Berry, D. Shekhawat, D.J. Haynes, J.J. Spivey, Partial oxidation of liquid hydrocarbons in the presence of oxygen-conducting supports: Effect of catalyst layer deposition, *Fuel*, 89 (2010) 1193-1201.
5. D.J. Haynes, A. Campos, M.W. Smith, D.A. Berry, D. Shekhawat, J.J. Spivey, Reducing the deactivation of Ni-metal during the catalytic partial oxidation of a surrogate diesel fuel mixture, *Catal Today*, 154 (2010) 210-216.
6. D. Shekhawat, D. A. Berry, H. W. Pennline, E. Granite, J. J. Spivey, Special Issue: Advanced Fossil Energy Utilization, *Fuel*, Volume 89, Issue 6, January 1, 2010.
7. Maria D. Salazar-Villalpando, D. A. Berry and A. Cugini, Role of Lattice Oxygen in the Partial Oxidation of Methane over Rh/Supported Ceria Catalysts. *Isotopic Studies, Solid State Ionics*, December 2009.
8. M. Salazar, D. A. Berry and T. H. Gardner, "Partial Oxidation of Methane over Rh/Supported-Ceria Catalysts: Effect of Catalyst Reducibility and Redox Cycles", Published, *International Journal of Hydrogen Energy*, 33/11, (2008), 2695-2703
9. Shadle, L.J., Berry, D.A., and Syamlal, M., "Coal Gasification", *Encyclopedia of Chemical Technology, Concise, 5th Edition (ISBN 978-0-470-04748-4)*. , John Wiley & Sons, Inc., NY, NY, May 2007.
10. Turton, R.A., Berry, D.A., Gardner, T.G., and Miltz, A., "The Evaluation of Zinc Oxide Sorbents in a Pilot-Scale Reactor: Sulfidation Kinetics and Reactor Modeling", *Industrial Engineering and Chemistry, Ind. Eng. Chem. Res.* 2004, 43, 1235-1243

PATENTS - Selected

1. U.S. Patent # 9,935,318 SOFC Cathode with Oxygen Reducing Layer, (2018)
2. U.S. Patent 9,598,644 Method of CO and/or CO₂ hydrogenation to higher hydrocarbons using doped mixed metal oxides, (2017).
3. U. S. Patent 9,562,203 Methane-rich syngas production from hydrocarbon fuels using multi-functional catalyst/capture agent, (2017).
4. U.S. Patent 9,126,833 Process for continuous synthesis of mixed oxide powders, (2015).
5. U.S. Patent 8,486,301 Method for designing a reforming and/or combustion catalysts system, (2013).
6. U.S. Patent # 7,442,353 "Heat Recirculating Reformer for Fluid Stream Pollutant Removal, (2008).

SYNERGISTIC ACTIVITIES

- Editorial Board Member, "Catalysis Today", January 2006-2009.
- Distinguished Visiting Scientist, Oak Ridge National Laboratory, April 2002.
- Research Management Board Member, Army Core Technology Program (CTP) for Power Systems, June 2005 / 2006.

GREGORY G. HENTHORN

EDUCATION

West Virginia University, Morgantown, WV, Executive MBA (2003);

West Virginia University, Morgantown, WV, J.D. (2000)

West Virginia University, Morgantown, WV, B.S., Chemical Engineering (1995)

RESEARCH AND PROFESSIONAL EXPERIENCE

AmeriCarbon Products, LLC; VP of Corporate Development; Morgantown, WV; 2020-present;

Focuses on commercial transactions; investor relations, capital attraction and management; business development with customers and collaborators; administrative and financial oversight.

West Virginia University; Associate Professor (Adjunct); Morgantown, WV; 2019-present;

Energy Production and Operations (ENLM 220)

Flat Rock Energy; EVP of Business Development; Morgantown, WV; 2010-2020; Flat Rock is

a private equity funded oil and gas exploration and production company that develops, funds, and implements drilling programs in the Appalachian Basin. Founder of company, securing more than \$100 million in private equity funding; Negotiated commercial transactions with investors and other oil and gas operators.

Kinetic Clean Energy; Managing Partner; Morgantown, WV; 2007-2010; The company

coordinated the origination, development, and finance of several methane-based renewable energy projects. Financed more than \$50 million in renewable electric power facility construction projects; Organized facility to convert fleet vehicles to compressed natural gas; Assisted in the formation of a team to commercialize ethane-to-plastics technology.

Fourth Venture Group; Vice President; Morgantown, WV; 2000-2007; Fourth Venture was an

angel capital and early stage venture capital firm that served as a launching pad for technology commercialization and economic development. Served as Chief Operating Officer for a 500,000-

member online portal that integrated with hundreds of brick-and-mortar merchants; Worked with DOE laboratories and NGOs to commercialize technologies developed in former Soviet military research institutes; Explored development of a liquefaction facility to convert coal to liquid transportation fuels; Co-founded an enterprise-class business-to-business software company that was focused on the surveying and construction sectors, from establishment of the business to its divestiture; Held executive management positions in two specialized manufacturing companies.

SELECTED PUBLICATIONS & PRESENTATIONS

- “New Business Opportunities in TransTech Energy Technologies”, West Virginia Senate Economic Development Committee Meeting, West Virginia State Capitol, January 18, 2011.
- “Opportunities for the Coal Industry to Create Revenue from Carbon Offsets”, 36th Annual West Virginia Mining Symposium, West Virginia Coal Association, Civic Center, Charleston, WV, February 18, 2009.
- Bai, Xingji and Henthorn, Greg. “13 Per Day.” *Capacity Magazine* Spring (2007): 77-79. Print.

SYNERGISTIC ACTIVITIES

1. **TechConnectWV**, Charleston, WV; Member, Board of Directors, 2004-present; Member, Executive Committee, 2010-present. TechConnectWV is a non-profit, 501(c)(3) organization dedicated to the advancement of science, technology, and the innovation economy in West Virginia.
2. **West Virginia University**, under contract with Kinetic, 2012-2016; *Feasibilities of a Coal-Biomass to Liquids Plant in Southern West Virginia* (Award DE-FE0009997).
3. National Research Center for Coal & Energy, West Virginia University, Morgantown, WV; Consultant, Energy Efficiency Division, under contract with Kinetic, 2010-2011; *Supported establishment of initial TransTech Energy Conference*.
4. **West Virginia High Technology Consortium Foundation**, Fairmont, WV; Consultant, INNOVA Commercialization Group, 2010-2011; *Identification of technology commercialization and investment opportunities at NETL and WVU*



Art Lucas

Senior Principal Process Engineer

Summary

Mr. Lucas has more than twenty-two years of process design and research experience in the Chemical and Polymer industries. Responsibilities have included process engineer, research engineer and other roles.

Education

2000 B.S. Chemical Engineer, West Virginia Institute of Technology, Montgomery, WV

Experience

2023-Present Senior Principal Process Engineer, Worley, Charleston, WV

- Air Permitting & Emissions for Blue Ammonia Technology
- Proposal and Scope Work OSBL Blue Ammonia Technology
- Plastics Recycling Technology
- UniSim Modeling with OLI Software
- Worley Education Passports in Low Carbon Hydrogen, Ambition, Sustainability, Energy

2006-2023 Senior Research Engineer, MATRIC, South Charleston, WV

Technology development and deployment of various technologies at both laboratory and pilot scale as listed below.

- Batch polymerizations with novel technologies
- Liquid-Liquid Extractions
- Membrane technology and filtrations
- High Molecular weight polymerization
- Pyrolysis Technology
- Agitated filter drying and precipitations
- Adsorption Technologies
- Renewable Energy Technology
- Recycle Technology for various consumer products
- Chlorination reactions with shock sensitive byproducts
- Algae processing to make nutraceuticals

- Wiped Film evaporation and azeotropic distillations
- Slurry handling of both miscible and immiscible solutions.
- Solids handling of pseudoplastics and high viscosity polymers

Responsibilities included the following:

- Technical liaison with customers technical staff to develop scope of work, project execution plans and testing protocols.
- Developed all documentation for pilot scale operations. This included but not limited to, P&IDs, mass and energy balances, operating procedures, EHS, Safety assessments, emergency response and daily operational plans.
- Managed customer projects from concept to completing. A Dual role as Senior Research Engineer and Project Manager. Managed average capital expenditures of \$500K to as excess of \$1.5MM.
- Technical documentation for patent filing for successful technology for both the customer and internal research projects.
- Trained the operation workforce on the new technology deployments. This includes sample methodology as well as operation know how.
- Developed technology packages for renewable energies as part of the Renewable Fuel Standard.
- Worked with customer to mitigate risk for large scale fermentation to acid technology hurdles. Solutions were adopted and customer deployment commercial scale implementation in excess of \$300MM.
- Developed and patented technology in Pyrolysis and Reverse Osmosis Membranes.
- Lead engineer for design and implementation of patented continuous biodiesel facility. Overseen technology transfer, prepared design and bid packages and orchestrated project implantation in a cradle to grave role. This also included writing all Standard Operation procedures an defining the safety and compliance issues for the facility.

2006 – 2006 Process Engineer, DuPont Chemical Company, Belle, WV

- Debottlenecking process by redeveloping process conditions.

Solid Handling and Material Transfer

Vacuum Operations

Slurry Transfer

Batch Processing

Blending and Conveying

- Responsible for all activities surrounding production metrics of the unit.
- Provided 24hr coverage for area of unit responsibility to provide direction as require for all production problems.
- Organized a process workflow system that directed the human interfaces with the process for optimal performance.
- Educated/Trained operations on critical paths for success and very instrumental in fostering a higher standard ow work practices of operational employees.
- Developed and implemented new process guidelines and control limits.
- Responsible for operational instructions for evening and night shift employees.

2001 – 2005

Project/Process Engineer, Sunoco Chemical – Kenova, WV

Extrusion Process

- Implemented Rheology technologies for improved process control.
- Project engineer for de-bottlenecking extrusion line.

Capital \$1.75 MM

Designed and implemented Master Batch Additive System

- Rotating equipment

Twin Screw Extruders

Gear pumps

Blenders

Conveyors

Rotary valves

Pelletizers

Bulk material transfer

Gravity and pneumatic conveying systems

- Decreased off spec product by improving raw additive blend methods.
- Fully utilized new and existing PLC components for decreasing labor efforts along additive system.
- Orchestrated work efforts with hourly group to obtain new process workflow and procedure for new equipment.
- Preventative maintenance routines and monitoring for new equipment.
- Daily engineering support to production. Organized and developed “Best Practices” along extrusion line using root cause analysis.

300% increase in reliability

Increased first pass prime material from 93% to 98.2%.

Polymerization Process:

- Improved first stage reaction control by installing a refrigerated water/glycol system.
 - Twin screw and reciprocating compressor technology
- Operating Discipline Rollout member
- Spheripol Catalyst Technologies
- Provided engineering support to operations for high activity catalyst trials.
- Combined reaction kinetics and catalyst technologies to minimize byproduct formation.
- Decreased off-spec product by 50% by developing and implementing IMR models for online Rheology measurement.

Propylene Purification:

- Catalyst technologies for feedstock purifications
- Installed and commissioned first Nickel catalyst bed within Chemicals division (\$100K capital).

Industrial Commission
Tax Liability Statement

Applicant:

AmeriCarbon Forge, LLC
3001 Cityview Drive
Morgantown, WV 26501

Application Title:

The Forge Project

Program:

- Lignite Research, Development and Marketing Program
- Renewable Energy Program
- Oil & Gas Research Program
- Clean Sustainable Energy Authority

Certification:

I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.



Signature

Chief Business Officer

Title

10/15/2025

Date

North American **COAL**

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Re: Support The Forge Project in North Dakota

Dear Mr. Henthorn:

North American Coal, LLC (NACoal) is pleased to express its support for the applications being submitted by AmeriCarbon Forge, LLC and Ore Spring Materials, LLC to the Clean Sustainable Energy Authority (CSEA) for The Forge Project and the associated Rare Earth and Critical Materials Integration Project. Both projects represent transformative opportunities to advance value-added lignite utilization and domestic manufacturing in North Dakota.

As the leading producer of lignite coal in North Dakota, NACoal remains committed to supporting innovation that utilizes North Dakota's lignite as a strategic resource for economic development and job creation. We recognize the importance of developing domestic sources of advanced carbon materials and critical minerals, particularly those essential to industrial, infrastructure, and defense applications.

Currently, NACoal is considering investing up to \$6 million in the commercial facility to be constructed as part of The Forge Project. Any such capital investment will be contingent upon completion of due diligence, mutually satisfactory definitive agreements, final project financing structure, and approval by NACoal's Board of Directors.

In addition to our potential equity participation, NACoal expects to continue supporting the project through its affiliate The Falkirk Mining Company, which operates the Falkirk Mine in McLean County, North Dakota—the planned feedstock source for The Forge Project. We anticipate that the project will strengthen the long-term viability of lignite operations by expanding the economic uses of this resource beyond power generation.

NACoal also recognizes the strategic significance of the Rare Earth and Critical Materials Integration Project being advanced by Ore Spring Materials in collaboration with AmeriCarbon, the University of North Dakota, and Microbeam Technologies. The potential to recover rare earth elements and critical minerals from by-product ash streams produced by the Forge facility offers a compelling opportunity to establish an integrated value chain for critical materials within the state. NACoal views this integration as a valuable bolt-on to the Forge Project, enhancing North Dakota's leadership in critical mineral recovery and clean industrial innovation.

We are encouraged by AmeriCarbon's technical progress, the strength of its partnerships with the University of North Dakota and other institutions, and the alignment of these projects with the state's economic goals. NACoal looks forward to continuing its collaboration with AmeriCarbon and its affiliates as they move toward commercial implementation of these important initiatives in North Dakota.

Sincerely,

NORTH AMERICAN COAL, LLC



Carroll L. Dewing
Senior Vice President and Chief Operating Officer



918 E Divide Ave
Bismarck, ND 58501
rainbowenergycenter.com

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Subject: Support of The Forge Project

Dear Mr. Henthorn:

Rainbow Energy Center, LLC is pleased to convey its strong endorsement of **The Forge Project** being advanced by AmeriCarbon and NACCO Natural Resources. The project's proposed location, near our Coal Creek Station operations, presents a unique opportunity for local synergy, strategic partnership, and regional economic development.

Rainbow is proud to be part of the electrical generation system in North Dakota, owning Coal Creek Station and Nexus Line, LLC, to deliver reliable power across the region. As part of our core mission, we are committed to exploring and supporting innovative technologies and value-added industrial uses of regional resources.

We view The Forge Project as complementary to our operations and regional energy ecosystem. The facility's production of Eco-Pitch™ from North Dakota lignite coal — using AmeriCarbon's proprietary process — dovetails with the region's broader ambitions to harness natural resources, enhance domestic manufacturing capacity, and build resilience in strategic supply chains.

Rainbow is committed to working cooperatively with AmeriCarbon to explore beneficial collaborations, including possible coordinated infrastructure use (energy, utilities, transmission access). We believe The Forge Project offers meaningful benefit to the county and state through economic stimulus, job creation, and long-term strategic advantage in energy and materials sectors.

Rainbow also recognizes the alignment between The Forge Project and the complementary rare earth element (REE) integration initiatives being advanced by AmeriCarbon and its affiliates, as well as NACCO Natural Resources, the University of North Dakota, and Microbeam Technologies. These efforts reinforce one another and present a valuable opportunity to leverage shared infrastructure and regional expertise to support critical mineral recovery and high-value carbon production within North Dakota's energy corridor. Rainbow wishes AmeriCarbon success in securing the Clean Sustainable Energy Authority award and looks forward to being a constructive collaborator as the project progresses.

Sincerely,

A handwritten signature in blue ink that reads "Jessica K. Bell".

Jessica K. Bell, Vice President External Affairs
Rainbow Energy Center, LLC

Cc: David Straley (NACCO Natural Resources)



October 14, 2025

Mr. Greg Henthorn
Chief Business Officer
AmeriCarbon Forge, LLC
3001 Cityview Drive
Morgantown, WV 26501

Dear Mr. Henthorn:

I am writing in support of your application to the North Dakota Clean Sustainable Energy Authority (CSEA) for **The Forge Project**, which proposes the construction of a commercial-scale manufacturing facility for Eco-Pitch™. The Forge Project represents a major step forward in establishing domestic manufacturing capacity for advanced carbon materials that will serve critical roles in industrial, infrastructure, and defense applications.

The Dickinson Group is a family-office private-equity investment firm based in Charleston, West Virginia. The Dickinson family has been part of the Kanawha Valley community for more than 200 years. We maintain substantial holdings in natural resources, real estate, and energy, and we draw upon our multi-generational experience and values to help capitalize and grow innovative and sustainable businesses that impact strategic domestic supply chains.

We share North Dakota's vision to create value-added industries that utilize lignite coal for high-technology applications. AmeriCarbon's Eco-Pitch™ process exemplifies this opportunity—transforming a regional natural resource into a high-value engineered carbon material through an innovative and environmentally responsible process. We also recognize the longer-term opportunity to integrate rare-earth-element (REE) recovery from by-product ash at the Forge facility, in coordination with AmeriCarbon's affiliate, Ore Spring Materials, LLC. This complementary effort could further strengthen the project's impact on U.S. supply-chain security and resource recovery.

The Dickinson Group believes we can support this project in a number of ways, including potential capital investment in AmeriCarbon Forge, LLC to support your cost-share commitment. Any capital investment will, of course, be subject to customary due diligence and approval by our investment board. As you know, our family of companies and partners have already demonstrated our commitment to AmeriCarbon's success, having made a seven-figure investment in AmeriCarbon and its affiliates to date.

We are encouraged by AmeriCarbon's progress and confident that The Forge Project in North Dakota will help establish a strong foundation for domestic critical materials production. We look forward to continuing our relationship with AmeriCarbon as you advance this transformative project.

Sincerely,



Steve Platz
President & CEO

DICKINSON FUEL COMPANY, INC.

170 Summers Street, Suite 300, Charleston, West Virginia 25301

DICKINSON GROUP



CONSOL Innovations, LLC
275 Technology Drive, Suite 101
Canonsburg, PA 15317

October 1, 2025

Clean Sustainable Energy Authority (CSEA)
North Dakota Industrial Commission
State Capitol, 14th Floor
600 E. Boulevard Ave., Dept. 405
Bismarck, ND 58505-0840

Re: Letter of Support for AmeriCarbon's Proposal to CSEA

On behalf of CONSOL Innovations LLC, I am pleased to offer this letter of support for AmeriCarbon's application to the Clean Sustainable Energy Authority ("CSEA") in support of a proposed project in McLean County, North Dakota. AmeriCarbon's proposed project represents a critical advancement in advanced manufacturing and carbon materials innovation, and we believe it aligns well with the mission of CSEA to support sustainable, emissions-reducing energy and industrial technologies.

CONSOL Innovations is interested in purchasing from AmeriCarbon a tailored mesophase version of Eco-Pitch™—a carbon material derived from domestic coal using a low-emissions process. Our intent is to convert this material into high-performance graphite foam for use in both defense and commercial applications.

The proposed project in North Dakota, which will house a commercial-scale production facility, is essential to enabling broader deployment of this domestic, sustainable carbon material. We are supportive of AmeriCarbon's efforts to scale production and have been working with the company in recent years toward a supplier-customer relationship. The MOU provides a framework for ongoing collaboration, and we view their success as important for our ability to deliver next-generation materials for critical applications.

We respectfully urge the Clean Sustainable Energy Authority to approve funding for AmeriCarbon's proposal, and we look forward to a continued relationship in realizing the economic, environmental, and strategic benefits of this technology.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Olson III".

Rudy Olson III, PhD
Director of New Technology
CONSOL Innovations LLC

rudolpholson@coreresources.com
(304) 907-2501



Worley Group, Inc.
500 Lee Street East, Suite 1300
Charleston, WV 25301

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. David A. Berry, Chief Executive Officer
3001 Cityview Drive
Morgantown, WV 26501

Subject: Letter of Support – CSEA Application for The Forge Project

Dear Mr. Berry:

Worley is pleased to express its support for AmeriCarbon Forge, LLC's application to the North Dakota Clean Sustainable Energy Authority (CSEA) for funding of The Forge Project—a first-of-its-kind commercial manufacturing facility for Eco-Pitch™, AmeriCarbon's patented coal tar pitch derived from North Dakota lignite coal. The Forge Project represents a critical step toward the domestic production of advanced carbon materials that support industrial, infrastructure, and defense applications across the United States.

As Worley continues to provide engineering and design services for the Forge Project, we remain confident in AmeriCarbon's progress toward commercial scale production. Upon completion of the FEL-3 engineering design package, Worley anticipates the opportunity to submit a proposal to AmeriCarbon for Detailed Engineering Design services and potential participation in later project phases as an EPC contractor or EPC-M provider, subject to mutual agreement and commercial terms. While these discussions remain preliminary, Worley looks forward to continuing its close technical collaboration with AmeriCarbon through future phases of project execution.

Worley is proud to support AmeriCarbon's commitment to innovation and to North Dakota's leadership in developing value-added energy products from lignite coal resources. We believe that The Forge Project, located near the Falkirk Mine in McLean County, represents an important milestone in advancing domestic carbon manufacturing and expanding the state's role in sustainable industrial development.

Respectfully,

DocuSigned by:

E7C08C9BF0F44A3
Daniel L. Noel, P.E.
Project Manager
Worley Group, Inc.



Mr. Greg Henthorn
Chief Business Officer
AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
3001 Cityview Drive
Morgantown, WV 26501

14 Oct 2025

Dear Mr. Henthorn:

It is my pleasure to provide this letter of support for AmeriCarbon and its proposal to the North Dakota Clean Sustainable Energy Authority (CSEA) for The Forge Project, which will establish a first-of-its-kind commercial-scale manufacturing facility for Eco-Pitch™. This project is directly aligned with critical Department of Defense (DoD) and defense-industrial base objectives to secure a domestic supply of high-performance carbon materials essential to the nation's infrastructure, energy, and defense sectors.

As a retired U.S. Air Force Colonel and former Program Director and System Program Manager for the \$66 billion F-22 Raptor stealth fighter program, I spent much of my career ensuring that America's most advanced air-dominance weapon system maintained technological superiority through secure and resilient supply chains. At Wright-Patterson Air Force Base, I led a 2,200-person government-industry enterprise responsible for every aspect of the program's lifecycle — including management, technology development, programming, planning and budgeting, contracting, risk management, airworthiness, and 24/7 customer support and sustainment of the entire operational F-22 fleet. That experience gave me firsthand insight into the critical importance of secure defense supply chains — and why projects like this one, which return essential materials manufacturing to U.S. soil, are vital to our national security.

Through the firm I founded, Vertex Partners, I have collaborated with AmeriCarbon for several years, helping the company connect with defense contractors, DoD officials, and technology transition offices. During that time, I have seen AmeriCarbon secure initial DoD funding and receive letters of interest and support from defense contractors, all validating a serious and well-documented need for a secure domestic source of coal-tar-pitch and related advanced carbon products. AmeriCarbon is now actively engaged with potential customers in materials validation programs—an essential step toward full qualification and adoption in mission-critical systems.



I fully support AmeriCarbon's efforts to advance The Forge Project, which will not only expand domestic carbon manufacturing but also create an anchor platform for integration with rare-earth-element recovery operations being developed by its affiliate, Ore Spring Materials, LLC—further strengthening the national materials supply chain.

I am confident that AmeriCarbon has the leadership, technology, and partnerships required to deliver on this vision and to provide tangible benefits to U.S. defense readiness and industrial resilience.

Respectfully,

A handwritten signature in blue ink, appearing to read "Sean M. Frisbee".

Sean M. Frisbee, Colonel, USAF (ret)
President
sean.frisbee@vertxpartners.org
304-276-8999



October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
3001 Cityview Drive
Morgantown, WV 26501

Subject: Letter of Support – Collaboration on Eco-Pitch™ and Asphalt Binder Development

Dear Mr. Berry,

It is our pleasure to express the support of the advanced pavement materials research team at South Dakota State University for AmeriCarbon's efforts to advance the development of Eco-Pitch™, a next-generation engineered carbon material, and its application in high-performance asphalt binder systems. Our collaboration with AmeriCarbon has been both productive and promising, and we look forward to continuing this important work as the company advances The Forge Project and related initiatives in North Dakota.

Through our research partnership, SDSU's advanced pavement materials research team has evaluated the mechanical performance of AmeriCarbon's engineered coal-tar-pitch-based materials (AC-127 and AC-128) as innovative binders or additives for asphalt pavements. The preliminary results demonstrated that these binders can achieve excellent stiffness and elasticity at high temperatures, favorable low-temperature cracking resistance, and adhesive bonding with common aggregates. These findings confirm that Eco-Pitch™-derived binders hold potential as alternatives to conventional petroleum-based asphalt, subject to further research, investigation, and optimization.

We are currently preparing for a Phase II program to expand this work, focusing on the formulation of a proprietary Eco-Pitch™ asphalt binder and its performance verification under industry-standard testing protocols. The next phase will build upon our previous laboratory studies, incorporating advanced rheological and mechanical evaluations, mix design development, and pilot-scale field validation.

Our advanced pavement materials research team at SDSU values its collaboration with AmeriCarbon and is committed to providing ongoing research and technical support as the company continues to scale its carbon technologies. We believe these innovations align strongly with regional and national objectives to enhance infrastructure durability of construction materials. We appreciate the opportunity to support AmeriCarbon's efforts and look forward to contributing to its success as the company advances The Forge Project and related programs.

Sincerely,

A handwritten signature in black ink that reads "Rouzbeh Ghabchi".

Rouzbeh Ghabchi, Ph.D., P.E.
Associate Professor
Department of Civil and Environmental Engineering
South Dakota State University
Rouzbeh.Ghabchi@sdstate.edu



UND.edu

COLLEGE OF ENGINEERING & MINES

CEM Research Institute
CEC, Room 246
2844 Campus Rd. Stop 8153
Phone: 701.777.5745
Website: engineering.UND.edu

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Subject: Letter of Support – The Forge Project

Dear Mr. Henthorn:

The University of North Dakota College of Engineering & Mines (UND-CEM) is pleased to express its support for The Forge Project being advanced by AmeriCarbon Forge, LLC. This important initiative represents a significant step forward in developing North Dakota's lignite resources into high-value carbon products that align with the state's broader goals for innovation and economic development.

UND and AmeriCarbon have worked together closely over the past several years through a series of collaborative research and development projects focused on lignite utilization, carbon product development, and rare earth element (REE) recovery. These joint efforts have strengthened North Dakota's position as a national leader in lignite innovation, and we consider our relationship with AmeriCarbon and its affiliate Ore Spring Materials, LLC to be a strategic partnership built on shared objectives and technical collaboration.

While The Forge Project is primarily a construction and commercialization effort, UND remains committed to supporting AmeriCarbon and Ore Spring as technical partners and collaborators as needs may arise. Our team at the College of Engineering & Mines stands ready to contribute expertise in areas such as feedstock evaluation, process optimization, and systems integration between carbon production and critical minerals recovery, consistent with our ongoing research mission.

We view The Forge Project as a model for how private industry and the state's research community can work together to drive economic growth and innovation within North Dakota's energy sector. UND looks forward to continuing to work with AmeriCarbon and its affiliates as you continue to advance this important initiative.

Sincerely,

DocuSigned by:

9CF8579D0B9464...

Daniel Laudal, Ph.D.
Executive Director
College of Engineering & Mines Research Institute
University of North Dakota
daniel.laudal@und.edu



October 15, 2025

State of North Dakota
The Industrial Commission
Clean Sustainable Energy Authority Program
State Capitol – Fourteenth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Re: The Forge Project: Rare Earths and Critical Materials Integration – Application for Grant Funding

Dear Members of the North Dakota Industrial Commission and the Clean Sustainable Energy Authority:

Ore Spring Materials, LLC (“Ore Spring”) is pleased to submit this application for grant and loan funding under the Clean Sustainable Energy Authority (CSEA) program for *The Forge Project: Rare Earths and Critical Materials Integration*. This project represents a unique opportunity to expand North Dakota’s lignite innovation platform by integrating rare earth element (REE) recovery and critical mineral production with AmeriCarbon’s advanced carbon manufacturing operations.

Ore Spring Materials is an affiliate of AmeriCarbon Enterprises, LLC, focused on developing new pathways for value-added utilization of lignite resources. Through this initiative, Ore Spring will collaborate with NACCO Industries, Inc., the University of North Dakota (UND), Microbeam Technologies, Inc., and AmeriCarbon Forge, LLC to demonstrate the recovery of REEs and other critical materials from concentrated ash and residue streams produced by AmeriCarbon’s Eco-Pitch™ process. This innovative approach builds directly upon UND’s ongoing lignite-based REE research and leverages AmeriCarbon’s commercial technology platform to accelerate deployment at industrial scale.

When fully implemented, the REE Integration Project will:

- ✓ Establish a domestic source of rare earth elements and critical minerals derived from North Dakota lignite and associated byproducts;
- ✓ Complement The Forge Project by utilizing its ash and carbon residues as a feedstock for REE extraction, creating a closed-loop, zero-waste manufacturing ecosystem; and
- ✓ Strengthen North Dakota’s leadership in the critical materials, clean energy, and advanced manufacturing sectors.

Ore Spring Materials, LLC is committed to advancing this initiative in close collaboration with UND, Microbeam, AmeriCarbon, and the State of North Dakota. The total program is expected to operate on a timeline that is in coordination with The Forge Project and represents a vital step toward establishing a vertically integrated supply chain for both carbon and critical materials within the state.



(888) 367-1650



www.americarbon.com



3001 City View Drive
Morgantown, WV 26501

This transmittal letter sets forth a binding commitment on behalf of Ore Spring Materials, LLC to complete the project as described in the accompanying application if the North Dakota Industrial Commission approves the requested funding under the CSEA program.

We appreciate the Commission's consideration and continued leadership in fostering innovation in lignite-based energy, materials science, and sustainable industrial development.

Sincerely,

Ore Spring Materials, LLC
by AmeriCarbon Enterprises, LLC, its Manager



Greg Henthorn
Chief Business Officer

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

| | |
|--------------------------|---|
| <input type="checkbox"/> | Application |
| <input type="checkbox"/> | Transmittal Letter |
| <input type="checkbox"/> | Tax Liability Statement |
| <input type="checkbox"/> | Letters of Support (If Applicable) |
| <input type="checkbox"/> | Confidentiality Request |
| <input type="checkbox"/> | Business Plan (Appendix) |
| <input type="checkbox"/> | Historical Financial Statements (3 years) (Appendix) |
| <input type="checkbox"/> | Budgeted Projections (Appendix) |
| <input type="checkbox"/> | Loan/Loan Guarantee Application (if Applicable, Appendix) |
| <input type="checkbox"/> | Other Appendices (If Applicable) |

When the package is completed, send an electronic version to ndicgrants@nd.gov

For more information on the application process please visit:

<https://www.ndic.nd.gov/grant-programs/csea/clean-sustainable-energy-authority-applicant-information>

Questions can be addressed to the Industrial Commission at 701-328-3722.

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title:

The Forge Project: Rare Earths and Critical Materials Integration

Applicant:

Ore Spring Materials, LLC

Date of Application:

October 15, 2025

Amount of Request

Grant: \$2,250,000

Loan: N/A

Total Amount of Proposed Project:

\$4,500,000

Duration of Project:

2 years

Point of Contact (POC):

Greg Henthorn, AmeriCarbon

POC Telephone:

304-685-6017

POC Email:

greg.henthorn@americarbon.com

POC Address:

3001 Cityview Drive
Morgantown, WV 26508

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|--|----------|
| Abstract | 1 |
| Project Description | 2 |
| Standards of Success | |
| Background/Qualifications | |
| Management | |
| Timetable | |
| Budget | |
| Confidential Information | |
| Patents/Rights to Technical Data | |
| State Programs and Incentives | |
| Loan/Loan Guarantee Application (if applicable) | |

ABSTRACT

Objective:

The objective of *The Forge Project: Rare Earths and Critical Materials Integration* is to demonstrate and advance the integration of AmeriCarbon's Eco-Pitch™ carbon manufacturing process with rare earth element (REE) and critical mineral (CM) recovery technologies developed by the University of North Dakota (UND) and Microbeam Technologies, Inc. (Microbeam). The project aims to establish a scalable, co-located platform in North Dakota that converts lignite-derived and related feedstocks into engineered carbon materials while simultaneously recovering REEs, germanium (Ge), gallium (Ga), and other critical minerals from process by-products.

This integration will (1) optimize AmeriCarbon's liquefaction process to utilize diverse feedstocks—including upgraded lignite, humins, and humic acid residues from UND's REE processing—tailoring pitch compositions to customer-specific performance requirements; (2) develop a pathway to use AmeriCarbon's carbon process ash as a high-value CM-bearing feedstock for Microbeam's Ge/Ga recovery system; and (3) define the engineering and economic framework for commercial-scale deployment at the Forge site in McLean County, ND.

Through this effort, the project will advance North Dakota's leadership in lignite-based innovation by demonstrating a fully integrated carbon-plus-critical-minerals manufacturing ecosystem—linking clean carbon production, REE-CM extraction, and high-purity metal refining. The outcome will be a validated process model, optimized feedstock strategy, and techno-economic foundation for an industrial complex that strengthens domestic supply chains for both advanced carbon materials and strategic minerals.

Expected Results:

The Forge Project will deliver a validated and integrated process framework that unites AmeriCarbon's Eco-Pitch™ manufacturing, UND's rare-earth extraction technologies, and Microbeam's germanium and gallium recovery system into a cohesive, North Dakota-based production platform.

The project is expected to:

- ✓ Demonstrate feedstock integration and optimization—confirming the technical viability of using upgraded lignite, humins, and humic-acid residues (individually and in blended configurations) as feedstocks for AmeriCarbon's carbon liquefaction process, yielding targeted pitch formulations for downstream customers in energy and materials sectors.
- ✓ Quantify and enhance by-product value recovery—producing empirical data on the concentration, separation, recovery, and refinement potential of REEs and critical minerals (Ge, Ga, and Sb) from AmeriCarbon's ash and residue streams using Microbeam's pyrometallurgical and hydrometallurgical processes.
- ✓ Validate carbon purity and product performance—through demineralization and purification studies conducted with UND to achieve premium carbon qualities suitable for graphite, anode, and advanced binder applications.

- ✓ Develop an integrated process and site design—including mass and energy balances, flow diagrams, and infrastructure layouts defining how REE-CM extraction, ash utilization, and carbon manufacturing can be co-located at AmeriCarbon’s commercial plant in McLean County.
- ✓ Produce a techno-economic and commercialization analysis—quantifying capital and operating costs, product revenue streams, and economic multipliers for North Dakota, while identifying a practical path to commercial deployment.

Collectively, these outcomes will advance the technology readiness and economic feasibility of an industrial system that transforms lignite and its by-products into high-value carbon and critical mineral commodities. Successful execution will position North Dakota as a national model for clean-energy resource integration—linking carbon manufacturing, REE-CM recovery, and critical-materials supply-chain development within one regional industrial ecosystem.

Duration:

2 years.

Total Project Cost:

\$4.5 million (\$2.25 million from CSEA grant program, and \$2.25 million in matching)

Participants:

The proposed project is being led by Ore Spring Materials, LLC, an AmeriCarbon affiliate formed to coordinate integration of advanced carbon and critical mineral technologies. AmeriCarbon Forge, LLC—a joint venture between AmeriCarbon Enterprises and NACCO Natural Resources—will serve as the commercial host entity and provide the process and infrastructure platform for pilot validation and future deployment at the Falkirk site in McLean County, North Dakota.

The University of North Dakota (UND) College of Engineering & Mines will participate in the project along with its demonstrated rare earth element (REE) extraction and beneficiation technology, leveraging pilot-scale systems developed under DOE- and NDIC-supported programs to supply upgraded lignite and humins as optimized feedstocks and to conduct purification and demineralization studies. Microbeam Technologies, Inc. (Microbeam) will apply its patented vaporization and selective condensation process to AmeriCarbon’s ash residues and UND’s mixed rare earth concentrates to recover germanium, gallium, and other critical minerals. As a subcontractor to AmeriCarbon, Worley Group will provide engineering and integration support, developing process flow diagrams and site-level integration studies for co-located operations.

These participants bring a strong combination of industrial capability, engineering depth, and technology readiness. Together, they form a comprehensive team capable of demonstrating a fully integrated carbon and critical materials production ecosystem that aligns with CSEA’s mission to advance sustainable, value-added energy and materials manufacturing in North Dakota.

PROJECT DESCRIPTION

Objectives:

Project FORGE

Carbon & Rare Earth Metal Critical Materials

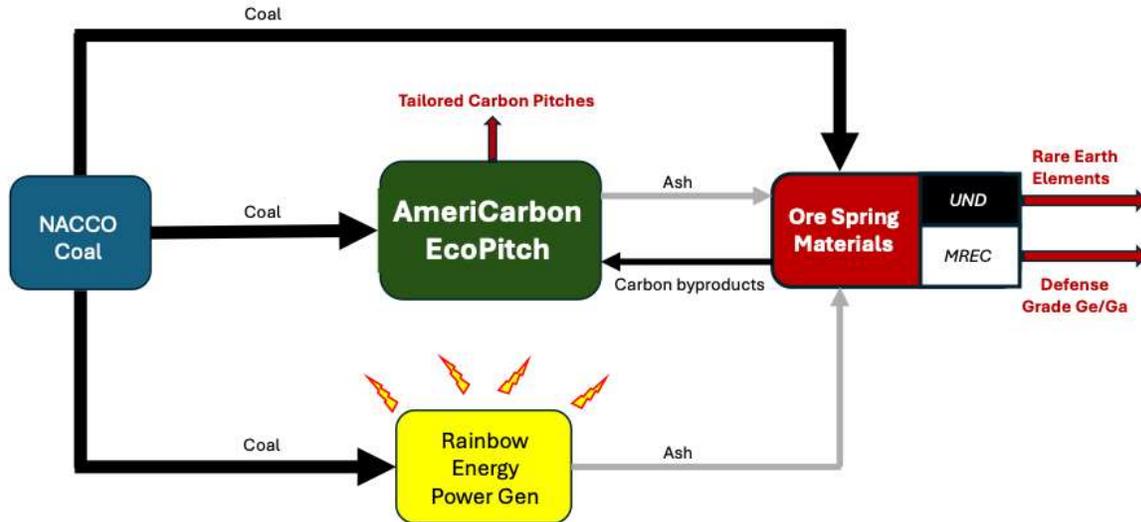


Figure 1. The Forge Project: Rare Earths and Critical Materials Integration.

The overarching objective of *The Forge Project: Rare Earths and Critical Materials Integration* is to develop, demonstrate, and engineer a fully integrated process that combines AmeriCarbon’s carbon liquefaction and pitch manufacturing technology with the rare earth and critical mineral recovery systems pioneered by UND and Microbeam. This integrated system will establish the technical and economic basis for a new lignite-based manufacturing industry in North Dakota that simultaneously produces high-value carbon materials and rare earth/critical mineral products from regional resources and process by-products.

Specifically, the proposed project will:

- ✓ Integrate and optimize feedstock utilization — Demonstrate the use of upgraded lignite, humins, and humic-acid residues from UND’s rare earth extraction process as alternative or blended feedstocks for AmeriCarbon’s Eco-Pitch™ process. This effort will refine process parameters to tailor pitch compositions for distinct industrial applications while maximizing yield and carbon efficiency.
- ✓ Develop and evaluate by-product valorization pathways — Characterize and optimize AmeriCarbon’s process residues and ashes for use as feedstock in Microbeam’s Ge/Ga recovery technology, enabling recovery of high-purity germanium, gallium, and other strategic minerals.

- ✓ Advance purification and demineralization techniques — Conduct joint studies with UND, Worley Group, and prospective customers to enhance removal of ash, sulfur, and metallic impurities from carbon and feedstock streams to achieve ultra-high-purity carbon suitable for advanced materials markets.
- ✓ Perform process integration and engineering design — Engage Worley Group to develop process flow diagrams (PFDs), material and energy balances, and site-integration studies that define how the carbon manufacturing, REE extraction, and critical mineral recovery systems can be co-located and operated synergistically at AmeriCarbon’s Forge site in McLean County, ND.
- ✓ Conduct techno-economic assessment and commercialization planning — Quantify the technical performance, cost structure, and economic impacts of the integrated system, including potential product revenues, co-product credits, and state-level economic multipliers.

The successful completion of these objectives will demonstrate a scalable, North Dakota-based model for the co-production of engineered carbon and critical materials—advancing national supply chain resilience while creating new markets and industrial opportunities within the state’s lignite resource base.

Methodology:

The Forge Project will be executed through a structured series of technical and engineering tasks designed to integrate AmeriCarbon’s Eco-Pitch™ manufacturing process with the rare earth and critical mineral recovery systems developed by UND and Microbeam Technologies. The following Statement of Work outlines the major work activities, responsible organizations, and corresponding budget allocations that collectively define the technical pathway for the project. This work structure provides the framework for coordination, data sharing, and process optimization across all participants.

The Forge Project will be an industrial manufacturing complex in North Dakota to produce critical materials such as carbon and REE-CM to address national and global vulnerabilities and shortfalls in the United States with severe economic and geopolitical strategic consequences caused by the current offshore supply of these materials. Central to the Forge Project is the planned joint venture (AmeriCarbon Forge, LLC) between AmeriCarbon and NACCO to build a lignite coal-to-carbon pitch/materials plant in McClean County, North Dakota. The establishment of this groundbreaking facility provides the basis for an integrated platform for critical materials manufacturing.

The REE manufacturing/production capability is being initiated by Ore Springs LLC, an AmeriCarbon and NACCO affiliate, to bring production of these critical elements derived from lignite coals and by-product streams from AmeriCarbon’s proprietary carbon pitch technology. Integration of these capabilities provide a unique and optimized opportunity that is a key basis of the Forge Project.

Under this proposed work scope being submitted by Ore Spring Materials, LLC, process integration efforts will be undertaken by the key participants to define the necessary optimization between the feedstock inputs and product/by-product outputs of the pitch production (AmeriCarbon) and REE-CM production (Ore Spring / UND / Microbeam).

Project Tasks

Task 1: Project Management:

This task encompasses all project management activities necessary to ensure the successful execution of the project in compliance with CSEA's contractual, technical, and administrative requirements. The Project Management team will provide overall leadership, coordination, and integration of technical, financial, and reporting activities across all project tasks. Responsibilities include tracking schedule and budget performance, managing risk and deliverables, maintaining communication with CSEA program management, and ensuring that project milestones are met in accordance with the approved Work Scope.

The task will also include coordination of subcontractor and partner activities, preparation of project management documentation, and oversight of quality assurance and safety compliance as applicable to R&D operations.

Estimated budget: \$100,000

Task 2: Preliminary Process and Site Integration Assessment

Based on the current design basis for each of the critical material technologies, a process integration and site layout study will be conducted. This will provide the starting point for the integration and optimization studies defined for the various technology efforts in Tasks 3-5. Critical parameters such as material mass and energy requirements will be conducted along with site utility, infrastructure process flow and acreage requirements will be defined. Outputs from Tasks 3-5 will be used to update final assessment study.

Estimated budget: \$100,000

Task 3: Pitch Integration & Optimization Studies

AmeriCarbon's proprietary Eco-Pitch process produces a unique by-product ash that has favorable characteristics that make separation/purification of REEs and CMs simpler, lower energy and more environmentally friendly than power plant derived ash or other post combustion sources. AmeriCarbon will conduct optimization studies to produce tailored ash that will then be evaluated by both the UND REE technology and Microbeam technologies to determine the maximal integration opportunities. AmeriCarbon will also conduct an extensive matrix effort to process and evaluate both lignite coals and the by-product carbon streams from the UND REE process (upgraded lignite by-product ore/carbons, humins and humic acid). This work will be conducted in AmeriCarbon's multi-ton, multi-million-dollar pilot facility to ensure the results can be directly scaled to the commercial plant being built at the North Dakota Project Forge site. Various chemical

and physical processing will be involved in the evaluation studies. This task will help ensure the process integration ties with the REE-CM recovery/production process are adequately defined to allow complete successful site process integration opportunities. The iterative and synergistic nature of process integration across tasks 3-5 are important to understand and optimizing for the successful overall integration of lignite coal, tailored carbon pitch (EcoPitch) and REE-CM production for Project Forge.

Estimated budget: \$2,975,000

Task 4: REE Process Integration & Optimization Studies

The University of North Dakota (UND) has developed extensive intellectual property for the separation and recovery of REE's in North Dakota lignite coal and demonstrated both at the laboratory and pilot scale. This task will be focused on producing various by-product variants to be tested as potential feedstock for AmeriCarbon's Eco-Pitch manufacturing plant. The iterative approach will allow both REE and pitch process unit operations to be optimized for both product quality and by-product integration. Data will be generated at both the laboratory and pilot scale. Demonstration of carbon products (such as graphite, carbon anodes, batteries) made from the novel pitches will be conducted at the bench-scale to validate the process integration approach at Project Forge.

Estimated budget: \$800,000

Task 5: Ge/Ga Process Integration & Optimization Studies

Microbeam's Ge/Ga pyrometallurgical process specifically focuses on concentration of gallium, germanium and antimony and is significant for important electronics and defense critical applications. Microbeam will test the various ash by-products from the AmeriCarbon Eco-Pitch process which will be uniquely produced in varying chemistries/specifications depending on the product/by-products being utilized (from lignite coal mines and by-product use from the UND REE process).

Estimated budget: \$300,000

Task 6: Technoeconomic Assessment

A study will be conducted to evaluate the optimization impact of the REE-CM integration of Project Forge on the baseline economics of the planned AmeriCarbon Forge pitch manufacturing plant. Input will be based on existing AmeriCarbon techno-economics and results from Tasks 3-5. This will also contain preliminary markets and plant economics for the REE integrated process/plant integration at the site.

Estimated budget: \$150,000

Task 7: Technology Development and Commercialization Path

Based on the deliverables of the preceding tasks, a gap analysis approach will be taken to identify a technology development and/or commercialization path leading to a complete integrated commercial lignite pitch and REE plant at the Project Forge site located in North Dakota.

\$75,000

Total project budget:

Task 1: \$100,000
Task 2: \$100,000
Task 3: \$2,975,000
Task 4: \$800,000
Task 5: \$300,000
Task 6: \$150,000
Task 7: \$75,000

Total: \$4,500,000

Anticipated Results:

The Forge Project will generate both technical and strategic outcomes that validate the feasibility and economic potential of integrating AmeriCarbon's carbon liquefaction process with UND's and Microbeam's critical-materials recovery technologies. Completion of the project will result in a process integration framework, validated technical data packages, and an engineering and economic foundation to support commercial-scale implementation at the planned Forge manufacturing complex in McLean County, North Dakota.

Key anticipated results include:

1. Validated Feedstock and Process Integration
 - Demonstrated use of upgraded lignite, humins, and humic-acid residues as optimized or blended feedstocks for AmeriCarbon's Eco-Pitch™ process.
 - Quantitative data defining yield, composition, and carbon conversion efficiency for each feedstock scenario.
 - Confirmed compatibility of these materials with existing pilot operations and projected commercial-scale plant parameters.
2. Improved Product Quality and Purity
 - Demonstrated reduction of ash and mineral impurities through optimized demineralization and purification processes.

- Production of ultra-high-purity carbon materials suitable for advanced applications such as synthetic graphite, carbon anodes, and binder pitches.
3. By-Product Value Recovery
- Characterization of REE, Ge, Ga, and Sb concentrations in AmeriCarbon’s process residues and UND’s by-product streams.
 - Bench-scale verification of Microbeam’s vaporization and selective-condensation process using these materials, achieving target Ge/Ga purities above 90% oxide basis.
 - Data supporting downstream refining to 99.999%-purity metals for evaluation by industrial offtakers.
4. Engineering and Economic Integration Framework
- Development of process flow diagrams, material and energy balances, and preliminary site layouts illustrating how carbon and critical-mineral systems can be co-located.
 - Definition of shared utilities, waste management, and by-product handling schemes to enable an integrated commercial facility.
 - Completion of a techno-economic assessment (TEA) quantifying capital and operating costs, product revenue potential, and overall economic contribution to North Dakota.
5. Technology Development and Commercialization Pathway
- Identification of remaining technical gaps and a stepwise plan toward full commercialization, including pilot-to-plant scale-up milestones.
 - Defined roles for industrial, academic, and engineering partners in the next development phase.
 - Comprehensive dataset and engineering documentation suitable for inclusion in future CSEA and DOE funding applications supporting scale-up.

Collectively, these outcomes will establish a first-of-its-kind lignite-based carbon and critical-materials manufacturing model. The project will demonstrate how North Dakota’s lignite resources can underpin a new clean-energy and strategic-materials industry—producing value-added carbon, recovering critical minerals, and enabling supply-chain resilience for the nation while diversifying the state’s energy economy.

Facilities:

Proposed Commercial Plant Site

AmeriCarbon and its partners have identified a strategic location for the Forge Project site near Underwood, North Dakota (Figure 2).

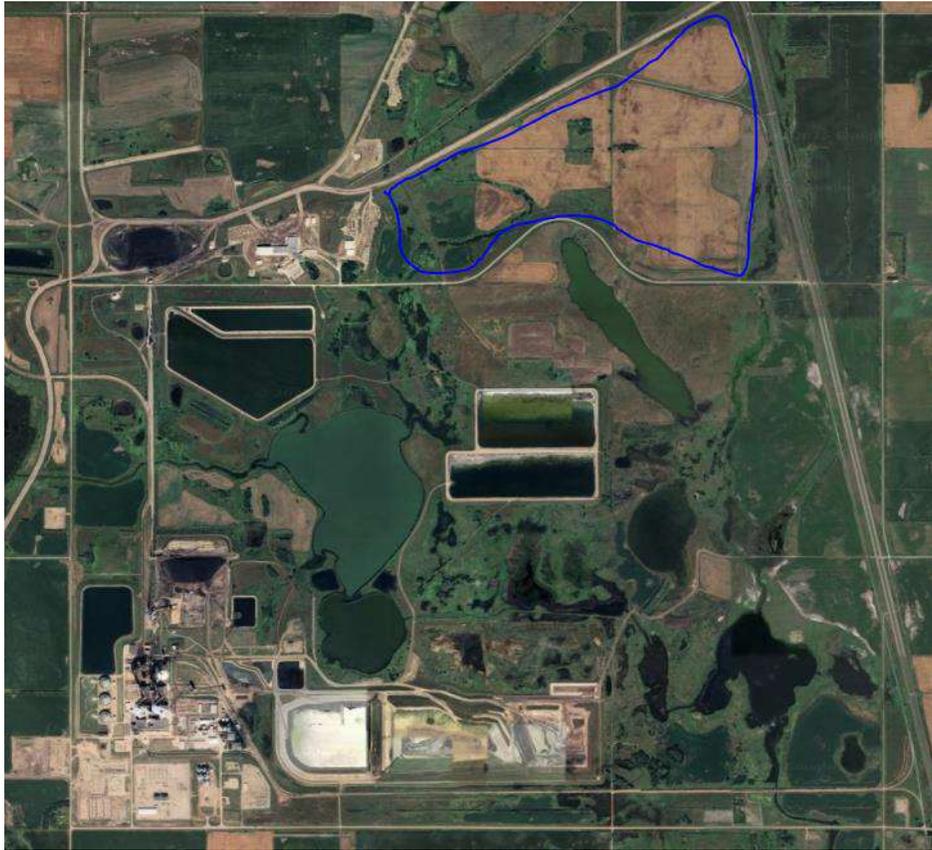


Figure 2. Planned location of the Forge Project near Underwood, North Dakota, outlined in blue.

The proposed site is situated near the following:

- Falkirk Mine, a significant lignite coal mining operation, and in proximity to key industrial infrastructures;
- *Rainbow Energy Center's Coal Creek Station*. This is North Dakota's largest power plant, known for its efficiency and substantial electricity generation capacity; and
- *Blue Flint Ethanol Plant*. Located just east of the Coal Creek Station, this facility has been operational for over a decade, producing ethanol and contributing to the region's biofuel industry.

The proximity to these facilities offers potential synergies, such as shared infrastructure and services, which can enhance operational efficiency and sustainability.

Pilot Plant: Foundation for Commercial Design

AmeriCarbon operates the only known multi-ton-per-day coal liquefaction and pitch manufacturing pilot facility in the United States. The pilot plant incorporates AmeriCarbon's patented Liquid Carbon Process (Eco-Pitch™), which converts domestic coals—including lignite—into engineered coal tar pitch and advanced carbon materials.

Key systems include:

- A continuous liquefaction reactor train with precision temperature and residence-time control;
- Real-time analytical instrumentation for viscosity, softening point, and product composition;
- Integrated ash-handling and residue collection systems designed for by-product sampling and characterization; and
- Utilities and controls suitable for rapid parameter adjustments during feedstock blending trials.

This facility provides the platform for conducting feedstock and process optimization under Task 3 (Pitch Integration & Optimization Studies), enabling direct scale-up to AmeriCarbon Forge, LLC's planned commercial plant in McLean County, North Dakota.



Figure 3. AmeriCarbon's Research and Pilot Demonstration Facility in Morgantown, West Virginia.

AmeriCarbon's pilot plant is significant for the following reasons:

- *Process Validation.* The pilot plant has been instrumental in validating the technical feasibility of the Eco-Pitch production process, ensuring that each stage operates seamlessly and efficiently.
- *Data Collection for Scale-Up.* Comprehensive data gathered from pilot operations have been pivotal in informing the scale-up process, facilitating a tenfold increase in production capacity for the commercial plant.

- *Risk Mitigation.* Operating the pilot plant has allowed AmeriCarbon to identify and address potential challenges in a controlled environment, significantly reducing risks associated with scaling up to commercial production.



Figure 4. AmeriCarbon’s pilot scale unit operations that underpin the LCP process.



Figure 5. AmeriCarbon’s pilot scale and research equipment.

University of North Dakota – College of Engineering & Mines Research Facilities

UND’s College of Engineering & Mines Research Institute houses extensive laboratory and pilot infrastructure dedicated to rare earth element (REE) and critical mineral recovery from lignite and associated materials. These include:

- ✓ A fully integrated pilot-scale REE extraction system capable of processing up to 500 kilograms per hour of lignite mine waste feedstock, producing mixed rare earth concentrates (MREC) and upgraded lignite co-products;

- ✓ The Advanced Materials Characterization Laboratory (AMCL), equipped with scanning electron microscopy (SEM-EDS), X-ray fluorescence (XRF), X-ray diffraction (XRD), inductively coupled plasma–mass spectrometry (ICP-MS), and thermal analysis instrumentation;
- ✓ A bench-scale purification and graphitization laboratory, supporting the development of ultra-high-purity carbons for anode and specialty applications; and
- ✓ Process modeling and engineering design software (Aspen Plus, COMSOL Multiphysics, MATLAB, and SimaPro) used for techno-economic and life-cycle analyses.

These facilities support Task 4 (REE Process Integration & Optimization Studies) and provide the test bed for refining demineralization, purification, and carbon-quality improvement studies.

Microbeam Technologies, Inc. – Grand Forks, ND and Minnetonka, MN

Microbeam operates analytical and pilot-scale systems focused on critical mineral recovery and advanced materials analysis. Its Grand Forks facility houses:

- ✓ Two automated scanning electron microscopes (CCSEM) with X-ray microanalysis for mineralogical and compositional mapping;
- ✓ Laboratory and bench-scale pyrometallurgical and hydrometallurgical reactors for germanium, gallium, and antimony vaporization, selective condensation, and refining; and
- ✓ A pilot bench system designed to process mixed rare earth concentrates (MREC) and produce Ge/Ga concentrates at rates of up to 5–10 kg/h.
- ✓ Thermochemical equilibrium modeling software (FactSage) to predict critical mineral vapor-liquid-solid transformations and interactions that is crucial in optimizing process conditions for pyrometallurgical applications.

Microbeam’s Grand Forks and Minnetonka locations include computational modeling, analytical equipment, a metals recovery and high-temperature testing facility, as well as a 7,000-square-foot shop and laboratory area for constructing and operating process equipment. These facilities will support Task 5 (Ge/Ga Process Integration & Optimization Studies) and provide analytical support across all project activities.

Worley Group Facilities

Worley Group will provide engineering design, process integration, and site planning services under Task 2 (Preliminary Process and Site Integration Assessment). The firm’s regional engineering offices and process modeling capabilities will be used to generate process flow diagrams (PFDs), mass and energy balances, and site layout studies defining how the integrated systems can be co-located and scaled at the Forge site.

Resources:

The successful execution of *The Forge Project: Rare Earths and Critical Materials Integration* will rely on a coordinated set of technical, analytical, and organizational resources contributed by AmeriCarbon, Ore Spring Materials, the University of North Dakota (UND), Microbeam Technologies, and Worley Group. These resources form the backbone of the project's ability to execute the technical scope and achieve the anticipated outcomes.

Technical and Engineering Resources

AmeriCarbon Enterprises, LLC / AmeriCarbon Forge, LLC. AmeriCarbon brings the nation's only multi-ton-per-day coal liquefaction pilot facility and a world-class technical team with experience in carbon product manufacturing, feedstock optimization, and process integration. The AmeriCarbon pilot facility will serve as the platform for Task 3 (Pitch Integration and Optimization Studies), providing real-world process data on temperature control, residence time, and yield performance across various feedstock configurations.

AmeriCarbon's engagement of Worley Group provides direct access to multidisciplinary engineering resources for process modeling, mass and energy balance development, and site integration design. Worley's engineering and construction teams have extensive experience in advanced materials, refining, and energy-infrastructure projects in North Dakota and globally.

Academic and Research Resources

University of North Dakota (UND) – College of Engineering & Mines Research Institute. UND contributes a fully operational pilot-scale rare earth element (REE) extraction facility capable of processing up to 500 kilograms per hour of lignite feedstock, producing upgraded lignite and mixed rare earth concentrates. The facility, coupled with UND's Advanced Materials Characterization Laboratory (AMCL), provides comprehensive analytical capabilities (SEM/EDS, XRF, XRD, ICP-MS, and thermal analysis).

UND's team has extensive experience in rare earth and critical mineral recovery, feedstock purification, and techno-economic modeling. Their existing DOE- and NDIC-supported programs provide validated process data and a mature platform for integration with AmeriCarbon's carbon liquefaction technology.

UND's REE extraction process produces several products, including a unique upgraded lignite carbon ore ("upgraded LCO"). REE/CM processing uses lignite that would be otherwise unsuitable for thermal applications (high ash and low heating value) and significantly upgrades it by 1) reducing mineral matter using physical separations and 2) removing the organically associated inorganic elements through dilute mineral acid extraction. UND's prior technology development has identified that our REE/CM process has promising economic potential; however, a major component (~50%) of projected revenues from a commercial facility is from the upgraded LCO, even under the low-value use as a combustion blending fuel. This highlights the magnitude of the potential economic benefit of, instead, manufacturing value-added carbon products.

Industrial Research and Critical Mineral Recovery Resources

Microbeam Technologies, Inc. Microbeam brings to the project a unique combination of analytical, metallurgical, and process-development capabilities. Its Grand Forks and Minnetonka facilities are equipped with equilibrium thermodynamics modeling, high-temperature furnaces, condensation systems, and metals-recovery benches designed to process mixed rare earth concentrates (MREC) and coal-derived ash into germanium (Ge) and gallium (Ga) products. These resources will be directly utilized under Task 5 (Ge/Ga Process Integration and Optimization Studies).

Microbeam's expertise in mineralogical analysis (SEM, XRF, and ICP-MS) and its patented vaporization and selective-condensation process will enable accurate assessment of REE and CM recovery from AmeriCarbon's by-product ash streams.

Data, Intellectual Property, and Prior Research Assets

The proposed project builds upon substantial intellectual property and data portfolios developed by the participants:

- ✓ **AmeriCarbon** AmeriCarbon holds proprietary intellectual property related to its Eco-Pitch production technology. The data from its pilot plant operations provide invaluable insights into the performance, efficiency, and scalability of the process. This proprietary data will be used to inform the commercial design and ensure that all process parameters are optimized for large-scale production. Further, AmeriCarbon holds five patents in the United States and Canada: US# 11667852, 10301549, 9845431, 9534176; and CA# 3120884.
- ✓ **UND** holds patents and pending applications covering the extraction of rare earths and critical minerals from lignite mine wastes and organically associated materials, and maintains several years of pilot-scale performance data validated under DOE projects.
- ✓ **Microbeam** holds patents and pending applications for its REE-predictive analysis algorithms (US# 11733184) and for the process of producing high-purity Ge and Ga from mixed rare earth concentrates and coal-derived ash (US# 12031195).

These collective IP and data resources form a strong foundation for the integrated process modeling and techno-economic evaluation that will be undertaken in this project.

Techniques to Be Used, Their Availability and Capability:

The Forge Project: Rare Earths and Critical Materials Integration will employ a suite of bench, pilot-, and engineering-scale techniques to validate the integrated process for carbon production and critical mineral recovery. All techniques are established and available within the existing facilities of AmeriCarbon, the University of North Dakota (UND), Microbeam Technologies, and Worley Group. Together, these techniques provide the ability to conduct process development, performance optimization, and economic evaluation at a level sufficient to inform commercial-scale design.

1. Feedstock Evaluation and Liquefaction (AmeriCarbon)

AmeriCarbon will utilize its Liquid Carbon Process (Eco-Pitch™) pilot plant and associated laboratory equipment to process and evaluate various feedstocks including run-of-mine lignite, upgraded lignite, humins, and humic acid residues supplied by UND. Techniques include:

- Controlled liquefaction testing. Continuous pilot-scale runs under variable residence time, temperature, and pressure conditions to determine yield and quality of resulting pitches.
- Analytical characterization. Viscosity, softening point, quinoline insolubles, toluene insolubles, elemental analysis, and ash content to assess performance and reproducibility.
- By-product handling and sampling. Automated collection and compositional mapping of ash and carbon residues for mineralogical and REE/CM content analysis.
- Blending and process-optimization matrix. Systematic blending of multiple feedstocks to identify optimal ratios for yield, purity, and pitch specification control.

All techniques are established within AmeriCarbon's operating pilot plant and have been used to generate validated process data for scale-up to commercial operations.

2. Rare Earth Element (REE) and Carbon Co-Product Processing (UND)

The UND College of Engineering & Mines Research Institute will apply a proven set of hydrometallurgical and beneficiation techniques used in its DOE- and NDIC-funded REE extraction programs. These include:

- Mild-acid leaching of lignite-based feedstocks to extract REEs and critical minerals from organically associated matrices while retaining the carbon structure for subsequent use by AmeriCarbon.
- Solid-liquid separation and washing to recover the upgraded carbon material with near-zero sodium and low-ash content.
- Two-stage oxalate precipitation and calcination to generate mixed rare earth concentrates (MREC) with ≥ 75 wt% REE purity on an oxide basis.
- Advanced purification and demineralization using bench-scale chemical treatment and filtration to produce high-purity carbon suitable for anode and binder applications.
- Bench-scale graphitization and electrochemical testing of resulting carbon materials (coin and 18650-cell evaluations).

All techniques are operational within UND's 500 kg/h pilot-scale REE extraction facility and Advanced Materials Characterization Laboratory (AMCL), which houses full analytical capabilities (SEM/EDS, XRF, XRD, ICP-MS, and TGA). These facilities have already achieved Technology Readiness Level (TRL) 6 for REE extraction from North Dakota lignite.

3. Critical Mineral (Ge/Ga/Sb) Recovery and Refining (Microbeam Technologies)

Microbeam will apply its patented vaporization and selective-condensation process to recover germanium (Ge), gallium (Ga), and antimony (Sb) from AmeriCarbon and UND by-product streams. The process combines pyrometallurgical techniques, including:

- High-temperature vaporization of MREC and ash feedstocks in controlled-atmosphere furnaces to release Ge and Ga vapors.
- Selective condensation and particulate capture to recover Ge- and Ga-rich oxides as discrete concentrates.
- Direct metallization and refining via chlorination, hydrolysis, and electrowinning steps to achieve high-purity ($\geq 99.999\%$) Ge and Ga metals.
- Analytical validation using SEM/EDS, XRF, ICP-MS, and XRD to confirm product purity and recovery yield.

Microbeam's bench-scale system (5–10 kg/h feed rate) is supported through DOE-, DoD, and NDIC-supported projects. These techniques will be used to confirm recovery factors, product specifications, and by-product recycling potential.

4. Process Integration and Engineering (AmeriCarbon and Worley Group)

Worley Group will apply process modeling, simulation, and site-integration techniques to develop a unified design framework that combines carbon manufacturing and REE/CM recovery. Methods include:

- Process flow diagram (PFD) and piping & instrumentation diagram (P&ID) development using Aspen Plus and AutoCAD Plant 3D.
- Mass and energy balance modeling based on empirical data from Tasks 3–5.
- Utility and infrastructure integration modeling for power, water, and material handling systems.
- Plot-plan and layout design to support co-location at the Forge site, including environmental, utility, and logistics interfaces.

Worley has extensive experience delivering front-end engineering design (FEED) and techno-economic analysis (TEA) studies for lignite, refining, and advanced-materials facilities throughout North Dakota and other U.S. industrial regions.

5. Analytical and Data Management Techniques

Cross-partner data will be standardized and validated using the following techniques:

- Statistical design of experiments (DOE) and response-surface modeling for optimization across feedstock blends and process parameters.

- Standardized analytical protocols for REE/CM assays and carbon purity (using ICP-MS, XRF, and SEM-EDS) to ensure comparability between institutions.
- Digital data management and integration via shared cloud-based project folders, ensuring traceability of raw data, analytical results, and reports.

These methods ensure technical consistency, reproducibility, and defensible data quality across all project activities.

Collectively, these techniques span the full technology chain—from feedstock characterization through carbon and mineral production, to process modeling and techno-economic evaluation. Each is already established, available, and fully capable of achieving the project’s technical objectives, providing a strong foundation for future scale-up and commercial implementation at the Forge site.

Environmental and Economic Impacts while Project is Underway:

The proposed project will be executed as a research, development, and engineering program, utilizing existing pilot and laboratory facilities at AmeriCarbon, the University of North Dakota (UND), and Microbeam Technologies. As such, environmental impacts during the project are expected to be minimal, localized, and fully manageable within standard institutional safety and environmental procedures.

Environmental Impacts

Limited Material and Energy Use. Pilot- and bench-scale testing will use small quantities of lignite, upgraded carbon feedstocks, and process residues. No large-scale excavation, construction, or waste disposal is planned. Energy and water use will remain within normal laboratory operations.

Waste and Effluent Management.

- Liquefaction residues, process ash, and small volumes of spent reagents generated at AmeriCarbon and UND will be managed under existing facility permits and standard operating procedures.
- Any acid or solvent streams from UND’s REE extraction and purification work will be neutralized and disposed of through UND’s hazardous waste program in compliance with state and federal regulations.
- Gaseous emissions from Microbeam’s high-temperature testing will be captured through particulate control and ventilation systems; no uncontrolled emissions are expected.

Environmental Health and Safety (EHS) Compliance. All partner facilities maintain active EHS programs that include staff training, chemical hygiene plans, and hazardous waste management protocols. No new permitting actions or environmental assessments are anticipated during this phase of work.

No Adverse Community or Ecological Effects. Work will occur entirely within existing industrial or research facilities in Grand Forks, Morgantown, Minnetonka, and other controlled laboratory environments. No fieldwork or disturbance of natural land, water, or habitat will occur during the project.

Economic Impacts

Direct Employment and Workforce Development. The project will support a skilled multidisciplinary workforce of engineers, scientists, and technicians across AmeriCarbon, UND, and Microbeam. Temporary project-specific employment will include graduate and undergraduate researchers at UND, contract engineers, and technical support personnel.

Local and Regional Spending. Project expenditures will include laboratory supplies, analytical services, and engineering support procured within North Dakota and neighboring states. UND's research operations and the project's overall planned activities will direct a substantial portion of spending to local vendors, utilities, and service providers.

Capacity Building for Future Industry. Beyond the immediate project, this work expands North Dakota's industrial base in high-value carbon and critical-mineral technologies. It strengthens institutional and workforce capacity for future phases involving pilot expansion and commercial deployment at the Forge site.

In summary, during the project's execution period, environmental impacts will be negligible and confined to controlled laboratory activities, while economic impacts will be positive, centered on job creation, technical workforce training, and procurement within North Dakota's research and industrial ecosystem. The project thus aligns with CSEA's mission to support clean and sustainable energy innovation with responsible environmental stewardship.

Ultimate Technological and Economic Impacts:

The Forge Project: Rare Earths and Critical Materials Integration will demonstrate the technical and economic viability of an integrated system that transforms North Dakota lignite and process by-products into high-value carbon materials and critical minerals. The project will validate an entirely new model of resource utilization — one that combines advanced carbon manufacturing, rare earth element (REE) extraction, and critical mineral recovery within a single industrial ecosystem. The long-term impacts extend well beyond this research phase, establishing a foundation for new industries, jobs, and supply chains centered in North Dakota.

Technological Impacts

The project will advance a first-of-its-kind integration of carbon and critical-material technologies, combining three complementary innovations:

1. AmeriCarbon's Eco-Pitch™ Liquefaction Process, which converts lignite, upgraded lignite, and humic-based materials into tailored binder and impregnating pitches for high-value applications in synthetic graphite, battery anodes, and carbon composites;

2. UND’s Rare Earth Extraction and Carbon Upgrading Process, which isolates REEs from lignite mine wastes and humic materials, producing upgraded carbon feedstocks with low ash and high purity suitable for conversion into premium carbon products; and
3. Microbeam’s Germanium and Gallium Recovery Process, which separates and refines critical minerals from AmeriCarbon and UND process residues using proprietary vaporization and selective-condensation techniques.

Together, these systems create a closed-loop process chain that captures value from every portion of the lignite resource—carbon, rare earths, and trace metals—while minimizing waste.

Technologically, the project will demonstrate:

- Integration at the process-engineering level, enabling simultaneous production of high-purity carbon materials and REE/CM concentrates within a single facility footprint;
- Improved environmental performance, including lower energy consumption and reduced waste generation compared with traditional REE and carbon manufacturing methods;
- Scalability and replicability, with data and designs directly transferable to commercial-scale deployment at AmeriCarbon Forge in McLean County, ND, and to future projects across other lignite-producing regions; and
- Alignment with national strategic goals, including the *2025 Executive Order on Increasing American Mineral Production*, which prioritizes domestic manufacturing of critical materials essential to defense, energy, and advanced manufacturing sectors.

By establishing the technical basis for co-locating carbon, REE, and critical-mineral production, the Forge Project will showcase a new generation of resource-integrated manufacturing capable of supporting the United States’ long-term industrial and supply-chain resilience.

Economic Impacts and Value to North Dakota

The Forge Project’s long-term economic impacts will be transformative for North Dakota, positioning the state as a center of excellence for critical-materials and advanced-carbon production.

Key economic impacts include:

- ✓ Creation of a New Industrial Platform. The integration of carbon manufacturing and REE/CM recovery represents the foundation of a new high-value industry in North Dakota—one that leverages the state’s lignite resources not for combustion, but for advanced manufacturing and critical-materials production.
- ✓ Expansion of Domestic Supply Chains. By enabling U.S.-based production of coal-tar-pitch equivalents, synthetic graphite precursors, and REE/CM products such as germanium and gallium, the project supports national energy security, defense readiness, and industrial competitiveness.

- ✓ Workforce Development and Technology Transfer. The project will train a new generation of engineers, scientists, and technicians in advanced carbon and critical-material processing, creating transferable expertise for future commercial plants. UND's participation ensures educational integration, internships, and hands-on experience for students in chemical and materials engineering.
- ✓ Regional Economic Growth. The Forge Project will strengthen the economic base of McLean County and surrounding areas by anchoring future construction, operations, and supply-chain activities. The commercial facility enabled by this research will attract suppliers, create high-wage technical jobs, and generate significant secondary economic activity in logistics, maintenance, and services.
- ✓ Diversification and Resource Valorization. Transforming lignite into carbon and mineral products redefines the economic potential of North Dakota's coal reserves—converting a low-cost energy resource into a feedstock for the aerospace, energy storage, semiconductor, and defense industries.

In the long term, the Forge Project will catalyze a new materials manufacturing corridor within the state—anchored by the AmeriCarbon Forge commercial complex and sustained by ongoing partnerships with UND, Microbeam, and the North Dakota Industrial Commission. This vertically integrated system will advance national clean-energy and materials goals while providing durable, high-value employment and long-term economic diversification for North Dakota.

Why the Project is Needed:

The Forge Project: Rare Earths and Critical Materials Integration is needed to close a critical gap between research-stage technologies for rare earth element (REE) and critical mineral recovery and the commercial-scale carbon manufacturing system now being advanced in North Dakota through AmeriCarbon Forge, LLC. This project represents the essential integration phase—aligning the technical, engineering, and operational interfaces that will enable these complementary processes to function as one unified manufacturing platform.

For decades, the United States has been almost entirely dependent on foreign sources for two strategic material streams—coal-tar pitch (used for graphite, anodes, and carbon composites) and rare earth elements and critical minerals (used in electronics, defense, and clean-energy technologies). China currently dominates both supply chains. This dependence poses serious risks to national security, economic competitiveness, and the resilience of U.S. manufacturing.

The Forge Project directly addresses these vulnerabilities by creating a North Dakota-based integrated production system that converts lignite and process by-products into high-value carbon materials and co-recovered critical minerals such as germanium, gallium, and REEs. Through coordinated development by AmeriCarbon, UND, and Microbeam Technologies, the proposed project will establish the technical and engineering basis for co-locating these processes at the AmeriCarbon Forge site in McLean County.

Germanium (Ge) and Gallium (Ga) are essential materials for advancing energy efficiency and sustainability across a wide range of technologies, including quantum processors, photonic circuits, and high-speed electronic devices. Ge enables low-power, high-speed transistors, single-

photon detectors, and quantum dots for integrated sensing and computing, while Ga—especially in the form of gallium nitride (GaN)—powers efficient LEDs, RF amplifiers, and power electronics that reduce energy consumption in data centers, electric vehicles, and renewable energy systems. The lack of readily available Ge and Ga is limiting the US ability to produce high efficiency electronic products for infrared optics, thermal imaging systems, satellite solar panels, emerging quantum computing, and photonics platforms.

Addressing National and State Priorities

1. Energy and Materials Security. The project will strengthen domestic supply chains by enabling U.S. production of two categories of critical inputs: (i) advanced carbon materials and (ii) REEs and associated critical minerals. Integration of AmeriCarbon’s Eco-Pitch™ process with UND’s REE extraction and Microbeam’s Ge/Ga recovery technologies directly supports the U.S. Department of Energy’s Critical Materials Initiative and the 2025 *Executive Order on Increasing American Mineral Production*.
2. Environmental Performance and Resource Optimization. The integration of these processes creates a closed-loop system that minimizes waste and maximizes value from North Dakota lignite. AmeriCarbon’s low-temperature, non-combustion carbon process reduces greenhouse-gas emissions by more than 90% compared with conventional pitch manufacturing. UND’s extraction process converts lignite mine waste into upgraded carbon feedstock, while Microbeam’s technologies recover high-purity metals from process residues. Together, they form an environmentally responsible pathway to critical-materials production with minimal incremental footprint.
3. Economic Diversification and Industrial Development in North Dakota. The proposed project will accelerate North Dakota’s transition from traditional coal utilization toward advanced materials manufacturing. It will position McLean County and the broader lignite region as a national hub for carbon, rare earth, and critical-mineral industries, supporting high-wage technical employment, new capital investment, and supply-chain growth in engineering, logistics, and materials processing.

Why This Project Is Needed Now

The underlying technologies—AmeriCarbon’s Eco-Pitch™ process, UND’s REE extraction platform, and Microbeam’s Ge/Ga separation system—have each reached pilot or early demonstration scale. However, they have not yet been integrated into a shared industrial framework. Without this integration, opportunities for efficiency, by-product valorization, and shared infrastructure would remain unrealized, limiting both economic and environmental benefits.

This project provides the bridge between discrete technology readiness and industrial integration, delivering the data, engineering, and techno-economic foundation required for full-scale implementation at the Forge Project site.

Strategic Outcomes

The Forge Project: Rare Earths and Critical Materials Integration is needed to:

- ✓ Demonstrate process compatibility and optimized material flow among the three technology systems;
- ✓ Establish engineering, economic, and environmental parameters for integrated production;
- ✓ Enable CSEA and the State of North Dakota to evaluate a scalable model for carbon and critical-mineral manufacturing; and
- ✓ Position North Dakota as a national leader in clean, secure, and sustainable materials production.

In short, *The Forge Project* is the integration step that transforms years of parallel research into a unified, commercially viable system. It advances CSEA’s mission by creating a model for clean energy and materials innovation that enhances national security, drives regional economic diversification, and redefines the role of lignite in a modern, low-carbon industrial economy.

STANDARDS OF SUCCESS

The success of *The Forge Project: Rare Earths and Critical Materials Integration* will be measured by its ability to demonstrate, document, and de-risk the technical, economic, and environmental viability of integrating AmeriCarbon’s carbon manufacturing process with the rare earth and critical mineral recovery technologies developed by UND and Microbeam Technologies.

The project will define and validate the framework for a fully integrated carbon and critical-materials manufacturing platform in North Dakota—one that enhances the value of lignite, strengthens domestic supply chains, and positions the state as a leader in sustainable energy and materials innovation.

Key Metrics for Success

1. Technical Integration and Performance

- Successful completion of pilot- and bench-scale testing demonstrating compatibility among AmeriCarbon, UND, and Microbeam process streams.
- Verified ability to process multiple feedstocks—lignite, upgraded lignite, humins, and humic-acid residues—within AmeriCarbon’s Eco-Pitch™ system to produce high-quality carbon pitches with defined customer specifications.

- Demonstrated recovery of germanium, gallium, and other critical minerals from AmeriCarbon and UND process residues, achieving purity levels suitable for downstream refining and potential commercial use.
- Delivery of a comprehensive **process integration model** including mass and energy balances, process flow diagrams (PFDs), and site-integration layouts validated by Worley Group.
- Completion of a **Techno-Economic Assessment (TEA)** showing clear economic potential for integrated production and co-location at the AmeriCarbon Forge site.

2. Environmental and Sustainability Outcomes

- Quantified reduction in process waste and greenhouse-gas intensity relative to conventional carbon and mineral processing.
- Documented lifecycle environmental benefits through data from the integrated process, emphasizing closed-loop material use and minimized waste generation.
- Establishment of an operational baseline to support future environmental permitting and sustainability certification for the commercial Forge facility.

3. Economic and Workforce Development Value

- Demonstrated economic viability and readiness for scale-up, providing the technical and economic foundation for subsequent CSEA and private-sector investment.
- Support of North Dakota-based engineering, research, and laboratory employment throughout the project period, including workforce participation by UND graduate and undergraduate students.
- Creation of an actionable roadmap for commercial deployment, enabling future job creation and local manufacturing investment in McLean County and across the state.

4. Advancement of Research, Development, and Technology Commercialization

- Advancement of three distinct technology families—carbon liquefaction, REE extraction, and Ge/Ga recovery—to a higher level of integration readiness.
- Development of a replicable model for industrial symbiosis that can be applied to other lignite regions or industrial sites in North Dakota.
- Generation of publishable, transferable technical data that can be leveraged by the public and private sectors to support future innovation and commercialization.

Alignment with CSEA Mission and Program Objectives

The Forge Project directly advances the mission of the Clean Sustainable Energy Authority by:

- ✓ Enhancing the **sustainability and value** of North Dakota’s lignite resource through clean manufacturing technologies;

- ✓ Supporting **energy and materials security** by establishing the foundation for domestic production of critical materials;
- ✓ Promoting **environmental stewardship** through substantial reductions in greenhouse-gas and waste outputs; and
- ✓ Driving **economic diversification** through new industries, jobs, and technical capabilities based in the state.

Benchmarks for Long-Term Success

While the proposed project focuses on integration and optimization, its longer-term success will be measured by its ability to catalyze future developments, including:

- **Commercial Deployment**. Successful transition of the integrated process to full-scale operation at the AmeriCarbon Forge site by 2027.
- **Expansion of Advanced Manufacturing**. Attraction of additional carbon, rare earth, and critical-mineral manufacturing facilities within North Dakota over the next decade.
- **Sustained Economic Impact**. Creation of durable, high-wage employment in engineering, manufacturing, and materials processing, supported by a North Dakota–based supply chain.

By meeting these standards of success, *The Forge Project* will deliver measurable technical achievements, clear economic and environmental benefits, and a validated framework for commercial implementation. The results will strengthen North Dakota’s leadership in clean, sustainable materials production and help establish a resilient, domestic supply chain for advanced carbon and critical-mineral industries.

BACKGROUND/QUALIFICATIONS

The Forge Project builds on more than a decade of development in lignite-based carbon manufacturing, rare earth element (REE) extraction, and critical mineral recovery technologies that have been pioneered independently by AmeriCarbon Enterprises, the University of North Dakota (UND), and Microbeam Technologies, Inc. This project represents the convergence of those technology paths into a unified industrial platform for the State of North Dakota.

Project Origins and Context

Ore Spring Materials, LLC was established to manage and coordinate the integration of AmeriCarbon’s coal-to-carbon pitch manufacturing process with emerging REE and critical-mineral recovery technologies developed by UND and Microbeam. The combined system—referred to as *The Forge Project: Rare Earths and Critical Materials Integration*—advances a vision of full-resource utilization: converting lignite and related by-products into high-value carbon materials, rare earth elements, and critical minerals, while minimizing waste and environmental impact.

This integration builds on a series of NDIC- and DOE-funded projects that have demonstrated both the technical feasibility and economic promise of these constituent technologies. The current project, submitted to the Clean Sustainable Energy Authority (CSEA), focuses on the next step—process integration, optimization, and engineering design—to prepare for commercial-scale deployment at the AmeriCarbon Forge site in McLean County.

Background of Key Project Participants

AmeriCarbon Enterprises, LLC / AmeriCarbon Forge, LLC

AmeriCarbon has developed the patented Liquid Carbon Process (LCP), a proprietary technology that converts coal, including lignite, into high-performance binder and impregnating pitches (Eco-Pitch™). The process eliminates dependence on imported coal-tar pitch and reduces greenhouse-gas emissions by over 90% compared to conventional coking-oven processes.

AmeriCarbon operates a 12,000-square-foot pilot facility in Morgantown, West Virginia—the only known coal liquefaction–based pitch production facility in the world. Over multiple NDIC-supported projects, AmeriCarbon has:

- ✓ Demonstrated successful conversion of North Dakota lignite into coal tar pitch meeting industrial specifications;
- ✓ Completed FEL-2 engineering through Worley Parsons, verifying commercial feasibility;
- ✓ Advanced FEL-3 design for the McLean County plant through a series of NDIC- and AmeriCarbon-funded efforts; and
- ✓ Launched a reactor optimization project to maximize conversion efficiency and throughput of lignite feedstocks.

These projects collectively establish AmeriCarbon as the nation’s leader in lignite-to-carbon process development. Its expertise in pilot-to-commercial scale-up, system engineering, and process integration underpins The Forge Project’s carbon manufacturing and feedstock optimization components.

University of North Dakota (UND) – College of Engineering & Mines Research Institute

UND has spent the past decade pioneering rare earth and critical mineral recovery from lignite and related materials, with support from both the U.S. Department of Energy (DOE) and the North Dakota Industrial Commission (NDIC). The university’s patented REE extraction process uses mild acid leaching and selective precipitation to produce Mixed Rare Earth Concentrates (MREC) while generating a valuable upgraded carbon by-product suitable for further conversion into high-value pitch products.

Key UND milestones include:

- ✓ Design, construction, and operation of a 500 kg/hr continuous pilot-scale REE extraction facility—the first of its kind using lignite mine waste feedstocks;

- ✓ Development of integrated purification, calcination, and ion-exchange processes capable of producing MREC with ≥ 75 wt% REE purity on an oxide basis;
- ✓ Partnership with DOE, Rare Earth Salts, Barr Engineering, and other industrial collaborators in completing a Front-End Engineering and Design (FEED) efforts for a demonstration facility; and
- ✓ Advancement of intellectual property protecting both the leaching process and organically associated critical-mineral recovery techniques.

UND's technologies form the front-end beneficiation and purification component of The Forge Project, providing high-purity carbon feedstocks and process data essential to optimizing AmeriCarbon's Eco-Pitch™ system.

Microbeam Technologies, Inc.

Microbeam Technologies, based in Grand Forks, North Dakota, and Minnetonka, Minnesota, is an applied research and development firm specializing in fuel characterization, ash behavior, and critical-mineral recovery from coal and carbonaceous feedstocks.

Microbeam's relevant experience includes:

- ✓ Development of a proprietary vaporization and selective-condensation process for germanium (Ge) and gallium (Ga) recovery from mixed REE concentrates (MREC) derived from UND's process;
- ✓ Successful bench-scale validation of this system under a DOE/NDIC-funded project (Award DE-FE0032522), achieving > 90 wt% purity of Ge/Ga concentrates;
- ✓ Operation of advanced analytical laboratories equipped with scanning electron microscopy, and X-ray fluorescence (XRF) for mineralogical and compositional mapping; and
- ✓ Longstanding collaboration with UND on REE characterization and process optimization.

Microbeam's role in The Forge Project is to lead the critical-mineral recovery and refinement tasks, evaluating AmeriCarbon's ash by-products as feedstocks for Ge/Ga separation and contributing process data to the integrated economic model.

Worley Group

Worley is a global engineering, procurement, and construction (EPC) firm with decades of experience in front-end engineering design (FEED) and industrial process integration. Through previous collaborations with AmeriCarbon and UND, Worley has developed process flow diagrams (PFDs), piping and instrumentation diagrams (P&IDs), and mass/energy balances for lignite-based carbon and REE facilities in North Dakota.

In The Forge Project, Worley will serve as the engineering integration lead, responsible for:

- Process modeling and mass/energy balance integration across the AmeriCarbon, UND, and Microbeam systems;
- Preliminary site layout and utility interface studies for the Forge site in McLean County; and
- Development of an engineering framework supporting future FEL-3 design and permitting.

Project Team Qualifications

The Forge Project team unites industrial operators, academic researchers, and engineering professionals with unmatched expertise in carbon manufacturing, REE extraction, and mineral recovery.

Technical Leadership

- **David Berry**, CEO of AmeriCarbon, brings more than three decades of DOE and DoD R&D experience in hydrocarbon conversion and advanced materials production, with multiple patents in carbon and liquid-phase processing.
- **Dr. Chetan Tambe**, Senior Engineer at AmeriCarbon, Dr. Tambe specializes in energy-efficient carbon product manufacturing from coal. Prior to joining AmeriCarbon, he worked as a Research Scientist at Cardolite Corporation (PA) on hydrogenation technology scale-up and research collaborations. He holds a Ph.D. from Michigan State University focused on sustainable biobased materials, and his academic work includes multiple peer-reviewed publications, a book chapter, and five patents.
- **Steve Mascaro**, Senior Process Engineer at AmeriCarbon, Steve brings over 25 years of process engineering experience, with a focus on pilot plant optimization. At AmeriCarbon, he leads efforts to optimize reactor performance and scale-up operations. Before joining AmeriCarbon, Steve worked at the U.S. Department of Energy's National Energy Technology Laboratory (NETL), leading pilot research in coal-gas desulfurization, catalyst development, and technical project reviews. He began his career at Aristech Chemical, where he held roles in process engineering, utilities, quality management, and oversaw the expansion of polypropylene capacity with Jacobs Engineering. He holds a B.S. in Chemical Engineering from West Virginia University.
- **Nolan Theaker**, Senior Research Manager with UND CPER, will be UND's principal investigator. Mr. Theaker has been the technical driver for UND's technology development and resource characterization efforts related to REE/CM since he joined UND in 2017. He is widely recognized within the DOE and the research community as a leading expert on REE/CM technologies. Mr. Theaker was the PI on UND's REE/CM pilot demonstration project (DE-FE0031835), as the technical lead on UND's recent FEED project (DE-FE0032295), holds two patents for UND's lignite-based extractive metallurgy process, and has been named as key personnel on two CORE-CM projects: Williston Basin and Gulf Coast.
- **Nic Dyrstad-Cincotta**, Research Operations Manager with UND CPER, is a mechanical and design engineer with over 10 years of experience in technology demonstration and scale-up. Nic was responsible for leading the design, construction and commissioning of

UND's existing REE/CM pilot facility and is one of its lead operations engineers. Nic is also an expert in process instrumentation and controls, having led the design, installation and programming of the REE/CM pilot's National Instruments LabVIEW PLC system and many of CPER's other R&D systems. Nic is also UND CPER's safety officer, responsible for maintaining the safety of our research spaces and operations.

- **Dr. Xiaodong Hou**, Research Associate Professor with UND CPER, is a material chemist with 16 years of experience synthesizing and characterizing advanced materials. He has over 45 peer-reviewed publications in chemistry materials and holds six patents. Dr. Hou has led multiple projects related to advanced carbon materials from lignite for LIBs, including DE-FE0031984 and DE-FE0032139. He will lead activities associated with proof-of-concept prototype product demonstrations for hard carbon anodes and collaborate with Vorbeck on demonstration of UPHA conversion into graphene products.
- **Dr. Dan Laudal**, Executive Director of the UND CEM Research Institute, is an expert on lignite coal, carbon products, and REE/CM technologies. His PhD research was the foundation for UND's technology development related to REE/CM from lignite. He was the Project Director on UND's FEED study project (DE-FE0032295) and in his nearly 20 years in the energy industry has been involved in a wide array of projects ranging from proof-of-concept to world-scale project development. He will support project management and serve as a technical advisor.
- **Dr. Steven Benson**, President of Microbeam Technologies, has over 45 years of experience in fuel chemistry, ash transformations, and critical-mineral recovery, with multiple issued patents and prior DOE project leadership.
- **Alex Benson**, Chief Operating Officer of Microbeam Technologies, leads Microbeam's projects related to the separation and recovery of Ge and Ga from coal-derived byproducts. He is the PI on DOE-NETL and DOD funded projects demonstrating and scaling this technology. He has also led multiple NDIC funded REE-CM resource evaluation efforts in ND (new and current resource developments). Mr. Benson also has experience in new product development, commercialization and operations management of greater than \$300M production facilities.
- **Art Lucas**, Senior Process Engineer at Worley, leads engineering integration and techno-economic analyses, supported by Worley's global process modeling resources.

Summary of Capabilities

The team's combined resources and expertise uniquely position North Dakota to pioneer an integrated carbon-and-critical-materials manufacturing platform. Each participant contributes complementary capabilities:

- AmeriCarbon provides pilot-to-commercial scale process experience and proprietary carbon-conversion data.
- UND supplies validated REE extraction and purification technology and advanced analytical infrastructure.

- Microbeam contributes metallurgical and analytical expertise in Ge/Ga recovery and characterization.
- Worley integrates these systems into a cohesive engineering and economic framework ready for scale-up.

Together, these organizations represent a fully capable and field-proven team that has already demonstrated success in DOE and NDIC-funded programs. Their collective qualifications ensure that The Forge Project will deliver credible, data-driven results that advance North Dakota's leadership in sustainable, value-added energy and materials manufacturing.

MANAGEMENT

Management Approach and Oversight

The Forge Project will be managed through a collaborative project management framework led by Ore Spring Materials, LLC, with technical execution carried out by AmeriCarbon Enterprises, LLC, the University of North Dakota (UND), Microbeam Technologies, Inc., and Worley Group. Ore Spring will serve as the project integrator and administrative lead, responsible for coordination, schedule adherence, and reporting to the Clean Sustainable Energy Authority (CSEA). Governance will be provided by a Project Steering Committee comprising representatives from Ore Spring, AmeriCarbon, UND, Microbeam, and Worley. The Steering Committee will convene monthly to review progress, technical results, budget performance, and risk management. Day-to-day authority resides with the Project Director (Dave Berry, AmeriCarbon) and designated technical leads from each partner organization. Project management will follow established best practices for research program execution, including structured work breakdown, milestone tracking, and risk-based decision gating.

Organization and Responsibilities

Ore Spring Materials, LLC (Project Lead)

- Owns project scope, schedule, and budget.
- Manages partner coordination, reporting, and communications with CSEA and NDIC.
- Oversees compliance, risk management, and quality assurance.
- Maintains the Project Management Plan (PMP), change control procedures, and reporting cadence.

AmeriCarbon (Carbon Manufacturing Lead)

- Leads Task 3 (Pitch Integration & Optimization Studies) and contributes to overall integration design.
- Provides pilot plant operations, data collection, and process optimization for feedstock blending.

- Supplies process performance and material balance data to inform Worley’s engineering integration models.

University of North Dakota (REE Integration Lead)

- Leads Task 4 (REE Process Integration & Optimization Studies) and contributes to feedstock and purification research.
- Provides upgraded lignite, humins, and humic-acid residues as test feedstocks.
- Conducts bench- and pilot-scale validation of demineralization, purification, and carbon-quality improvements.

Microbeam Technologies, Inc. (Critical Mineral Recovery Lead)

- Leads Task 5 (Ge/Ga Process Integration & Optimization Studies).
- Conducts bench-scale vaporization, condensation, and refining trials on AmeriCarbon and UND by-product streams.
- Provides mineralogical and compositional analysis to support the techno-economic assessment.

Worley Group (Engineering and Integration Lead, subcontractor to AmeriCarbon)

- Leads Task 2 (Preliminary Process and Site Integration Assessment) and contributes to system modeling, process flow diagrams (PFDs), and mass/energy balance integration.
- Supports development of the Techno-Economic Assessment (Task 6) and future FEL-3 readiness.

Execution Controls and Reporting Cadence

The Project Management Office (PMO), under Ore Spring, will implement an integrated control and reporting system that emphasizes technical performance, schedule adherence, and accountability. Monthly Progress Reports will summarize technical milestones, budget-to-actual performance, safety metrics, and partner activities. Quarterly Steering Committee Reviews will validate milestone completion and address corrective actions where required. Change Control (MOC) procedures will govern scope and budget modifications, ensuring transparent communication and documented decision-making. A shared risk register will be maintained and reviewed monthly, with proactive mitigation measures documented for technical, financial, and schedule risks.

Safety, Quality, and Environmental Management

All partner facilities operate under established environmental, health, and safety (EHS) programs compliant with federal, state, and institutional requirements. UND’s chemical hygiene plan and AmeriCarbon’s pilot plant safety procedures will guide laboratory and pilot operations. Quality assurance (QA/QC) procedures will include cross-laboratory data verification, analytical

calibration, and review of deliverables by the Project Director and Steering Committee prior to submission to CSEA.

Evaluation Points (Stage Gates & Milestones)

| Gate / Milestone | Primary Deliverable / Evidence | Decision / KPI |
|--|--|---|
| G1 – Project Initiation | Approved Project Management Plan; Partner Agreements Executed | Schedule and communication plan validated; risk log initialized |
| M1 – Feedstock and Baseline Testing Complete | Pilot-scale test results (AmeriCarbon & UND) | Feedstock performance validated; preliminary yield and quality data established |
| M2 – REE and Critical Mineral Recovery Trials Complete | Bench-scale Ge/Ga recovery results; REE and ash analyses | Demonstrated process compatibility and recovery factors |
| G2 – Integration Design Review | Preliminary mass & energy balances; draft process flow diagrams (Worley) | Engineering and data readiness for techno-economic analysis confirmed |
| M3 – Techno-Economic Assessment Complete | Draft TEA report integrating data from Tasks 3–5 | Commercial potential, cost structure, and ND economic impacts validated |
| G3 – Final Project Review / Closeout | Final report submitted to CSEA; validated integration framework | Project objectives met; commercial integration pathway defined |

Stakeholder Engagement and Communication

Ore Spring will maintain continuous engagement with CSEA, NDIC, and local stakeholders throughout the project. Communication will include monthly technical and financial reports, semi-annual technical briefings, and public outreach via UND’s research communications and AmeriCarbon’s stakeholder network to highlight North Dakota’s leadership in critical-materials innovation.

Summary

This management framework ensures that The Forge Project is executed on schedule, within scope, and in full compliance with CSEA program objectives. The integrated approach—combining industrial, academic, and engineering expertise under coordinated project management—provides the structure necessary to achieve technical success, transparent reporting, and measurable outcomes that support North Dakota’s clean energy and materials strategy.

TIMETABLE

The Forge Project: Rare Earths and Critical Materials Integration is planned as a 24-month project commencing upon award authorization by the Clean Sustainable Energy Authority (CSEA). The schedule outlined below provides the target start and completion dates for major project activities, including key technical milestones and reporting deliverables.

| Task / Activity | Description | Start Date | Completion Date | Deliverable / Reporting Milestone |
|---|--|------------|-----------------|--|
| Project Initiation and Management Setup | Execute partner subcontracts, finalize Project Management Plan (PMP), and convene kickoff meeting. | Month 1 | Month 2 | Project Kickoff Meeting; Project Management Plan submitted to CSEA. |
| Task 1 – Project Management (Ongoing) | Continuous coordination, reporting, and oversight throughout all project phases. | Month 1 | Month 24 | Monthly progress reports; quarterly steering committee reviews; risk register updates. |
| Task 2 – Preliminary Process and Site Integration Assessment | Worley conducts initial process integration, baseline data review, and site layout study. | Month 2 | Month 6 | Preliminary Process Integration Summary; included in Q2 Report. |
| Task 3 – Pitch Integration & Optimization Studies (AmeriCarbon) | Pilot-scale testing using lignite, upgraded lignite, humins, and blended feedstocks. Generate process data on yields, ash content, and | Month 3 | Month 14 | Interim Technical Report #1 (Month 9); Pilot Test Data Package #1 (Month 14). |

| | | | | |
|---|---|----------|----------|--|
| | pitch composition. | | | |
| Task 4 – REE Process Integration & Optimization Studies (UND) | Produce upgraded carbon by-products and REE-rich residues; conduct purification and demineralization testing; validate product quality. | Month 4 | Month 15 | Interim Technical Report #2 (Month 12); Data Summary for Integration Model (Month 15). |
| Task 5 – Ge/Ga Process Integration & Optimization (Microbeam) | Bench-scale testing of AmeriCarbon and UND residues; validate selective vaporization and condensation for Ge/Ga recovery. | Month 6 | Month 18 | Interim Technical Report #3 (Month 18); Analytical Results Package. |
| Task 6 – Techno-Economic Assessment (TEA) | Integrate process data into unified engineering and economic model; evaluate commercial potential for Forge site co-location. | Month 16 | Month 21 | Draft TEA and Integration Report (Month 21). |
| Task 7 – Technology Development and Commercialization Pathway | Identify remaining technical gaps; develop roadmap for pilot-to-commercial transition and follow-on funding. | Month 20 | Month 23 | Final Technical Report (Month 23) summarizing integration readiness. |

| | | | | |
|------------------|--|----------|----------|--|
| Project Closeout | Submit final reports and documentation; conduct project review with CSEA and partners. | Month 24 | Month 24 | Final Report and Presentation to CSEA; Project Completion Certification. |
|------------------|--|----------|----------|--|

Reporting Cadence

- Monthly Progress Reports — Submitted to CSEA within 10 days of month end; include technical updates, budget status, schedule performance, and safety metrics.
- Quarterly Reports — Summarize progress toward milestones, major findings, and planned next steps; Months 3, 6, 9, 12, 15, 18, 21.
- Interim Technical Reports — Issued at completion of major tasks (Tasks 3–5) and submitted to CSEA within 30 days of task completion.
- Final Report and Presentation — Delivered at Month 24, summarizing results, integration framework, and recommendations for commercial implementation at the Forge site.

Overall Schedule Summary

| Phase | Duration | Key Milestones |
|--|--------------|---|
| Phase 1 – Project Initiation and Integration Setup | Months 1–3 | Kickoff meeting; PMP approved; partner agreements executed. |
| Phase 2 – Feedstock, REE, and Mineral Optimization | Months 3–18 | Completion of pilot- and bench-scale testing (AmeriCarbon, UND, Microbeam). |
| Phase 3 – Integration, Analysis, and TEA | Months 16–21 | Completion of engineering and economic modeling; draft integration report. |
| Phase 4 – Commercialization Planning and Closeout | Months 21–24 | Final report, stakeholder review, and project closeout with CSEA. |

This timetable provides a clear framework to manage technical progress, coordinate partner activities, and ensure timely reporting to CSEA. The phased schedule aligns with the project’s integration objectives and ensures that technical deliverables and data are available in time to support engineering, economic, and commercialization evaluations.

BUDGET

Please use the table below to provide an **itemized list** of the project’s capital costs; direct operating costs, including salaries; and indirect costs; and an explanation of which of these costs will be supported by the financial assistance and in what amount. The budget should identify all other committed and prospective funding sources and the amount of funding from each source. **Please feel free to add columns and rows as needed.** Higher priority will be given to projects with a high degree of matching private industry investment.

| Project Associated Expense | NDIC Grant | NDIC Loan | Applicant’s Share (Cash) | Other Project Sponsor’s Share | Total |
|----------------------------|-------------|-----------|--------------------------|-------------------------------|-------------|
| | | | | | |
| | | | | | |
| Project budget | \$2,250,000 | | \$2,250,000 | | \$5,000,000 |
| | | | | | |
| | | | | | |
| Total | \$2,250,000 | | \$2,250,000 | | \$5,000,000 |

Please use the space below to justify project expenses and discuss whether the project’s objectives will be unattainable or delayed if less funding is available than requested.

CONFIDENTIAL INFORMATION

A person or entity may file a request with the Commission to have material(s) designated as confidential. By law, the request is confidential. The request for confidentiality should be strictly limited to information that meets the criteria to be identified as trade secrets or commercial, financial, or proprietary information. The Commission shall examine the request and determine whether the information meets the criteria. Until such time as the Commission meets and reviews the request for confidentiality, the portions of the application for which confidentiality is being requested shall be held, on a provisional basis, as confidential.

If the confidentiality request is denied, the Commission shall notify the requester and the requester may ask for the return of the information and the request within 10 days of the notice. If no return is sought, the information and request are public record.

Note: Information wished to be considered as confidential should be placed in separate appendices along with the confidentiality request. The appendices must be clearly labeled as confidential. If you plan to request confidentiality for **reports** if the proposal is successful, a request must still be provided.

To request confidentiality, please use the template available at <http://www.nd.gov/ndic/CSEA-app-doc-infopage.htm>.

PATENTS/RIGHTS TO TECHNICAL DATA

Each participating organization — AmeriCarbon Enterprises, LLC, the University of North Dakota (UND), and Microbeam Technologies, Inc. — brings its own background intellectual property (IP), expertise, and technical data to this project. All such background IP, including pre-existing inventions, know-how, research results, and proprietary methods, will remain the sole property of the originating organization.

Any new data, methods, or intellectual property developed during the course of this project will be governed by mutually agreed terms among the parties and in accordance with applicable North Dakota Industrial Commission (NDIC) and Clean Sustainable Energy Authority (CSEA) policies. Ownership of project-generated IP will be determined based on the nature and level of contribution, with appropriate rights to use the resulting data for research, development, and commercialization as permitted under program guidelines..

STATE PROGRAMS AND INCENTIVES

Ore Spring Materials, LLC is a newly formed entity and has not received any state funding to date. Ore Spring’s affiliate, AmeriCarbon Products, LLC, has been the recipient of the following contracts through the Lignite Research Council and funded by the North Dakota Industrial Commission:

| NDIC Contract Number | Title | Term of Contract | NDIC Share |
|-----------------------------|---|--------------------------------|-------------------|
| Contract No. FY22-XCVII-241 | North Dakota Lignite Coal-Based Pitch for Production of High Value Carbon Product | January 2022 through June 2023 | \$550,000.00 |
| Contract No. FY23-102-251 | Engineering Design and Feasibility Analysis for Commercial Graphite and Asphalt Manufacturing from Lignite Derived Carbon Pitch | July 2023 through June 2025 | \$700,000.00 |
| Contract No. FY24-104-258 | Lignite Conversion Reactor Optimization for Commercial Carbon Pitch Manufacturing | July 2024 through January 2026 | \$743,800.00 |
| Contract No. FY25-107-264 | Commercial Plant Design Optimization: Lignite to Critical Carbon Materials | May 2025 through July 2026 | \$1,499,653 |

PUBLICATIONS - Selected

1. Ping Wang, Bret Howard, Nicholas Means, Dushyant Shekhawat, David Berry. "Coal chemical-looping with oxygen uncoupled (CLOU) using a Cu-based oxygen carrier derived from natural minerals". *Energies* 2019, 12, 1453, doi:10.3390/en12081453.
2. Daniel J Haynes, Dushyant Shekhawat, David A Berry, Amitava Roy, James J. Spivey, Effect of calcination temperature on the steam reforming activity of Ni substituted pyrochlore catalysts, Jun 2018 to *Applied Catalysis: A: Gen.*
3. Ping Wang, Nicholas Means, Bret Howard, Dushyant Shekhawat, and David Berry, The Reactivity of CuO Oxygen Carrier and Coal in Chemical-Looping with Oxygen Uncoupled (CLOU) and In-situ Gasification Chemical-Looping Combustion (iG-CLC), *Fuel* 217 (2018) 642-649.
4. M.W. Smith, D.A. Berry, D. Shekhawat, D.J. Haynes, J.J. Spivey, Partial oxidation of liquid hydrocarbons in the presence of oxygen-conducting supports: Effect of catalyst layer deposition, *Fuel*, 89 (2010) 1193-1201.
5. D.J. Haynes, A. Campos, M.W. Smith, D.A. Berry, D. Shekhawat, J.J. Spivey, Reducing the deactivation of Ni-metal during the catalytic partial oxidation of a surrogate diesel fuel mixture, *Catal Today*, 154 (2010) 210-216.
6. D. Shekhawat, D. A. Berry, H. W. Pennline, E. Granite, J. J. Spivey, Special Issue: Advanced Fossil Energy Utilization, *Fuel*, Volume 89, Issue 6, January 1, 2010.
7. Maria D. Salazar-Villalpando, D. A. Berry and A. Cugini, Role of Lattice Oxygen in the Partial Oxidation of Methane over Rh/Supported Ceria Catalysts. *Isotopic Studies, Solid State Ionics*, December 2009.
8. M. Salazar, D. A. Berry and T. H. Gardner, "Partial Oxidation of Methane over Rh/Supported-Ceria Catalysts: Effect of Catalyst Reducibility and Redox Cycles", Published, *International Journal of Hydrogen Energy*, 33/11, (2008), 2695-2703
9. Shadle, L.J., Berry, D.A., and Syamlal, M., "Coal Gasification", *Encyclopedia of Chemical Technology, Concise, 5th Edition (ISBN 978-0-470-04748-4)*. , John Wiley & Sons, Inc., NY, NY, May 2007.
10. Turton, R.A., Berry, D.A., Gardner, T.G., and Miltz, A., "The Evaluation of Zinc Oxide Sorbents in a Pilot-Scale Reactor: Sulfidation Kinetics and Reactor Modeling", *Industrial Engineering and Chemistry, Ind. Eng. Chem. Res.* 2004, 43, 1235-1243

PATENTS - Selected

1. U.S. Patent # 9,935,318 SOFC Cathode with Oxygen Reducing Layer, (2018)
2. U.S. Patent 9,598,644 Method of CO and/or CO₂ hydrogenation to higher hydrocarbons using doped mixed metal oxides, (2017).
3. U. S. Patent 9,562,203 Methane-rich syngas production from hydrocarbon fuels using multi-functional catalyst/capture agent, (2017).
4. U.S. Patent 9,126,833 Process for continuous synthesis of mixed oxide powders, (2015).
5. U.S. Patent 8,486,301 Method for designing a reforming and/or combustion catalysts system, (2013).
6. U.S. Patent # 7,442,353 "Heat Recirculating Reformer for Fluid Stream Pollutant Removal, (2008).

SYNERGISTIC ACTIVITIES

- Editorial Board Member, "Catalysis Today", January 2006-2009.
- Distinguished Visiting Scientist, Oak Ridge National Laboratory, April 2002.
- Research Management Board Member, Army Core Technology Program (CTP) for Power Systems, June 2005 / 2006.

GREGORY G. HENTHORN

EDUCATION

West Virginia University, Morgantown, WV, Executive MBA (2003);

West Virginia University, Morgantown, WV, J.D. (2000)

West Virginia University, Morgantown, WV, B.S., Chemical Engineering (1995)

RESEARCH AND PROFESSIONAL EXPERIENCE

AmeriCarbon Products, LLC; VP of Corporate Development; Morgantown, WV; 2020-present;

Focuses on commercial transactions; investor relations, capital attraction and management; business development with customers and collaborators; administrative and financial oversight.

West Virginia University; Associate Professor (Adjunct); Morgantown, WV; 2019-present;

Energy Production and Operations (ENLM 220)

Flat Rock Energy; EVP of Business Development; Morgantown, WV; 2010-2020; Flat Rock is

a private equity funded oil and gas exploration and production company that develops, funds, and implements drilling programs in the Appalachian Basin. Founder of company, securing more than \$100 million in private equity funding; Negotiated commercial transactions with investors and other oil and gas operators.

Kinetic Clean Energy; Managing Partner; Morgantown, WV; 2007-2010; The company

coordinated the origination, development, and finance of several methane-based renewable energy projects. Financed more than \$50 million in renewable electric power facility construction projects; Organized facility to convert fleet vehicles to compressed natural gas; Assisted in the formation of a team to commercialize ethane-to-plastics technology.

Fourth Venture Group; Vice President; Morgantown, WV; 2000-2007; Fourth Venture was an

angel capital and early stage venture capital firm that served as a launching pad for technology commercialization and economic development. Served as Chief Operating Officer for a 500,000-

member online portal that integrated with hundreds of brick-and-mortar merchants; Worked with DOE laboratories and NGOs to commercialize technologies developed in former Soviet military research institutes; Explored development of a liquefaction facility to convert coal to liquid transportation fuels; Co-founded an enterprise-class business-to-business software company that was focused on the surveying and construction sectors, from establishment of the business to its divestiture; Held executive management positions in two specialized manufacturing companies.

SELECTED PUBLICATIONS & PRESENTATIONS

- “New Business Opportunities in TransTech Energy Technologies”, West Virginia Senate Economic Development Committee Meeting, West Virginia State Capitol, January 18, 2011.
- “Opportunities for the Coal Industry to Create Revenue from Carbon Offsets”, 36th Annual West Virginia Mining Symposium, West Virginia Coal Association, Civic Center, Charleston, WV, February 18, 2009.
- Bai, Xingji and Henthorn, Greg. “13 Per Day.” *Capacity Magazine* Spring (2007): 77-79. Print.

SYNERGISTIC ACTIVITIES

1. **TechConnectWV**, Charleston, WV; Member, Board of Directors, 2004-present; Member, Executive Committee, 2010-present. TechConnectWV is a non-profit, 501(c)(3) organization dedicated to the advancement of science, technology, and the innovation economy in West Virginia.
2. **West Virginia University**, under contract with Kinetic, 2012-2016; *Feasibilities of a Coal-Biomass to Liquids Plant in Southern West Virginia* (Award DE-FE0009997).
3. National Research Center for Coal & Energy, West Virginia University, Morgantown, WV; Consultant, Energy Efficiency Division, under contract with Kinetic, 2010-2011; *Supported establishment of initial TransTech Energy Conference*.
4. **West Virginia High Technology Consortium Foundation**, Fairmont, WV; Consultant, INNOVA Commercialization Group, 2010-2011; *Identification of technology commercialization and investment opportunities at NETL and WVU*



Art Lucas

Senior Principal Process Engineer

Summary

Mr. Lucas has more than twenty-two years of process design and research experience in the Chemical and Polymer industries. Responsibilities have included process engineer, research engineer and other roles.

Education

2000 B.S. Chemical Engineer, West Virginia Institute of Technology, Montgomery, WV

Experience

2023-Present Senior Principal Process Engineer, Worley, Charleston, WV

- Air Permitting & Emissions for Blue Ammonia Technology
- Proposal and Scope Work OSBL Blue Ammonia Technology
- Plastics Recycling Technology
- UniSim Modeling with OLI Software
- Worley Education Passports in Low Carbon Hydrogen, Ambition, Sustainability, Energy

2006-2023 Senior Research Engineer, MATRIC, South Charleston, WV

Technology development and deployment of various technologies at both laboratory and pilot scale as listed below.

- Batch polymerizations with novel technologies
- Liquid-Liquid Extractions
- Membrane technology and filtrations
- High Molecular weight polymerization
- Pyrolysis Technology
- Agitated filter drying and precipitations
- Adsorption Technologies
- Renewable Energy Technology
- Recycle Technology for various consumer products
- Chlorination reactions with shock sensitive byproducts
- Algae processing to make nutraceuticals

- Wiped Film evaporation and azeotropic distillations
- Slurry handling of both miscible and immiscible solutions.
- Solids handling of pseudoplastics and high viscosity polymers

Responsibilities included the following:

- Technical liaison with customers technical staff to develop scope of work, project execution plans and testing protocols.
- Developed all documentation for pilot scale operations. This included but not limited to, P&IDs, mass and energy balances, operating procedures, EHS, Safety assessments, emergency response and daily operational plans.
- Managed customer projects from concept to completing. A Dual role as Senior Research Engineer and Project Manager. Managed average capital expenditures of \$500K to as excess of \$1.5MM.
- Technical documentation for patent filing for successful technology for both the customer and internal research projects.
- Trained the operation workforce on the new technology deployments. This includes sample methodology as well as operation know how.
- Developed technology packages for renewable energies as part of the Renewable Fuel Standard.
- Worked with customer to mitigate risk for large scale fermentation to acid technology hurdles. Solutions were adopted and customer deployment commercial scale implementation in excess of \$300MM.
- Developed and patented technology in Pyrolysis and Reverse Osmosis Membranes.
- Lead engineer for design and implementation of patented continuous biodiesel facility. Overseen technology transfer, prepared design and bid packages and orchestrated project implantation in a cradle to grave role. This also included writing all Standard Operation procedures an defining the safety and compliance issues for the facility.

2006 – 2006 Process Engineer, DuPont Chemical Company, Belle, WV

- Debottlenecking process by redeveloping process conditions.

Solid Handling and Material Transfer

Vacuum Operations

Slurry Transfer

Batch Processing

Blending and Conveying

- Responsible for all activities surrounding production metrics of the unit.
- Provided 24hr coverage for area of unit responsibility to provide direction as require for all production problems.
- Organized a process workflow system that directed the human interfaces with the process for optimal performance.
- Educated/Trained operations on critical paths for success and very instrumental in fostering a higher standard ow work practices of operational employees.
- Developed and implemented new process guidelines and control limits.
- Responsible for operational instructions for evening and night shift employees.

2001 – 2005

Project/Process Engineer, Sunoco Chemical – Kenova, WV

Extrusion Process

- Implemented Rheology technologies for improved process control.
- Project engineer for de-bottlenecking extrusion line.

Capital \$1.75 MM

Designed and implemented Master Batch Additive System

- Rotating equipment

Twin Screw Extruders

Gear pumps

Blenders

Conveyors

Rotary valves

Pelletizers

Bulk material transfer

Gravity and pneumatic conveying systems

- Decreased off spec product by improving raw additive blend methods.
- Fully utilized new and existing PLC components for decreasing labor efforts along additive system.
- Orchestrated work efforts with hourly group to obtain new process workflow and procedure for new equipment.
- Preventative maintenance routines and monitoring for new equipment.
- Daily engineering support to production. Organized and developed “Best Practices” along extrusion line using root cause analysis.

300% increase in reliability

Increased first pass prime material from 93% to 98.2%.

Polymerization Process:

- Improved first stage reaction control by installing a refrigerated water/glycol system.
 - Twin screw and reciprocating compressor technology
- Operating Discipline Rollout member
- Spheripol Catalyst Technologies
- Provided engineering support to operations for high activity catalyst trials.
- Combined reaction kinetics and catalyst technologies to minimize byproduct formation.
- Decreased off-spec product by 50% by developing and implementing IMR models for online Rheology measurement.

Propylene Purification:

- Catalyst technologies for feedstock purifications
- Installed and commissioned first Nickel catalyst bed within Chemicals division (\$100K capital).

Nolan L. Theaker

Senior Research Manager – Critical Minerals, Center for Process Engineering Research
University of North Dakota, Grand Forks, ND 58202

Education and Training

| | | |
|----------------------------|----------------------|--------------|
| University of Louisville | Chemical Engineering | B.S. 2016 |
| University of Louisville | Chemical Engineering | M.Eng. 2017 |
| University of North Dakota | Chemical Engineering | Pursuing PhD |

Research and Professional Experience

2017-Present Senior Research Manager, College of Engineering and Mines Research Institute.

Responsibilities include high-level innovative research and development of novel concepts for submission of funding proposals. Coordinated and led efforts associated with downstream rare earth element concentration operations that have resulted in the development of final process flow diagrams and process designs. Principle Investigator to \$6.5M pilot-scale REE extraction and concentration project, as well as PI/Co-PI on 7 other proposals, managing up to \$10M in total project funds involving pilot-scale design, construction, and operation; resource identification and quantification; engineering-scale economic and engineering analyses; and novel process development and commercialization. Key contributor/PI to multiple proposals involving REE/CM extraction and/or concentration from multiple, conventional and unconventional feedstocks. Proposed efforts associated with coal conversion and value improvement using chemical/thermal methods. Co-PI for project involving CO₂ utilization from coal-derived flue gases.

2016-2017 Research Assistant, University of Louisville Conn Center.

Research involved design and operation of multi-stage electrochemical reactor scheme for efficient production of fuels from CO₂. Developed nano-functionalized electrocatalysts for improvements in activity and selectivity for targeted reactions in two phase reaction systems. Implemented phase-segregation devices for multi-step electrochemical reaction system, with planned production cost below research benchmarks to date.

2014-2015 Co-op Engineer, University of Kentucky CAER.

Research involved improvement and operation of a DOE bench-scale CO₂ capture unit in multiple reaction conditions, including enzymatic and amine-based systems. Evaluation and comparison of catalyst performance in a holistic view for CO₂ capture was conducted, including novel organic and enzymatic catalysts. Implemented system changes for improved user functionality of the system, including development of control systems and equipment selection for easy manual usage.

Publications/Presentations

1. **Theaker, N.**, Strain, J. M., Kumar, B., Brian, J. P., Kumari, S., & Spurgeon, J. M. (2018). Heterogeneously Catalyzed Two-Step Cascade Electrochemical Reduction of CO₂ to Ethanol. *Electrochimica Acta*, 274, 1-8. doi:10.1016/j.electacta.
2. Park, D., Middleton, A., Smith, R., Laudal, D., **Theaker, N.**, Hsu-Kim, H., Jiao, Y. A Biosorption-based approach for the selective extraction of REEs from coal byproducts. *Separation and Purification Technology*. 2020.

3. Dong, Z; Deblonde, G; Middleton, A; Hu, D; Dohnalkova, A; Kovarik, L; Qafoku, O; Shutthanandan, S; Jin, H; Hsu-Kim, H; **Theaker, N**; Jiao, Y; Park, D. “Microbe Encapsulated Silica Gel Biosorbent for Selective Extraction of Scandium from Coal Byproducts.” *Environmental Science and Technology*. 2021.
4. Mann, M; **Theaker, N**; Benson, S; Palo, D. “Investigation of Rare Earth Element Extraction from North Dakota Coal-Related Feedstocks – Final Report”. Submitted March 31, 2020.
5. Mann, M., **Theaker, N.**, Ling, A., Haugen, C., Winburn, R., Brewer, J., Benson, S., Benson, A., James, D., Goven, G., Koenig, A, Srinivasachar, S. “Feasibility Study of a One Tonne per day Rare Earth Extraction and Concentration Plant from Low-Rank Coal Resources.” Submitted January 28, 2022.
6. **Theaker, N.**, Rew, B., Laudal, D., Mann, M. Investigation of rare earth element extraction from North Dakota Coal-Related Feed Stocks. 2019 NETL Annual Crosscutting Projects Review Meeting. April 9th, 2019. Pittsburgh, PA.
7. **Theaker, N.** “Extraction of Rare Earth Elements from Lignite Coal – Kinetics of Extraction and Bench-Scale Updates.” 2019 Annual Society of Mining Engineering” Presented February 2, 2019.
8. Zygarlicke, C; Folkedahl, B; Feole, I; Kurz, B; **Theaker, N**; Benson, S; Hower, J; Eble, C. “Rare-Earth Elements (REEs) in U.S. Coal-Based Resources: Sampling, Characterization, and Round-Robin Interlaboratory Study – Final Report”. Submitted September 30th, 2019.
9. Gautam, M; Hofsommer, D. T; **Theaker, N**; Paxton, W. F; Grapperhaus, C. A; Spurgeon, J. M. "The effect of flue gas contaminants on electrochemical reduction of CO₂ to methyl formate in a dual methanol/water electrolysis system." *Chem Catalysis*, 2022.
10. Spurgeon, J; **Theaker, N**; Phipps, C; Uttarwar, S; Grapperhaus, C. A. "A Comparative Technoeconomic Reduction of CO₂ with Methanol to Produce Methyl Formate." *ACS Sustainable Chemistry & Engineering*, 2022.

Patents/Applications:

1. Theaker, Nolan; Laudal, Dan. 2020. Method for Leaching Rare Earth Elements and Critical Minerals from Organically Associated Materials. USA. 63/112,846A, filed Nov. 12, 2020.
2. Theaker, Nolan; Laudal, Dan; Lucky, Christine. 2020. Generation of Rare Earth Elements from Organically-Associated Leach Solutions. USA. 63/112,842A, filed Nov. 12, 2020.

Synergistic Activities

Mr. Theaker’s principal area of research interest include energy, fuels, and alternative critical material research. These include developing alternative uses and sources of fuels and valuable materials, both carbon and mineral based, as well as developing new and unconventional sources of energy-critical materials.

*NAME Nicholas Anthony Dyrstad-Cincotta

*Required fields

ORCID ID (Optional)

*POSITION TITLE Research Operations Manager

*PRIMARY ORGANIZATION & LOCATION University of North Dakota, Grand Forks, ND

***PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.D.2.h.i.a.3](#))**

| PREVIOUS ORGANIZATION(S) & LOCATION(S) | DEGREE (if applicable) | RECEIPT DATE* (MM/YYYY) | FIELD OF STUDY |
|---|------------------------|-------------------------|------------------------|
| University of North Dakota, Grand Forks, ND | M. Sc | 12/2018 | Mechanical Engineering |
| University of North Dakota, Grand Forks, ND | B.A | 05/2018 | Mechanical Engineering |
| University of North Dakota, Grand Forks, ND | M.B.A | 05/2022 | Business |

Note - For Fellowship applicants only, please include the start date of the Fellowship.

***APPOINTMENTS AND POSITIONS - (see [PAPPG Chapter II.D.2.h.i.a.4](#))**

| Start Date - End Date | Appointment or Position Title, Organization, and Location |
|-----------------------|--|
| 2023-Present | Research Operations Manager, UND College of Engineering and Mines Research Institute(Formerly Institute for Energy Studies), Grand Forks, ND |
| 2021-2023 | Research Engineer, UND Institute for Energy Studies, Grand Forks, ND |
| 2018-2021 | Engineer, UND Institute for Energy Studies, Grand Forks, ND |
| 2016-2018 | Junior Engineer, UND Institute for Energy Studies, Grand Forks, ND |
| 2015 | Quality Engineering Co-op, United Technologies Corporation Aerospace Systems, Jamestown, ND |
| 2013-2015 | Research Assistant, UND Institute for Energy Studies, Grand Forks, ND |

***PRODUCTS - (see [PAPPG Chapter II.D.2.h.i.a.5](#)) Products Most Closely Related to the Proposed Project**

Tomomewo, O. S., Dyrstad-Cincotta, N., Mann, D., Ellafi, A., Alamooti, M., Srinivasachar, S., & Nelson, T. (2020, September 18). Proposed Potential Mitigation of Wastewater Disposal Through Treated Produced Water in Bakken Formation. American Rock Mechanics Association.

Dyrstad-Cincotta, N. "Supercritical Treatment Technology for Water Purification." North Dakota Energy Conference & Expo (NDECE), Grand Forks, ND. November 2019.

D., Mann, M., Srinivasachar, S., Dyrstad-Cincotta, N. "Supercritical Treatment Technology for Water Purification." U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) Concentrating Solar-Thermal Power (CSP) Program Summit 2019, Oakland, CA. March 2019.

Nasah, J., Jensen, B., Dyrstad-Cincotta, N., Gerber, J., Laudal, D., Mann, M., Srinivasachar, S. "Segregation of Unreacted Char from Oxygen Carriers During Chemical Looping Combustion." 5th International Conference on Chemical Looping, 24-27 September 2018, Park City, Utah, USA.

Nasah, J., Gerber, J., Laudal, D., Mann, M., Srinivasachar, S., Dyrstad-Cincotta, N., Jensen, B. "Method for Separation of Coal Conversion Products from Oxygen Carriers." Journal, International Journal of Greenhouse Gas Control. 2019.

Other Significant Products, Whether or Not Related to the Proposed Project (see [PAPPG Chapter II.D.2.h.i.a.5](#))

RESEARCH AWARDS AND MAJOR PROJECT ACTIVITIES

Award: NDIC-R-046-056 - "Electrostatic Lubrication Filtration of Wind Turbine Oil Reservoirs" (2021-2024)

Award: NDIC-FY21-XCIV-233 - "Electrostatic Filtration of Large Lubricant Reservoirs" (2021-2023)

Project Activity: Key Personnel on DE-0031835 - "Rare Earth Element Extraction and Concentration at Pilot-Scale from North Dakota Coal-Related Feedstocks" (Ongoing)

***Synergistic Activities - (see [PAPPG Chapter II.D.2.h.\(i\)\(a\)\(6\)](#))**

Mr. Dyrstad-Cincotta principal areas of expertise are emissions control for advanced and traditional coal power generation and supercritical water treatment systems. He has specific expertise on fluid-bed based technology development, aiding in the development effort for all fluidized bed systems of the CLC group. He has experience in emissions monitoring at bench, pilot and field scale, and has performed multiple combustion-based testing for technology development or verification. More recently, he served as technical lead for the commissioning and operation of UND's Rare Earth Element Extraction pilot plant research project.

Other areas under which Mr. Dyrstad-Cincotta has been active include coal-based pollution measurement and control (sulfur oxides, aerosol formation and nitrogen oxides), underground coal gasification, coal beneficiation and natural gas processing. Mr. Dyrstad-Cincotta has several years' experience in planning, executing and reporting of day-to-day activities associated with bench-scale and pilot-scale research programs. He is also currently the lead programmer for process control systems (PCS) in the College of Engineering and Mines Research Institute and has taken on the role of aiding the rest of the UND College of Engineering & Mines in their PCS design and programming efforts.

***Certification:**

When the individual signs the certification on behalf of themselves, they are certifying that the information is current, accurate, and complete. This includes, but is not limited to, information related to domestic and foreign appointments and positions. Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§287, 1001, 1031 and 31 U.S.C. §§3729-3733 and 3802.

Signature
(Please type out full name): Nicholas Anthony Dyrstad-Cincotta

Date: 11/20/2024

*NAME Xiaodong Hou

*Required fields

ORCID ID (Optional)

*POSITION TITLE Research Associate Professor

*PRIMARY ORGANIZATION & LOCATION University of North Dakota, Grand Forks, ND

*PROFESSIONAL PREPARATION - (see [PAPPG Chapter II.D.2.h.i.a.3](#))

| PREVIOUS ORGANIZATION(S) & LOCATION(S) | DEGREE (if applicable) | RECEIPT DATE* (MM/YYYY) | FIELD OF STUDY |
|--|------------------------|-------------------------|-------------------------------|
| Shanghai Jiao Tong University | Ph.D. | 07/2009 | Polymer Chemistry and Physics |
| Shaanxi University of Science and Technology | M. Eng. | 07/2005 | Chemical Engineering |
| Shaanxi University of Science and Technology | B. Eng. | 07/2002 | Chemical Engineering |

Note - For Fellowship applicants only, please include the start date of the Fellowship.

*APPOINTMENTS AND POSITIONS - (see [PAPPG Chapter II.D.2.h.i.a.4](#))

| Start Date - End Date | Appointment or Position Title, Organization, and Location |
|-----------------------|--|
| 2022-Present | Research Associate Professor, University of North Dakota CEM Research Institute, Grand Forks, ND, USA |
| 2018-2022 | Research Assistant Professor, University of North Dakota Institute for Energy Studies, Grand Forks, ND, USA |
| 2014-2017 | Analytic Chemist/Lecturer, University of North Dakota Institute for Energy Studies, Grand Forks, ND, USA |
| 2013-2014 | Interim Lab Director/Analytic Chemist, University of North Dakota Environmental Analytical and Research Laboratory, Grand Forks, ND, USA |
| 2010-2013 | Postdoctoral Researcher, University of North Dakota Chemistry Department, Grand Forks, ND, USA |

***PRODUCTS - (see [PAPPG Chapter II.D.2.h.i.a.5](#)) Products Most Closely Related to the Proposed Project**

1. Xiaodong Hou. Battery Cathodes from Humic Acid. US Non-provisional Patent Application 20220123316, 17/558080.
2. Xiaodong Hou and Shuai Xu. Battery Anodes from Humic Acid. US Non-provisional Patent Application 20220115641, 7/558023.
3. Xiaodong Hou and Shuai Xu. Battery Materials and Fabrication Methods, PCT/US2021/044488, and US Provisional Application No. 63/124,487.
4. Pushparaj, R. I.; Hou, X.; Xu, S.; Zhang, X.; Abdelmalek, B.; Zhang, R., Coal-derived porous carbon anodes for Na-ion batteries. *Renewable and Sustainable Energy* 2024, 2 (1), DOI: 0.55092/rse2024000X
5. Zhang, X.; Pushparaja, R. I.; Mann, M.; Hou, X., Coal-Derived Graphene Foam and Micron-Sized Silicon Composite Anodes for Lithium-ion Batteries. *Electrochimica Acta* 2022, 434, 141329.
6. Xu, S.; Hou, X.; Wang, D.; Zuin, L.; Zhou, J.; Hou, Y.; Mann, M., Insights into the Effect of Heat Treatment and Carbon Coating on the Electrochemical Behaviors of SiO Anodes for Li-Ion Batteries. *Advanced Energy Materials* 2022, 12 (18).
7. Liu, X.; Han, J.; Hou, X.; Altincicek, F.; Oncel, N.; Pierce, D.; Wu, X.; Zhao, J. X., One-pot synthesis of graphene quantum dots using humic acid and its application for copper (II) ion detection. *Journal of Materials Science* 2021, 56 (8), 4991-5005.
8. Xu, S.; Zhou, J.; Wang, J.; Pathiranaage, S.; Oncel, N.; Robert Ilango, P.; Zhang, X.; Mann, M.; Hou, X., In Situ Synthesis of Graphene-Coated Silicon Monoxide Anodes from Coal-Derived Humic Acid for High-Performance Lithium-Ion Batteries. *Advanced Functional Materials* 2021, 31 (32), 2101645.

Other Significant Products, Whether or Not Related to the Proposed Project (see [PAPPG Chapter II.D.2.h.i.a.5](#))

9. Pushparaj, R. I.; Cakir, D.; Zhang, X.; Xu, S.; Mann, M.; Hou, X., Coal-Derived Graphene/MoS₂ Heterostructure Electrodes for Li-Ion Batteries: Experiment and Simulation Study. *ACS applied materials & interfaces* 2021, 13 (50), 59950-59961.
10. Ilango, P. R.; Savariraj, A. D.; Huang, H.; Li, L.; Hu, G.; Wang, H.; Hou, X.; Kim, B. C.; Ramakrishnah, S.; Peng, S., Electrospun flexible nanofibers for batteries: design and application. *Energy Environ. Rev* 2023, 6, 12. Reagen, S.; Wu, Y.; Liu, X.; Shahni, R.; Bogenschuetz, J.; Wu, X.; Chu, Q. R.; Oncel, N.; Zhang, J.; Hou, X.;
11. Combs, C.; Vasquez, A.; Zhao, J. X., Synthesis of Highly Near-Infrared Fluorescent Graphene Quantum Dots Using Biomass-Derived Materials for In Vitro Cell Imaging and Metal Ion Detection. *ACS applied materials & interfaces* 2021, 13 (37), 43952-43962.
12. Hou, X.; Hou, Y.; Mann, M., Porous Silicon/Lignite-derived Graphene Composite Anodes for Lithium ion batteries. In 36th International Battery Seminar and Exhibition, Fort Lauderdale, FL, 2019.
13. Baker, J.; Xu, S.; Mann, J.; Dockter, A.; Hou, Y.; Mann, M.; Hou, X., Preparation of Lithium Ion Battery Cathode Composites Using Leonardite-Derived Humic Acid. In 2018 AIChE Annual Meeting, Pittsburg, PA, 2018.

***Synergistic Activities - (see [PAPPG Chapter II.D.2.h.\(i\)\(a\)\(6\)](#))**

- Principal Investigator: Dr. Hou is the technical group lead of battery research at CEM Research Institute, the major active projects include “Engineering Design and Feasibility Analysis for Commercial Graphite and Asphalt Manufacturing from Lignite-Derived Carbon Pitch (Subcontractor to AmeriCarbon LLC)”, awarded \$700,000 by NDIC Lignite Research Program, “Advanced Processing of Coal and Coal Waste to Produce Graphite for Fast-Charging Lithium Ion Battery Anode” awarded \$1,000,000 (DE-FE0032139), and “ Lignite-derived Carbon materials for Li-ion Battery Anode (DE-FE0031984)”, awarded \$500,000 by DOE NETL ACP program, “The Preparation of a High Capacity Graphene Modified Graphite /SiO_x Anode Electrode Batteries”, awarded \$259,796 by a private cell manufacturer. “Porous Silicon/Lignite-Derived Graphene Composite Anodes for Li-Ion Batteries (DE-FE0026825/S000045)”, awarded \$369,581 by DOE UCFER. “New Battery Charing Technology”, awarded \$248,229 by NDIC Research ND program. “Advanced Lithium Batteries for Unmanned Aircraft Systems” \$140,000 and “Lignite-Derived Graphene/Si Anode for Li-ion Battery” awarded \$150,000 by UND VPR Post-Doctoral Program.
- Lab Director: Dr. Hou has served as the director/manager for the Advanced Materials Characterization Laboratory and Environmental Analytic Research Laboratory since 2014 and being lead the establishment of Advanced UAV and Satellite Materials Characterization laboratory.
- Industrial Collaboration: Dr. Hou has been working with multiple companies on battery R&D, including Packet Digital, and as a consultant at a local battery company Clean Republic from 2014 to 2017
- Invited Lecture & Presentations: He presents at multiple battery- and coal-relevant conferences.
- Graduate Faculty: Dr. Hou mentors one postdoc, four Ph.D. students, one M.S. graduate and several undergraduates on Coal-derived materials for Li-ion battery research.

***Certification:**

When the individual signs the certification on behalf of themselves, they are certifying that the information is current, accurate, and complete. This includes, but is not limited to, information related to domestic and foreign appointments and positions. Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§287, 1001, 1031 and 31 U.S.C. §§3729-3733 and 3802.

Signature
(Please type out full name): Xiaodong Hou

Date: 11/20/2024

Dr. Daniel A. Laudal

daniel.laudal@und.edu / 701-777-5745

Executive Director | College of Engineering & Mines Research Institute (CEMRI)

Director | Center for Process Engineering Research Center (CPER)

University of North Dakota (UND)

Education and Training

University of North Dakota

Chemical Engineering

B.S.

University of North Dakota

Chemical Engineering

Ph.D.

Research and Professional Experience

2022-Present Executive Director and Research Professor, UND CEMRI

As Executive Director, leading the research division of the College of Engineering & Mines, with total external research expenditures of \$20M/year, 80+ faculty and staff researchers, and research centers in AI, cybersecurity, water, infrastructure, materials, and process engineering. As Research Professor, technical expertise includes critical minerals, carbon products, carbon capture, utilization and storage, and advanced power generation systems. Research is focused on applied research and technology development with significant experience in process scale-up and techno-economic analyses.

2021-Present Director, UND CPER

Leading the Center for Process Engineering Research, a multidisciplinary research center focused on applied research and technology development in areas such as energy, mining/minerals, materials, chemicals/petrochemicals, environmental, and many other fields that require process engineering expertise. UND’s CPER aims to drive innovation and facilitate the seamless transition of groundbreaking discoveries into practical real-world applications. As Director, leading a team of full-time dedicated faculty and staff researchers and managing resources towards effectively achieving CPER’s goals: innovation to develop novel solutions; supporting small business and startups; conducting state of the art research; engaging industry partnerships; educating and training the workforce; and contributing to policy development.

2019-2021 Environmental Manager / Project Tundra Manager, Minnkota Power Coop.

Led the environmental regulatory compliance and environmental planning efforts for a generation & transmission cooperative serving eastern ND and northwestern MN. As Project Tundra Project Manager, led Minnkota’s development of a \$1.5B world-scale carbon capture and storage project for the Milton R. Young Station, a lignite coal fired power plant in ND. Responsibilities included leading development of the design, permitting and financing of the carbon capture plant and geologic storage facility.

2016-2018 Manager: Major Projects, UND Institute for Energy Studies (IES).

Primary roles included developing and writing funding proposals, managing research projects, coordinating IES research staff and students, and process design/development of innovative solutions to challenges in the energy industry. Principal Investigator or Project Manager or several DOE, State and industry funded projects. Research focused on the following major areas: carbon management for the power industry, production of co-products from coal and associated materials, value-added opportunities/technology development for North Dakota’s energy industries.

2012-2015 *Research Engineer, UND Institute for Energy Studies.*

Lead researcher or principal investigator on several federal, state and industry funded projects. Work involved early-stage R&D of novel processes and technologies, primarily focusing on laboratory- and bench-scale demonstrations. Areas of focus included chemical looping combustion and post combustion carbon dioxide capture.

2008-2012 *Research Engineer, UND Energy & Environmental Research Center.*

Research involved design and operation of various lab and pilot-scale gasification, combustion and advanced power systems. Gained invaluable experience with high pressure and high temperature systems and fluidized beds.

2006-2008 *Field Engineer, Schlumberger Oilfield Services.*

Design, execution, and evaluation of well cementing operations in the Williston Basin.

Awards and Honors

Lignite Energy Council Distinguished Service Award – Research & Development: October, 2020 ‘In appreciation of your leadership during the engineering and design stages of Project Tundra.’

Selected Publications/Patents

Laudal, D., Benson, S. “Rare earth element extraction from coal.” U.S. Patent No. 10,669,610. March 2017

Theaker, N., **Laudal, D.** “Method for leaching rare earth elements and critical minerals from organically associated materials.” U.S. Patent No. 11,913,090. February 2024.

Theaker, N., **Laudal, D.**, Lucky, C. “Generation of rare earth elements from organically associated leach solutions.” U.S. Patent No. 17/519,346. Filed May 2022.

Laudal, D., Benson, S., Addleman, S., Palo, D. “Leaching behavior of rare earth elements in Fort Union lignite coals of North America.” *International Journal of Coal Geology* 191 (2018) 112-124.

Laudal, D., Benson, S., Addleman, S., Palo, D. “Rare earth elements in North Dakota lignite coal and lignite-related materials.” *ASME Journal of Energy Resources and Technology* 140 (2018).

Park, D., Middleton, A., Smith, R., Deblonde, G., **Laudal, D.**, Theaker, N., Hsu-Kim, H., Jia, Y. “A biosorption-based approach for selective extraction of rare earth elements from coal byproducts.” *Separation and Purification Technology*. Volume 241:116726. June 2020.

Bellal, A., Hou, X., Nasah, J., Van der Watt, J., **Laudal, D.**, Hoffman, J. 2024. Performance and economic viability assessment of a novel CO₂ adsorbent for manufacturing and integration with coal power plants. *Chemical Engineering Journal*, 498, 155604

Van der Watt, J.G., **Laudal, D.**, Krishnamoorthy, G., Feilen, H., Mann, M., Shallbetter, R., Nelson, T., Srinivasachar, S. “Development of a spouted bed reactor for chemical looping combustion.” *Journal of Energy Resources and Technology*. 140(11), 112002 (8 pages), November 2018.

Nelson, T., van der Watt, J.G., **Laudal, D.**, Feilen, H., Mann, H., Srinivasachar, S. “Reactive jet and cyclonic attrition analysis of ilmenite in chemical looping combustion systems.” *International Journal of Greenhouse Gas Control*. Volume 91, December 2019, 102837.

Nasah, J., Jensen, B., Dyrstad-Cincotta, N., Gerber, J., **Laudal, D.**, Mann, M., Srinivasachar, S. “Method for separation of coal conversion products from oxygen carriers.” *International Journal of Greenhouse Gas Control*. Volume 88, September 2019, pages 361-370.

Synergistic Activities

- PhD Research focused on development of a novel technology to recover rare earth elements from lignite coal and was the foundation for UND’s ongoing efforts related to REE/CM. <https://commons.und.edu/theses/2123/>.
- Original PI on Phase 2 of DE-FE0027006, the bench-scale demonstration of UND’s lignite-based REE/CM technology.
- Current Project Director / Project Manager on DE-FE0032295, a FEED and business planning study geared towards commercializing UND’s lignite-based REE/CM technology.
- While at Minnkota managed a \$50M portfolio of DOE, State of ND, and investor funding supporting the development of Project Tundra.
- Served as a project advisor on UND’s existing Phase 1 CORE-CM project on the Williston Basin

IDENTIFYING INFORMATION:

NAME: Benson, Alexander

POSITION TITLE: Chief Operating Officer

PRIMARY ORGANIZATION AND LOCATION: Microbeam Technologies Inc., Minnetonka, Minnesota, United States

Professional Preparation:

| ORGANIZATION AND LOCATION | DEGREE (if applicable) | RECEIPT DATE | FIELD OF STUDY |
|---|---------------------------|--------------|---------------------------|
| University of St Thomas., St. Paul, Minnesota, United States | BS | 12/2011 | Mechanical Engineering |

Appointments and Positions

| | |
|----------------|--|
| 2024 - present | Chief Operating Officer, Microbeam Technologies Inc., Minnetonka, Minnesota, United States |
| 2024 - 2024 | Program Manager, Microbeam Technologies Inc., Minnetonka, Minnesota, United States |
| 2019 - 2024 | Sr. Project Manager, Microbeam Technologies Inc., Minnetonka, Minnesota, United States |
| 2017 - 2019 | Sr. Research Engineer (part-time), Microbeam Technologies Inc., Denver, Colorado, United States |
| 2017 - 2019 | Manufacturing Manager, Medtronic - Minimally Invasive Technology Group, Boulder, Colorado, United States |
| 2016 - 2017 | Sr. Product Engineer, Medtronic - Minimally Invasive Technology Group, Boulder, Colorado, United States |
| 2015 - 2016 | Sr. Manufacturing Engineer, Medtronic Energy and Component Center, Minneapolis, Minnesota, United States |
| 2012 - 2015 | Manufacturing Engineer, American Medical Systems, Minnetonka, Minnesota, United States |
| 2007 - 2012 | Lab Assistant (part-time), Microbeam Technologies Inc, Grand Forks, North Dakota, United States |

Products**Products Most Closely Related to the Proposed Project**

1. Fuka M, Kolb E, Benson A, Benson S., inventors. Microbeam Technologies, Inc., assignee. System And Method For Predicting Abundance Of Rare Earth Elements. United States of America 11,733,184 B2. 2023 August 22.
2. Benson A, Benson S, Kolb E, Fuka M. Development of Low-Cost Rare Earth Element Analysis and Sorting Methods. [revised 2021 January]. [Print]. 2017 July. Other: Contract No. FY18-LXXXIII-213
3. Benson SA, Benson AS., inventors. Microbeam Technologies Incorporated, assignee. System and Method for Producing Critical Minerals. United States of America 12,031,165 B2.

2024 July 07.

Other Significant Products, Whether or Not Related to the Proposed Project

1. Benson S, Patwardhan S, Stadem D, Langfeld J, Benson A, Desell T. Application of Condition Based Monitoring and Neural Networks to Predict the Impact of Ash Deposition on Plant Performance. Accepted for presentation at 28th International Conference on the Impact of Fuel Quality on Power Production and the Environment, 2022.; 2022.

Certification:

When the individual signs the certification on behalf of themselves, they are certifying that the information is current, accurate, and complete. This includes, but is not limited to, information related to domestic and foreign appointments and positions. Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§ 287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802.

Certified by Benson, Alexander in SciENCv on 2025-09-30 14:37:31

IDENTIFYING INFORMATION:**NAME:** Benson, Steven**POSITION TITLE:** President, sbenson@microbeam.com, 701-213-7070**PRIMARY ORGANIZATION AND LOCATION:** Microbeam Technologies Incorporated ,
Grand Forks, North Dakota, United States**Professional Preparation:**

| ORGANIZATION AND LOCATION | DEGREE (if applicable) | RECEIPT DATE | FIELD OF STUDY |
|---|---------------------------|--------------|----------------|
| Pennsylvania State University, University Park, Pennsylvania, United States | PHD | 05/1987 | Fuel Science |
| Minnesota State University, Moorhead, Minnesota, United States | BS | 07/1977 | Chemistry |

Appointments and Positions

1991 - present President, sbenson@microbeam.com, 701-213-7070, Microbeam Technologies Incorporated , Grand Forks, North Dakota, United States

2015 - 2017 Associate Vice President for Research, Energy & Environmental Research Center, University of North Dakota, Grand Forks, North Dakota, United States

2010 - 2014 Chair Petroleum Engineer Department and Director Institute for Energy Studies, University of North Dakota, Grand Forks, North Dakota, United States

2008 - 2010 Professor, Chemical Engineering, University of North Dakota, Grand Forks, North Dakota, United States

1994 - 2008 Associate Director for Research/Senior Research Manager, Energy & Environmental Research Center, University of North Dakota, Grand Forks, North Dakota, United States

1986 - 1994 Senior Research Manager, Energy & Environmental Research Center, University of North Dakota, Grand Forks, North Dakota, United States

1984 - 1987 Graduate Research Assistant, Pennsylvania State University, University Park, Pennsylvania, United States

1983 - 1984 Research Supervisor, UND Energy Research Center, Grand Forks, North Dakota, United States

1977 - 1983 Research Chemist, ERDA and US DOE, Grand Forks Energy Technology Center, Grand Forks, North Dakota, United States

Products**Products Most Closely Related to the Proposed Project**

1. Benson SA., Benson AS.. Systems and Method for Producing Critical Minerals. Patent No.: US 12,031,165 B2. 2024 July 07.

2. Fuka M, Kolb E, Benson A, Benson S. System and Method for Predicting the Presence of Rare Earth Elements. Patent No. US 11,733,184 B2. 2023 August 22.
3. Laudal D, Benson S. Rare Earth Extraction from Coal. US Patent US 10,669,610 B2. 2020 June 02.
4. Laudal DA, Benson SA, Addleman RS, Palo D. Leaching behavior of rare earth elements in Fort Union lignite coals of North America. International Journal of Coal Geology. 2018 April 15; 191:112.
5. Benson AS, Patwardhan S, Kolb E, Benson SA. Production of Germanium Concentrates from Coal Ash. SBIR Phase I - Topic Area #A244-055.. 2025 August 19.

Other Significant Products, Whether or Not Related to the Proposed Project

1. Lyu Z, Patwardhan S, Stadem D, Langfeld J, Benson S, Thoelke S, Desell T. Neuroevolution of recurrent neural networks for time series forecasting of coal-fired power plant operating parameters. The Genetic and Evolutionary Computation Conference (GECCO 2020). 2021 July 10.
2. Benson AS, Benson SA, Stadem D, Kolb E, Rew B, Morgan D. Development of Low-Cost Rare Earth Element Analysis and Sorting Methods. Final Report, ND Industrial Commission, Contract No. FY18-LXXXIII-213. 2021 January 01.
3. Laudal DA, Benson SA, Palo D, Addleman AS. Rare Earth Elements in North Dakota Lignite Coal and Lignite-Related Materials. ASME, J. Energy Resour. Technology. 2018 April 09; 140(6):062205.
4. Stadem D, Patwardhan S, Fuka M, Benson S. Condition Based Monitoring and Predicting Ash Behavior in Coal Fired Boilers - III - Coal Tracker Optimization. Pittsburgh Coal Conference. 2019 September.

Certification:

I certify that the information provided is current, accurate, and complete. This includes but is not limited to information related to domestic and foreign appointments and positions.

I also certify that, at the time of submission, I am not a party to a malign foreign talent recruitment program.

Misrepresentations and/or omissions may be subject to prosecution and liability pursuant to, but not limited to, 18 U.S.C. §§ 287, 1001, 1031 and 31 U.S.C. §§ 3729-3733 and 3802.

Certified by Benson, Steven in SciENCv on 2025-09-29 20:45:36

**Industrial Commission
Tax Liability Statement**

Applicant:

Ore Spring Materials, LLC
3001 Cityview Drive
Morgantown, WV 26501

Application Title:

The Forge Project: Rare Earths and Critical Materials Integration

Program:

- Lignite Research, Development and Marketing Program
- Renewable Energy Program
- Oil & Gas Research Program
- Clean Sustainable Energy Authority

Certification:

I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.



Signature

Authorized Agent, Chief Business Officer

Title

Oct. 15, 2025

Date

North American **COAL**

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Re: Support The Forge Project in North Dakota

Dear Mr. Henthorn:

North American Coal, LLC (NACoal) is pleased to express its support for the applications being submitted by AmeriCarbon Forge, LLC and Ore Spring Materials, LLC to the Clean Sustainable Energy Authority (CSEA) for The Forge Project and the associated Rare Earth and Critical Materials Integration Project. Both projects represent transformative opportunities to advance value-added lignite utilization and domestic manufacturing in North Dakota.

As the leading producer of lignite coal in North Dakota, NACoal remains committed to supporting innovation that utilizes North Dakota's lignite as a strategic resource for economic development and job creation. We recognize the importance of developing domestic sources of advanced carbon materials and critical minerals, particularly those essential to industrial, infrastructure, and defense applications.

Currently, NACoal is considering investing up to \$6 million in the commercial facility to be constructed as part of The Forge Project. Any such capital investment will be contingent upon completion of due diligence, mutually satisfactory definitive agreements, final project financing structure, and approval by NACoal's Board of Directors.

In addition to our potential equity participation, NACoal expects to continue supporting the project through its affiliate The Falkirk Mining Company, which operates the Falkirk Mine in McLean County, North Dakota—the planned feedstock source for The Forge Project. We anticipate that the project will strengthen the long-term viability of lignite operations by expanding the economic uses of this resource beyond power generation.

NACoal also recognizes the strategic significance of the Rare Earth and Critical Materials Integration Project being advanced by Ore Spring Materials in collaboration with AmeriCarbon, the University of North Dakota, and Microbeam Technologies. The potential to recover rare earth elements and critical minerals from by-product ash streams produced by the Forge facility offers a compelling opportunity to establish an integrated value chain for critical materials within the state. NACoal views this integration as a valuable bolt-on to the Forge Project, enhancing North Dakota's leadership in critical mineral recovery and clean industrial innovation.

We are encouraged by AmeriCarbon's technical progress, the strength of its partnerships with the University of North Dakota and other institutions, and the alignment of these projects with the state's economic goals. NACoal looks forward to continuing its collaboration with AmeriCarbon and its affiliates as they move toward commercial implementation of these important initiatives in North Dakota.

Sincerely,

NORTH AMERICAN COAL, LLC



Carroll L. Dewing
Senior Vice President and Chief Operating Officer



918 E Divide Ave
Bismarck, ND 58501
rainbowenergycenter.com

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Subject: Support of The Forge Project

Dear Mr. Henthorn:

Rainbow Energy Center, LLC is pleased to convey its strong endorsement of **The Forge Project** being advanced by AmeriCarbon and NACCO Natural Resources. The project's proposed location, near our Coal Creek Station operations, presents a unique opportunity for local synergy, strategic partnership, and regional economic development.

Rainbow is proud to be part of the electrical generation system in North Dakota, owning Coal Creek Station and Nexus Line, LLC, to deliver reliable power across the region. As part of our core mission, we are committed to exploring and supporting innovative technologies and value-added industrial uses of regional resources.

We view The Forge Project as complementary to our operations and regional energy ecosystem. The facility's production of Eco-Pitch™ from North Dakota lignite coal — using AmeriCarbon's proprietary process — dovetails with the region's broader ambitions to harness natural resources, enhance domestic manufacturing capacity, and build resilience in strategic supply chains.

Rainbow is committed to working cooperatively with AmeriCarbon to explore beneficial collaborations, including possible coordinated infrastructure use (energy, utilities, transmission access). We believe The Forge Project offers meaningful benefit to the county and state through economic stimulus, job creation, and long-term strategic advantage in energy and materials sectors.

Rainbow also recognizes the alignment between The Forge Project and the complementary rare earth element (REE) integration initiatives being advanced by AmeriCarbon and its affiliates, as well as NACCO Natural Resources, the University of North Dakota, and Microbeam Technologies. These efforts reinforce one another and present a valuable opportunity to leverage shared infrastructure and regional expertise to support critical mineral recovery and high-value carbon production within North Dakota's energy corridor. Rainbow wishes AmeriCarbon success in securing the Clean Sustainable Energy Authority award and looks forward to being a constructive collaborator as the project progresses.

Sincerely,

A handwritten signature in blue ink that reads "Jessica K. Bell".

Jessica K. Bell, Vice President External Affairs
Rainbow Energy Center, LLC

Cc: David Straley (NACCO Natural Resources)



Worley Group, Inc.
500 Lee Street East, Suite 1300
Charleston, WV 25301

October 14, 2025

AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. David A. Berry, Chief Executive Officer
3001 Cityview Drive
Morgantown, WV 26501

Subject: Letter of Support – CSEA Application for The Forge Project

Dear Mr. Berry:

Worley is pleased to express its support for AmeriCarbon Forge, LLC's application to the North Dakota Clean Sustainable Energy Authority (CSEA) for funding of The Forge Project—a first-of-its-kind commercial manufacturing facility for Eco-Pitch™, AmeriCarbon's patented coal tar pitch derived from North Dakota lignite coal. The Forge Project represents a critical step toward the domestic production of advanced carbon materials that support industrial, infrastructure, and defense applications across the United States.

As Worley continues to provide engineering and design services for the Forge Project, we remain confident in AmeriCarbon's progress toward commercial scale production. Upon completion of the FEL-3 engineering design package, Worley anticipates the opportunity to submit a proposal to AmeriCarbon for Detailed Engineering Design services and potential participation in later project phases as an EPC contractor or EPC-M provider, subject to mutual agreement and commercial terms. While these discussions remain preliminary, Worley looks forward to continuing its close technical collaboration with AmeriCarbon through future phases of project execution.

Worley is proud to support AmeriCarbon's commitment to innovation and to North Dakota's leadership in developing value-added energy products from lignite coal resources. We believe that The Forge Project, located near the Falkirk Mine in McLean County, represents an important milestone in advancing domestic carbon manufacturing and expanding the state's role in sustainable industrial development.

Respectfully,

DocuSigned by:

E7C08C9BF0F44A3
Daniel L. Noel, P.E.
Project Manager
Worley Group, Inc.



Mr. Greg Henthorn
Chief Business Officer
AmeriCarbon Forge, LLC
c/o AmeriCarbon Enterprises, LLC
3001 Cityview Drive
Morgantown, WV 26501

14 Oct 2025

Dear Mr. Henthorn:

It is my pleasure to provide this letter of support for AmeriCarbon and its proposal to the North Dakota Clean Sustainable Energy Authority (CSEA) for The Forge Project, which will establish a first-of-its-kind commercial-scale manufacturing facility for Eco-Pitch™. This project is directly aligned with critical Department of Defense (DoD) and defense-industrial base objectives to secure a domestic supply of high-performance carbon materials essential to the nation's infrastructure, energy, and defense sectors.

As a retired U.S. Air Force Colonel and former Program Director and System Program Manager for the \$66 billion F-22 Raptor stealth fighter program, I spent much of my career ensuring that America's most advanced air-dominance weapon system maintained technological superiority through secure and resilient supply chains. At Wright-Patterson Air Force Base, I led a 2,200-person government-industry enterprise responsible for every aspect of the program's lifecycle — including management, technology development, programming, planning and budgeting, contracting, risk management, airworthiness, and 24/7 customer support and sustainment of the entire operational F-22 fleet. That experience gave me firsthand insight into the critical importance of secure defense supply chains — and why projects like this one, which return essential materials manufacturing to U.S. soil, are vital to our national security.

Through the firm I founded, Vertex Partners, I have collaborated with AmeriCarbon for several years, helping the company connect with defense contractors, DoD officials, and technology transition offices. During that time, I have seen AmeriCarbon secure initial DoD funding and receive letters of interest and support from defense contractors, all validating a serious and well-documented need for a secure domestic source of coal-tar-pitch and related advanced carbon products. AmeriCarbon is now actively engaged with potential customers in materials validation programs—an essential step toward full qualification and adoption in mission-critical systems.



I fully support AmeriCarbon's efforts to advance The Forge Project, which will not only expand domestic carbon manufacturing but also create an anchor platform for integration with rare-earth-element recovery operations being developed by its affiliate, Ore Spring Materials, LLC—further strengthening the national materials supply chain.

I am confident that AmeriCarbon has the leadership, technology, and partnerships required to deliver on this vision and to provide tangible benefits to U.S. defense readiness and industrial resilience.

Respectfully,

A handwritten signature in blue ink, appearing to read "Sean M. Frisbee".

Sean M. Frisbee, Colonel, USAF (ret)
President
sean.frisbee@vertxpartners.org
304-276-8999

October 10, 2025

Gregory Henthorn

Chief Business Officer

Ore Spring Materials, LLC, c/o AmeriCarbon Enterprises, LLC

Re: Letter of Commitment in Support of the Proposal Entitled “The Forge Project: Rare Earths and Critical Materials Integration” submitted to the North Dakota Industrial Commission’s Clean Sustainable Energy Authority

Dear Mr. Henthorn:

The University of North Dakota College of Engineering & Mines (UND-CEM) is pleased to express its intent to collaborate with Ore Spring Materials and AmeriCarbon on the above-referenced proposal submitted to the North Dakota Industrial Commission’s Clean Sustainable Energy Authority (CSEA). This letter conveys UND’s commitment to participate in the project as a subrecipient, contingent upon successful award and final negotiation of terms and budget.

UND’s ongoing lignite-based rare earth element (REE) and critical mineral recovery program has established a strong foundation for producing upgraded lignite carbon ores (LCOs) and associated byproducts such as humins and humic acids. These materials present a unique opportunity to create high-value carbon products that complement AmeriCarbon’s Eco-Pitch™ liquefaction process. This collaboration will allow both organizations to accelerate commercialization of value-added carbon materials while supporting North Dakota’s goals for clean and sustainable energy development.

UND’s Proposed Scope of Work

UND anticipates contributing to the project under three broad, integrated work areas:

1. Feedstock Evaluation

UND will evaluate and supply upgraded lignite from REE processing and humins from humic acid extraction for AmeriCarbon’s liquefaction testing. Through iterative evaluation with AmeriCarbon, UND’s bench- and pilot-scale work will include refining physical and chemical beneficiation methods to produce low-ash feedstocks and characterizing their suitability for high-quality pitch production. This effort will assess how the removal of organically associated inorganics influences liquefaction performance and pitch quality.

2. R&D on Premium, High-Purity Carbon Pathways

Building on UND’s rare earth leaching and purification expertise, the team will investigate advanced demineralization and purification methods to produce ultra-high-purity carbon materials from both LCO feedstocks and liquefaction products. These studies will inform AmeriCarbon’s ability to access premium markets for battery-grade graphite and other high-value carbon applications. UND will conduct bench-scale optimization and laboratory graphitization studies, including electrochemical evaluation of resulting graphite anodes using both coin and 18650-type cells.

3. Engineering and Techno-Economic Integration

UND will collaborate with AmeriCarbon and their engineering contractor on process integration and economic modeling for potential co-location of rare earth extraction and Eco-Pitch™ facilities. This work will leverage the engineering and costing frameworks developed under UND’s prior DOE- and NDIC-supported front-end engineering design (FEED) studies, adapted to evaluate the combined technical and economic potential of an integrated REE recovery, pitch production, and synthetic graphite manufacturing system.

An indicative total budget of approximately **\$800,000 over a 24-month period** is anticipated for UND's participation, subject to adjustment and negotiation upon award.

Project Benefits and Impact

The proposed collaboration will directly strengthen North Dakota's leadership in lignite innovation and critical minerals recovery by:

- Expanding the value proposition of UND's rare earth extraction platform through high-value carbon co-products;
- Enhancing AmeriCarbon's liquefaction process with feedstocks uniquely derived from lignite and humic materials, potentially improving operability, carbon yield and purity; and
- Demonstrating a pathway to integrated, high-purity carbon and critical mineral production that supports clean energy technologies and domestic supply chain resilience.

UND-CEM strongly supports this initiative and looks forward to working closely with the Ore Spring Materials team to advance these objectives. Please do not hesitate to contact me should additional information be required.

Sincerely,

DocuSigned by:

B19AB8472D964A9...
Ryan Adams, Ph.D.
Dean
College of Engineering & Mines
University of North Dakota
ryan.s.adams@und.edu

DocuSigned by:

9CFF8579D0B9464...
Daniel Laudal, Ph.D.
Executive Director
College of Engineering & Mines Research Institute
University of North Dakota
daniel.laudal@und.edu

October 14, 2025

Ore Spring Materials, LLC
c/o AmeriCarbon Enterprises, LLC
Attn: Mr. Greg Henthorn, Chief Business Officer
3001 Cityview Drive
Morgantown, WV 26501

Dear Mr. Henthorn:

Microbeam Technologies, Inc. ("Microbeam") is pleased to express its intent to collaborate with Ore Spring Materials, LLC and AmeriCarbon Enterprises, LLC on The Forge Project: Rare Earths and Critical Materials Integration proposal being submitted to the North Dakota Industrial Commission's Clean Sustainable Energy Authority (CSEA). This letter conveys Microbeam's commitment to participate as a subrecipient, contingent upon successful award and final negotiation of terms and budget

Microbeam's proposed role in the project is to conduct applied research, testing, and analysis on concentrated ash and residue streams derived from AmeriCarbon's Eco-Pitch™ process, which converts lignite and related feedstocks into engineered carbon materials. The scope of work will include processing and characterization of rare earth elements (REE) and selected critical minerals (CM) (such as germanium, gallium and antimony)-contained in byproducts from pilot-scale production runs designed to simulate operations at the future Forge Project site.

Microbeam will apply its analytical, mineralogical, and chemical separation (pyrometallurgical and hydrometallurgical processing) expertise to determine REE-CM concentration, distribution, and recovery potential. Activities will include bench-scale testing, process simulation, and refinement of separation and upgrading methods to support development of an integrated REE-CM recovery system alongside AmeriCarbon's Eco-Pitch™ manufacturing operations.

An indicative total budget of \$300,000 over a 24-month period is anticipated for Microbeam's participation, subject to adjustment and negotiation upon award. Microbeam is proud to support this collaborative effort, which aligns closely with our company's mission to advance practical, market-driven solutions for the valorization of North Dakota's lignite resources. The integration of REE-CM recovery with value-added carbon manufacturing represents a transformative step toward creating new industries, expanding domestic critical materials supply chains, and diversifying the state's energy economy.

As part of the engagement, Microbeam anticipates contributing \$15,000 in cost share toward the project. This contribution may include a combination of cash and in-kind support such as personnel time, laboratory resources, and analytical services. The final structure of this contribution will be confirmed during project contract negotiations and is contingent upon award of funding and mutually agreed terms among the project participants.

We look forward to contributing our expertise and to continuing our productive partnership with Ore Spring Materials, AmeriCarbon, and the University of North Dakota.

Sincerely,



Dr. Steven Benson, President
Microbeam Technologies, Inc.

Shipping:
4200 James Ray Drive, Ste. 193
Grand Forks, ND 58202-6090

Mailing:
PO Box 5
Victoria, MN 55386-0005

Phone: 701-757-6200
Fax: 701-738-4899
info@microbeam.com



October 14, 2025

Mr. Greg Henthorn
Chief Business Officer
AmeriCarbon Forge, LLC
3001 Cityview Drive
Morgantown, WV 26501

Dear Mr. Henthorn:

I am writing in support of your application to the North Dakota Clean Sustainable Energy Authority (CSEA) for **The Forge Project**, which proposes the construction of a commercial-scale manufacturing facility for Eco-Pitch™. The Forge Project represents a major step forward in establishing domestic manufacturing capacity for advanced carbon materials that will serve critical roles in industrial, infrastructure, and defense applications.

The Dickinson Group is a family-office private-equity investment firm based in Charleston, West Virginia. The Dickinson family has been part of the Kanawha Valley community for more than 200 years. We maintain substantial holdings in natural resources, real estate, and energy, and we draw upon our multi-generational experience and values to help capitalize and grow innovative and sustainable businesses that impact strategic domestic supply chains.

We share North Dakota's vision to create value-added industries that utilize lignite coal for high-technology applications. AmeriCarbon's Eco-Pitch™ process exemplifies this opportunity—transforming a regional natural resource into a high-value engineered carbon material through an innovative and environmentally responsible process. We also recognize the longer-term opportunity to integrate rare-earth-element (REE) recovery from by-product ash at the Forge facility, in coordination with AmeriCarbon's affiliate, Ore Spring Materials, LLC. This complementary effort could further strengthen the project's impact on U.S. supply-chain security and resource recovery.

The Dickinson Group believes we can support this project in a number of ways, including potential capital investment in AmeriCarbon Forge, LLC to support your cost-share commitment. Any capital investment will, of course, be subject to customary due diligence and approval by our investment board. As you know, our family of companies and partners have already demonstrated our commitment to AmeriCarbon's success, having made a seven-figure investment in AmeriCarbon and its affiliates to date.

We are encouraged by AmeriCarbon's progress and confident that The Forge Project in North Dakota will help establish a strong foundation for domestic critical materials production. We look forward to continuing our relationship with AmeriCarbon as you advance this transformative project.

Sincerely,



Steve Platz
President & CEO

DICKINSON FUEL COMPANY, INC.

170 Summers Street, Suite 300, Charleston, West Virginia 25301

DICKINSON GROUP

NORTHERN PLAINS NITROGEN

Clean Sustainable Energy Authority Application

10/15/25

APPLICATION

APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

| | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Application |
| <input checked="" type="checkbox"/> | Transmittal Letter |
| <input checked="" type="checkbox"/> | Tax Liability Statement |
| <input checked="" type="checkbox"/> | Letters of Support (attached) |
| <input type="checkbox"/> | Confidentiality Request (not required) |
| <input checked="" type="checkbox"/> | Business Plan (Appendix) |
| <input type="checkbox"/> | Historical Financial Statements (3 years) (NPN Inc. newly formed – no initial financial statements available) |
| <input checked="" type="checkbox"/> | Budgeted Projections (Appendix) |
| <input type="checkbox"/> | Loan/Loan Guarantee Application (not applicable) |
| <input type="checkbox"/> | Other Appendices (If Applicable) |

When the package is completed, send an electronic version to ndicgrants@nd.gov

For more information on the application process please visit:

<https://www.ndic.nd.gov/grant-programs/csea/clean-sustainable-energy-authority-applicant-information>

Questions can be addressed to the Industrial Commission at 701-328-3722.

Clean Sustainable Energy Authority
North Dakota Industrial Commission

Application

Project Title: Northern Plains Nitrogen

Applicant: Northern Plains Nitrogen, Inc.

Date of Application: October 15, 2025

Amount of Request

Grant: \$20,000,000

Loan:

Total Amount of Proposed Project:

\$2,200,000,000

Duration of Project: Three years construction,
indefinite operation thereafter

Point of Contact (POC): Craig Siiro

POC Telephone: 612-669-7703

POC Email: craig.siiro@npn.ag

POC Address: Northern Plains Nitrogen, Inc.
4200 James Drive, Grand Forks, ND 58203

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|--|------------|
| Abstract | 4 |
| Project Description | 5 |
| Standards of Success | 10 |
| Background/Qualifications | 11 |
| Management | 12 |
| Timetable | 13 |
| Budget | 14 |
| Confidential Information | 15 |
| Patents/Rights to Technical Data | 15 |
| State Programs and Incentives | 15 |
| Loan/Loan Guarantee Application (if applicable) | n/a |

ABSTRACT

Objective:

Northern Plains Nitrogen, Inc. (“NPN” or the “Company”) was formed in June 2025 by NPN, LLP to develop, construct, commission and operate a world scale nitrogen-based fertilizer plant. Located just west of Grand Forks, North Dakota, the NPN plant will serve all farmers in the Upper Midwest and the entire Northern Plains of the USA and portions of Canada. The project originated in 2012 when local farm associations, cooperatives and individual farmers, frustrated by supply delays during the crucial planting season, formed parent company NPN, LLP to develop a reliable, stable nitrogen-based fertilizer source.

Expected Results:

The plant will produce up to 1.1 million short tons of granulated urea per year as well as 65,000 short tons of anhydrous ammonia per year. The plant can also produce up to 100,000 short tons of urea liquor for Diesel Exhaust Fluid (“DEF”). Any DEF produced reduces the granular urea produced in matching tons. DEF urea can be upgraded to commercial grade DEF onsite, meaning 32.5% urea plus water (300,000 STPY of DEF) or to a more affordable transport ton of 50% urea plus water (200,000 STPY of DEF) depending on customer and markets.

The project is expected to generate an unlevered IRR of 14.6%, and based on a 60% debt/equity ratio, a levered IRR of 18.0%

Duration:

NPN expects to complete the next steps of Front End Engineering Design (“FEED”) with the current equity raise. Following closely behind the updated FEED study, the project would update the air environmental permit to reflect the reduction in impacts from the previous air permit, then commence the project equity and debt raise, a much larger transaction that will lead to construction of the fertilizer plant. In conjunction with the project financing, the project would be prepared to bring the project to Final Investment Decision (“FID”) by the fourth quarter of 2026. The next step would be the beginning of Detail Engineering and commitment to the long lead-time major equipment items required for construction to commence. Construction is expected to begin in 2027 after sufficient detail engineering is completed, allowing for civil works (grading, roads, drains, piling, etc). Construction would continue through 2029 with commissioning to begin in the first half of 2030. First natural gas feed will be required perhaps as early as late 2029, but definitely within the first half of 2030, to commence insulation and equipment dry-out, as well as for steam generation with an auxiliary boiler to clean high-pressure steam piping systems that feed the steam turbines.

Total Project Cost:

Estimated project cost is \$2.2 billion USD.

Participants and stakeholders (not ranked in any order):

Direct participants in the Project include:

- Members (Investors) in Northern Plains Nitrogen LLP, which include roughly 175 farmer and cooperative investors largely domiciled within the State of North Dakota
- Private sector equity investors in Northern Plains Nitrogen, Inc., currently a direct and wholly-owned subsidiary of Northern Plains Nitrogen LLP.

- Technology companies (KBR, Stamicarbon, others to be determined) for ammonia, urea, granulation and process software.
- The City of Grand Forks, ND, pursuant to a Development Agreement currently under negotiation.
- Offtake partners for granulated urea, diesel exhaust fluid (DEF), and ammonia, pursuant to agreements currently in negotiation
- Nodak Electric Cooperative
- Natural gas procurement is currently in negotiation, for ultimate delivery via the Viking pipeline network. NPN is seeking local (Bakken) natural gas, and will prioritize an in-state source of natural gas if and when available.

Additional stakeholders and beneficiaries of the Northern Plains Nitrogen Project

- The farmers of North Dakota.
- Major Farming Cooperatives.
- Various Agricultural Growing Associations (Corn Growers, Wheat, Soybean, etc.)
- Trucking companies in the Region.
- Local construction companies in the Region.
- Local engineering design firms in the Region.
- One or more of the Top 10 Engineering Design Firms in the USA.
- Major equipment suppliers from around the world.
- Commodity items supplied from local and international suppliers (pipe, valves, motor control centers, electrical cables & conduit, fabricated steel, piles, fencing, concrete).

PROJECT DESCRIPTION

Objectives:

NPN, LLP (parent company of Northern Plains Nitrogen, Inc.) was formed in 2012 by over 175 partners composed mainly of cooperatives and independent farmers located throughout the Northern Plains region with their main objective to establish a reliable, local source of nitrogen fertilizer to overcome past and existing problems with supply of this vital agricultural nutrient, and to improve the region's productivity with an emphasis on food (and national) security. Over the last 13 years, NPN, LLP has invested approximately \$27 million USD on engineering studies, environmental permitting, land purchases, market analyses, and other front end project development activities. In June 2025, NPN, LLP formed NPN, Inc. (the Company) to manage the development, construction, commission and operate the Northern Plains Nitrogen fertilizer plant.

As of June 2025, NPN, LLP owns the project site, holds essentially all currently obtainable environmental permits (the air permit requires an update and renewal process), and has completed an initial FEL3-quality Front-End Engineering Design (FEED) study which includes a Class 3 detailed estimate. Discussions are under way with several potential suppliers to secure a reliable source of low-cost natural gas. This also includes discussions with natural gas pipeline operators who are positioned to affordably deliver the natural gas feedstock to the site from regional sources, potentially including the Bakken. Offtake dialogues are in place with several reputable bankable customers representing more than 100% of planned facility output.

The plant is expected to produce 1 million tons of granulated urea; 100,000 tons of diesel exhaust fluid (100% urea basis, or 300,000 STPY on standard DEF formulas); and 65,000 tons of anhydrous ammonia (82-0-0).

Methodology:

The ammonia plant will be utilizing technology known as a *KBR Purifier*. Since 1943, KBR (NYSE: KBR, market cap \$6.3B) has licensed, engineered and constructed more than 250 ammonia plants worldwide, capturing approximately 50% of the market share of licensed capacity. KBR Purifier™ is the most recent iteration of their ammonia process technology, has a safe proven reliable process with the best efficiency available in the ammonia technology field worldwide.

Urea will be produced using Stamicarbon technology. Similarly, Stamicarbon holds a dominant share of global urea capacity. There are approximately 260 urea plants worldwide using the Stamicarbon process, representing more than half of all installed capacity worldwide. Stamicarbon is a unit of NextChem, which is majority-owned by Maire S.p.a. (MIL: MAIRE, market cap \$4.2B).

The management of NPN believes that there is no technology risk inherent in its project development plans, and all aspects of engineering and construction will benefit from the risk mitigation through the “reps and warranties” of its construction and engineering contractors.

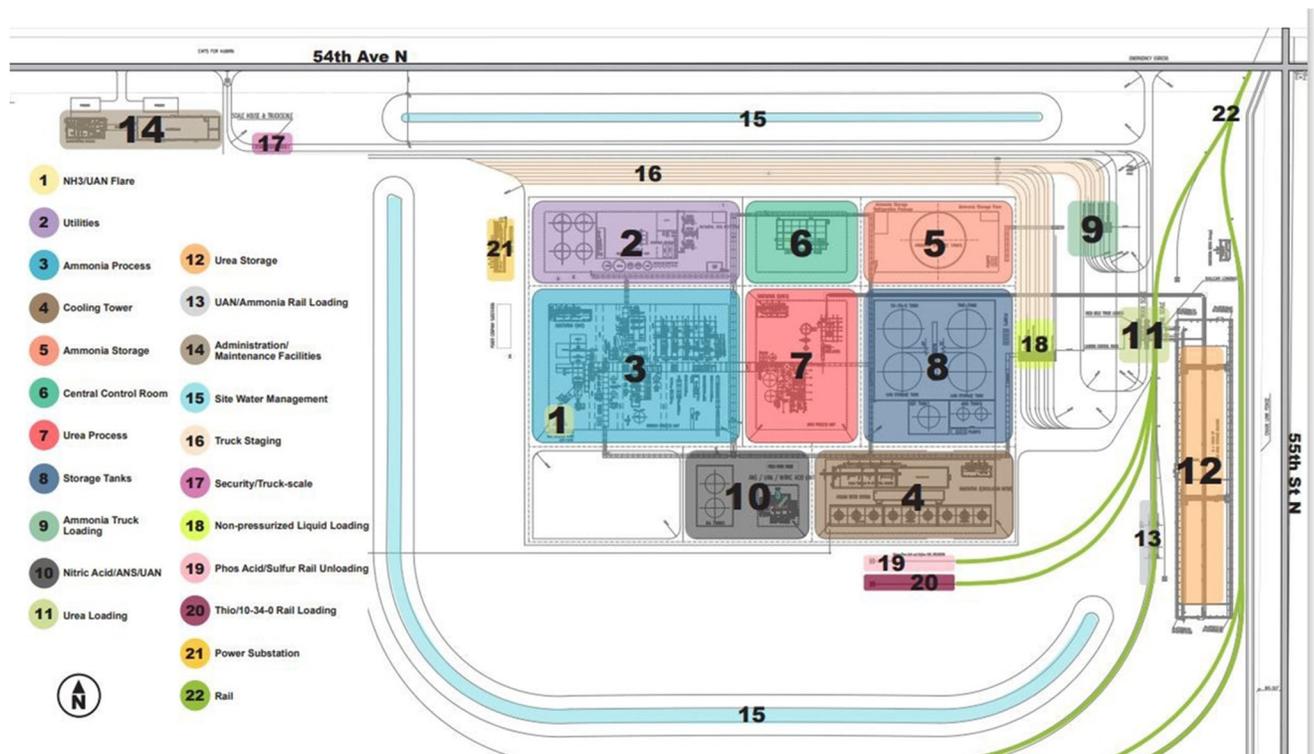
Anticipated Results:

The following sets forth key operating and financial metrics associated with the NPN fertilizer project:

- NPV of \$597 million USD is significantly positive (basis offtake at 90% of market, 10yr contract, and gran urea priced at \$472/ST EXW which is approximately \$90/ST below 2025 delivered costs as experienced by NPN partners)
- Unlevered IRR is projected at 14.6%
- The projected levered IRR of 18.0% is based on a ratio of 60% debt / 40% equity
- Baseline (2026) natural gas price delivered to site of \$3.50 / MMBtu was used for financial modeling and is above the current estimated delivered price of Western Canadian gas (\$2.16 / MMBtu) or North Dakota Bakken natural gas.

Facilities:

The initial plant design (below) was based on the initial FEED study undertaken in 2014. This layout includes areas for future products and expansion. It also includes both truck and rail loading systems, storage for both anhydrous ammonia and granular urea.



Resources:

Natural gas from ND Bakken or Western Canadian sources.

Electrical power from local utility company, Nodak, using RECs credits.

Labor and construction materials for the plant will be sourced from local or regional entities as much as possible. This would include concrete, piles, fencing, buildings, rail, roads, site clearing and drainage, security, housing, transportation/hauling, plant operations & maintenance (excludes large rotating equipment and catalyst work), food, company administration (HR, Procurement, Legal, etc.). Water from City of Grand Forks wastewater treatment plant, in accordance with a Development Agreement under negotiation with the City.

Out-of-state resources will include technology providers. It is also anticipated that the project will require out-of-state detail engineering designers for some key process areas of the plant. Labor will need to be supplemented for construction via building trades or open shop as determined by availability of contractors for each trade in the region (concrete including finishers, carpenters, scaffolding builders, ironworkers, electricians, instrument techs, pipefitters, millwrights, insulators, painters, etc.).

Techniques to Be Used, Their Availability and Capability:

- Project main technologies for ammonia, urea, and urea granulation – provided by an Engineering/Procurement company – expected to be KBR (Houston-based) and Stamicarbon (Netherlands).
- Detail engineering designs provided by our main EPCM company with components assigned locally.

- Supply of Major Capital Equipment (Pressure Vessels, Heat Exchangers, Pumps, Compressors, Reformer, ammonia storage tank, cooling tower, water treating units, Motor Control Centers, Switchgear, Main Electrical Transformers, Digital Control Centers) – from outside the region (Requires international procurement activities).
- Site clearing and grading – available locally
- Site roads, fencing, drain systems, painting, insulation, and concrete placement (rebar and finishing) – available locally and regionally.
- Site piling – available regionally.
- Labor for piping, structural steel, instrumentation, electrical (high voltage and low voltage), millwrights (rotating equipment), operating engineers (crane operators), vessel interiors – some regionally available, supplemented from outside the region. Materials for same – sources locally and supplemented from outside the region.
- Millwrights for Major Rotating Equipment (Synthesis Gas and Air Compression) – specialty from outside the region (traditionally provided by the Original Equipment Manufacturer, OEM).
- Catalyst placement – specialty from outside the region (traditionally provided by catalyst suppliers).
- Heavy Haul for large and/or extra heavy equipment – specialty from outside the region
- Heavy Lift contractors – specialty requiring support from outside the region
- Rail, buildings (excluding process and compressor building) systems – available regionally

Environmental and Economic Impacts while Project is Underway:

Site development will expose open ground subject to potential runoff and high turbidity in regional drains and waterways, thus will require close adherence to standard “best practice” construction techniques to avoid soil erosion.

Plain debris and wastes from construction will need to be properly land-filled or otherwise disposed of properly.

Construction roads for ingress and egress will require dust control during dry weather periods and water management to prevent soil erosion during wet periods.

Due to high labor headcount on site during construction, it is anticipated to transport some labor by bus from staging/parking areas and/or living areas.

Housing will be required. Intentions are to allow the city of Grand Forks to receive the maximum benefit for the influx of labor (housing and meals) and create a managed camp to meet the needs for the balance of the labor.

It is anticipated based on historically similar projects in similar regions of North America that the total labor force estimated to be approximately 3000 individuals will impact another 4x in terms of people. In similar fashion the economic impact during construction will make a 7x impact dollar-for-dollar. Based on the current total costs of the project at \$2.2Bn USD, it is anticipated that regionally the project will have direct spending of between \$200mm and \$400mm USD depending on availability of housing, food services, building materials, supplies, and construction labor.

Carbon savings related to transportation avoidance >20,000 TPY avoided CO2 emissions

Ultimate Technological and Economic Impacts:

Technologies proposed to be implemented for the Northern Plains Nitrogen project are not new, and are proven in multiple locations worldwide. To remove risks to the plant, investors, the environment and people, NPN has selected the most reliable, safe, efficient, and proven technologies in both ammonia (KBR Purifier) and granular urea (Stamicarbon) production.

The plant will be controlled by the most modern and available distributive control system (computer) and will have back up (redundant) shutdown programs via Programmable Logic Controllers and software. The plant will also monitor all effluents for environmental compliance and reporting, including water in and out (amounts and quality), air out (amounts and quality), and solid waste management.

The project has provided for, and intends to store, up to 30,000 short tons of anhydrous ammonia on site in an ultra-secure storage facility, specifically it will use API 620, Appendix R design with a DOUBLE WALL, using Sketch 5.7 of API for general configuration and which will also be placed inside an earth berm for additional security.

During construction, the project will use secondary safety auditing techniques to ensure compliance with such safety rules as Fall Protection, Confined Space Entry, High Voltage (Arc Flash Protection), hot work permits once natural gas has been introduced. Extensive operator training with SIMULATORS. The entire work force and administration staff will be required to comply with a Drug and Alcohol policy which will require pre-screening and random testing.

At no point will the project produce or own ammonium nitrate, a hazardous fertilizer chemical that is not generally in high demand by farmers in the region.

Using project-provided housing, we will seek to maximize the use of local labor and contractors the project, which will have a positive financial impact on the region in particular, the City of Grand Forks, and the State of North Dakota.

Regionally, the site production and location should reduce overall traffic on rail and/or truck for movement of granular urea into the region. This has both a safety and environmental benefit to the area.

Why the Project is Needed:

Currently, granular urea, used by Northern Plains region farmers as the preferred nitrogen fertilizer, is produced in, or sourced from, three areas within the USA: NOLA/Gulf Coast, the southern Great Plains, portions of the corn belt, and a small plant operated by DGC in North Dakota. As the USA is deficient in their overall nitrogen production to meet Agriculture and Industrial consumers, suppliers (producers and traders) also import into the USA several million tons annually from Canada, and occasionally in recent years, from Trinidad, the Middle East and Mexico. As the Northern Plains are the farthest buyer from production sources or import points, the entire region becomes the least served, and highest priced, due to transportation and supply chain logistics. This is further complicated with global disruptions in production and supply such as that which exists in Central Eastern Europe and the Middle East. To obtain these fertilizer resources, the northern plains farmers are burdened not only with logistics issues

but with struggles to guarantee physical delivery of fertilizer products. In fact, some farmers have prepaid for their fertilizer only to find out that due to any number of logistics issues, product would not be delivered. This project's mission and purpose is to ensure the farmers in the northern plains receive at least one million tons or approximately one-third of their needs met, for this essential nitrogen nutrient. As mentioned, this is a critical element of national security as it relates to food and nutrition nationwide.

STANDARDS OF SUCCESS

The standards by which the success of the project is to be measured. This may include:

- *Emissions reduction – see calculation for carbon emissions avoidance.*
- *Reduced environmental impacts.*
- *Increased energy sustainability.*
- *Value to North Dakota.*
- *Explanation of how the public and private sector will make use of the project's results, and when and in what way.*
- *The potential commercialization of the project's results.*
- *How the project will enhance the research, development and technologies that reduce environmental impacts and increase sustainability of energy production and delivery of North Dakota's energy resources.*
- *How it will preserve existing jobs and create new ones.*
- *How it will otherwise satisfy the purposes established in the mission of the Program.*

The Northern Plains Nitrogen project will create approximately 3,000 construction jobs in the region of Grand Forks for as long as three years. In addition, as part of this the project will employ local labor, designers, housing, food services & suppliers, gas and fuels, commercial drivers, legal, and construction contractors. The regional number used is a significant part of both the onsite headcount and offsite impact, and the final number will be determined through personnel and contractor qualifications and selection process. While likely an understated figure, it could be assumed that at least 10-15% of the total labor needs will be sourced locally.

The plant site will create a total of 118 new permanent jobs: 25 high income administrative roles, 85 in operations, and 8 as daily contractors. There will be no reduction of local jobs because of this project.

Value to North Dakota comes from several aspects. First, there will be a direct positive impact on the city of Grand Forks and the broader region in terms of employment and spending on materials and supplies. There will a positive tax impact due to the addition of the project to the property tax base, as well as multiplier effect benefits to the local economy. The value to the state by the use of stranded natural gas will be substantial, impacting both its royalty revenue from oil income as well, as the associated production of natural gas. This project would also support the construction of a major pipeline from the Bakken to eastern North Dakota, which can supply cities in the east such as Fargo and Grand Forks but can also feed into other natural gas pipeline systems east of the Red River in Minnesota.

Local production of granular urea means that farmers can source fertilizer from a nearby facility instead of transporting it from Oklahoma, NOLA/Gulf Coast, or Alberta, reducing the environmental footprint and

improving safety on regional highways by decreasing the distance traveled by large tractor-trailers and rail.

The project's mission to provide a RELIABLE supply of nitrogen nutrients to the regional farming community is an enormous improvement over the current situation, in which local farmers are sometimes unable to gain timely access to fertilizer during the crucial planting season, with a predictable effect on crop yields. The NPN project will enhance fertilizer availability, and contribute significantly to farmer economics as well as food production volumes.

CO2 Emissions Benefit for the State of North Dakota

The Northern Plains Nitrogen project will improve the carbon footprint of the North Dakota fertilizer sector by sharply reducing the extent to which distribution of urea relies on transportation by truck, rail, and occasionally maritime vessels over long distances. For purposes of this emissions benefit calculation, we have assumed the following:

- Rail imports considered, assuming only a one-way loaded trip from Belle Plain SK and Carseland Alberta to Grand Forks ND.
- Assumed 50% of 1,100,000 tons/year from each location.
- Assumed 65,000 tons/year of ammonia from Medicine Hat Alberta. CF Industries currently ships 65,000 tons/year into the two tanks adjacent to the NPN site.
- The NPN plant will be as efficient as any urea plant in the world based on KBR Purifier ammonia production and the Stamicarbon Ultra Low Energy urea plant design.
- Stamicarbon made the statement today that NPN plant will be the most efficient urea plant in the USA.
- **Total CO₂ emission reduction with NPN plant is 20,387.50 tons/year**

BACKGROUND/QUALIFICATIONS

*Please provide a summary of prior work related to the project conducted by the applicant and other participants as well as by other organizations. **This should also include summary of the experience and qualifications pertinent to the project of the applicant, key personnel, and other participants in the project.***

Key personnel have significant experience in the construction and management of nitrogen-based fertilizer plants and farming, including:

Clark Bailey, CEO

- Head of Division responsible for capital projects, operations and oversight of 7,500-person of a mining business for phosphate and potassium nutrients as well as iron and zirconium. Four mines with projects valued in excess of \$12Bn USD.
- Designed, built, commissioned and operated numerous nitrogen and phosphate plants, natural gas separation plants, mines, and other process plants. Managed six potash mine expansions and new facilities in Canada valued at approximately \$10Bn USD.
- Work experience: EuroChem, Potash Corp., Fish Engineering & Construction Inc.
- BS Mechanical Engineering, U. Texas

Larry Mackie, COO:

- Over fifty years' experience in nitrogen plant development, construction, maintenance, and management
- Expertise in nitrogen process efficiency and product quality
- Work experience: J R Simplot, Mackie International
- BS Mechanical Engineering, U. Manitoba

Darin Anderson, President

- President, owner and general manager overseeing budgeting, marketing, production, and human resources at 4,500-acre farm
- 25 years of experience in farming and agriculture
- Work experience: D & J Anderson Farms
- BS Agricultural Economics, North Dakota State U.

Ken Charpentier, VP Site Management

- Founded, led and successfully exited a pipeline and facilities construction company that grew to over \$250 million in annual revenue and over 1,000 employees
- Over four decades of experience in construction services and management
- Detroit Lakes Vocational Tech School, welding degree

Larry Parnell, VP Natural Gas Supply

- Extensive oil & gas industry experience, including reserves development, drilling and completion, asset acquisition and offtake and delivery
- Work experience: Amerada Hess, ARCO, BP
- BS Petroleum Engineer, Texas A&M

MANAGEMENT

*A description of **how** the applicant will manage and oversee the project to ensure it is being carried out on schedule and in a manner that best ensures its objectives will be met, **and a description of the evaluation points to be used** during the course of the project.*

NPN management plans to oversee this project with its own individually selected highly qualified and experienced Project Management Staff which will work with the selected world class EPCM contractor and their team. NPN's team will be composed of a Project Manager and a Technical Manager who will be required to work directly with the EPCM's home office, where key decisions will be made, details in design are being worked out. The Project Manager will be supported by a construction team as described further below and a technical team composed of a Senior Process Engineer and a Senior Mechanical Engineer, plus experienced engineers either directly hired or brought on board by contract for electrical high voltage and low voltage systems and instrumentation, including the plant's various control systems.

The NPN team will further be composed of a Construction Manager who will work with the NPN Project Team and the EPCM contractor to determine scope breaks, timing or sequences, possible contractors for the various assignment, grading of contractor's bids, involvement with contractor terms & conditions as well as scope

Other members of the site team will include Materials Control, Inspection & Testing (both of received materials and for onsite work), Safety & Safety Training, Schedule Management, Contract Controls. Contract or “Project Controls” has the responsibility to track, audit, and confirm progress then measure and gauge quantities (yards, feet, tons, and hours) against a baseline to determine actual progress vs ‘claimed’ progress and update the schedule to be kept in a software system such as Primavera P3 or equivalent. Agreed progress by contract and by contractor will be reported to the Project’s Comptroller and signed off by the Project Manager for monthly progress payments. Ultimate progress will be tracked against an original baseline with actual progress as determined by quantities (yards of concrete, number of piles, tons of steel, feet of pipe, etc.) and/or accomplishments (used for such as testing systems) including during design phases against drawings or packages by discipline.

TIMETABLE

Please provide a project schedule setting forth the starting and completion dates, dates for completing major project tasks/activities, and proposed dates upon which the interim reports will be submitted.

The expected timetable is as follows:

3rd Quarter 2025

- Select engineering firm to complete front-end engineering design (FEED) study

2nd Half 2025

- Series A financing
- Non-binding fertilizer offtake MOUs
- Non-binding natural gas supply MOUs

4th Quarter 2025

- Initiate development agreement process with the City of Grand Forks
- Onboard full management team

2nd Quarter 2026

- Produce FEL3-quality FEED study
- Engage EnSafe (environmental company) to update air permit based on updated FEED study

3rd Quarter 2026

- Commence project finance raise for NPN project special purpose vehicle (SPV)

4th Quarter 2026

- Final investment decision (FID)
- Project SPV capitalized
- Development fee paid to Series A investors
- Selection of EPCM contractor
- Negotiate contract

2027

- Detailed engineering in process
- Construction begins
- Long-lead time equipment ordered

2028 -2029

- Construction continues

2030

- Testing and commissioning
- Project startup
- First commercial shipments

BUDGET

Please use the table below to provide an **itemized list** of the project’s capital costs; direct operating costs, including salaries; and indirect costs; and an explanation of which of these costs will be supported by the financial assistance and in what amount. The budget should identify all other committed and prospective funding sources and the amount of funding from each source. **Please feel free to add columns and rows as needed.** Higher priority will be given to projects with a high degree of matching private industry investment.

| Project Associated Expense | NDIC Grant | NDIC Loan | Applicant’s Share (Cash) | Other Project Sponsor’s Share | Total |
|---------------------------------------|---------------------|-----------|--------------------------|-------------------------------|---------------------|
| Feed Study Update | | | | \$19,000,000 | \$19,000,000 |
| Other direct development costs | | | | \$5,700,000 | \$5,700,000 |
| Salaries, benefits and subcontractors | | | | \$3,600,000 | \$3,600,000 |
| Legal | | | | \$951,000 | \$951,000 |
| Other admin costs | | | | \$1,378,000 | \$1,378,000 |
| Development Fee | | | \$12,000,000 | | \$12,000,000 |
| Preferred Return | | | | \$2,371,000 | \$2,371,000 |
| Start-up Project Costs | \$5,000,000 | | | | \$5,000,000 |
| Long Lead Time Parts | \$15,000,000 | | | | \$15,000,000 |
| Total | \$20,000,000 | | \$12,000,000 | \$33,000,000 | \$65,000,000 |

Please use the space below to justify project expenses and discuss whether the project's objectives will be unattainable or delayed if less funding is available than requested.

CONFIDENTIAL INFORMATION

A person or entity may file a request with the Commission to have material(s) designated as confidential. By law, the request is confidential. The request for confidentiality should be strictly limited to information that meets the criteria to be identified as trade secrets or commercial, financial, or proprietary information. The Commission shall examine the request and determine whether the information meets the criteria. Until such time as the Commission meets and reviews the request for confidentiality, the portions of the application for which confidentiality is being requested shall be held, on a provisional basis, as confidential.

If the confidentiality request is denied, the Commission shall notify the requester, and the requester may ask for the return of the information and the request within 10 days of the notice. If no return is sought, the information and request are public record.

Note: Information wished to be considered as confidential should be placed in separate appendices along with the confidentiality request. The appendices must be clearly labeled as confidential. If you plan to request confidentiality for **reports** if the proposal is successful, a request must still be provided. To request confidentiality, please use the template available at <http://www.nd.gov/ndic/CSEA-app-doc-infopage.htm>.

PATENTS/RIGHTS TO TECHNICAL DATA

Any patents or rights that the applicant wishes to reserve must be identified in the application. If this does not apply to your proposal, please note that below.

For the NPN project proposed in Grand Forks, North Dakota, currently there are no NPN patents that will apply to the project. However, there are technologies owned by others for several of the key processes and for some of the major components. Furthermore, NPN has in place Non-Disclosure Agreements with KBR for their Purifier Technology and with Stamicarbon for their Urea process and Granulation Unit. Other processes that may be chosen may also apply by the FID stage which could include catalyst, reforming section, CO₂ removal, distributive control systems, catalyst, molecular sieve and/or absorption units, cold box, cooling tower fill, flare tip, construction techniques for items such as installation of roof for the atmospheric cold ammonia storage tank, certain control valves and measurement instruments/analyzers, and two key rotating equipment pieces (synthesis gas compressor and axial flow air compressor plus their respective steam turbine drivers).

STATE PROGRAMS AND INCENTIVES

Any programs or incentives from the State that the applicant has participated in within the last five years should be listed below, along with the timeframe and value.

No participation in any previous program with the State of North Dakota.

**Revised 5/10/2023*

TRANSMITTAL LETTER



October 15, 2025

North Dakota Clean Sustainable Energy Authority
North Dakota Industrial Commission
State Capitol 14th Floor
600 E. Boulevard Ave.
Dept. 405
Bismarck, ND 58505-0840

Subject: Transmittal Letter for the Clean Sustainable Energy Authority

Dear Commissioners:

I am conveying this Letter of Transmittal to formally express interest, and to submit an application, for grant funding from the Clean Sustainable Energy Authority on behalf of Northern Plains Nitrogen, Inc., the developer of the Northern Plains Nitrogen fertilizer project and its proposed construction in Grand Forks, ND. This letter shall serve as a binding commitment that, contingent upon an award from the CSEA, we will complete the project as described in our application.

Northern Plains Nitrogen, Inc. has carefully reviewed the project development plans, projected financing needs, and all aspects of the feasibility and suitability of the project as it relates to benefiting the State of North Dakota, the generation of attractive returns for investors, and benefitting the region's agricultural industries.

By signing this letter, I am affirming that Northern Plains Nitrogen, Inc. commits to fully complying with the terms associated with the CSEA granting process. Please consider this letter as our official expression of intent and commitment to the State of North Dakota. We look forward to a positive response, and are open to provide additional information, and responses to any questions the commissioners and staff members may have.

Best regards,

A handwritten signature in black ink that reads 'Craig Siiro'.

Craig Siiro
Chief Financial Officer
Northern Plains Nitrogen, Inc.

TAX LIABILITY STATEMENT

Industrial Commission
Tax Liability Statement

Applicant:

Northern Plains Nitrogen, Inc.

Application Title:

Northern Plains Nitrogen

Program:

- Lignite Research, Development and Marketing Program
- Renewable Energy Program
- Oil & Gas Research Program
- Clean Sustainable Energy Authority

Certification:

I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.



Signature

CFO

Title

10/15/25

Date

LETTERS OF SUPPORT

July 16, 2025

Mr. Charles D. Sorkin
Managing Director
Hamilton Clark Sustainable Capital, Inc.
1701 Pennsylvania Avenue NW
Suite 200
Washington, DC 20006

Re: Northern Plains Nitrogen Fertilizer Production Facility Grand Forks, North Dakota

Dear Mr. Sorkin,

It was a pleasure meeting you in Grand Forks on April 30th. I am pleased that Northern Plains Nitrogen has engaged Hamilton Clark Sustainable Capital, Inc. to procure investment for the fertilizer production facility under development in Grand Forks. This is an exciting project that holds tremendous potential for Grand Forks, the region, and the State of North Dakota. Hamilton Clark joining the NPN development team adds significant capital development experience and success that will surely accelerate efforts to bring this project to fruition.

The Grand Forks Region Economic Development Corporation and the City of Grand Forks have supported the development of Northern Plains Nitrogen's fertilizer production facility for more than a decade. The City of Grand Forks has entered into a partnership agreement that serves as a foundation for final agreements for water supply, infrastructure development, and other key municipal services essential for the successful development of this facility. The City of Grand Forks has had this agreement in place since May of 2013, and the City Council renews its support and commitment to Northern Plains Nitrogen twice annually.

I have personally worked with members of the Northern Plains Nitrogen board of directors and other key representatives for more than a decade. They are experienced and successful leaders in agribusiness and the fertilizer production industry. Specifically, we have worked closely with Chief Executive Officer Clark Bailey and Chief Operating Officer Larry Mackie. We are confident that their collective past experiences and achievements in the industry will serve our region well and propel this project to success.

Please feel free to contact me should you have any questions.

All the Best,



Keith Lund
President & CEO

CC: Larry Mackie, COO, Northern Plains Nitrogen



North Dakota Development Fund
ND Department of Commerce
1600 E. Century Ave., Suite 6
Bismarck, ND 58503

September 1, 2023

The North Dakota Grain Growers Association supports the Northern Plains Nitrogen (NPN) Project. Our members would benefit from NPN's initiatives.

With NPN as a local source of fertilizers, we anticipate:

- Dependable Supply: A consistent, top-notch supply of fertilizer for our crops.
- Stable Prices: Reduced dependency on global markets ensures predictable fertilizer costs.
- Eco-friendly Products: Fertilizers with a smaller carbon footprint.
- Reduced Transportation Issues: Local production cuts out long-haul transport problems, ensuring timely delivery and consistent quality products.

Our organization believes this project would improve local agriculture and as a result, our regional economy would benefit. We ask the North Dakota Development Fund to invest in this project.

Thank you for your consideration.

Sincerely,

North Dakota Grain Growers
Kayla Pulvermacher
Executive Director

701-282-9361 - www.ndgga.com - 1002 Main Ave. West, West Fargo, ND 58078



September 1, 2023

To Whom It May Concern,

Re: Support for increased fertilizer production in the state

We, the North Dakota Corn Growers Association, a member-focused organization representing more than 13,000 corn growers across the state, strongly support efforts that help to address a significant problem for our growers: fertilizer supply shortage and extraordinary price spikes.

One such endeavour is the development of the Northern Plains Nitrogen (NPN) project. Corn growers of the state would greatly benefit from such a resource in North Dakota. If NPN were to begin producing fertilizer for our growers, we would have a consistent and more dependable supply for us to produce corn. We would reap the benefits from more stability in prices, quality, and a reduced dependency on global markets. There likely would be environmental benefits because state-produced fertilizer would need less transportation and would have a smaller carbon footprint.

As a forward-looking association, we are mindful of societal development and carbon goals. However, from a practical standpoint, we also see an immediate need for transitional nitrogen fertilizer production, like that which NPN proposes, along with its sequestration approach. Such a fertilizer source is preferred by many growers and there is a big demand.

We believe more fertilizer producers like NPN entering the market would improve local agriculture and our regional economy.

We ask the North Dakota Development Fund support projects like this that would help us to have access to locally produced, available, and lower-cost fertilizer,

Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Mauch", is written over a light blue horizontal line.

Andrew Mauch
President
North Dakota Corn Growers Association



WBI ENERGY TRANSMISSION, INC.
P. O. Box 5601
Bismarck, ND 58506-5601
(701) 530-1600
www.wbienergy.com

August 30, 2023

Mr. Shayden Akason
Deputy Director/Head of Investment and Innovation
North Dakota Department of Commerce
1600 E. Century Ave., Suite 6
Bismarck, ND 58503

Subject: Proposed Northern Plains Nitrogen Fertilizer Project

Dear Mr. Akason:

WBI Energy Transmission, Inc. ("WBI Energy") supports the proposal submitted by Northern Plains Nitrogen, LLP ("NPN") to secure funding from the North Dakota Development Fund Fertilizer Facility Loan Funding solicitation to construct a fertilizer production facility in North Dakota.

WBI Energy is a wholly-owned subsidiary of MDU Resources Group, Inc. (NYSE: MDU), which provides essential products and services through its regulated energy delivery and construction services businesses. WBI Energy owns and operates approximately 3,800 miles of pipelines in Minnesota, Montana, North Dakota, South Dakota and Wyoming that transport natural gas to serve homes, businesses, and industrial facilities across the region.

NPN is proposing to construct and operate a fertilizer production facility to meet the nitrogen-based fertilizer needs of the region's agricultural producers. The NPN facility will utilize a large quantity of natural gas as feedstock for the production of fertilizer. As a large user of natural gas, the NPN project could serve as a catalyst for potential new pipeline projects thereby enhancing the regional natural gas transportation landscape. Based on these and other positive attributes, WBI Energy encourages the North Dakota Development Fund to fund NPN's proposed project.

We look forward to working with NPN on this exciting opportunity. Please feel free to contact me at (701) 530-1623 or Mark.Anderson@WBIenergy.com if you would like additional information.

Sincerely,

Mark D. Anderson
Director of Marketing & Business Development
WBI Energy Transmission, Inc.

BUSINESS PLAN



Northern Plains Nitrogen

Enhancing U.S. Fertilizer Independence | Strengthening America's Food Security



**\$45 MILLION SERIES A DEVELOPMENT CAPITAL FOR A
1+ MILLION TONS PER YEAR NITROGEN FERTILIZER PLANT**

OCTOBER 2025



Executive Summary

Company Description

Northern Plains Nitrogen, Inc. (“NPN” or the “Company”) was formed in June 2025 by NPN, LLP to develop, construct, and operate a world scale nitrogen-based fertilizer plant. Located in Grand Forks, North Dakota, the NPN plant will serve Upper Midwest and Northern Plains farmers. The project originated in 2012 when local cooperatives and farmers, frustrated by supply delays during the crucial planting season, formed parent company NPN, LLP to develop a reliable, stable fertilizer source.

Experienced Management

Management has designed, developed, constructed and operated numerous world-scale multi-billion-dollar projects, such as fertilizer, petrochemical, and industrial plants, mines, and other facilities, for companies and clients such as J. R. Simplot, Potash Corp., and EuroChem.

Project Overview

The NPN plant is designed to produce for sale, per year:



**1 million
tons**

Granulated Urea



**300,000
tons**

Diesel Exhaust Fluid
(DEF)



**65,000
tons**

Ammonia

The plant will be constructed on land owned by parent company NPN, LLP at an estimated cost of:

\$2.2 billion

Executive Summary

Value Proposition

Northern Plains farmers consume roughly three million tons per year of urea.

There is no significant competitive regional production, and local nitrogen fertilizer prices are among the nation's highest.



By locating the NPN plant close to local demand, drawing on low-cost natural gas, and selling at market prices, management expects the plant to deliver superior returns.

Estimated unlevered project IRR 14.6%, levered IRR 18.0%

Proposed Financing

The Company is seeking \$45 million of Series A development equity to ready the project for financing.



Use of proceeds includes updating the FEED study, adding team members, establishing feedstock and offtake agreements, paying a development fee to NPN, LLP, and other corporate purposes.

Management is targeting an estimated 1.8x return to Series A investors in less than two years, with the potential for further long-term upside from equity participation in the fertilizer project.

Project History, Status, and Series A Deliverables

Project Origins

NPN, LLP was formed in 2012 by cooperatives and independent farmers from the Northern Plains to establish a stable, reliable, local source of nitrogen fertilizer. Over the last 13 years, NPN, LLP has invested approximately \$27 million on engineering studies, permitting, land purchases, market analyses, and other project development activities. In June 2025, NPN, LLP formed NPN, Inc. (the Company) to manage the development, construction, and operation of the Northern Plains Nitrogen fertilizer plant.

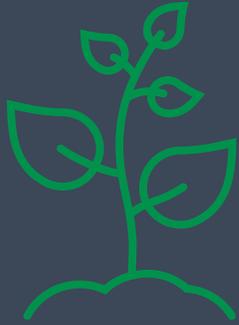
Project Development Status

As of June 2025, NPN, LLP owns the project site, holds essentially all currently obtainable permits, and has completed an initial FEL3-quality Front-End Engineering Design (FEED) study. Discussions are under way with several potential suppliers of low-cost natural gas. Offtake dialogues are in place with customers representing more than 100% of planned facility output.

As part of the Series A financing, NPN, LLP will contribute these and other assets to NPN, Inc.

Series A Deliverables

The goal of the Series A raise is to prepare for the \$2.2 billion project financing and reach Final Investment Decision (FID). Specific uses of the Series A proceeds include updating the FEED study, paying a development fee to NPN, LLP, and obtaining natural gas supply and fertilizer offtake agreements.



Fertilizer Market Dynamics and NPN's Strategic Location

Nitrogen Fertilizer Market Context and NPN's Product Focus

Nitrogen-based fertilizer products generally start with ammonia (NH₃), which is typically made from atmospheric nitrogen and natural gas using the Haber-Bosch process. Nitrogen fertilizers include liquid ammonia, liquid urea ammonium nitrate, and granulated (solid) urea.

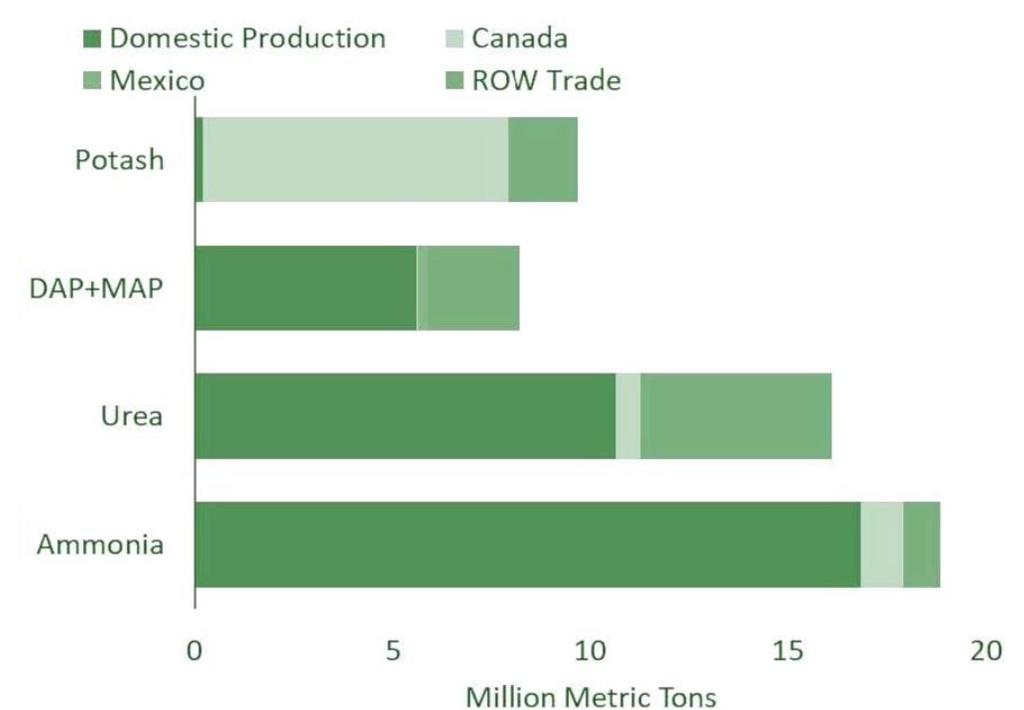
The NPN plant is designed to produce 1 million tons per year of fertilizer in the form of granulated urea. A key advantage of urea over other nitrogen fertilizers, and a reason for its intensive use in the Northern Plains, is that it can be applied by conventional spreading equipment – no specialized equipment is necessary.

As the accompanying chart shows, U.S. farmers use roughly 16 million tons of urea per year, representing a market of about \$7 billion per year. Of that amount, approximately 5 million tons are imported. The last U.S. nitrogen fertilizer plant was completed in 2017.

The Company expects to succeed because of its project's key differentiating attributes:

- strong local urea demand
- high local urea prices
- access to low-cost natural gas (which accounts for roughly 85% of variable cost)
- excellent site logistics

U.S. Fertilizer Market by Product and Source



Source: Bloomberg

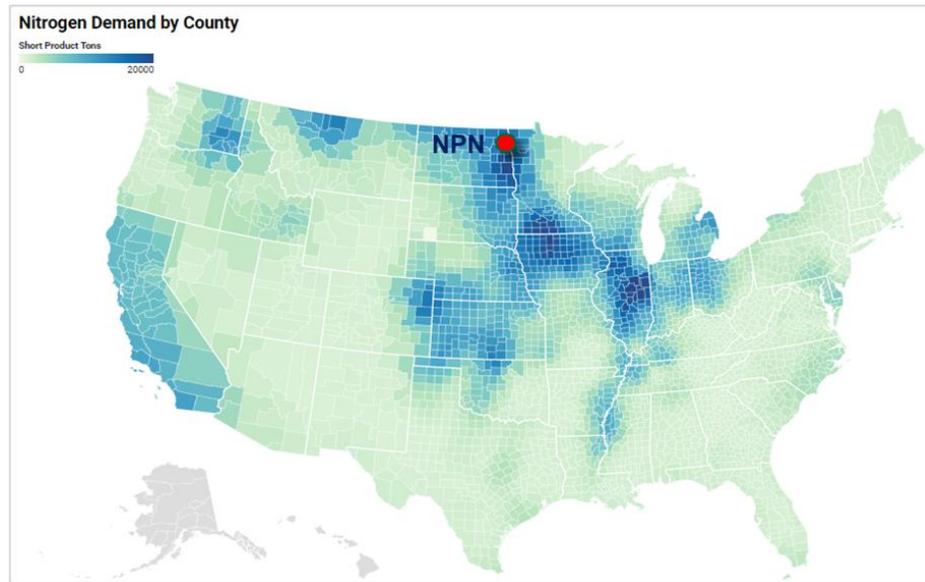
Note: DAP = diammonium phosphate; MAP = monoammonium phosphate

Supplying Local Demand: the Northern Plains Urea Market

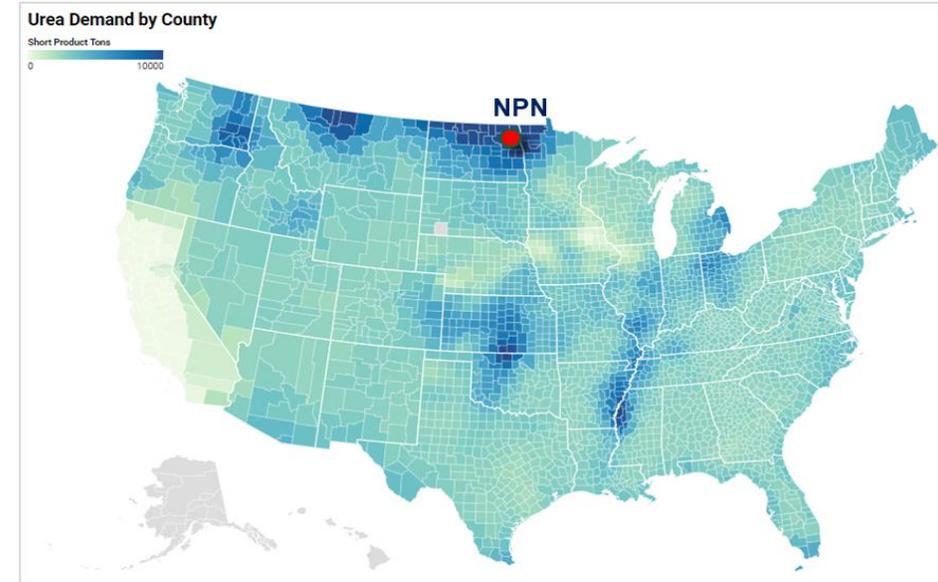
North Dakota is one of the highest urea demand regions in the U.S.

While North Dakota farmers are heavy users of nitrogen fertilizer overall, their demand for urea stands out.

The NPN plant design is specifically optimized for granulated urea production to serve strong local demand.



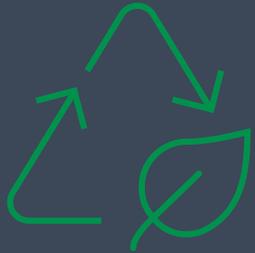
Source: NPN, LLP proprietary data based on county-level reporting



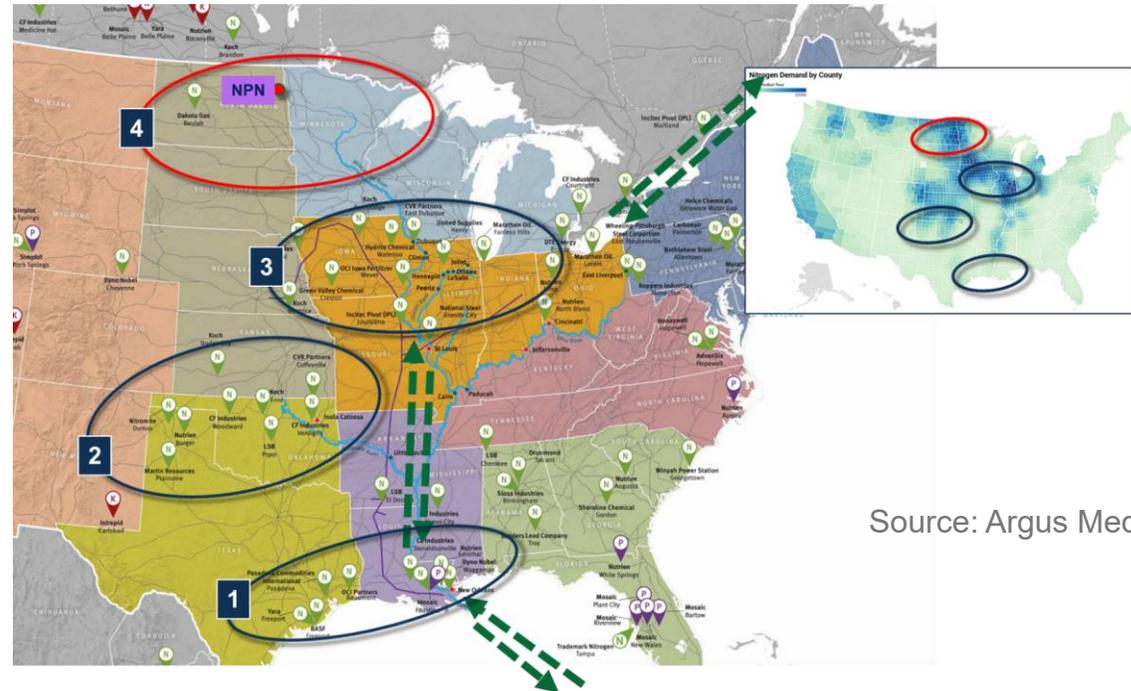
Source: NPN, LLP proprietary data based on county-level reporting

Limited Local Competition

Despite robust demand, there is very little fertilizer production in the Northern Plains region



By building local supply to serve local demand, management expects to save on transport costs and gain a competitive advantage.



Source: Argus Media; NPN, LLP

Areas on the maps circled in dark blue show major centers of fertilizer production:

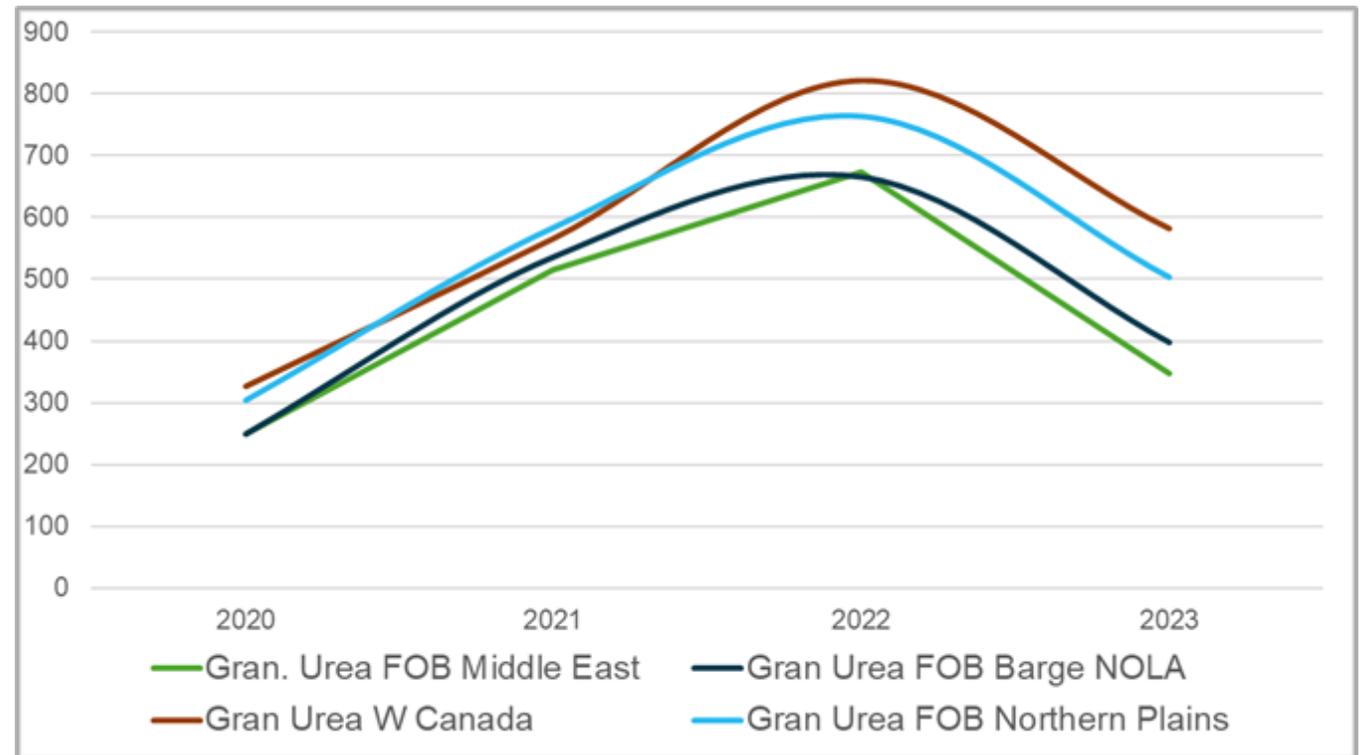
1. NOLA / Gulf Coast
2. Southern Great Plains
3. Corn Belt

Area 4, circled in red, is the Northern Plains region, the site of the Company's fertilizer project. The larger map shows that there is very little nitrogen fertilizer production in the Northern Plains, while the inset map highlights the region's strong fertilizer demand.

Northern Plains Urea Pricing Dynamics

Granulated urea prices in the Northern Plains region (ND, SD, MN) are significantly higher than in New Orleans, reflecting a substantial transportation cost premium.

Granulated Urea Prices at Selected Hubs (figures in \$/ton)



Source: Argus Media

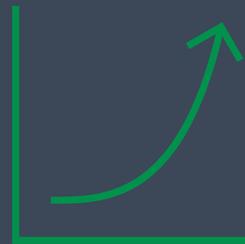
The Right Location: Summary of the Advantages

NPN's location offers numerous advantages:

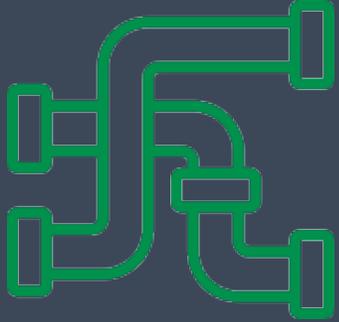


In addition, as detailed further herein, the project is expected to benefit from low-cost natural gas, by far the largest variable cost of nitrogen fertilizer production.

The Result:



Estimated project IRR of 14.6% unlevered, 18.0% levered



Natural Gas Supply Options

Low-Cost Natural Gas Sources

NPN management is in dialogue with potential suppliers of natural gas from North Dakota and western Canada.

- Natural gas is the most significant variable cost for nitrogen fertilizer production – management expects natural gas to equal roughly 85% of the project's variable costs.
- As the accompanying chart shows, western Canadian gas (AECO hub) has tended to trade at a meaningful discount to the Henry Hub benchmark for the past 15 years. Its volatility has also been substantially lower, largely due to the absence of weather-related disruptions.
- By sourcing low-cost natural gas from western Canada or North Dakota's Bakken Shale, and reducing transport costs to local fertilizer users, management expects to achieve healthy profit margins and generate an attractive financial return (estimated unlevered project IRR of 14.6%, levered IRR of 18.0%).

Henry Hub and AECO daily spot prices May 2010 – May 2025



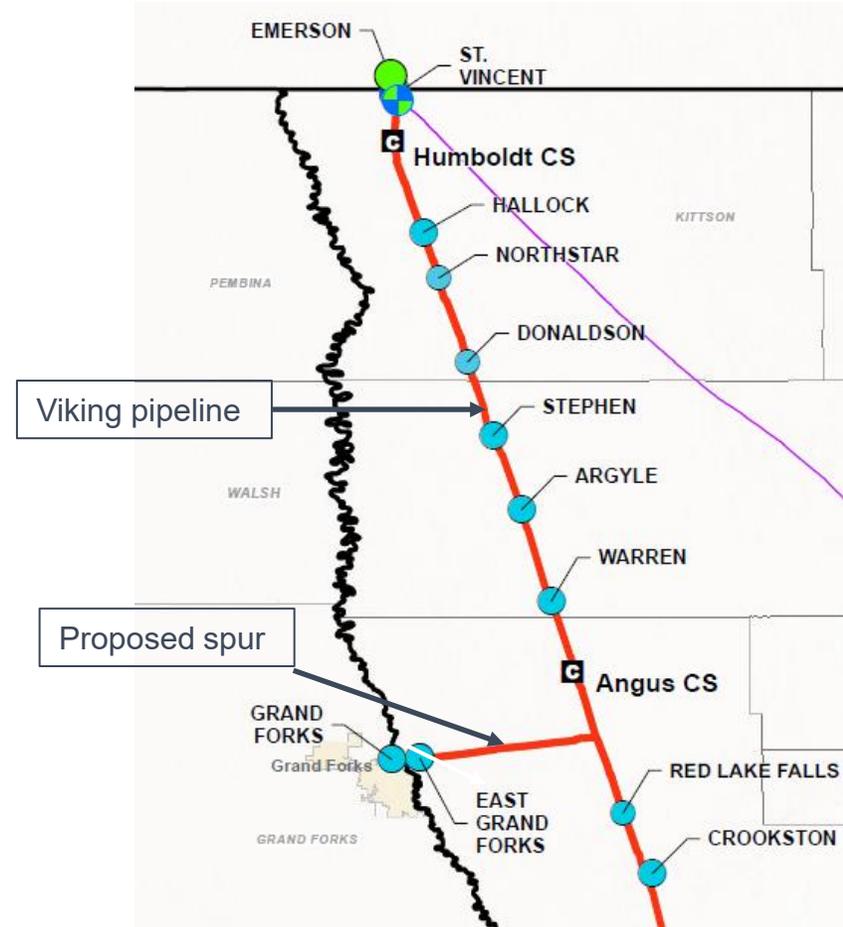
Source: Bloomberg

Natural Gas Supply Options – Viking Pipeline Northern Route

- DT Midstream's Viking pipeline (ticker: DTM; pipeline shown in red on the map) carries western Canadian natural gas from Emerson, Manitoba into Minnesota and further south. With the addition of a short 15-mile spur, it could supply all of the NPN plant's needs.
- United Energy Corp., a Bismarck, ND-based diversified energy company, has expressed an interest in sourcing and supplying Canadian natural gas to the NPN facility by way of the Viking pipeline.
- Initial discussions with United Energy management suggest that the price would be based on AECO Hub plus transport cost.

Recent AECO Hub spot prices of roughly \$1.16/MMBtu, plus an estimated \$1/MMBtu transport cost, would yield a delivered cost of \$2.16/MMBtu, well below the price levels assumed in the Company's model of \$3.50/MMBtu in 2026, and \$4.75/MMBtu average through 2025.

Northern supply route – Viking pipeline



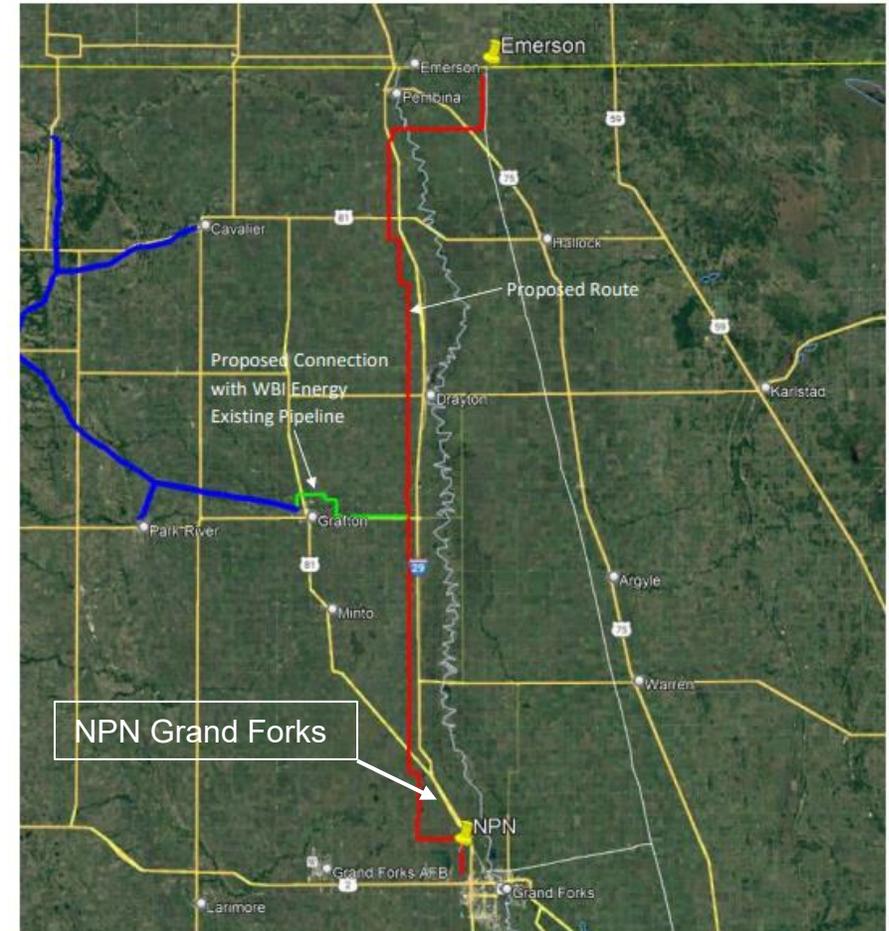
Source: DT Midstream, HamiltonClark

Natural Gas Supply Options – WBI Northern Routes

WBI Energy Transmission Inc. has proposed to deliver natural gas by two northern routes:

1. WBI could construct an 82-mile line from Emerson, Manitoba to Grand Forks, North Dakota, to transport western Canadian gas from the TC Energy Pipeline (shown in red on map).
2. WBI could deliver natural gas from North Dakota's Bakken Shale play, as well as from western Canada, by building the Emerson-Grand Forks line (shown in red), and connecting it to WBI's existing pipeline (shown in blue) by way of a short extension (shown in green).

Northern supply routes – WBI



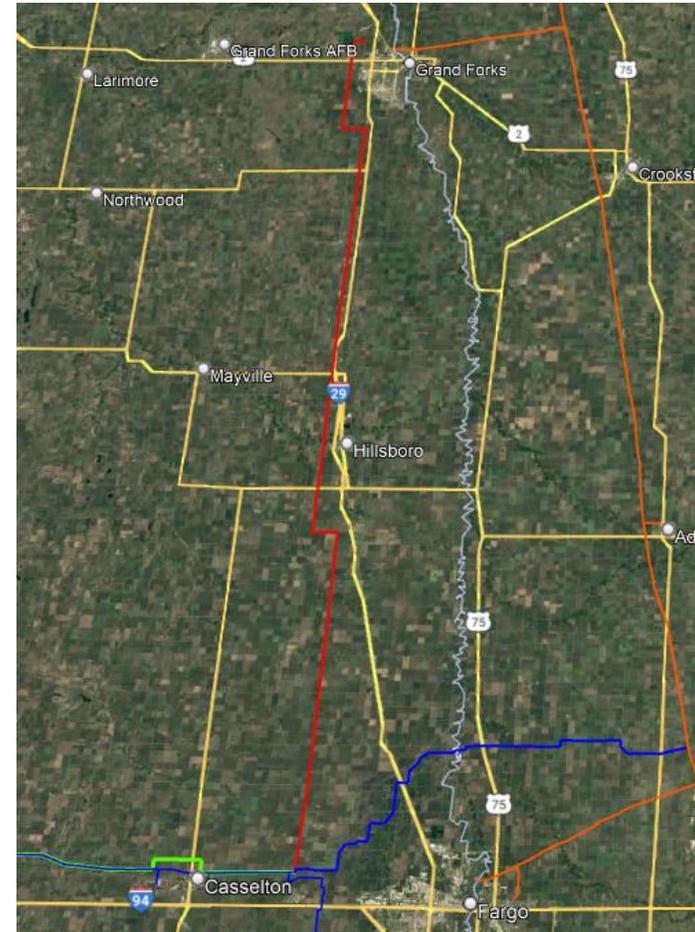
Source: WBI Energy Transmission, Inc.

Natural Gas Supply Options – WBI Southern Bakken Route

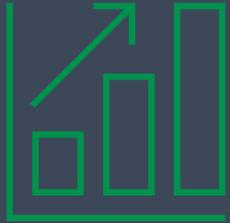
WBI Energy Transmission Inc. has also proposed to deliver low-cost natural gas by a southern route:

- WBI has already proposed to construct a Bakken East pipeline (part of which is shown in green on the map) to transport stranded natural gas from the Bakken Shale to its existing network in southeastern North Dakota (shown in blue).
- WBI has proposed to NPN that it could construct an extension north to Grand Forks (shown in red) to serve the Company's nitrogen-based fertilizer plant.

Southern supply route – WBI



Source: WBI Energy Transmission, Inc.



Project Offtake and Financial Projections

Product Offtake Status

Urea

- Conversations are progressing with two large retail distributors capable of handling required storage and transportation.
- Both distributors are interested in securing up to 100% of NPN's annual urea output
- Discussions evaluating several possible offtake structures ranging from pricing consideration and durations from 5 to 15 years on terms that should be acceptable to project finance providers.

Ammonia

- The Company expects to find customers for the modest amount of ammonia the plant will produce.

Diesel Exhaust Fluid

- Initial customer dialogues are under way.

Project NPV based on urea offtake terms (\$MM)

| Offtake % of Sales | Offtake duration, years | | | |
|--------------------|-------------------------|-----|-----|-----|
| | Perpetuity | 10y | 5y | 0 |
| 0% | 721 | 721 | 721 | 721 |
| 20% | 671 | 693 | 705 | 721 |
| 40% | 621 | 666 | 690 | 721 |
| 50% | 596 | 652 | 682 | 721 |
| 70% | 546 | 625 | 666 | 721 |
| 90% | 496 | 597 | 650 | 721 |
| 100% | 471 | 584 | 642 | 721 |

Offtake agreements are often priced at a modest discount to incentivize the offtake party to make a multi-year purchase commitment.

The table above shows that even if the plant's entire output is sold at a discount through an offtake agreement for perpetuity, project NPV is still significantly positive.

Diesel Exhaust Fluid (DEF) Market

- Diesel Exhaust Fluid (DEF) is a solution of 32.5% urea in purified water used in conjunction with a selective catalytic reduction (SCR) unit to convert nitrogen oxides in a diesel engine exhaust stream into nitrogen and water vapor. Many diesel engine cars and trucks in the U.S. use SCR units to meet EPA emissions standards.
- The Company intends to convert approximately 100,000 tons per year of its urea output into diesel exhaust fluid.
- The Company sees the DEF market as an attractive opportunity for several reasons:
 - DEF is relatively simple to produce from urea and requires little incremental capital expenditure.
 - Relatively stable year-round demand for DEF should help balance the seasonality of the granular urea fertilizer business.
- Discussions with potential DEF distributors and customers are underway.



NPN Project Financial and Operating Profile

The table sets forth key operating and financial metrics associated with the NPN fertilizer project:

- NPV of \$597 million is significantly positive
- Unlevered IRR is 14.6%
- Levered IRR of 18.0% is based on a ratio of 60% debt / 40% equity
- Baseline (2026) natural gas price of \$3.50 / MMBtu is far above current estimated delivered price of Canadian gas (\$2.16 / MMBtu)

A detailed project model is available under NDA

Economics

| | | |
|------------------------|--------|---------|
| Net Present Value | \$ mil | \$597 |
| Unlevered IRR | % | 14.6% |
| Levered IRR (60% debt) | % | 18.0% |
| Payback Period | years | 11.8 |
| Capital Expenditure | \$ mil | \$2,194 |

OPEX assumptions

| | | |
|-----------------------------|----------|--------|
| Natural Gas Price (in 2026) | \$/MMBtu | \$3.50 |
| Power Price (in 2026) | \$/MWh | \$67.3 |

Price and EBITDA assumptions

| | | |
|----------------------------|--------------|-------|
| Ammonia price (in 2030) | \$/short ton | \$606 |
| Urea price (in 2030) | \$/short ton | \$472 |
| EBITDA (first year - 2030) | \$ mil | \$396 |

Capacity, Short Tons Per Day

| | | |
|---------------|------|-------|
| Ammonia | STPD | 2,000 |
| Urea Solution | STPD | 3,300 |
| Urea Solid | STPD | 3,300 |



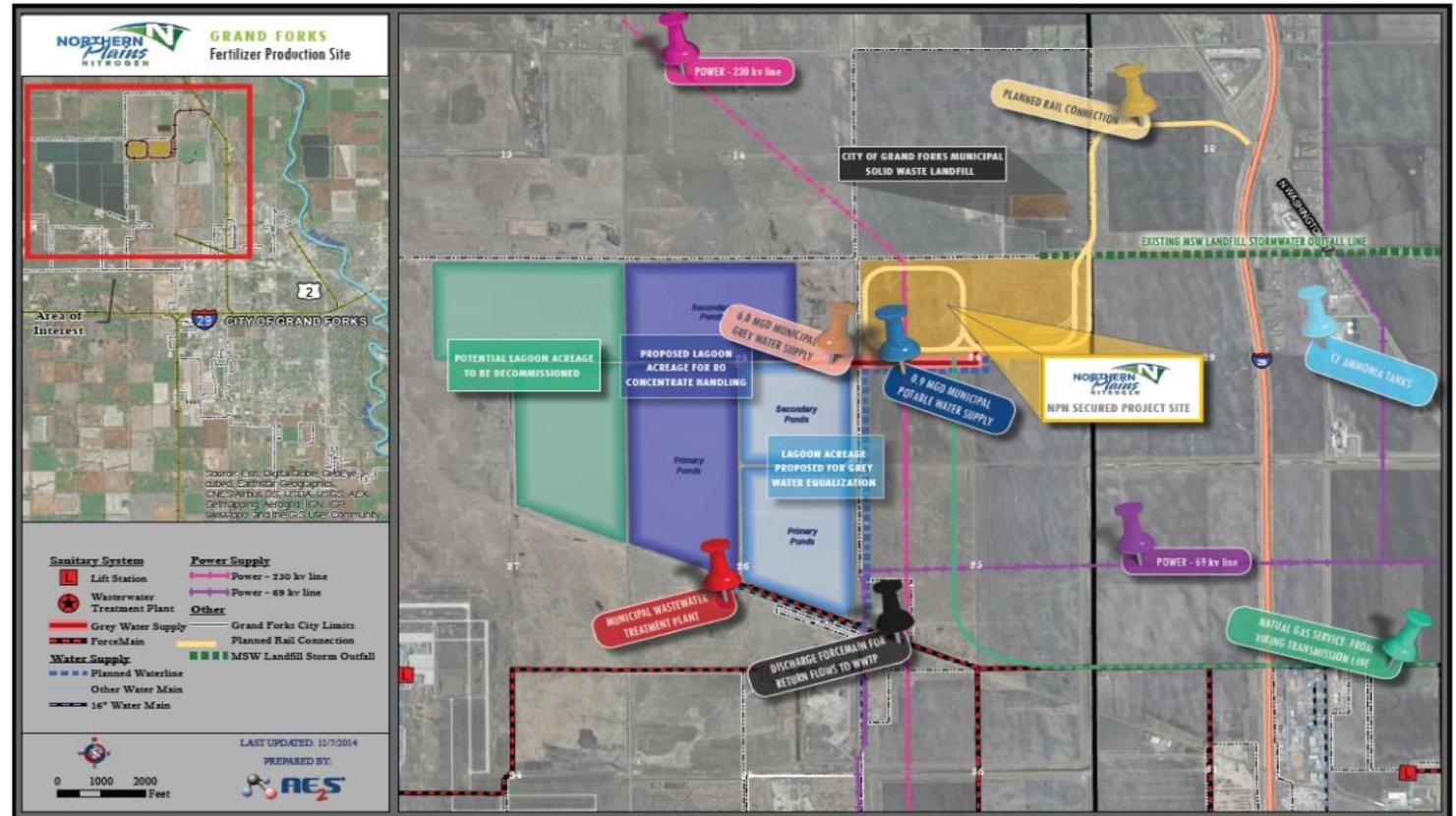
Project Design and Status

Project Logistics – Road, Rail, Water and Power

Logistics for the NPN project site are excellent

- Interstate 29 and State Highway 2 are within 2.5 miles
- Planned rail link less than one mile
- High-voltage transmission lines run close to the site perimeter
- Adjacent municipal wastewater plant will provide process water and receive discharge

NPN project site map showing transport and infrastructure links



Source: NPN, LLC

Process Technology Selection

The NPN plant will license proven, highly-bankable process technologies from leading vendors

Since 1943, KBR (NYSE: KBR, market cap \$6.3B) has licensed, engineered and constructed more than 250 ammonia plants worldwide, capturing approximately 50% of the market share of licensed capacity. KBR Purifier™ is the most recent iteration of their ammonia process technology.

Similarly, Stamicarbon holds a dominant share of global urea capacity. There are approximately 260 urea plants worldwide using the Stamicarbon process, representing more than half of all installed capacity. Stamicarbon is part of NextChem, which is majority-owned by Maire S.p.a. (MIL: MAIRE, market cap \$4.2B)

| Process Unit | Capacity (Short Tons Per Day) | Technology | Worldwide Licenses |
|---------------------------------|-------------------------------------|---------------|-----------------------|
| Ammonia | 2,000 | KBR Purifier™ | 50+ |
| Urea | 3,300 | Stamicarbon | 260 |
| Urea granulation | 3,300 | Stamicarbon | 34 |
| Urea to diesel exhaust fluid | 300 | Stamicarbon | 12 |

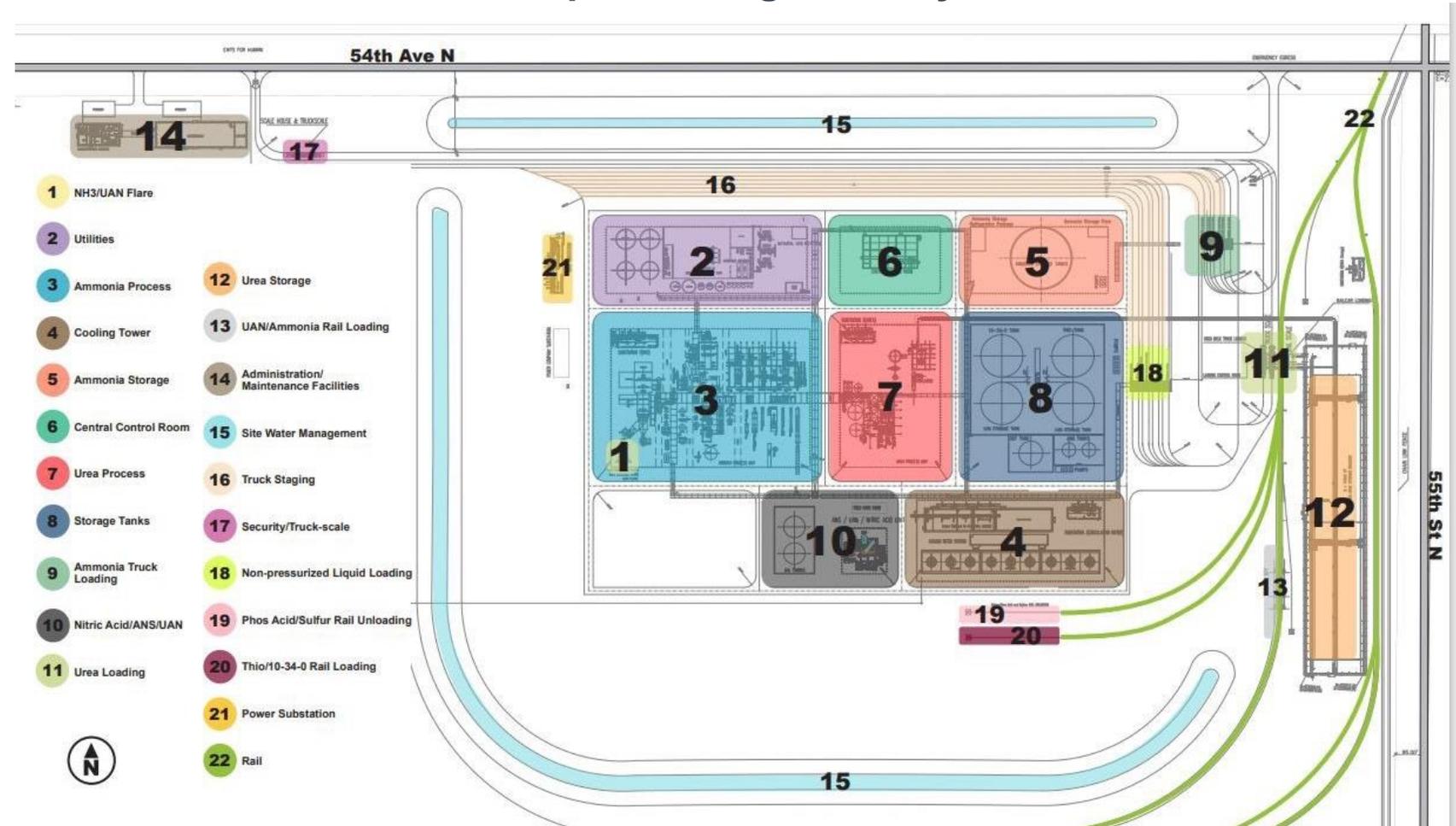
Site Plan and Process Design

Initial plant design and layout

A FEL 3-quality Front-End Engineering and Design (FEED) study was completed some time ago, including:

- Facility layout and process flow
- Initial specification of major equipment
- Detailed assessment of key inputs and outputs

Updating the earlier FEED study will be an important Series A use of proceeds.



Source: NPN, LLC, Chengda Engineering

Site Control, Permitting, and Survey Status

NPN, LLP already owns the land on which the Northern Plains Nitrogen plant will be constructed.

Substantial progress on securing all initial permits has been achieved. The City of Grand Forks and the State of North Dakota have been supportive.

Management plans to secure or complete other permits and studies, including a construction permit, a local development agreement, and an operations permit, at the appropriate stage in the development process.

Permit or Survey Type

Status

Air

Air permit was obtained for an earlier iteration of the plant design. Environmental consulting firm Ensafe has been engaged to update and renew the air permit based on new, smaller, less complex plant design.

Archaeological Survey

Completed.

Environmental Phase I

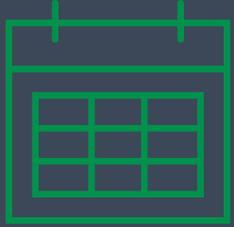
No findings. Previous use of the site was determined to be agricultural. No further study required.

Wastewater
(national pollution
discharge elimination
system permit)

Not needed. The plant's source of process water will be Grand Forks municipal wastewater; the plant's water will be discharged under the city's existing permit.

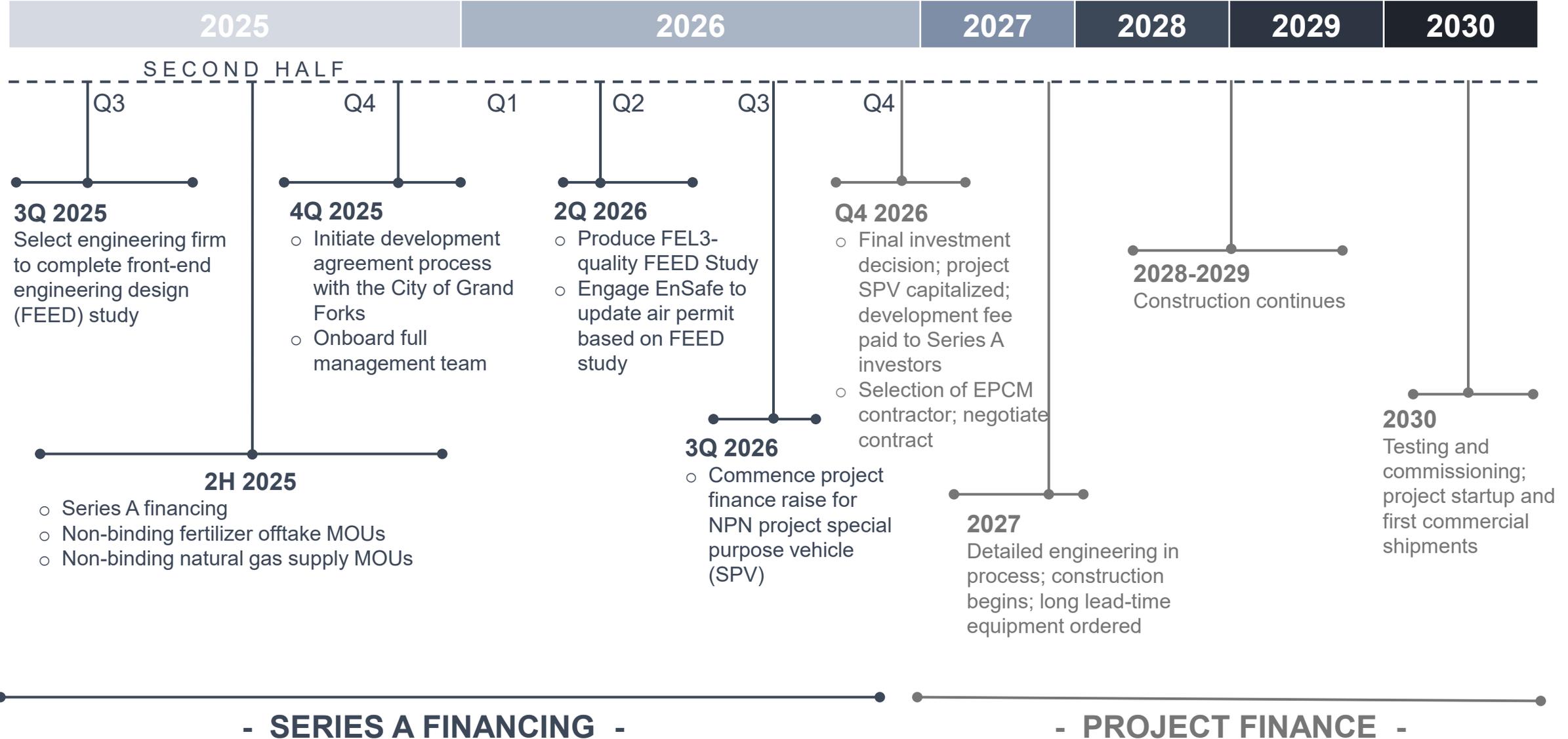
Wetlands

Permitted. U.S. Army Corps of Engineers determined that the site has no offset requirements for wetlands.



Timeline, Financial Forecast and Use of Proceeds

Timeline



Use of Proceeds, Cap Table, and Target Returns

The Company is raising \$45 million of Series A development equity at a pre-money valuation of \$63 million to ready the Northern Plains Nitrogen plant for Final Investment Decision (FID). Action items include the following:

- Update the previous FEL3-quality Front End Engineering Design (FEED) study to reflect current plant design and cost estimates
- Build out the management team
- Sign MOUs for natural gas supply and fertilizer offtake
- Complete a development agreement with the City of Grand Forks
- Prepare to raise \$2.2 billion of project finance to construct and commission the Northern Plains Nitrogen facility.

Management expects the \$2.2 billion project financing will include a development fee of \$150 million, to be distributed to Series A and other Company shareholders. Management is targeting a 1.8x return to Series A in less than two years, with the potential for further long-term upside from equity participation in the fertilizer project.

Summary Use of Series A Proceeds

| Use | \$ MM |
|------------------------------------|---------------|
| Update FEED study | \$19.0 |
| NPN, LLP development fee | 12.0 |
| Other project development expenses | 4.3 |
| Repayment of land purchase loan | 1.5 |
| Other general corporate purposes | 5.7 |
| Financing costs | 2.5 |
| Total | \$45.0 |

Post-Series A Cap Table (fully diluted basis)

| Shareholder and security type | % |
|---|---------------|
| NPN, LLP (common stock) | 52.5% |
| Series A investors (Series A preferred) | 37.5% |
| Management options pool (common stock) | 10.0% |
| Total | 100.0% |

Series A Returns Analysis

Management expects that the \$2.2 billion project financing will include a development fee of \$150 million, which will take the form of a purchase of Company shares held by Series A investors and other Company shareholders.

Based on the cash waterfall shown here, Series A investors would earn a 1.8x multiple on invested capital in less than two years, with the potential for further upside depending on the deal terms reached with project finance providers.

- Given a \$63 million net pre-money valuation, Series A investors would own 41.7% of the Company on an undiluted basis.
- Assume that the \$150 million distribution / share purchase occurs 18 months after the Series A round.
- First, Series A investors recoup their principal plus accumulated dividends.
- Second, remaining cash is distributed pro rata to NPN, LLP and Series A investors.
- Result is cash totaling \$79.6 million to Series A investors, representing a 1.8x multiple on invested capital.

The NPN project model estimates an unlevered IRR to project equity of 14.6%, and a levered IRR of 18.0%. The Company believes that there is room for additional returns to Series A by allocating a modest equity interest in the fertilizer project to Series A and common shareholders, and/or increasing the development fee

Proposed Cash Waterfall (\$ MM)

Ownership (undiluted basis)

| | |
|--------------------|--------|
| NPN, LLP | 58.33% |
| Series A investors | 41.67% |

| | |
|-------------------------|---------|
| Post-FID distribution | \$150.0 |
| Distribution net of tax | \$123.4 |

| | |
|---------------------------|------|
| Months until distribution | 18 |
| Series A dividend | 5.0% |

Step 1. Series A repayment

| | |
|------------------------|---------------|
| Repayment of principal | \$45.0 |
| Payment of dividends | \$3.4 |
| Total | \$48.4 |

| | |
|----------------|--------|
| Remaining cash | \$75.0 |
|----------------|--------|

Step 2. Pro rata distribution

| | |
|--------------------|--------|
| NPN, LLP | \$43.8 |
| Series A investors | \$31.3 |

| | |
|----------------------------------|--------|
| Total cash to Series A investors | \$79.6 |
|----------------------------------|--------|

| | |
|---------------------------------|-----|
| Multiple on Series A investment | 1.8 |
|---------------------------------|-----|

NPN, Inc. Financial Projections

The Company expects to receive a \$150 million development fee in 4Q 2026 as part of the \$2.2 billion project financing.

In subsequent periods, the Company expects to generate ongoing service revenue by overseeing fertilizer plant construction, and then managing and operating the facility. Starting in 2034, when the plant begins generating positive cash flow, the Company may receive distributions by way of project equity ownership.

| | 2025 | | | | | 2026 | | | | | 2027 | 2028 |
|-------------------------------------|-------|----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------|------------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Annual | Annual |
| Revenue: | - | - | - | - | - | - | - | - | - | - | - | - |
| Development fee | - | - | - | - | - | - | - | - | 150,000,000 | 150,000,000 | - | - |
| Services | - | - | - | - | - | - | - | - | - | - | 2,893,584 | 2,943,420 |
| Total revenue | - | - | - | - | - | - | - | - | 150,000,000 | 150,000,000 | 2,893,584 | 2,943,420 |
| Operating expenses: | - | - | - | - | - | - | - | - | - | - | - | - |
| General and administrative | - | 1,000 | 289,950 | 1,001,850 | 1,292,800 | 1,038,850 | 1,237,350 | 1,134,350 | 1,225,350 | 4,635,900 | 2,411,320 | 2,452,850 |
| Financing fee | - | - | 2,500,000 | - | 2,500,000 | - | - | - | - | - | - | - |
| Cost of development fee | - | - | - | - | - | - | - | - | 36,700,000 | 36,700,000 | - | - |
| Amortization | - | - | - | - | - | - | - | - | - | - | - | - |
| Depreciation | - | - | - | - | - | - | - | - | - | - | - | - |
| Total expenses | - | 1,000 | 2,789,950 | 1,001,850 | 3,792,800 | 1,038,850 | 1,237,350 | 1,134,350 | 37,925,350 | 41,335,900 | 2,411,320 | 2,452,850 |
| Operating income | - | (1,000) | (2,789,950) | (1,001,850) | (3,792,800) | (1,038,850) | (1,237,350) | (1,134,350) | 112,074,650 | 108,664,100 | 482,264 | 490,570 |
| Other income (expense): | - | - | - | - | - | - | - | - | - | - | - | - |
| Other income (expense) | - | - | - | - | - | - | - | - | - | - | - | - |
| Interest expense | - | - | - | - | - | - | - | - | - | - | - | - |
| Total other income (expense) | - | - | - | - | - | - | - | - | - | - | - | - |
| Income before taxes | - | (1,000) | (2,789,950) | (1,001,850) | (3,792,800) | (1,038,850) | (1,237,350) | (1,134,350) | 112,074,650 | 108,664,100 | 482,264 | 490,570 |
| Income taxes | - | (253) | (706,136) | (253,568) | (959,958) | (262,933) | (313,173) | (287,104) | 28,366,094 | 27,502,884 | 122,061 | 124,163 |
| Net income (loss) | - | (747) | (2,083,814) | (748,282) | (2,832,842) | (775,917) | (924,177) | (847,246) | 83,708,556 | 81,161,216 | 360,203 | 366,407 |



Leadership

Management Team



CLARK BAILEY
CEO

- Division head responsible for capital projects, operations, and oversight of 7,500-person mining business
- Designed, built, and commissioned numerous nitrogen, natural gas separation, and other process plants
- EuroChem, Potash Corp., Fish Engineering
- BS mechanical engineering, U. Texas



LARRY MACKIE
COO

- Over fifty years of experience in nitrogen plant development, construction, maintenance, and management
- Expertise in nitrogen process efficiency and product quality
- J R Simplot, Mackie International
- BS mechanical engineering, U. Manitoba



DARIN ANDERSON
President

- President, owner, and general manager overseeing budgeting, marketing, production, and human resources at 4,500-acre farm
- 25 years of experience in farming and agriculture
- D & J Anderson Farms
- BS agricultural economics, North Dakota State U.



CRAIG SIIRO, CPA
CFO

- Twenty-five years of public accounting experience
- Formed Integrated Consulting Services in 2010 to provide fractional CFO services to private companies
- CFO to NPN, LLP since 2016
- Baker Tilly, Integrated Consulting Services
- MBA, U. Minnesota

Management Team (continued)



KEN CHARPENTIER
VP, Site Management

- Founded, led, and successfully exited a pipeline and facilities construction that grew to over \$250 million in annual revenue and over 1,000 employees.
- Over four decades of experience in construction services and management
- Detroit Lakes Vocational Tech School, welding degree



OLIVIER HARVEY
VP, Marketing

- Expertise includes strategic marketing, supply chain management, and product quality
- Led an 80-person team in marketing, product development, and other areas across multiple continents
- EuroChem, Novaya, TMK
- MBA, Warwick



LARRY PARNELL
VP, Natural Gas Supply

- Extensive oil & gas industry experience, including reserves development, drilling and completion, asset acquisition, and offtake and delivery
- Amerada Hess, ARCO, BP
- BS, petroleum engineer, Texas A&M

Project Experience

The NPN leadership team has decades of collective experience designing, constructing, and managing nitrogen fertilizer and other process plants, negotiating and overseeing multi-billion-dollar EPC projects, and running large-scale capital-intensive operations.

EPC contract negotiation and oversight experience

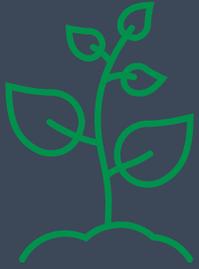
- Negotiated dozens of EPC contracts and oversaw the construction associated with the \$3 billion expansion of Potash Corp.'s Rocanville Mine; the \$2 billion expansion of the Cory Mine; the \$2 billion expansion of the Picadilly Mine, and numerous other large projects.

Nitrogen fertilizer plant construction, engineering upgrades, and operating experience

- Construction: oversaw the disassembly, relocation, inspection, and construction of numerous ammonia plants.
- Engineering upgrades: responsible for capital projects and technology upgrades at seven ammonia plants, four urea plants, and nine other nitrogen-related large process plants
- Operations: responsible for nitrogen-based fertilizer plant management, engineering, process improvement, and maintenance.

Other relevant experience

- Managed a multinational mining division with 7,500 employees and up to 8,000 contractors. Responsible for over \$8 billion of capital projects as well as day-to-day operations.



Summary

Why NPN, Why Now



Strong local demand alongside limited local production



Low-cost natural gas feedstock available from North Dakota and western Canada



Offtake agreements under development



Exceptional management with decades of experience developing and managing multi-billion-dollar projects in the fertilizer, chemical, and mining industries



Projected return to Series A investor of approximately 1.8x in less than two years, with the potential for further long-term upside from equity in the fertilizer project



Unlevered project IRR estimated at 14.6%, levered IRR of 18.0%

Contacts

Please do not contact management directly. To request more information, or schedule a call with management, please contact members of the Hamilton Clark Sustainable Capital, Inc. deal team:

Charles Sorkin

Managing Director
(917) 744-3387

charles.sorkin@hamiltonclark.com

Jim LoGerfo

Managing Director
(646) 408-5495

jim.logerfo@hamiltonclark.com

Hamilton Clark Sustainable Capital, Inc. is a member of FINRA and SIPC and is a registered SEC broker-dealer.

HAMILTONCLARK

Disclaimers

The information herein has been prepared for potential interested parties solely for the purpose of making an evaluation of NPN, Inc. (the “Company”) and the transaction presented herein, and does not purport to be all inclusive or contain all the information that an interested party may require. Neither the Company nor Hamilton Clark Sustainable Capital, Inc. (“HamiltonClark”) has independently verified any of this information, including financial projections related to future performance. Any such statements, estimates and projections reflect various assumptions concerning anticipated results, which may or may not prove to be correct. Such statements may contain forward-looking statements, as that term is defined in the U.S. Private Securities Litigation Reform Act of 1995. Such forward-looking statements, opinions and projections are not guarantees of future performance and involve known and unknown risks and uncertainties. Other important factors could cause actual results to differ from the statements, opinions and projections contained herein. Forward-looking statements, opinions and projections are based on historical and/or current information that relate to future operations, strategies, financial results or other developments. No representations or warranties, express or implied, are made as to the adequacy or accuracy of such statements, estimates or projections. . If a prospective interested party seeks to pursue this matter further, it will be provided with such information as mutually agreed. In addition, any eventual agreement will contain such representations and warranties as agreed between the parties.

The information herein includes the Company's key assumptions and projected financial and operations data. Although the Company believes that the assumptions used to create these projections are reasonable, projections are necessarily speculative, and therefore the Company cannot assure prospective interested parties that such projections will conform to actual results. Actual results realized during any future period are likely to vary from the projections, and the variations may be material and adverse. The Company makes no representation or warranty, express or implied, as to the adequacy or accuracy, completeness or reliability of this information or in any oral or written information furnished or made available. Interested parties must not place undue reliance on projected financial results. Actual results will vary from projected results and may be significantly worse than projected. The Company's complete financial model will be made available to selected interested parties.

No responsibility or liability is or will be accepted, by the Company or HamiltonClark, or by any of their officers, directors or agents as to or in relation to the accuracy or completeness of this Executive Summary or any other written or oral information made available to any interested party, or its advisors and any liability therefore is hereby expressly disclaimed. In furnishing this document, neither the Company, HamiltonClark nor any other person undertake any obligation to provide the recipient with access to any additional information or to update this document or additional information or to correct any inaccuracies therein which may become apparent.

BUDGETED PROJECTIONS

NORTHERN PLAINS NITROGEN, INC.
PROJECTED BALANCE SHEET
YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | 2026 | | | |
|---|-------------|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 |
| Assets: | | | | | | | | |
| Current assets: | | | | | | | | |
| Cash | \$ - | \$ - | \$ 26,551,717 | \$ 14,399,867 | \$ 3,769,350 | \$ 2,263,250 | \$ 1,097,650 | \$ (0) |
| Accounts receivable | - | - | - | - | - | - | - | - |
| Deferred income taxes | - | 253 | 706,389 | 959,958 | 1,222,891 | 1,536,064 | 1,823,168 | - |
| Other current assets | - | - | - | - | - | - | - | - |
| Total current assets | - | 253 | 27,258,106 | 15,359,824 | 4,992,241 | 3,799,314 | 2,920,818 | (0) |
| Property, net | - | - | - | - | - | - | - | - |
| Other assets: | | | | | | | | |
| Project | - | - | 15,658,333 | 26,808,333 | 36,400,000 | 36,668,750 | 36,700,000 | - |
| Total other assets | - | - | 15,658,333 | 26,808,333 | 36,400,000 | 36,668,750 | 36,700,000 | - |
| Total assets | \$ - | \$ 253 | \$ 42,916,439 | \$ 42,168,158 | \$ 41,392,241 | \$ 40,468,064 | \$ 39,620,818 | \$ (0) |
| Liabilities and stockholder's equity: | | | | | | | | |
| Current liabilities: | | | | | | | | |
| Line of credit | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| Current portion of long-term debt | - | - | - | - | - | - | - | - |
| Current portion of subordinated debt | - | - | - | - | - | - | - | - |
| Accounts payable | - | - | - | - | - | - | - | - |
| Deferred revenue | - | - | - | - | - | - | - | - |
| Accrued preferred return | - | - | 187,500 | 750,000 | 1,312,500 | 1,875,000 | 2,437,500 | - |
| Accrued interest | - | - | - | - | - | - | - | - |
| Accrued expenses | - | - | - | - | - | - | - | - |
| Total current liabilities | - | - | 187,500 | 750,000 | 1,312,500 | 1,875,000 | 2,437,500 | - |
| Long-term liabilities: | | | | | | | | |
| Long term debt, net of current portion | - | - | - | - | - | - | - | - |
| Note payable - stockholder | - | - | - | - | - | - | - | - |
| Subordinated debt, net of current portion | - | - | - | - | - | - | - | - |
| Total long-term liabilities | - | - | - | - | - | - | - | - |
| Total liabilities | - | - | 187,500 | 750,000 | 1,312,500 | 1,875,000 | 2,437,500 | - |
| Stockholder's equity: | | | | | | | | |
| Common stock | - | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Preferred stock | - | - | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 |
| Retained earnings | - | (747) | (2,272,061) | (3,582,842) | (4,921,259) | (6,407,936) | (7,817,682) | (45,001,000) |
| Total stockholder's equity | - | 253 | 42,728,939 | 41,418,158 | 40,079,741 | 38,593,064 | 37,183,318 | - |
| Total liabilities and stockholder's equity | \$ - | \$ 253 | \$ 42,916,439 | \$ 42,168,158 | \$ 41,392,241 | \$ 40,468,064 | \$ 39,620,818 | \$ - |

NORTHERN PLAINS NITROGEN, INC.
PROJECTED STATEMENT OF INCOME
YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | | 2026 | | | | |
|--------------------------------|-------|----------|----------------|---------------|----------------|---------------|---------------|---------------|----------------|----------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total |
| Revenue: | | | | | | | | | | |
| Development fee | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 150,000,000 | \$ 150,000,000 |
| Services | - | - | - | - | - | - | - | - | - | - |
| Total revenue | - | - | - | - | - | - | - | - | 150,000,000 | 150,000,000 |
| Operating expenses: | | | | | | | | | | |
| General and administrative | - | 1,000 | 289,950 | 1,001,850 | 1,292,800 | 1,038,850 | 1,237,350 | 1,134,350 | 1,225,350 | 4,635,900 |
| Financing fee | - | - | 2,500,000 | - | 2,500,000 | - | - | - | - | - |
| Cost of development fee | - | - | - | - | - | - | - | - | 36,700,000 | 36,700,000 |
| Amortization | - | - | - | - | - | - | - | - | - | - |
| Depreciation | - | - | - | - | - | - | - | - | - | - |
| Total expenses | - | 1,000 | 2,789,950 | 1,001,850 | 3,792,800 | 1,038,850 | 1,237,350 | 1,134,350 | 37,925,350 | 41,335,900 |
| Operating income | - | (1,000) | (2,789,950) | (1,001,850) | (3,792,800) | (1,038,850) | (1,237,350) | (1,134,350) | 112,074,650 | 108,664,100 |
| Other income (expense): | | | | | | | | | | |
| Other income (expense) | - | - | - | - | - | - | - | - | - | - |
| Interest expense | - | - | - | - | - | - | - | - | - | - |
| Total other income (expense) | - | - | - | - | - | - | - | - | - | - |
| Income before taxes | - | (1,000) | (2,789,950) | (1,001,850) | (3,792,800) | (1,038,850) | (1,237,350) | (1,134,350) | 112,074,650 | 108,664,100 |
| Income taxes | - | (253) | (706,136) | (253,568) | (959,958) | (262,933) | (313,173) | (287,104) | 28,366,094 | 27,502,884 |
| Net income (loss) | \$ - | \$ (747) | \$ (2,083,814) | \$ (748,282) | \$ (2,832,842) | \$ (775,917) | \$ (924,177) | \$ (847,246) | \$ 83,708,556 | \$ 81,161,216 |
| Project costs: | | | | | | | | | | |
| Beginning | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 26,808,333 | \$ 36,400,000 | \$ 36,668,750 | \$ 36,700,000 | \$ 26,808,333 |
| Additions | - | - | 15,658,333 | 11,150,000 | 26,808,333 | 9,591,667 | 268,750 | 31,250 | - | 9,891,667 |
| Transfer | - | - | - | - | - | - | - | - | (36,700,000) | (36,700,000) |
| Ending | \$ - | \$ - | \$ 15,658,333 | \$ 11,150,000 | \$ 26,808,333 | \$ 36,400,000 | \$ 36,668,750 | \$ 36,700,000 | \$ - | \$ - |

NORTHERN PLAINS NITROGEN, INC.
 PROJECTED STATEMENT OF STOCKHOLDER'S EQUITY
 YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | | 2026 | | | | |
|-------------------------------------|-------|--------|---------------|---------------|----------------|---------------|---------------|---------------|---------------|---------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total |
| Common stock: | | | | | | | | | | |
| Beginning | \$ - | \$ - | \$ 1,000 | \$ 1,000 | \$ - | \$ 1,000 | \$ 1,000 | \$ 1,000 | \$ 1,000 | \$ 1,000 |
| Issuance | - | 1,000 | - | - | 1,000 | - | - | - | - | - |
| Ending | - | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Preferred stock: | | | | | | | | | | |
| Beginning | - | - | - | 45,000,000 | - | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 |
| Issuance | - | - | 45,000,000 | - | 45,000,000 | - | - | - | - | - |
| Ending | - | - | 45,000,000 | 45,000,000 | - | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 | 45,000,000 |
| Retained earnings: | | | | | | | | | | |
| Beginning | - | - | (747) | (2,272,061) | - | (3,582,842) | (4,921,259) | (6,407,936) | (7,817,682) | (3,582,842) |
| Net income | - | (747) | (2,083,814) | (748,282) | (2,832,842) | (775,917) | (924,177) | (847,246) | 83,708,556 | 81,161,216 |
| Preferred return | - | - | (187,500) | (562,500) | (750,000) | (562,500) | (562,500) | (562,500) | (562,500) | (2,250,000) |
| Distributions to stockholders | - | - | - | - | - | - | - | - | (120,329,374) | (120,329,374) |
| Ending | - | (747) | (2,272,061) | (3,582,842) | (3,582,842) | (4,921,259) | (6,407,936) | (7,817,682) | (45,001,000) | (45,001,000) |
| Stockholders equity - ending | \$ - | \$ 253 | \$ 42,728,939 | \$ 41,418,158 | \$ (3,581,842) | \$ 40,079,741 | \$ 38,593,064 | \$ 37,183,318 | \$ - | \$ - |

NORTHERN PLAINS NITROGEN, INC.
PROJECTED STATEMENT OF CASH FLOWS
YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | | 2026 | | | | |
|---|-------|----------|----------------|---------------|----------------|--------------|--------------|--------------|---------------|---------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total |
| Cash flows from operating activities: | | | | | | | | | | |
| Net income (loss) | \$ - | \$ (747) | \$ (2,083,814) | \$ (748,282) | \$ (2,832,842) | \$ (775,917) | \$ (924,177) | \$ (847,246) | \$ 83,708,556 | \$ 81,161,216 |
| Adjustments to reconcile net income (loss) to cash flows from operating activities: | | | | | | | | | | |
| Depreciation and amortization | - | - | - | - | - | - | - | - | - | - |
| (Gain) loss on sale of assets | - | - | - | - | - | - | - | - | - | - |
| Change in operating assets and liabilities: | | | | | | | | | | |
| Accounts receivable | - | - | - | - | - | - | - | - | - | - |
| Other current assets | - | - | - | - | - | - | - | - | - | - |
| Deferred income taxes | - | (253) | (706,136) | (253,568) | (959,958) | (262,933) | (313,173) | (287,104) | 1,823,168 | 959,958 |
| Accounts payable | - | - | - | - | - | - | - | - | - | - |
| Deferred revenue | - | - | - | - | - | - | - | - | - | - |
| Accrued preferred return | - | - | 187,500 | 562,500 | 750,000 | 562,500 | 562,500 | 562,500 | (2,437,500) | (750,000) |
| Accrued interest | - | - | - | - | - | - | - | - | - | - |
| Accrued liabilities | - | - | - | - | - | - | - | - | - | - |
| Cash flows from operating activities | - | (1,000) | (2,602,450) | (439,350) | (3,042,800) | (476,350) | (674,850) | (571,850) | 83,094,224 | 81,371,174 |
| Cash flows from investing activities: | | | | | | | | | | |
| Purchases of property | - | - | - | - | - | - | - | - | - | - |
| Purchase of project | - | - | (15,658,333) | (11,150,000) | (26,808,333) | (9,591,667) | (268,750) | (31,250) | 36,700,000 | 26,808,333 |
| Proceeds from sale of property | - | - | - | - | - | - | - | - | - | - |
| Cash flows from investing activities | - | - | (15,658,333) | (11,150,000) | (26,808,333) | (9,591,667) | (268,750) | (31,250) | 36,700,000 | 26,808,333 |
| Cash flows from financing activities: | | | | | | | | | | |
| Increase (decrease) in line of credit - bank | - | - | - | - | - | - | - | - | - | - |
| Proceeds from long-term debt | - | - | - | - | - | - | - | - | - | - |
| Proceeds from subordinated debt | - | - | - | - | - | - | - | - | - | - |
| Payments on long-term debt | - | - | - | - | - | - | - | - | - | - |
| Change in notes payable - stockholder | - | - | - | - | - | - | - | - | - | - |
| Payments on subordinated debt | - | - | - | - | - | - | - | - | - | - |
| Distributions to shareholders | - | - | - | - | - | - | - | - | (120,329,374) | (120,329,374) |
| Preferred return | - | - | (187,500) | (562,500) | (750,000) | (562,500) | (562,500) | (562,500) | (562,500) | (2,250,000) |
| Issuance of preferred stock | - | - | 45,000,000 | - | 45,000,000 | - | - | - | - | - |
| Issuance of common stock | - | 1,000 | - | - | 1,000 | - | - | - | - | - |
| Cash flows from financing activities | - | 1,000 | 44,812,500 | (562,500) | 44,251,000 | (562,500) | (562,500) | (562,500) | (120,891,874) | (122,579,374) |
| Net change in cash | - | - | 26,551,717 | (12,151,850) | 14,399,867 | (10,630,517) | (1,506,100) | (1,165,600) | (1,097,650) | (14,399,867) |
| Cash - beginning | - | - | - | 26,551,717 | - | 14,399,867 | 3,769,350 | 2,263,250 | 1,097,650 | 14,399,867 |
| Cash - ending | \$ - | \$ - | \$ 26,551,717 | \$ 14,399,867 | \$ 14,399,867 | \$ 3,769,350 | \$ 2,263,250 | \$ 1,097,650 | \$ 0 | \$ 0 |

NORTHERN PLAINS NITROGEN, INC.
 SCHEDULE OF SCHEDULE OF DEVELOPMENT COSTS
 YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | | 2026 | | | | |
|------------------------------------|-------------|-------------|---------------------|----------------------|----------------------|---------------------|-------------------|------------------|-------------|---------------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total |
| Development costs: | | | | | | | | | | |
| Environmental | \$ - | \$ - | \$ - | \$ 140,000 | \$ 140,000 | \$ 170,000 | \$ 90,000 | \$ - | \$ - | \$ 260,000 |
| Fertilizer Market Study | - | - | - | - | - | - | 125,000 | 25,000 | - | 150,000 |
| Gas Consultants | - | - | 10,000 | 30,000 | 40,000 | 20,000 | - | - | - | 20,000 |
| FEED Study Update | - | - | 2,916,667 | 8,750,000 | 11,666,667 | 5,833,333 | - | - | - | 5,833,333 |
| Test Piles | - | - | - | - | - | 700,000 | - | - | - | 700,000 |
| NTI Geotechnical Engineering | - | - | - | - | - | 300,000 | - | - | - | 300,000 |
| NTI Construction Materials Testing | - | - | - | - | - | 350,000 | - | - | - | 350,000 |
| AE2S Civil Engineering | - | - | - | - | - | 300,000 | - | - | - | 300,000 |
| Other | - | - | 731,667 | 2,230,000 | 2,961,667 | 1,918,333 | 53,750 | 6,250 | - | 1,978,333 |
| Total development costs | \$ - | \$ - | \$ 3,658,333 | \$ 11,150,000 | \$ 14,808,333 | \$ 9,591,667 | \$ 268,750 | \$ 31,250 | \$ - | \$ 9,891,667 |

NORTHERN PLAINS NITROGEN, INC.
SCHEDULE OF OPERATING EXPENSES
YEARS ENDING DECEMBER 31, 2025 AND 2026

| | 2025 | | | | | 2026 | | | | |
|---|-------|----------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Total |
| General and Administrative: | | | | | | | | | | |
| Team Salaries | \$ - | \$ - | \$ - | \$ - | \$ - | \$ 180,000 | \$ 540,000 | \$ 540,000 | \$ 540,000 | \$ 1,800,000 |
| Salary Burdens | - | - | - | - | - | 72,000 | 216,000 | 216,000 | 216,000 | 720,000 |
| Subcontractor | - | - | 180,000 | 540,000 | 720,000 | 360,000 | - | - | - | 360,000 |
| Public Relations | - | - | 5,000 | 57,000 | 62,000 | 62,000 | 66,500 | 63,500 | 64,500 | 256,500 |
| Project Legal | - | 1,000 | 50,000 | 150,000 | 201,000 | 200,000 | 250,000 | 150,000 | 150,000 | 750,000 |
| Accounting | - | - | 5,000 | 15,000 | 20,000 | 15,000 | 15,000 | 15,000 | 15,000 | 60,000 |
| Director & Officer's Insurance | - | - | - | 90,000 | 90,000 | - | - | - | 90,000 | 90,000 |
| Office computers and equipment | - | - | 3,000 | 9,000 | 12,000 | 9,000 | 9,000 | 9,000 | 9,000 | 36,000 |
| Software | - | - | 20,000 | 60,000 | 80,000 | 60,000 | 60,000 | 60,000 | 60,000 | 240,000 |
| Internet | - | - | 1,500 | 4,500 | 6,000 | 4,500 | 4,500 | 4,500 | 4,500 | 18,000 |
| Rent | - | - | 5,000 | 15,000 | 20,000 | 15,000 | 15,000 | 15,000 | 15,000 | 60,000 |
| Office Supplies | - | - | 450 | 1,350 | 1,800 | 1,350 | 1,350 | 1,350 | 1,350 | 5,400 |
| Travel | - | - | 20,000 | 60,000 | 80,000 | 60,000 | 60,000 | 60,000 | 60,000 | 240,000 |
| | - | - | - | - | - | - | - | - | - | - |
| Total general and administrative expenses | \$ - | \$ 1,000 | \$ 289,950 | \$ 1,001,850 | \$ 1,292,800 | \$ 1,038,850 | \$ 1,237,350 | \$ 1,134,350 | \$ 1,225,350 | \$ 4,635,900 |



CSEA Loan Application

Submitted to:

Clean Sustainable Energy Authority
North Dakota Industrial Commission

Project Title:

Commercial Deployment of Carbon Dioxide Capture, Transport,
and Storage

Submitted by:

HLCP Prodco, LLC on behalf of Dakota Spirit AgEnergy, LLC

Date Submitted:

October 15, 2025



Harvestone LCP
1815 Schafer St. Suite 220
Bismarck, ND 58503

October 15, 2025

Clean Sustainable Energy Authority
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

RE: Harvestone Low Carbon Partners' Loan Application for Clean Sustainable Energy Authority

To the Clean Sustainable Energy Authority (CSEA):

Please find enclosed the loan application from Harvestone Low Carbon Partners for Dakota Spirit AgEnergy's project for "*Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage*". Our project intends to capture carbon dioxide from Dakota Spirit ethanol production and transport via truck to our operational Class VI injection well at Blue Flint Ethanol for permanent sequestration.

This project further drives innovation across North Dakota's agricultural and energy sectors while delivering measurable economic benefits for the state. The project seeks to advance carbon capture technology, develop non-pipeline transport solutions, and expand CO₂ storage capabilities for ethanol facilities. HLCP will leverage similar infrastructure and technology at Dakota Spirit to the operational capture facility at Blue Flint. Growing access to low carbon market opportunities and enhancing profitability for local corn producers. By integrating sustainable low carbon technologies into ethanol production, the project strengthens long-term market access for agricultural commodities and reinforces the resilience of biorefineries and their supply networks throughout North Dakota.

The potential support from CSEA provides Dakota Spirit a unique opportunity to advance our project on an aggressive schedule and serve as a template for producers without direct access to CO₂ storage and potentially supporting future opportunities around Enhanced Oil Recovery within the North Dakota; thereby showing a quick return on CSEA invested support with an operational project in the first quarter of 2027.

For any questions regarding our application, please contact our project lead, Adam Dunlop, at 701-442-7503 or adunlop@harvestonelcp.com. Thank you for your consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jeff Zueger", is written over a light blue horizontal line.

Jeff Zueger
CEO
Harvestone Low Carbon Partners

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title:

Commercial Deployment of Carbon Dioxide
Capture, Transport, and Storage for Dakota
Spirit AgEnergy

Applicant:

HLCP ProdCo, LLC

Date of Application:

October 15, 2025

Amount of Request

Grant: \$0

Loan: \$20,000,000

Total Amount of Proposed Project:

\$94,513,473

Duration of Project: August 2025-March 2027

Point of Contact (POC):

Adam Dunlop

POC Telephone:

(701) 251-3961

POC Email:

adunlop@harvestonelcp.com

POC Address:

1815 Schafer St. Suite 220
Bismarck, ND 58503

TABLE OF CONTENTS

| | |
|---|-----------|
| Abstract | 1 |
| Project Description | 2 |
| Standards of Success | 10 |
| Background/Qualifications | 13 |
| Management | 14 |
| Timetable | 15 |
| Budget | 15 |
| Confidential Information | 16 |
| Patents/Rights to Technical Data | 16 |
| State Programs and Incentives | 16 |
| Tax Liability Statement | 17 |
| Letters of Support | 18 |

APPENDIX

| |
|--------------------------------------|
| APPENDIX A – HLCP Overview |
| APPENDIX B – McGough Overview |
| APPENDIX C – Salof Overview |
| APPENDIX D – EERC Overview |
| APPENDIX E – ICT Overview |
| APPENDIX F – KLJ Overview |
| APPENDIX G – Project Schedule |

CONFIDENTIAL Appendix

| |
|---|
| APPENDIX H – Process Flow Diagram |
| APPENDIX I – Transportation Term Sheet |
| APPENDIX J – Financial |
| HLPC Business Plan |
| Historical Financial Statements |
| Budgeted Projections |
| APPENDIX K – Loan Application |

ABSTRACT

Objective:

This project will capture and liquefy the carbon dioxide (CO₂) emissions from the Dakota Spirit AgEnergy (DSA) Ethanol facility, safely transport to the Blue Flint Sequester (BFS) facility in Underwood, North Dakota, and permanently geologically sequester the CO₂ into the active Class VI storage well. The designed transportation of the CO₂ will create a “virtual pipeline” through contracted trucking with a dedicated North Dakota-based carrier, ensuring safe and permanent delivery of CO₂ to the Blue Flint facility in McLean County, North Dakota.

The project is designed to sequester approximately 250,000 metric tons of CO₂ per year, which will significantly lower the carbon intensity (CI) of the ethanol produced at Dakota Spirit. This reduction in CI will enhance access to premium low-carbon fuel markets and unlock financial incentives under federal programs such as 45Q and 45Z. Ultimately, the project will strengthen the financial viability of Dakota Spirit’s ethanol production and the agricultural and manufacturing industries it supports across North Dakota.

Expected Results:

This project will enable the capture, transportation, and permanent storage of CO₂ from DSA into the BFS Class VI CO₂ sequestration well near Underwood, ND. The project will include the design and construction of a CO₂ capture and liquification plant and the associated loadout and receiving infrastructure. The project will secure all necessary County, State, and Federal permits and regulatory approvals to support project implementation and revenue generation. The project will design and deliver a unique trucking solution to safely transport CO₂ from the DSA capture facility to the BFS facility.

The project will generate additional tax revenue for both the local community and the State, create hundreds of temporary construction jobs, five new full-time positions at the facility, and support approximately 25 truck driving positions. In addition, it will demonstrate the technical and economic feasibility of carbon capture transportation and storage technologies while protecting and enhancing environmental quality through a significant reduction in carbon emissions.

Duration:

The project is expected to require 20 months to complete, with targeted completion in the 1st Quarter of 2027.

Total Project Cost:

Total project costs are approximately \$94,513,473. This application requests the Clean Sustainable Energy Authority for a loan of \$20,000,000 which represents approximately 20% of the total project costs.

Participants:

Harvestone Low Carbon Partners will provide overall management for the project. The Energy and Environmental Research Center (EERC) will provide technical and regulatory support. McGough will serve as Engineering Procurement and Construction (EPC) contractor, and Salof will act as the primary technology provider. Together project partners will design, manufacture and install the major equipment required for carbon capture, compression, dehydration, and liquefaction and loading of the liquefied CO₂.

PROJECT DESCRIPTION

Objectives:

The project will demonstrate CO₂ can safely be transported via truck between capture facilities and permanent storage locations. This project will capture and liquefy carbon dioxide (CO₂) emissions from the Dakota Spirit AgEnergy (DSA) Ethanol facility, safely transport the liquefied CO₂ to the Blue Flint facility in Underwood, North Dakota, and permanently geologically sequester it into an active Class VI CO₂ deep subsurface storage well. Successful deployment of this process may enable similar CO₂ transport for beneficial use projects to develop across the state.

The project will enhance the financial viability of low carbon ethanol production within the region. There are numerous markets for biofuels with aggressive carbon reduction strategies. This has increased financial opportunity for renewable fuel producers who can reduce the carbon intensity of the renewable fuel they produce. Ethanol production via fermentation generates a relatively pure stream of carbon dioxide thus avoiding the expense of gas separation. Ethanol facilities that can capture and permanently sequester the fermentation CO₂ stream represent the single largest opportunity to reduce the carbon intensity (CI) of fuel produced. This CI advantage, along with the 45Q and 45Z tax code benefit, enhances the financial incentives to permanently sequester CO₂.

The Dakota Spirit Ag Energy CO₂ Capture, Transportation, and Storage project will ensure continued market access and enhanced financial stability, while promoting economic development across industries and the state of North Dakota.

Significant due diligence has been completed, and the project is scheduled to advance. The key activities necessary to bring the CO₂ sequestration into a commercial application include:

1. Construction of the Capture Compression & Dehydration Facility (CCDF) and Loadout infrastructure
2. Design and construction of the CO₂ receiving facility and integration into flowline
3. Finalization of agreements with a dedicated carrier for CO₂ transport
4. Submission and approval of a Major Modification to the existing North Dakota Class VI CO₂ Geologic Sequestration Permit

Methodology:

This project utilizes advanced methods to capture high-purity CO₂ produced during fermentation at the Dakota Spirit Ag Energy ethanol facility. The collected CO₂ will be compressed into a liquid and loaded into specially designed transport trailers, then conveyed by a dedicated North Dakota-based carrier to a receiving location near Blue Flint. At this location, the CO₂ will be combined with the CO₂ from Blue Flint that is currently being sequestered and be injected into a permitted saline geologic formation for permanent sequestration. The methodology employs proven capture technology similar to the system

currently in use at Blue Flint ethanol. The transportation process features an innovative truck-based approach. Storage operations will comply with Class VI standards and are supported by a comprehensive Monitoring, Reporting, and Verification (MRV) plan to guarantee long-term containment.

Construct Capture Compression & Dehydration Facility and Loadout Infrastructure (CCDF)

This project includes the design, procurement, and construction of a 785 metric tonnes per day Capture, Compression, & Dehydration facility. This plant will consist of compressors, blowers, a cooling system, CO₂ purification vessels, dryers, and other process tanks and pumps, as well as the electrical gear and instrumentation systems required to operate this equipment. This project also includes the construction of a new building to house the process equipment. The system will be highly automated and will be a state-of-the-art designed and constructed facility. The loadout infrastructure includes a total of 4 storage tanks each with a capacity of ~113,000 gallons, a re-condenser system to reliquefy both vapor boil-off from the storage tanks and vapor recovered from filling trucks, as well as 4 loadout stations equipped with pumps, meters, electrical gear and automation to ensure the safe and efficient loading of liquid CO₂ into transport trailers. A small building will also be constructed to house the electrical gear and other necessary components of the loadout facility.

Construct CO₂ Receiving & Injection Facility

The CO₂ receiving facility will be constructed near the Blue Flint ethanol facility and will consist of 2 large storage tanks, each with a capacity of ~113,000 gallons, a re-condenser system to reliquefy both vapor boil-off from the storage tanks and vapor recovered during offloading from the transport trailers into the storage tanks, as well as 4 truck offloads, each with a pump that will move liquid CO₂ from the transport trailers into the storage tanks. The receiving facility will also have 2 high pressure pumps to inject the liquid CO₂ from the storage tanks into the existing Blue Flint flowline and ultimately into the Class VI injection well. This facility will also have the electrical and automation systems necessary to ensure safe and efficient offloading of liquid CO₂ into storage and ultimately injected into the Class VI well. There will be a small building constructed to house the electrical gear and other necessary functions of the offload facility.

Execute Transportation Agreements with dedicated carrier for CO₂ transport

Dakota Spirit intends to collaborate with a North Dakota-based carrier to facilitate continuous CO₂ transportation to the receiving site near Blue Flint Ethanol. The carrier will be responsible for owning and operating a fleet of CO₂ trailers designed for this purpose. HLCP has conducted a request for proposal process with multiple carriers regarding this opportunity. HLCP has selected a carrier that satisfies the necessary requirements for Dakota Spirit's CO₂ transportation needs. Final negotiations on the transportation agreement are currently in progress, with execution expected by the end of the year. This timeline is intended to allow the carrier adequate time to order dedicated CO₂ storage trailers, establish a fleet for the project, onboard the necessary drivers and employees, and be operational in advance of CO₂ capture facility completion. The principal terms of the transportation agreement are outlined in Appendix I.

Submission and approval of North Dakota Class VI CO₂ Geologic Sequestration Major Modification Permit application

HLCP contracted EERC to support development and advancement of a storage facility permit major modification for Blue Flint Sequester Company, located in McLean County, North Dakota, to increase the annual permitted injection volume to approximately 500,000 tonnes. The primary scope of work includes updating the geologic model with new surrounding well data, history matching the reservoir model with operational data, delineating an extended Area of Review (AOR) through new simulation work for the CO₂ plume extent boundaries, reestablishing the Pore Space area,, reevaluating the testing and monitoring program along with the revision of the greenhouse gas reporting program Monitoring, Reporting, and Verification (MRV) plan. The MRV plan will be submitted for approval by the Environmental Protection Agency (EPA). The modified storage facility permit will be submitted to the North Dakota Department of Mineral Resources (ND-DMR). The process will include development of permit submittal, ND-DMR review, a public hearing, and if approved a docket order.

Anticipated Results:

This project will demonstrate the safe, commercial-scale use of truck-based CO₂ transport for permanent geologic storage—a first-of-its-kind in North America. It will result in the permanent sequestration of approximately 3 million metric tons of CO₂ over the project life, reducing the carbon intensity of ethanol from Dakota Spirit Ag Energy and enabling access to premium low-carbon fuel markets. The project will also generate valuable operational, regulatory, and economic data to support the replication of this model across rural ethanol facilities, while further establishing North Dakota as a leader in flexible, scalable CCS deployment. The project will:

- Inject millions of dollars into the local economy.
- Protect existing jobs in the energy industry.
- Provide additional jobs in construction and operational phases.
- Yield environmental benefits associated with reduced carbon emissions.
- Provide incremental tax revenue to State.
- Provide new revenue stream to pore space owners.
- Provide proof of concept and inform design of potential future storage projects.
- Demonstrate class VI permit modification protocols.
- Produce liquefied CO₂ for other possible future uses.

Facilities:

The project involves two key HLCP facilities: Dakota Spirit AgEnergy (DSA) and Blue Flint Ethanol (BFE). CO₂ from the fermentation process at DSA will be captured and liquified in a newly constructed building adjacent to the DSA ethanol production facility. The liquified CO₂ will then be loaded onto CO₂ trailers through an onsite truck rack before being transported to BFE. Upon arrival at BFE, the CO₂ will be offloaded into storage adjacent to the BFE ethanol plant. The receiving site will be directly connected to the injection line for the BFE CO₂ capture facility, delivering liquid CO₂ from both facilities to the operational Class VI injection well.

Dakota Spirit AgEnergy

Harvestone Low Carbon Partners (HLCP) owns and operates the Dakota Spirit Ethanol facility near Spiritwood, North Dakota. Dakota Spirit purchases about 27 million bushels of corn from approximately 500 local corn producers and produces over 80 million gallons of ethanol each year along with an estimated 165,000 tons of dry distillers grains and about ~33 million lbs of corn oil. A byproduct of fermentation at the facility is carbon dioxide (CO₂). Dakota Spirit produces about 250,000 metric tons per year of CO₂, which is currently scrubbed and released to the atmosphere. HLCP has explored many opportunities to put this CO₂ to beneficial use and believes geological sequestration now provides the best opportunity for the biorefinery, the State, and the environment. The Capture, Compression, and Dehydration Facility (CCDF) will be located on Dakota Spirit plant property. More information about HLCP facilities is provided in APPENDIX A

The Capture Compression and Dehydration Facility will utilize a proven and established Salof liquefaction design. The Plant is designed to capture the CO₂ gas produced during the fermentation of corn into ethanol. The CO₂ Liquefaction Plant will compress, dehydrate and liquefy the CO₂. The plant is designed to meet throughput, purity, and electrical consumption guarantees under worst case supply temperature and pressure scenarios. In addition, the plant is normally able to operate at a 28% turndown ratio. An overview and process flow for the liquefaction plant and loadout is provided in APPENDIX H.

Blue Flint Ethanol

The captured and liquefied CO₂ will be transported from Dakota Spirit AgEnergy to the Blue Flint Ethanol facility using a dedicated fleet of trucks. Upon arrival at the Blue Flint Ethanol production plant, the CO₂ will be offloaded at designated truck offloading racks and be transferred into onsite storage tanks located adjacent to the plant.

Once unloaded and stored, high pressure pumps will increase the CO₂ pressure to a super critical state and push directly into an existing flowline that currently handles the CO₂ stream captured from the Blue Flint Ethanol facility. This process enables the commingled sequestration of CO₂ from both the Dakota Spirit AgEnergy and Blue Flint Ethanol facilities at the CO₂ injection well, supporting integrated carbon storage efforts.

The receiving facility will feature two large storage tanks (~113,000 gallons each), advanced vapor recovery and re-liquefaction systems, multiple truck offload stations with pumps, high-pressure pumps for flowline injection, and integrated electrical and automation equipment housed in a dedicated building. This comprehensive system will enable the safe and efficient offloading, storage, and sequestration of CO₂, supporting future storage initiatives and providing new revenue streams for pore space owners.

Resources:

Key resources include CO₂ capture and compression equipment, specialized transport trailers, receiving infrastructure near the storage site, and qualified personnel for operations, monitoring, and regulatory compliance.

HLCP will be reliant on various project partners, technical experts, professional contractors, and service providers to complete the construction and permitting for the project.

The capture, loadout, receiving, metering, and pumping assets will utilize engineering, design, and construction managed by McGough which is providing an EPC wrap to the project. They will be supported by multiple subcontractors and technology providers such as Salof.

Subsurface technical expertise along with modeling and permitting development will be provided by HLCP and the EERC.

HLCP- HLCP team successfully developed and has operated the Blue Flint Capture and Sequestration site since October 2023- demonstrating both developmental and operational skills unique in any industry. They have met all regulatory requirements and have successfully negotiated and put in place the first of its kind Tax Equity Transaction with Bank of America.

McGough – McGough is a premier construction firm with offices in key markets in the central and southern US and operates nationally. McGough has a history of successfully completing complex industrial projects spanning from power generation, agriculture and food processing, refineries, water/wastewater, manufacturing and more. McGough will serve as EPC for the construction of the Capture, Compression, and Dehydration facility located at DSA

Salof Ltd Inc. – Salof is a manufacturer of modular process systems for the CO₂, LNG, and industrial refrigeration markets, based in New Braunfels, Texas. The company specializes in systems for carbon capture and storage, CO₂ liquefaction, natural gas processing, and heavy hydrocarbon removal, offering turnkey solutions and aftermarket services.

I. C. Thomasson – I. C. Thomasson Associates, Inc., a Salas O'Brien Company (ICT) is an employee-owned, multidisciplinary engineering consulting firm providing expertise in mechanical, electrical, controls, plumbing, fire protection, information technology, energy efficiency, and environmental services.

KLJ – KLJ Engineering is a national, multi-disciplinary engineering firm founded in 1938 that provides services in a wide range of areas including aviation, power, environmental, public works, structural, and land development. The company offers planning, design, and support for infrastructure projects and works with both public and private clients across the United States from its headquarters in Bismarck, North Dakota.

EERC – The Energy & Environmental Research Center is a research, development, demonstration, and commercialization facility focused on energy and environment technologies development. For over 20 years, the EERC has been a world leader in carbon storage, providing foundational site characterization, laboratory analyses, modeling, simulation, and regulatory permitting support. The EERC has a successful track record across the energy industry and with North Dakota's Underground Injection Control (UIC) Class VI permitting program authorities to permit commercial-scale CCS projects.

Dedicated Carrier – Dakota Spirit will partner with a dedicated, ND based carrier to operate 24/7 transportation of CO₂ to the receiving site at Blue Flint Ethanol. The carrier will own and operate a specialized fleet of CO₂ trailers. HLCP has completed a Request for Proposal (RFP) process with multiple local and national carriers participating. HLCP has selected a carrier and is currently in final negotiations of the transportation agreement. Key terms of the transportation agreement can be found in Appendix I

Techniques to Be Used, Their Availability and Capability:

All efforts will be led by the HLCP team who successfully developed and are currently operating the Blue Flint CCS project. The project integrates proven technologies, including CO₂ capture from ethanol fermentation, compression, truck-based transport, and Class VI geologic storage. While each technique is commercially available, truck-based CO₂ transport has traditionally been utilized to transport industrial and beverage grade CO₂ at conditions similar to those that will be utilized in this project. This project will be the first to demonstrate trucked CO₂ transport and storage at full commercial scale, establishing its viability for broader deployment across rural regions without pipeline access and can be a demonstration of how this could be applied for beneficial uses such as enhance oil recovery (EOR).

Environmental and Economic Impacts while Project is under Construction:

Environmental Impacts

The project is expected to significantly reduce the lifecycle carbon emissions of ethanol produced by Dakota Spirit by 40%. This reduction will enhance access to high value low-carbon fuel markets and help meet environmental targets set by local, state, and federal jurisdictions, while also delivering a range of broader environmental benefits.

By integrating proven CO₂ capture from ethanol fermentation, compression, truck-based transport, and Class VI geologic storage, the project demonstrates a comprehensive approach to minimizing the carbon footprint associated with ethanol production. This effort supports the transition to cleaner energy by preventing substantial volumes of CO₂ from being released into the atmosphere, thereby contributing to climate change mitigation.

Furthermore, the project's deployment of truck-based CO₂ transport and storage at commercial scale is particularly significant for rural regions without pipeline access. It establishes a replicable model for carbon management in agricultural areas, helping preserve the viability of local biofuel industries and supporting sustainable rural economies.

During the construction phase, environmental impacts will be carefully managed to minimize the project's footprint. Efforts will focus on limiting land disturbance and controlling emissions from construction activities and trucking operations. The project's commitment to environmental stewardship extends to ensuring compliance with all applicable regulations and pursuing best practices in carbon capture and storage.

In the long term, the successful implementation of this project positions North Dakota as a leader in flexible carbon capture and storage (CCS) deployment. It lays the groundwork for future low-carbon

infrastructure and the potential for additional applications such as enhanced oil recovery (EOR). The knowledge and operational experience gained will inform the development of future large-scale CO₂ transport and storage projects, further amplifying the project's positive environmental impact across the region.

Economic Impacts

Ensuring continuous operations at DSA during challenging market conditions will positively affect the economy of central North Dakota. Ethanol production serves as a market outlet for local corn producers. Without ethanol production, producers may experience higher transportation costs, lower basis, and more difficulty marketing their corn. HLCP employs approximately 160 staff and has annual payroll of approximately \$22 million per year. Corn purchases at DSA and BFE will likely exceed \$200 million in value passed to local producers and into adjacent communities in 2025.

This project will require an investment of nearly \$95 million to reach commercial production. During construction, businesses providing skilled contract work will be needed. Industries such as hospitality and tourism will see additional customers, as contract workers will require hotels, fuel, and other amenities. The project will also include real property components that will generate additional value to support local county and school districts. The project will also comply with Federal Prevailing Wage and Apprenticeship requirements.

The project's real property components are expected to generate new taxable value, providing additional revenue streams to support local county governments and school districts. These investments not only boost immediate economic activity but also lay a foundation for long-term community growth by enhancing infrastructure and public services.

On a broader scale, the project helps sustain the agricultural economy by ensuring continued demand for corn from local producers. By keeping biofuel markets open and competitive, it protects farm income and supports rural livelihoods. Payments to property owners for subsurface pore space use will also serve as an investment in the rural economy, incentivizing participation and benefiting landowners.

The successful implementation of this project positions North Dakota as a leader in flexible carbon capture and storage (CCS) deployment. It creates a replicable model for ethanol plants and rural industries lacking pipeline access, further enhancing economic stability by attracting future CCS-related investments and associated industries. The resulting knowledge and operational experience will support the development of additional large-scale CO₂ transport and storage projects, including EOR, amplifying economic impacts across the region.

Ultimately, the project serves as a catalyst for both immediate and sustained economic growth, helping secure the viability of local agriculture, expanding job opportunities, and strengthening the fiscal health of communities throughout central North Dakota.

Ultimate Technological and Economic Impacts:

This project positions North Dakota as a leader in flexible CCS deployment, demonstrating that truck-based CO₂ transport can operate successfully at commercial scale. It creates a model for ethanol plants and rural industries without pipeline access, helping sustain local agriculture by keeping biofuel markets open and competitive. It also lays the groundwork for future low-carbon infrastructure and potential CO₂ supply for EOR.

Commercial Scale operation proves technology viability

Dakota Spirit produces about 250,000 tonnes per year of CO₂. Much larger sources of CO₂ exist in ND with limited access to on-site sequestration. This project will produce valuable knowledge that could enable future efforts in large-scale CO₂ transport and storage. HLCP intends to optimize the process of storing, loading, transporting, and receiving CO₂ via truck. The project will develop best practices to ensure this process is safe and efficient. It will focus on maximizing timeliness and capacity of transport to drive down transport costs and minimize CO₂ losses associated with loading and unloading.

This project will be the first ever Major Modification to a ND issued Class VI Storage Facility permit. The process utilized for modifying the permit will provide a template for any future Class VI modifications required in ND.

Improved viability of ethanol plants

For ethanol plants to remain competitive it is critical to differentiate our products and create new markets beyond the commodity demand for fuel ethanol. Decreasing the carbon intensity of ethanol through CCS represents the best opportunity to differentiate the commodities we produce from those of other producers and position our company assets to operate at full capacity for years to come.

Economics to Surface/Pore space ownership

With the State's primacy for authority and regulation of Class VI Geologic Subsurface Storage wells along with favorable geologic formations, North Dakota is a popular target for Carbon Capture and Storage (CCS) projects. In a carbon-constrained future, CCS projects will continue to be a mechanism by which North Dakota could continue to supply energy from our diverse fuel sources to the nation. Assets within the state and from outside are investigating storage opportunities with a primary focus being in the western and central regions. In North Dakota, subsurface pore space is considered the property of the surface owner. Therefore, to inject and store CO₂ in the subsurface, financial consideration must be provided to the surface owner. These payments will serve as an investment in the rural economy.

Why the Project is Needed:

This project addresses a critical gap in carbon capture infrastructure for rural ethanol producers who lack access to CO₂ pipelines or nearby geologic storage capabilities. Without a viable transport and sequestration solution, these facilities risk losing access to low-carbon fuel markets and valuable incentives such as the 45Q or 45Z tax credit. By demonstrating that truck-based CO₂ transport to permanent storage can operate successfully at commercial scale, this project ensures that North Dakota's farming and biofuel economy remains competitive. It also strengthens the state's position as a national leader in carbon management, enabling broader CCS adoption across rural America, and could also enable potential future applications such as enhanced oil recovery (EOR).

STANDARDS OF SUCCESS

Emissions reduction and reduced environmental impacts

Measuring success against an emission reduction goal for this project is straightforward from a measurement standpoint compared to other projects. The EPA specifies measurement techniques and calculations to ultimately track the amount of carbon dioxide stored. This project will sequester approximately 250,000 tons of CO₂ per year from fermentation, which is the equivalent to taking about 50,000 cars off the road each year. Over its planned lifespan this project will prevent more than 3 million tons of CO₂ emissions from reaching our atmosphere. We believe opportunity exists to expand the project and provide even larger reductions if incentives and regulations to minimize CO₂ emissions are maintained or increased.

Increased energy sustainability

Ethanol is a renewable fuel. It is already the most widely accepted and cost-effective alternative to increase sustainability in liquid transportation fuels. The biogenic CO₂ emitted from the fermentation process is the same CO₂ that corn originally captured from the atmosphere during photosynthesis. Therefore, CCS from ethanol fermentation can be viewed as removing CO₂ from the atmosphere while concurrently producing a sustainable liquid transportation fuel. There is approximately a 40% reduction of carbon intensity of the ethanol production process when deploying carbon capture.

Value to North Dakota

The ethanol industry has substantial economic effects on the overall economy of North Dakota. About half of the corn grown in the state is utilized in ethanol production. Providing low carbon intensity transportation fuel has been a foundational element of HLCP's business model. Another sequestration project will further solidify the financial future for the organization, its employees, and the local suppliers who rely on HLCP as a purchaser or supplier of goods and services. Both Agricultural and Energy leaders recognize the value of this project to North Dakota. Letters of support can be found in Appendix D, attached to the application.

According to the North Dakota Department of Mineral Resources (DMR), the Bakken Formation holds an estimated 167 billion barrels of oil in place (OIP). To date, cumulative production has reached roughly 5 billion barrels, meaning less than 3% of the in-place resource has been recovered. This extremely low recovery factor highlights both the tight nature of the Bakken reservoir and its substantial untapped potential.

Looking ahead, CO₂-enhanced oil recovery (EOR) represents a promising path to unlock additional barrels from this mature unconventional play. The combination of existing extensive well infrastructure, advanced completion technologies, and the growing availability of captured CO₂ make it technically feasible to test and scale CO₂ injection in selected areas.

Pilot-scale CO₂ injection tests will be essential to evaluate injectivity, miscibility, and incremental recovery under Bakken-specific conditions. The EERC led Bakken Production Optimization Program (BPOP) report on EOR recovery studies published on April 30, 2021 indicates “CO₂ needs to be tested on a larger scale... logistics of gathering and handling it... both from sourcing and transportation... within oilfield EOR operations.”

The availability of a liquid CO₂ supply, which can be trucked to pilot sites, offers a practical and localized source of large, continuous CO₂ volumes—an important enabler for near-term field trials. Successful pilots would establish the technical and economic foundation for broader CO₂ EOR deployment across the Bakken, improving recovery efficiency while contributing to emissions reduction and carbon management goals.

Explanation of how the public and private sector will make use of the project's results, and when and in what way.

Former Governor Burgum set a goal for the state of North Dakota to be carbon neutral by 2030. “Of all the opportunities, perhaps none has more potential than carbon capture and storage,” he said on May 15, 2021¹. Successful execution of this project will exemplify steps and strategies others can follow to help North Dakota reach this goal through “innovation not regulation.” This innovative commercial scale project will provide a clear roadmap for similar projects that do not have direct access to pipeline or the geology necessary for sequestration.

This project will be the first major modification submittal of a ND-DMR Class VI geologic sequestration permit, setting the development and standard for all future ND Class VI permit modifications. Establishing the blueprint for the permit modification application will allow other operators the benefit of improved efficiency in the application process, reduced redundancy in documentation, and a more organized review by the ND-DMR permitting authority. This will provide clarity between the operator and ND-DMR authority with a structured approach to include essential information as per modification type, such as updated site characterization, operational history matching, AOR delineation, pore space agreements, and testing and monitoring plans, ensuring compliance with specific provisions of the Class VI regulations.

The potential commercialization of the project's results

This IS a commercial project. Commercialization of non-pipeline CO₂ transport presents a pathway for ethanol producers without access to suitable geological formations and the ability supports future opportunities around enhanced oil recovery.

How the project will enhance the research, development and technologies that reduce environmental impacts and increase sustainability of energy production and delivery of North Dakota's energy resources

This project will improve upon existing CCDF design to increase both the percentage of CO₂ captured and the energy efficiency of this design. Demonstration of commercial scale CO₂ transportation for sequestration will provide valuable insights around trucking efficiencies, transport, loading, and offloading. This will benefit future project development for CO₂ sources without immediate access to geological formation or other CO₂ transportation mechanisms.

How it will preserve existing jobs and create new ones

The completion of this project will help ensure North Dakota maintains access to high paying jobs. It helps ensure the existing HLCP workforce of around 160 employees has sustained employment. Construction of the compression plant, CO₂ transport solution, and the CO₂ stream unloading/receiving infrastructure will require several hundred contractors over the nearly two years required to complete the project. The construction phase will also provide apprenticeship opportunities. Following completion, the operating assets will require additional labor, services and contractors to operate, maintain, monitor, inspect, and perform workover services. This will create new jobs for both skilled and unskilled labor. The trucking company selected to provide the logistics of CO₂ transport expects to create at least 25 new jobs to ensure adequate manpower to move the contracted volumes.

How it will otherwise satisfy the purposes established in the mission of the program

This project directly supports the CSEA purpose statement by advancing research, development, and commercialization of carbon capture and storage technologies that significantly reduce environmental impacts and enhance the sustainability of North Dakota's energy production. By serving as a blueprint for future ND Class VI permit modifications, the project encourages innovation and sets industry standards, fostering partnerships between public and private sectors to accelerate large-scale deployment of clean energy solutions.

The financial support provided through CSEA enables this project to leverage proven CCS infrastructure and technologies, positioning North Dakota as a leader in clean, sustainable energy. The project's focus on commercialization—particularly for non-pipeline CO₂ transport—opens new pathways for industries such as ethanol production and enhanced oil recovery, diversifying and growing the state's economy. Additionally, the creation and preservation of high-paying jobs, apprenticeship opportunities, and workforce development further contribute to economic growth and sustainability in rural communities, in alignment with CSEA's mission.

BACKGROUND/QUALIFICATIONS

The applicant, **Harvestone Low Carbon Partners (HLCP)**, has direct and relevant experience developing and operating carbon capture and storage (CCS) projects in North Dakota. Most notably, Harvestone successfully built and for the past two years has safely operated the Blue Flint CCS facility. This site is a fully permitted and operational Class VI geologic storage project, making it one of the few active commercial CCS sites in the United States. Its performance has validated the viability of saline storage in the region.

The Blue Flint CCS site also serves as the designated storage location for the current project, and much of the capture and transport infrastructure will leverage the same proven technology and operational design already in use. This ensures a high level of technical readiness and project risk mitigation.

The CO₂ capture at Dakota Spirit Ag Energy (DSA) will utilize established fermentation-based capture systems, similar to those already deployed and integrated with Blue Flint, further demonstrating the continuity and reliability of the approach.

Key personnel at Harvestone bring deep expertise in CCS development, permitting, operations, and regulatory compliance:

- **Jeff Zueger** – Chief Executive Officer
- **Adam Dunlop** – Chief Development Officer
- **Zach Liu** – Director of Subsurface CCUS
- **Cathy Stevens** – Subsurface Regulatory Manager
- **Brian Markegard** – Senior Process Engineer
- **Jeff Martian** – Senior Process Engineer

Together, this team has successfully advanced CCS in North Dakota from concept to operation, making them uniquely qualified to deliver the proposed project safely, efficiently, and at commercial scale.

Additional technical expertise to the project will be provided by various contractors, service providers and prospective project partners. Organizational descriptions and expertise of key project partners and service providers can be found in the following appendices:

- APPENDIX A – Harvestone Low Carbon Partners
- APPENDIX B – McGough
- APPENDIX C – Salof LTD
- APPENDIX D – EERC
- APPENDIX E – ICT
- APPENDIX F – KLJ

MANAGEMENT

The project will be led and managed by **Adam Dunlop**, Chief Development Officer at Harvestone Low Carbon Partners. Mr. Dunlop and his team bring deep experience in low-carbon project development and operational expertise. They will oversee all aspects of execution, ensuring alignment with the project's technical, regulatory, and commercial goals.

Harvestone will use its proven project management structure, developed and refined through the successful development, construction, and operation of the Blue Flint CCS project. A dedicated project team, reporting to Mr. Dunlop, will coordinate all day-to-day activities, including CO₂ capture integration at Dakota Spirit Ag Energy, transportation logistics, and injection operations at the Blue Flint site.

Harvestone will follow a stage-gate project management framework, with clear milestones, deliverables, and risk assessments at each stage. Oversight will include regular internal reviews and coordination across engineering, operations, regulatory, and commercial teams. Contractors and vendors will be managed through performance-based metrics and regular progress checks.

Key Milestones throughout the project will include:

- Completion of engineering and procurement for key systems
- Construction and installation of capture, loading, and injection equipment
- System commissioning and start of CO₂ transport and injection
- Major Modification of the Class VI Geologic Sequestration Permit
- Executed Transportation Agreement
- Periodic safety and environmental audits

Project progress will be tracked against a detailed schedule, with frequent reporting and stakeholder updates to ensure transparency, accountability, and timely delivery of all objectives.

TIMETABLE

HLCP has assembled an overall project timeline based on schedules and proposals for the various tasks described in the Methodology and Project Description sections. This compilation has the project substantially complete and injection commencing in Q1 2027. We believe this to be a conservative and achievable timeline.

A Gantt chart indicating key tasks and timelines is provided in APPENDIX G.

BUDGET

| Project Associated Expense | Total Cost | NDIC's Share Loan | Applicant Share (Cash) |
|-----------------------------------|----------------------|----------------------|---------------------------|
| Capture, Compression, & Loadout | \$ 67,621,339 | \$ 20,000,000 | \$ 47,621,339 |
| Class VI Permit Modification | 600,000 | | 600,000 |
| Receiving & High Pressure Pumping | 16,800,000 | | 16,800,000 |
| Legal | 900,000 | | 900,000 |
| Contingency (10%) | 8,592,134 | | 8,592,134 |
| Project Total | \$ 94,513,473 | \$ 20,000,000 | \$ 74,513,473 |

Please use the space below to justify project expenses and discuss whether the project's objectives will be unattainable or delayed if less funding is available than requested.

Project costs are based on proposals, quotes, and estimates from strategic partners. The Capture, Compression, & Loadout cost covers the design and construction of the capture and loadout facilities at Dakota Spirit. Class VI Permit Modification includes expenses for a major permit modification to an existing Class VI storage facility. Receiving & High-Pressure Pumping costs pertain to new offloading infrastructure at Blue Flint Ethanol and the CO₂ injection flowline connection. Legal costs cover permit modification fees and execution of the Transportation Agreement. A 10% contingency is included to manage unexpected construction overruns and maintain financial targets.

HLCP's request for \$20,000,000 through the CSEA Loan application represents approximately 20% of total project cost with the remaining balance funded other mechanisms and cash generated from HLCP operations.

CONFIDENTIAL INFORMATION

HLCP has included confidential information regarding the project business plan, containing historical company financial statements, and project budget projections, and investment returns in Appendix J. HLCP is a privately held entity. It is HLCP's policy to not release financial and other sensitive information to the public. The management of HLCP is responsible for complying with and maintaining this code of conduct as defined in the company's policy. An executed confidentiality agreement or non-disclosure agreement is required for third parties to view HLCP's confidential and sensitive information.

As part of the application, HLCP has also included technical drawings provided by our technology partner Salof in Appendix H. HLCP has also included a preliminary draft of the transportation agreement terms yet to be finalized with the transportation partner.

HLCP has completed and attached the confidentiality request template provided with the application and provided a separate Confidential Appendix.

PATENTS/RIGHTS TO TECHNICAL DATA

Any patents or rights that the applicant wishes to reserve must be identified in the application. If this does not apply to your proposal, please note that below.

Not Applicable

STATE PROGRAMS AND INCENTIVES

Any programs or incentives from the State that the applicant has participated in within the last five years should be listed below, along with the timeframe and value.

In the past 5 years, HLCP and its subsidiaries have participated in the following state programs and incentives:

- **NDIC LRC Grant to drill stratigraphic test well:** Awarded 2020-\$3,388,000 plus up to \$250,000 (Amend #1); \$2,903,349 funded in March 2021
- **ERP Loan:** Funded on September 10, 2020. The proceeds were \$10,000,000.
- **NDIC Renewable Energy Program Grant for Seismic Survey to Advance Potential CO₂ Storage in Eastern North Dakota:** Awarded \$324,460 in 2021.
- **CSEA Loan:** Funded on December 1, 2022. The proceeds were \$15,000,000.

Industrial Commission
Tax Liability Statement

Applicant: HLCP ProdCo, LLC

Application Title: Carbon Dioxide Capture, Transportation, and Storage for Dakota Spirit AgEnergy

Program:

- Lignite Research, Development and Marketing Program
- Renewable Energy Program
- Oil & Gas Research Program
- Clean Sustainable Energy Authority

Certification:

I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.



Jeff Zueger

Signature

Chief Executive Officer

Title

October 15, 2025

Date

LETTERS OF SUPPORT

North Dakota Agriculture Commissioner

North Dakota Farmers Union

North Dakota State Senator Wanzek

North Dakota State Representative Satrom

Mayor of Jamestown



STATE OF NORTH DAKOTA
DEPARTMENT OF AGRICULTURE
600 E BOULEVARD AVE, DEPT 602
BISMARCK, ND 58505-0020

DOUG GOEHRING
COMMISSIONER

October 9, 2025

North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

RE: Dakota Spirit AgEnergy Clean Sustainable Energy Application

Dear Members of the North Dakota Industrial Commission:

I am writing in support of Dakota Spirit AgEnergy's project of Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for the Clean Sustainable Energy loan request.

This initiative promotes innovation within North Dakota's agricultural and energy sectors while generating measurable economic benefits for the state. The project aims to advance carbon capture, develop non-pipeline transportation solutions, and enhance storage capabilities at ethanol facilities, creating new market opportunities and improving profitability for local corn producers. Integrating sustainable technologies into ethanol production strengthens long-term market access for agricultural commodities and supports the continued success of biorefineries and their supply networks across North Dakota. Additionally, this project leverages federal incentives such as the 45Q and 45Z tax credits, enhancing competitiveness in both domestic and international renewable fuel markets. The initiative advances environmental stewardship by producing lower-carbon fuels and promoting sustainable economic growth practices. Comprehensive due diligence has been conducted to ensure the project's safety and compliance with all applicable standards and regulations.

I recommend approval of Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage project for the Clean Sustainable Energy loan. Thank you for your consideration of this application.

Sincerely,

A handwritten signature in blue ink, appearing to read "Doug Goehring".

Doug Goehring
Agriculture Commissioner



PO Box 2136 • 1415 12th Ave SE
Jamestown, ND 58401
800-366-8331 • 701-252-2341
ndfu.org

October 10, 2025

North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

RE: Support of *Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage Project*

Dear Industrial Commission Members,

North Dakota Farmers Union supports Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage project and its request for a Clean Sustainable Energy loan.

This initiative represents an investment in North Dakota agriculture, offering measurable economic stability and long-term sustainability for our state's farmers.

The success of our state's corn growers is fundamentally linked to the vitality of the ethanol industry. Dakota Spirit AgEnergy's project will directly benefit family farmers adding even more value to North Dakota's ethanol and inherently to its corn crop. This effort positions North Dakota ethanol as a leading lower-carbon fuel. It creates sustainable market advantages, by integrating advanced technologies and the pursuit of federal incentives like the 45Q and 45Z tax credits. This is crucial for securing long-term market access in an increasingly carbon-conscious global and domestic energy landscape.

This project is not just an investment in a single facility but a critical infrastructure asset that supports an entire supply chain. We urge you to approve the requested financing, recognizing that this is a strategic investment that aligns state economic development goals and profitability needs of North Dakota agriculture.

North Dakota Farmers Union recommends approval of a Clean Sustainable Energy Loan to support Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage Project.

Sincerely,
NORTH DAKOTA FARMERS UNION

Mark Watne
President





North Dakota Senate

STATE CAPITOL
600 EAST BOULEVARD
BISMARCK, ND 58505-0360



Senator Terry M. Wanzek

District 29
900 Seventh Avenue SW
Jamestown, ND 58401-4542
tmwanzek@ndlegis.gov

COMMITTEES:

Appropriations - Government Operations Division, Chairman

October 10, 2025

North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Members of the North Dakota Industrial Commission,

My name is Terry Wanzek. I'm a ND State Senator and a ND Farmer from Jamestown. I represent District 29 in the ND Senate. Sitting in a combine day after day, with auto steer, harvesting soybeans and corn, affords me a lot of time to think and ponder on the challenges of today's business environment. I'm reminded of the importance of exploring, developing, enhancing and/or expanding our marketing potential in Agriculture and Energy industries in ND. It's vitally important that we keep up with the new innovative marketing opportunities and ideas that cross our paths.

I am writing in strong support of Dakota Spirit AgEnergy's project of Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for the Clean Sustainable Energy loan. This initiative promotes innovation within North Dakota's agricultural and energy sectors while generating measurable economic benefits for the state. The project aims to advance carbon capture, develop non-pipeline transportation solutions, and enhance storage capabilities at ethanol facilities, creating new market opportunities and improving profitability for local corn producers. Integrating sustainable technologies into ethanol production strengthens long-term market access for agricultural commodities and supports the continued success of biorefineries and their supply networks across North Dakota.

Additionally, this project leverages federal incentives such as the 45Q and 45Z tax credits, enhancing competitiveness in both domestic and international renewable fuel markets. The initiative advances environmental stewardship by producing lower-carbon fuels and promoting sustainable economic growth practices. Comprehensive due diligence has been conducted to ensure the project's safety and compliance with all applicable standards and regulations.

ND businesses, like Dakota Spirit AgEnergy, leaders in their industry, need our support in developing North Dakota's promising future economy. I strongly recommend approval of Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage project for the Clean Sustainable Energy loan.

Sincerely,


Terry Wanzek (Oct 10, 2025 09:01:55 CDT)

Senator Terry M Wanzek
ND Senate, District 29
Cell # 701-320-3303

October 7, 2025

North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Members of the North Dakota Industrial Commission,

Ethanol is an important component of our state's economy. For that reason I am writing in strong support of Dakota Spirit AgEnergy's project of Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for the Clean Sustainable Energy loan request.

This initiative promotes innovation within North Dakota's agricultural and energy sectors while generating measurable economic benefits for the state. The project aims to advance carbon capture, develop non-pipeline transportation solutions, and enhance storage capabilities at ethanol facilities, creating new market opportunities and improving profitability for local corn producers. Integrating sustainable technologies into ethanol production strengthens long-term market access for agricultural commodities and supports the continued success of biorefineries and their supply networks across North Dakota. Additionally, this project leverages federal incentives such as the 45Q and 45Z tax credits, enhancing competitiveness in both domestic and international renewable fuel markets. The initiative advances environmental stewardship by producing lower-carbon fuels and promoting sustainable economic growth practices. Comprehensive due diligence has been conducted to ensure the project's safety and compliance with all applicable standards and regulations.

I strongly recommend approval of Dakota Spirit AgEnergy's Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage project for the Clean Sustainable Energy loan to build a brighter future.

Sincerely,

Rep. Bernie Satrom D12
PO Box 950
Jamestown, ND 58402
701 320 7239 Cell

DWAINE HEINRICH, MAYOR
102 THIRD AVENUE SOUTHEAST
JAMESTOWN, ND 58401



701-252-5900 CITY HALL
dheinrich@JamestownND.gov
www.JamestownND.gov

October 9, 2025

North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Members of the North Dakota Industrial Commission:

As you are aware, the Dakota Spirit AgEnergy ethanol plant east of Jamestown contributes significantly to the economy of this region as well as the economy of North Dakota. The construction of Dakota Spirit AgEnergy was and continues to be a boon to North Dakota's ag and energy sector's impact upon all of North Dakota and is a significant contribution of our area's value added ag industry.

Dakota Spirit AgEnergy will be submitting a Clean Sustainable Energy Grant and Loan Application for the Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage from Dakota Spirit AgEnergy.

I am writing to you today as Mayor of Jamestown to express my support for Dakota Spirit AgEnergy and their grant and loan application. In doing so I am confident that I am speaking for the vast majority of Jamestown as well as Stutsman County residents.

Your thoughtful consideration of and approval of the application from Dakota Spirit AgEnergy will go a long way to advance this important project.

Should you have any questions or concerns, please do not hesitate to contact me at any time.

Respectfully submitted,

A handwritten signature in blue ink that reads "Dwaine Heinrich". The signature is written in a cursive style.

Dwaine Heinrich, Mayor
City of Jamestown, North Dakota



DAKOTA SPIRIT
A HARVESTONE COMPANY

APPENDIX SUMMARY

APPENDIX A

HLCP Overview

APPENDIX B

McGough Overview

APPENDIX C

Salof Overview

APPENDIX D

EERC Overview

APPENDIX E

ICT Overview

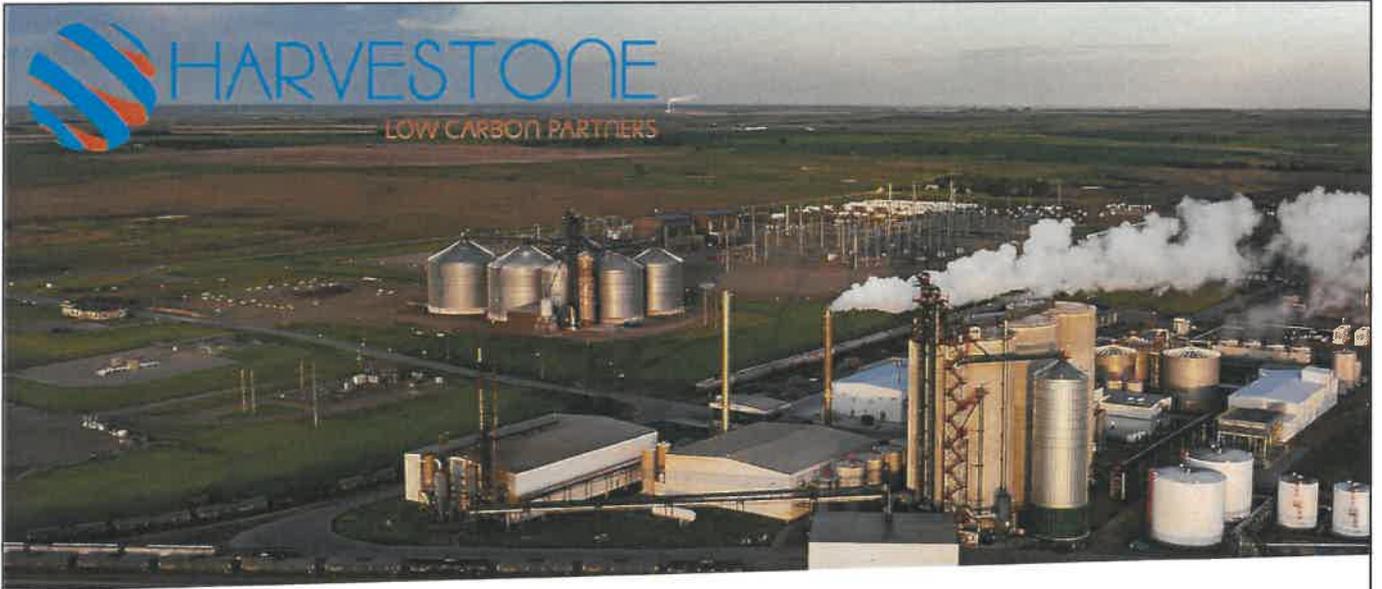
APPENDIX F

KLJ Overview

APPENDIX G

Project Schedule

APPENDIX A
HLCP OVERVIEW



HLCP Overview

October 2025

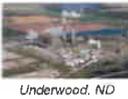
Confidential

Scaled Low-Cl Bioethanol Platform with Attractive Visible Growth Through CCS Development

Key Highlights

| | |
|--|--|
| Scaled Low-Cl Bioethanol Production | <ul style="list-style-type: none"> 3 operating top tier corn-based biorefineries ~220MM gallons of bioethanol produced per year |
| In-Service Carbon Capture & Sequestration (CCS) | <ul style="list-style-type: none"> 1 of only a few operating bioethanol CCS plants in the world; strong operating history since COD in October 2023 1 of only 8 Class VI permit holders in the U.S. >200,000 metric tons (mt) of current and future CO₂ captured per year at BFE With a post-CCS Carbon Intensity (CI) score of 0.4, BFE is the lowest U.S. CI bioethanol provider in the market |
| Vertical Integration | <ul style="list-style-type: none"> Advantaged geology enables on-site sequestration and vertically integrated CCS operations Allows for full capture of low-Cl economics and zero dependence on third-party CO₂ pipeline infrastructure or sequestration solution |
| LCFS Bioethanol Sales Agreements | <ul style="list-style-type: none"> Low-Cl bioethanol sold to I-Grade counterparties located in premium LCFS markets |
| Tax Equity Financing (TEF) | <ul style="list-style-type: none"> Closed first-of-its-kind Tax Equity Financing in 2024 Enables monetization of 45Q and 45Z tax credits earned in connection with ongoing CCS activities at BFE |
| CCS Growth Projects | <ul style="list-style-type: none"> Projects under development at DSA and IBEC will capture an additional ~400,000 mt of CO₂/year Land required for IBEC CCS already owned and subsurface geology de-risked from stratigraphic test well Highly attractive project returns |

Asset Overview

| Facility | Description | CCS |
|---------------------------------------|---|----------------|
| Blue Flint Ethanol (BFE) |  <ul style="list-style-type: none"> 76MM gallons of bioethanol / year >200,000 mt of CO₂ / year Co-located combined heat and power drives lower cost and CI Actively shipping low-Cl bioethanol into premium LCFS markets under long term offtakes | Active |
| Dakota Spirit AgEnergy (DSA) |  <ul style="list-style-type: none"> 84MM gallons of bioethanol / year >235,000 mt of CO₂ / year Co-located combined heat and power drives lower cost and CI Access to multiple LCFS markets ND primacy will result in shortened Class VI permit timeline | Online 1Q 2027 |
| Iroquois Bio-Energy Co. (IBEC) |  <ul style="list-style-type: none"> 60MM gallons of bioethanol / year >165,000 mt of CO₂ / year Access to multiple LCFS markets Stratigraphic test well completed, pore space secured, permit developed | Online 1Q 2028 |

3 Top-Tier Bioethanol Production Facilities Driven by Operational Excellence, Strong Corn & Bioethanol Basis, and Proximity to Attractive CCS Geology



Source: Company Management
 (1) HLCP Unaudited financial statements for the year ending 12/31/2024

BFE – One-of-a-Kind Bioethanol Facility & CCS Asset

BFE Bioethanol Facility Key Stats

Underwood, ND



| | | |
|----------------|--------------------------------------|---|
| Plant Overview | Location | Underwood, ND |
| | Plant Technology | ICM / Fagen |
| | Plant Commissioned | 2007 |
| | Rail Service | Canadian Pacific |
| Capacity | LCFS Markets Served | Actively shipping low-Cl bioethanol into premium LCFS markets |
| | Production Capacity (MM gal/year) | 78.0 |
| | Corn Consumption (MM bushels/year) | 25.3 |
| | DDGS Production (Tons/year) | 150,774 |
| | Corn Oil Production (MM lbs/year) | 23.2 |
| | CO ₂ Production (mt/year) | >200,000 |
| | Actual CCS Start-Up | Q4 2023 |



BFE Bioethanol Facility Overview

- Commissioned in February 2007 as a 50 MGY plant and located in Underwood, ND
- Co-located with Coal Creek Station (1,200 MW Power Plant)
 - BFE utilizes low grade steam from Coal Creek Station (CC Station) resulting in:
 - Favorable Cl score in LCFS markets
 - Low-cost thermal energy
 - Redundant thermal energy supply – higher online time
- On-site, redundant combined heat & power back-up from natural gas commissioned in 2023 if CC Station is ever retired or service is interrupted
 - Enables access to LCFS markets, additional redundancy, and low energy input cost
- Total of 3.7MM bushels of corn storage
 - Including 2.2MM bushels at CC Drying & Storage, which is co-located with BFE
- 3 steam tube DDGS low temperature dryers
- Produces 76MM gallons of bioethanol / year
- Robust U.S. and Canadian market access via Canadian Pacific rail enables lowest shipping cost into Western Canada
 - Short line corn rail supply agreement as backstop to local corn via truck
- Blue Flint CCS assets commissioned in October 2023
 - Capturing and sequestering an annualized >210,000 mt of CO₂ per year
- Please click on the photo or link below to watch a video on CO₂ Carbon Capture & Storage at the Blue Flint Ethanol plant in North Dakota
 - [CO₂ Carbon Capture & Storage at the Blue Flint Ethanol](#)

DSA – Attractive Bioethanol Facility with CCS Development Underway

DSA Bioethanol Facility Key Stats

Spiritwood, ND



| | | |
|----------------|--------------------------------------|---------------------------------|
| Plant Overview | Location | Spiritwood, ND |
| | Plant Technology | KFI / McGeugh |
| | Plant Commissioned | 2015 |
| | Rail Service | BNSF |
| Capacity | LCFS Markets Served | Access to multiple LCFS markets |
| | Production Capacity (MM gal/year) | 84.0 |
| | Corn Consumption (MM bushels/year) | 28.0 |
| | DDGS Production (Tons/year) | 154,760 |
| | Corn Oil Production (MM lbs/year) | 35.4 |
| | CO ₂ Production (mt/year) | 250,000 |
| | Estimated CCS Start-Up | Q1 2026 |



DSA Bioethanol Facility Overview

- Commissioned in April 2015 and located in Spiritwood, North Dakota as a 65 MGY plant
- Co-located with Great River Energy's (GRE) Spiritwood Station, a 100MW power plant which provides low grade steam to DSA for thermal needs
 - GRE to pay for on-site CHP, if GRE ever decides to shut down Spiritwood Station
- Class VI filed in H2 2025 via a modification to the existing permit at BFE to accommodate DSA CO₂
 - CCS development capex includes truck loading / unloading to access BFE's existing Class VI well site
 - Estimated construction time is ~70 weeks from FID
- Actively developing plans to sequester CO₂ production
- Evaluating opportunities with multiple third-parties to sell CO₂ under long-term contracts for utilization in the manufacturing of Urea, Methanol and / or SAF
- 3 steam tube DDGS low temperature dryers
- 2.3MM bushels of corn storage on site with corn dryer
- Installed and commissioned Alpha Laval Oil Skimmer technology in late Q3 2024, which enhanced corn oil production to 1.3 lb/bushel
- Adjacent rail loop provides main line BNSF unit train service

IBEC – Premier Bioethanol Asset with Substantially Derisked CCS Development

IBEC Bioethanol Facility Key Stats

Rensselaer, IN



| | | |
|----------------|--------------------------------------|---------------------------------|
| Plant Overview | Location | Rensselaer, IN |
| | Plant Technology | ICM / Fagen |
| | Plant Commissioned | 2007 |
| | Rail Service | CSX |
| Capacity | LCFS Markets Served | Access to multiple LCFS markets |
| | Production Capacity (MM gal/year) | 60.0 |
| | Corn Consumption (MM bushels/year) | 20.2 |
| | DDGS Production (Tons/year) | 133,185 |
| | Corn Oil Production (MM lbs/year) | 18.5 |
| | CO ₂ Production (mt/year) | >165,000 |
| | Estimated CCS Start-Up | Q1 2028 |

IBEC Bioethanol Facility Overview

- Commissioned in 2007 as a 40 MGY plant and located in Rensselaer, IN
 - Located 2 hours southeast of Chicago
 - Top three corn producing county in Indiana
 - 2MM bushels of corn storage on site
 - 3MM gallons of bioethanol storage on site
- ICM facility with advanced process control and selective milling technology
- Large wet feed market potential in local area
- CCS strategically located to capture emerging new Eastern LCFS markets
 - On-site stratigraphic test well drilled into Mt. Simon Formation in 2024 confirmed positive properties to utilize as geologic injection formation
 - Extensive 2D and stratigraphic testing completed, which will accelerate EPA review process
 - Secured necessary pore space rights in September 2024
 - Class VI permit filed with the EPA in August 2025
 - CCS development capex estimated to be \$64MM and takes 70 weeks from initial equipment order



Source: Company Management

APPENDIX B
MCGOUGH OVERVIEW



McGough

Building Our Critical Infrastructure

McGough is one of North America's largest and respected construction organizations. We routinely partner with clients to develop, plan and execute diverse and complex industrial construction projects within the markets we serve. We flourish via early involvement by influencing scope, budget, schedule and managing execution. We drive success by never settling for less.



Industry-Leading Expertise

At McGough, we're building America's future, tangible and intangible. We bring an unmatched team of construction professionals together and work relentlessly to understand and integrate complex equipment and systems, executing to specifications and standards that are second to none. We're responsible for delivering industrial facilities that help our clients and their communities thrive. Safe, efficient infrastructure is at the forefront of every project we pursue. Our responsibility is to build America's critical infrastructure, which is essential to the foundation of a flourishing society. We care, and it shows.



Dakota Spirit AgEnergy

THE EXPERIENCE YOU NEED:

- › Greenfield Development
- › Shutdowns + Turnarounds
- › Plant Expansions
- › Start-Up Support

Industrial Markets We Serve

Oilseed Processing
Central Energy and Utilities
Chemical Production
Crude Oil Refining
Ethanol Production

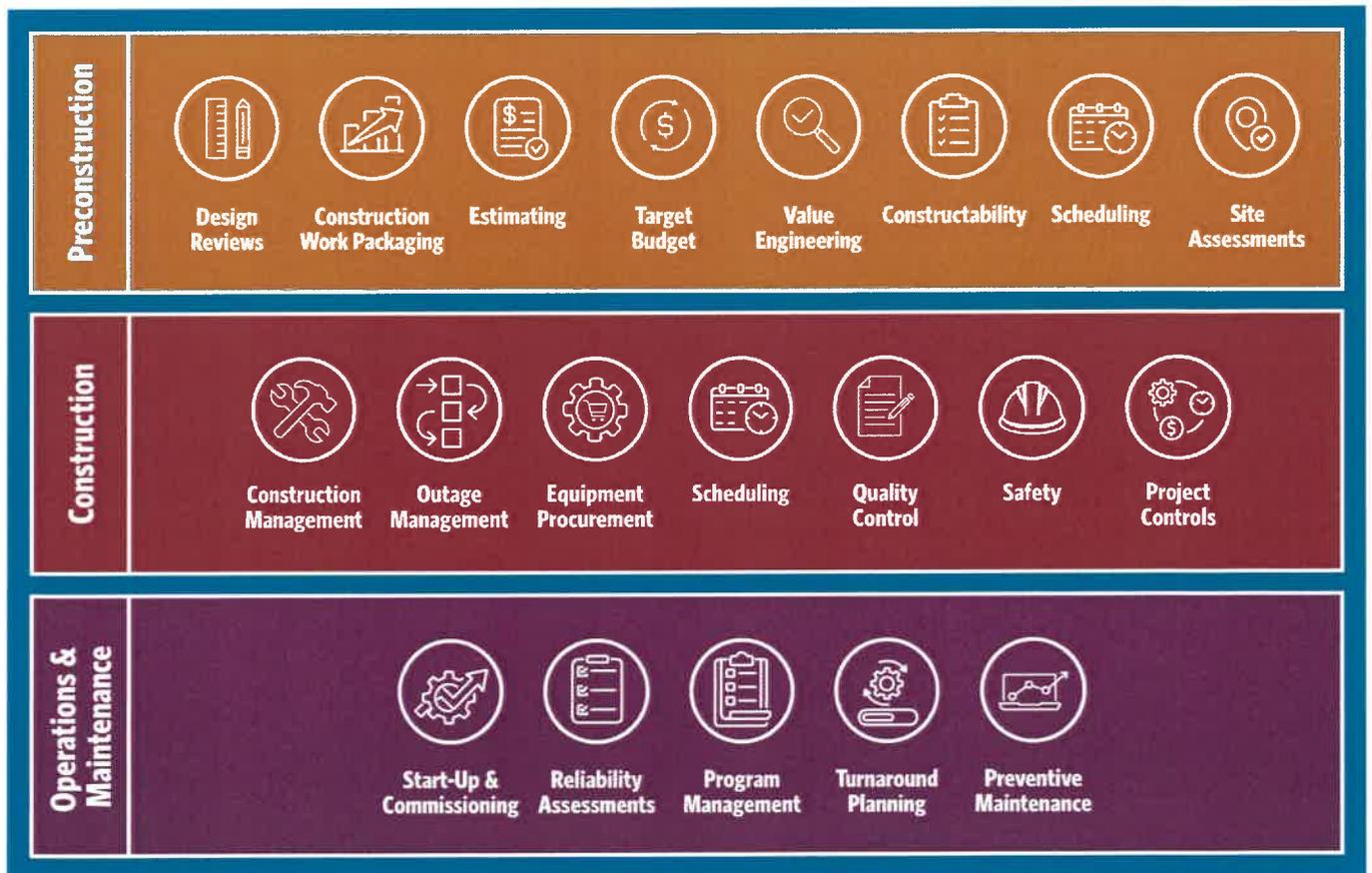
Food and Beverage Manufacturing
Power Generation
Pipeline and Terminals
Renewables
Water/Wastewater

**WE REGULARLY
DELIVER PROJECTS
OF ALL SIZES
RANGING FROM
\$5,000 TO
\$500,000,000!**



Heartland Corn Products

Industrial Services



Quick Facts!



About McGough

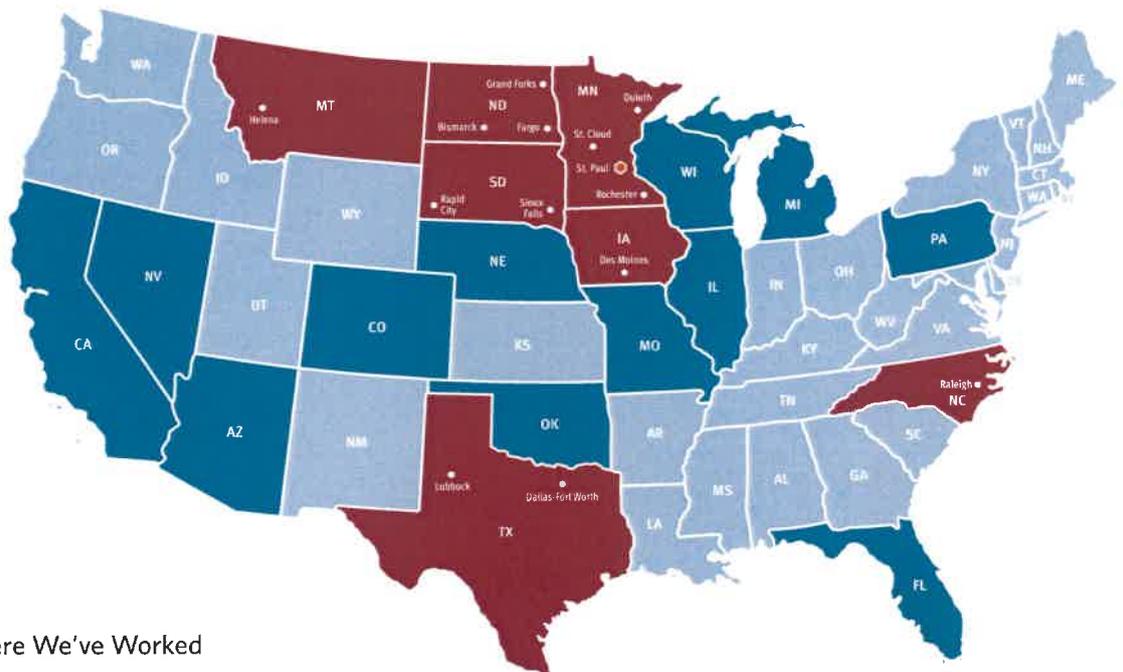
McGough is a premier construction firm with offices in key markets in the central and southern US and operate nationally. We have a history of thriving on jobs of all sizes, especially complex industrial projects spanning from power generation, ag and food processing, refineries, water/wastewater, manufacturing and more. We believe the things that set us apart are our down-to-earth, collaborative culture and our talented people. At every level, McGough employees do the right thing, are good stewards and act with integrity — the foundation of our reputation as exceptional partners who help elevate every project we touch.

HEADQUARTERS

Minneapolis-St. Paul, MN

OFFICES

- Bismarck, ND
- Dallas-Fort Worth, TX
- Des Moines, IA
- Duluth, MN
- Fargo, ND
- Grand Forks, ND
- Helena, MT
- Lubbock, TX
- Raleigh, NC
- Rapid City, SD
- Rochester, MN
- Sioux Falls, SD
- St. Cloud, MN



69+ YEARS IN BUSINESS

900+ NATIONWIDE EMPLOYEES

\$2.0B ANNUAL REVENUE

ZERO LITIGATION WITH CLIENTS

90% REPEAT CUSTOMERS



www.mcgough.com



BUILDING FOR THE NEXT GENERATION

Experience



CHS

Canola Processing Plant

Greenfield canola processing and refining facility that processes up to 550,000 tons of canola seed annually. The project consists of the following areas: seed receiving, preparation, extraction, refining, utility building, cooling tower/fire protection, and unit train capable loop track with rail load-out facility and office and plant maintenance facility.

With a total value of over \$125M, this complex agricultural processing plant was developed on a greenfield site along Highway 75, just south of Hallock, Minnesota. Design-build work included electrical and controls, pre-engineered metal buildings, fire protection, grain handling structures and associated equipment, grain storage, and field erected tanks.

PROJECT HIGHLIGHTS

- Civil / Sitework / Utilities
- Piling
- Construction of Preparation / Extraction / Refinery
- Grains Facility
- Rail
- Tank Farm
- Expansion to 1500 Tons per Day

LOCATION

HALLOCK, MN

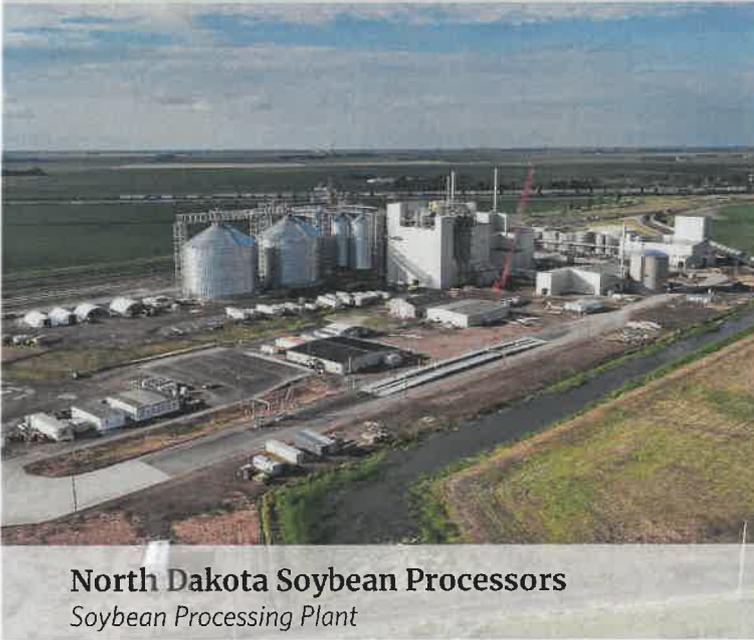
SIZE

1500 TONS/DAY
PROCESSING PLANT

SERVICES

PRECONSTRUCTION
GENERAL CONTRACTOR

Standard Project Profile



LOCATION
Casselton, ND

COST
Confidential Contract Value

COMPLETION
October 2024

OWNER
CGB Enterprises and
Minnesota Soybean
Processors

MCGOUGH'S ROLE ON PROJECT: Construction Manager At Risk

Greenfield development of a soybean processing plant that focuses on outbound products such as refined soybean oil, soybean meal, and soybean hull pellets. Ability to receive 50,000 bushels per hour, and process 125,000 bushels per day, or approximately 42 million bushels per year. Project includes (3) main processing buildings, Prep, Solvent Extraction and Crude Oil Refinery, (2) main storage bins that store 1.1 million bushels each, an oil tank farm holding more than 4 million gallons of crude oil and a utility plant providing both steam and chilled water supply for process needs.

Total project cost of approximately \$400,000,000 with construction completed in 24 months. Peak manpower reached over 360 construction employees on site per day. Total pieces of installed process equipment exceeded 2,000 and process piping installed in excess of 77,000lf.

APPENDIX C
SALOF OVERVIEW



**5141 IH 35 South
New Braunfels, TX 78132
830-225-1744**

COMPANY DOSSIER

Company Structure: Salof LTD., Inc., is a Sub S Corporation, incorporated in the state of Texas on March 13, 2017.

Company Goal: To provide the CO₂, LNG, and Industrial Refrigeration markets with World Class Process Systems that:

- Have cost competitive designs,
- Have minimal construction times,
- Are easy to install with shop fabricated, pre-wired, and tested modules,
- Can be commissioned in the shortest possible time, and
- Are Safe and Economical to Operate

Salof's design theory is based on a "Plug and Play" philosophy. To the fullest extent possible, fabricated modules, including interconnecting piping, is test fit and control wiring is completed and tested at our facility to greatly reduce site installation time. The PLC/HMI programming is executed by Salof Engineers and functionally tested to insure safe and efficient operation. As added quality control, a database of all components used in the manufacturing of a facility is maintained to insure we provide the correct equipment parts in the event parts are needed.

Total Employees: 98 personnel including contractors –

Salof has the ability to easily ramp up shop labor through agreements with local resourcing agencies, and additionally through the reputation of the company as an excellent environment to work in and a company focused on the needs of the employee. The benefit of this alliance and reputation is it allows for operation cost to remain low and returns this value to the customer through cost savings in plant fabrication.

Primary Business: Manufacturer of Modular CO₂, LPG, and LNG Liquefaction Plants, including complete integration of PLC and HMI for safe plant operation.

Background: Salof LTD. was started in 2017. The company is a startup based on the history and knowledge of a core group of former Salof Refrigeration CO. Inc's, personnel. Salof Refrigeration completed multiple projects around the world and delivered systems specifically in the CO₂, LNG, NG, LPG, Conditioning and Industrial Refrigeration markets before being purchased by GE OIL & Gas in May 2013.

Salof LTD., Inc., Company Dossier

Salof LTD. is dedicated to continuing the philosophy of providing a facility to the customer that is fully operational and backed by the Salof name.

Services: Salof LTD. provides the following services; engineering, drafting, procurement, manufacturing, startup, commissioning, parts and services. Salof can also provide aftermarket technical support, plant monitoring, controls system upgrades, as well as equipment maintenance and package refurbishing. With the ability to design, procure, and manufacture facilities in house, Salof can produce a quality product in a controlled environment on a continual basis for all customers.

Key Process: Salof incorporates the latest technology and manufacturing processes to provide a facility designed to the customer specifications. Guarantees can be provided on capacity, power consumption, and schedule. With the ability to perform a large majority of the commissioning testing in house through the use of a plug and play design Salof can provide these guarantees knowing that when the product ships it has already been tested for functionality and ability to the extent possible without introducing gas to the systems. This allows for a high-quality product to be delivered each time.

Key Personnel: Salof's Key Personnel represent a combined experience of over 200 years in design, manufacturing, installation, commissioning, operation, and parts supply for:

- 155 - CO2 Liquefaction Plants,
- 71 - Acid Recovery Plants,
- 20 - LNG Liquefaction Plants
- 8 - LPG, HHR Plants
- 50 - Ammonia Refrigeration Systems

Additionally, most of the Key Personnel were formally associated with Salof Refrigeration Co., Inc., before being purchased by GE Oil and Gas in June of 2013.

Location: Salof LTD., Inc., is located in the original Salof Companies facility in New Braunfels, Texas. The facility sits on a 9-acre tract with 40,000 sq./ft of manufacturing space under crane, 6,000 sq./ft of office space and 8,000 sq./ft of parts storage space.

The site is situated along Interstate 35 in New Braunfels, Texas allowing easy access to transport completed modules throughout the United States, Canada, and Mexico. For International Shipping, the Port of Houston is 190 miles from our facility.

Current Client list:

- Airgas/Air Liquide
- Air Products
- Matheson / Continental Carbonic Products., Inc.
- Linde / Praxair
- Messer
- Pennsylvania Grain

Salof LTD., Inc., Company Dossier

- Poet Ethanol
- Polar Ice
- Mustang Gas Products LLC.
- SME
- Red Trail Energy(GEVO)
- Blue Flint Ethanol(Harvestone)
- Shell
- Midrex
- Hartree
- White Energy
- SMS

APPENDIX D
EERC OVERVIEW

EERC Background/Overview with Oil and Gas and CO2 Storage Focus

The Energy & Environmental Research Center (EERC) is a research, development, demonstration, and commercialization organization recognized as one of the world's leading developers of cleaner, more efficient energy and environmental technologies. The EERC has a proven track record working with industry to develop and deploy a wide range of innovative and synergistic technologies. Since the EERC became a part of the University of North Dakota (UND) in April 1983, it has established working relationships with over 1300 different entities, including federal and state agencies such as the U.S. Department of Energy (DOE), universities, energy exploration and production companies, research and development firms, engineering firms, and other organizations, representing 53 countries. The EERC employs over 200 people and is expanding its staff. This staff includes a diverse multidisciplinary team of engineers, geologists, and other scientists with extensive research and operational experience and cross training. The EERC has expertise in data collection, management, and interpretation; petrophysical analysis; geostatistical analysis; geo cellular modeling at field and regional scales; geologic characterization and reservoir evaluation; conducting predictive numerical injection and production simulations; performing fossil fuel and CO₂ storage resource assessments; and creating geographic information system (GIS) products. The EERC has a specialized technical group focused on the implementation of new approaches to the exploration, development, and production of oil and gas resources and geologic CO₂ storage. Working closely with industry and government agencies, this group has developed tools and approaches specifically focused on resource assessment and optimization with a focus on commercial application of technology. Practicing under the long-standing EERC philosophy of collaboration with an interdisciplinary approach, the group's success is based on developing effective partnerships with energy and environmental industries and government agencies. The EERC has a proven track record of conducting small- and large-scale projects that meet the needs of its clients. Projects can range in size and scope from singularly focused, fast-tracked projects for individual clients, to multiyear, multimillion-dollar programs with multiple stakeholders. Projects successfully conducted in the past include studies focused on the Powder River, Denver–Julesburg, Williston, and Alberta Basins. Extensive databases of petroleum related characteristics for the basins have been created, including web-based decision support systems (DSSs) for CO₂ storage and enhanced oil recovery (EOR) opportunities and the unconventional Bakken resource play. These web-based systems use GIS, are based on existing geological and engineering data sets, and are tailored to aid in the identification and, ultimately, development of new oil and gas exploitation and CO₂ storage opportunities in the central interior of North America.

Carbon Capture, Utilization, and Storage

CCUS RESEARCH, DEVELOPMENT, AND DEPLOYMENT



The Energy & Environmental Research Center (EERC) is working with key stakeholders to develop CO₂ mitigation solutions. Carbon capture, utilization, and storage (CCUS) can provide a proven option for utilities and other industries seeking to combine greenhouse gas (GHG) mitigation with operations, creating market advantages and opportunities for the use or sale of captured CO₂.

At the EERC, we conduct applied research for all stages of CO₂ capture and geologic storage projects, from technology demonstrations and regional assessments to detailed site appraisals in support of CCUS deployment. We successfully design and deploy CCUS technologies, including projects at the industrial scale, forming effective partnerships with industry.

Our expertise and extensive experience encompass associated storage incidental to enhanced oil recovery (EOR) operations and dedicated storage in deep saline formations. Capabilities also extend to potential storage in unconventional oil and gas reservoirs and other subsurface scenarios, such as deep unminable coal seams.



CARBON CAPTURE

We have the equipment and expertise to evaluate and develop CO₂ capture systems. Several of our highly adaptable pilot-scale systems can produce combustion flue gas and gasification syngas from virtually any fuel (all coal ranks, liquids, and gases) for testing of postcombustion and precombustion CO₂ capture and separation technologies.

Capture and separation have been successfully demonstrated at Minnkota Power Cooperative's Milton R. Young Station near Center, North Dakota, as part of Project Tundra. The project has received additional federal and state funding and is moving ahead to a front-end engineering and design (FEED) study.

CARBON UTILIZATION

We conduct multidisciplinary research to demonstrate the potential for CO₂-based EOR and associated storage in the unconventional tight Bakken petroleum system, which has the potential to produce over 600 billion barrels of oil. We developed an innovative method to determine the ability of CO₂ to permeate the Bakken's tight formation and mobilize oil, yielding new insight into the chemical and physical mechanisms of CO₂ storage and EOR in these types of formations.

North Dakota CarbonSAFE research has proven the feasibility of CO₂ use for EOR in both conventional and unconventional oil fields. The EERC has shared involvement in other states' CarbonSAFE studies as well, yielding positive results in multiple types of geologic formations.

CARBON STORAGE

We have investigated CO₂ geologic storage at all levels, from regional assessments to detailed site appraisals, in support of CCUS deployment. CO₂ storage due to EOR operations and dedicated storage of CO₂ in deep saline formations are both valued EERC skillsets.

The Red Trail Energy Carbon Capture and Storage Project is assessing the ability to inject captured CO₂ from its ethanol plant into two potential sandstone layers for permanent storage.

SERVICES AND SOLUTIONS

- Pilot-scale testing and evaluation of capture technology:
 - System is portable and can be installed on-site.
 - Long-term demonstration of solvent performance and impurity management.
 - Modeling and assessment of integration approaches.
 - Techno-economic evaluations of capture technologies.
 - Technical support for large-scale capture demonstration.
 - Proven adaptive management approach for deployment of storage, both in deep saline formations and associated with EOR.
 - Implementation of field services: vendor identification and selection, project planning, data acquisition and support, and fully integrated interpretation of data and results.
 - Life cycle analysis of CCUS projects, including CO₂ EOR.
- Expertise to develop cost-effective technical programs:
 - Site characterization including field and laboratory testing and evaluation of geologic, geophysical, geomechanical, and petrophysical data.
 - Design and implementation of site-specific, cost-effective MVA (monitoring, verification, and accounting) plans to ensure that business case and regulatory requirements of a CO₂ storage project are met.
 - Development of new cost-effective geophysical monitoring technologies.
 - Reservoir and process chemistry modeling and simulation.
 - Risk assessment and risk management.

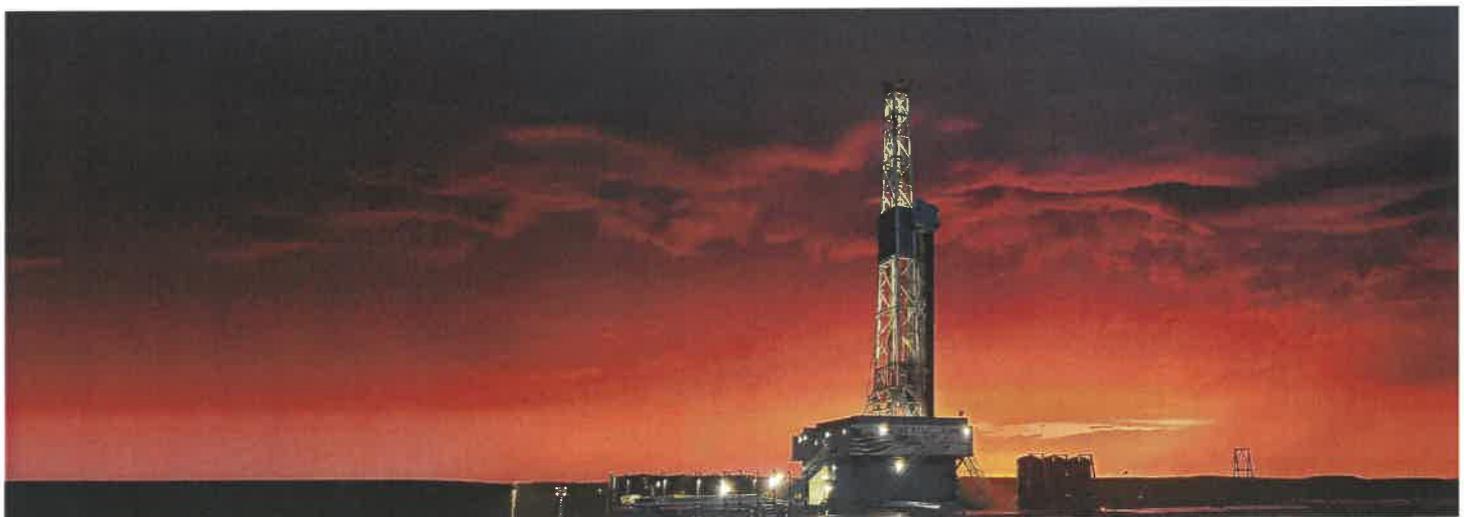
PCOR PARTNERSHIP INITIATIVE

The PCOR Partnership Initiative addresses regional capture, transport, use, and storage challenges facing commercial CCUS deployment by focusing on:

- Strengthening the technical foundation for geologic CO₂ storage and enhanced oil recovery.
- Advancing capture technology.
- Improving application of monitoring technologies.
- Promoting integration between capture, transportation, use, and storage industries.
- Facilitating regulatory frameworks.
- Providing scientific support to policy makers.



The U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) through its Regional Carbon Sequestration Partnerships Initiative, the North Dakota Industrial Commission (NDIC), and partner organizations are fostering the deployment of CCUS in the PCOR Partnership region. The EERC leads the PCOR Partnership Initiative, with support from the University of Wyoming and the University of Alaska at Fairbanks



PROJECT TUNDRA

Our extensive work in CO₂ capture enables CCUS projects to move forward by determining the best capture technology options and system configurations for an existing lignite-fired system. Our research in CCUS informed Minnkota Power Cooperative's Project Tundra, which will assess the final barriers relating to efficiency and economics for implementation of postcombustion capture on the existing fleet of power systems.

Project Tundra is led by Minnkota

Power and supported by partnerships between the EERC, BNI Energy, NDIC, DOE, and Burns & McDonnell.



BEST

The North Dakota Brine Extraction and Storage Test (BEST) project is developing active reservoir management (ARM) techniques that have potential to improve the performance of geologic CO₂ storage. ARM uses the extraction of native brine from the same formation where CO₂ is being stored to manage reservoir pressure to improve injection and minimize a CCS project's risk and operating profile. Modeling suggests that ARM can theoretically reduce the size of the permitted area, the area of review, and the postinjection monitoring period for CCS projects by more than 90%. The ARM being conducted by the EERC through the BEST project is the first at-scale field pilot designed to validate ARM performance. The results will be valuable for determining the expected techno-economic performance of ARM for a range of potential implementation scenarios that could benefit CCS projects.

Treatment and handling of high-TDS (total dissolved solids) waters associated with energy production are challenging and not readily or economically accomplished using conventional water treatment techniques. Geologic injection is often required to effectively manage fluids associated with electrical power generation, oil and gas production, and active reservoir management for geologic CO₂ storage. As part of a public-private collaboration, the EERC constructed a facility in western North Dakota to pilot-test high-TDS water treatment technologies. These technologies can produce alternate sources of water for industrial or domestic use, produce salable products, and meaningfully reduce brine disposal volumes. The pilot testing conducted through the BEST project provides critical understanding of technology performance under field operating conditions.



NORTH DAKOTA CARBONSAFE, CARBONSAFE-WY, MIDCONTINENT

The North Dakota Carbon Storage Assurance Feasibility Enterprise—CarbonSAFE for short—is assessing the feasibility of commercial-scale geologic storage of CO₂ to manage CO₂ emissions captured from coal-based energy facilities. The project is part of an ongoing effort to ensure clean, affordable energy and the wise use of North Dakota's resources. The North Dakota project is one of 16 projects funded under DOE's CarbonSAFE Initiative. DOE's CarbonSAFE Initiative supports projects that address key research in the path toward the deployment of CCUS technologies, including the development of safe, commercial-scale geologic storage sites for CO₂.

RED TRAIL ENERGY CCS

Red Trail Energy (RTE), which owns an ethanol plant near Richardton, North Dakota, and the EERC began investigating CCUS to reduce the CO₂ emissions associated with ethanol production. Reducing emissions at an ethanol facility makes the produced fuel more valuable to states that have low-carbon fuel programs. It could also qualify the facilities for federal tax credits for capturing and storing CO₂ in deep geologic formations. In partnership with NDIC through the North Dakota Renewable Energy Program, and with DOE, research has been ongoing since 2016. Technical and economic feasibility of CCUS technology with ethanol production has been successfully demonstrated for the RTE site. Recent activities include construction and implementation following approval of the first North Dakota CO₂ storage facility permit in October 2021.



BELL CREEK AND CEDAR CREEK ANTICLINE PROJECTS

With the support of Denbury Resources Inc. (Denbury), the EERC successfully completed the integrated technical assessment of 5 million tons of associated storage at Denbury's Bell Creek Field as part of the PCOR Partnership. This collaboration has facilitated the ongoing field assessment of several innovative technologies through the PCOR Partnership and multiple separately funded projects. Denbury continues to support the PCOR Partnership in the advancement of EOR technology to foster CCUS deployment. Denbury is implementing a commercial project that injects approximately 1 million tons (0.9 million tonnes) of CO₂ a year into its Bell Creek oil field to rejuvenate oil production and permanently store anthropogenic CO₂ deep underground. The EERC is adding value to Denbury's project through additional characterization, monitoring, and modeling. This collaborative effort will result in a new standard for safe and practical long-term geologic storage of anthropogenic CO₂.



FEED AT COAL CREEK STATION

A FEED study is being conducted for full-scale carbon capture at the Coal Creek Station located 50 miles north of Bismarck, North Dakota. The EERC is leading the FEED, utilizing our experience in carbon capture and providing critical information learned during previous slipstream testing with our portable pilot-scale carbon capture system. The EERC is being supported by NDIC, Rainbow Energy, Mitsubishi Heavy Industries, and Burns & McDonnell.



PCO₂C

Beginning in 2008, the EERC worked with DOE and 30 private sector partners under the Partnership for CO₂ Capture (PCO₂C). The program began to develop, evaluate, and reduce the energy requirements and associated costs of promising carbon capture technologies. PCO₂C advanced technologies along the development pathway in preparation for scale-up and deployment. The EERC designed and fabricated world-class systems to test postcombustion and precombustion capture technologies on its existing solid fuel combustion and gasification test facilities.



Energy & Environmental Research Center

University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018
www.undeerc.org



APPENDIX E
ICT OVERVIEW



A Salas O'Brien Company

NASHVILLE, TN | KNOXVILLE, TN | TAMPA, FL | BROOKHAVEN, MS | SAN ANTONIO, TX | LOUISVILLE, KY

FIRM OVERVIEW

Established in 1942 and headquartered in Nashville, TN, I.C. Thomasson Associates, Inc. (ICT) has a strong local team of over 300 skilled professionals, including over 75 licensed engineers. We manage more than 1,200 projects annually, with construction costs often surpassing \$500 million.

Engineering service specialties include:

- Mechanical engineering
- Electrical Engineering
- Fire protection
- Instrumentation and controls
- HVAC design
- Plumbing design
- IT/Telecom design

Our clients work in diverse industries:

- Hospitality
- Multi-family
- Healthcare
- Industrial
- Manufacturing
- Commercial
- Institutional
- Aviation
- Education

#2 BUILDING DESIGN
+ CONSTRUCTION
TOP 70 ENGINEERING FIRMS 2024

MEP
GIANTS
#9 2024

#31 2025
ENR
TOP 500



EXPANDED CAPABILITIES

In Spring 2024, ICT became a Salas O'Brien company, significantly expanding our in-house service offerings to include civil, structural, acoustic design, and decarbonization. As a Salas O'Brien company, ICT has access to more than 4,100 team members, 900+ registered technical professionals with over 95 office locations. Together, we work in all 50 states and around the world in even more industries, including life sciences, mission-critical, and sports and entertainment. By collaborating and sharing expertise, we deliver exceptional solutions for our clients' most complex challenges.

COMMITMENT TO EXCELLENCE AND INNOVATION

We are dedicated to upholding the highest standards of quality and innovation in all of our projects. Our engineers are industry leaders who stay at the forefront of emerging technologies and industry best practices. With a rich history and a forward-looking vision, ICT is your trusted partner in engineering excellence.

APPENDIX F
KLJ OVERVIEW

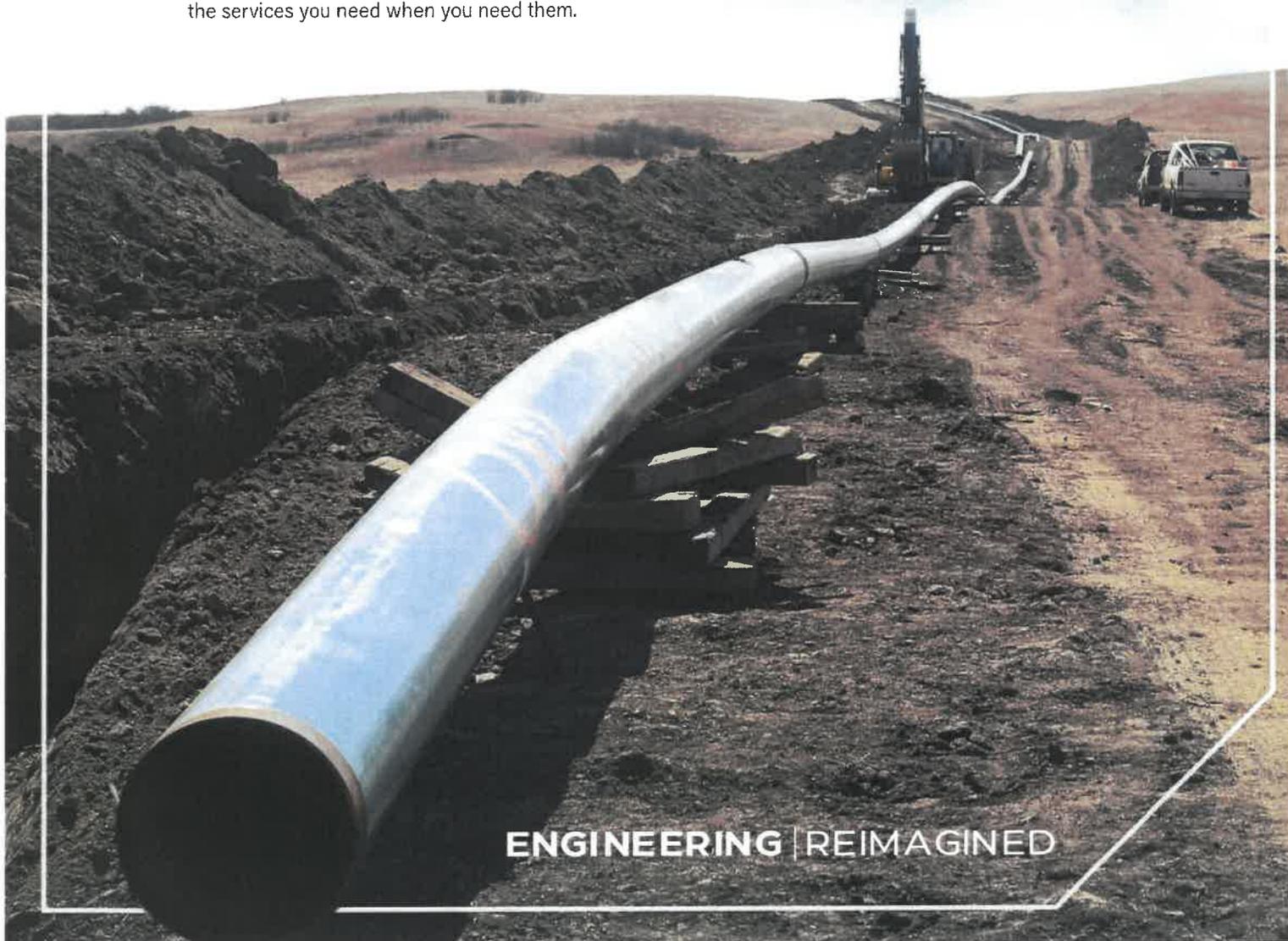


2025

OIL & GAS

Since the 1930s, KLJ has focused on infrastructure of all types, and for the dynamic oil and gas industry, our full-service engineering company can help you plan, operate, and maintain your Oil & Gas infrastructure.

We bring experience and understanding to each project, developing a customized approach to deliver the services you need when you need them.



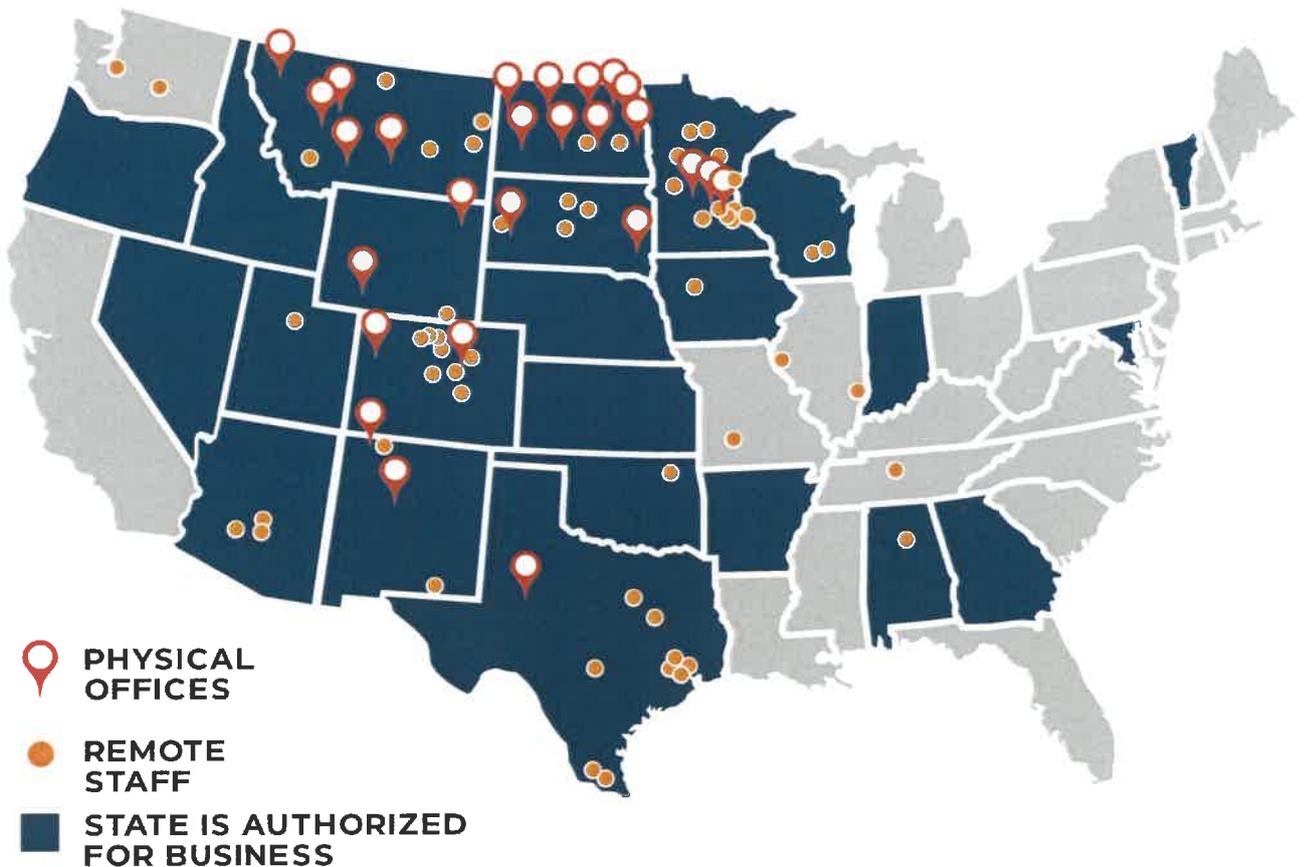
ENGINEERING | REIMAGINED

NATIONWIDE EXPERTISE

LOCALLY DELIVERED

At KLJ, our people are positioned to make a difference. With offices across multiple states and remote team members embedded in communities nationwide, we deliver high-quality engineering services rooted in regional knowledge. Our licensure in nearly every state enables us to be not only available—but authorized—to deliver wherever we're needed.

Below is a detailed map of KLJ's office locations and the cities where our remote employees reside—demonstrating not only where we are, but how effectively we can support your project anywhere it takes place.



OUR SURVEY SERVICES IN THE SOUTHWEST AND FOUR CORNERS REGIONS

have expanded with the addition of D.R. Griffin, Inc. and United Field Services in the following locations:
Grand Junction, CO | Flora Vista, New Mexico | Rock Springs, WY

OFFICE LOCATIONS

COLORADO

- Denver Metro/
Englewood
- Grand Junction

MINNESOTA

- Annandale
- Eagan
- Saint Louis Park

MONTANA

- Billings
- Bozeman
- Great Falls
- Helena
- Kalispell

NEW MEXICO

- Albuquerque
- Flora Vista

NORTH DAKOTA

- Bismarck
- Devils Lake
- Dickinson
- Grafton
- Grand Forks
- Minot
- Valley City
- West Fargo
- Williston

SOUTH DAKOTA

- Rapid City
- Sioux Falls

TEXAS

- Midland

WYOMING

- Gillette
- Rock Springs

REMOTE LOCATIONS

ALABAMA

- Ashville

ARIZONA

- Goodyear
- Surprise
- Wadell

COLORADO

- Brighton
- Littleton
- Lakewood
- Longmont
- Colorado Springs
- Westminster
- Broomfield
- Wheat Ridge

IOWA

- Pomeroy

ILLINOIS

- West Union
- Andalusia

MINNESOTA

- Golden Valley
- Waconia
- Bemidji
- Northome
- Farmington
- Osakis
- Duluth
- Fridley
- Deerwood
- Rochert
- Minneapolis

MISSOURI

- Springfield

MONTANA

- Glendive
- Sidney
- Miles City
- Butte
- Havre

NORTH DAKOTA

- Mandan
- Jamestown

NEW MEXICO

- Carlsbad
- Farmington

OKLAHOMA

- Collinsville

SOUTH DAKOTA

- Pierre
- Aberdeen
- Piedmont
- Selby

TENNESSEE

- Nashville

TEXAS

- Cypress
- Corsicana
- Harlingen
- Greenville
- La Porte
- Edinburg
- Wortham
- San Antonio
- Dickinson

UTAH

- Cedar Hills

WASHINGTON

- Tacoma

WISCONSIN

- Black Earth
- Hudson
- Deerfield

WYOMING

- Cheyenne



OIL & GAS SERVICES



DESIGNING OUR NATION'S POWER INFRASTRUCTURE

The ups and downs of the oil and gas industry keep all of us on our toes and anticipating the next big move. New technologies lead to new opportunities, and we know that when the time is right you need a partner who can help transport, store, and handle your commodity. Partner with us for reliable oil and gas infrastructure.

UPSTREAM

- > Pad and Road Design
- > Engineered Well Pads
- > Drilling Application for Permits to Drill (APDs)
- > General Pad Arrangements
- > Facility Design
- > Survey, Environmental, and Right-of-Way (ROW) Services
- > CO2 Flooding

MIDSTREAM & PIPELINE

- > Hydraulic Modeling
- > Pipeline Design and Specification
- > Engineered Horizontal Directional Drilling (HDD)/ Bore Profiles
- > DOT 192/195, Pipeline and Hazardous Materials Safety Administration (PHMSA) Compliance
- > GIS/CAD
- > Alignment Sheet, and Development
- > Pipeline Facilities
- > Survey, Environmental, and ROW Services
- > Route Selection
- > Project Cost Estimating
- > Materials Procurement
- > Gas Plant Facilities

- > Pipelines, Regulated and Non-Regulated: Gathering, Transmission, Chemical, Water
- > Natural Gas, Liquefied Petroleum Gas, Crude Oil, Refined Petroleum Products, and Chemicals
- > Pipeline Facilities
 - > Field Treating (H2S, CO2, H2O)
 - > Saltwater Disposal
 - > Well-Head Processing
 - > Central Processing Facilities
 - > Tank Farms and Batteries: Crude, Natural Gas and NGL Storage
 - > Loading and Unloading Facilities/Terminals: Crude, Natural Gas
 - > Meter Stations/Tie-Ins
 - > Compressor Stations
 - > Pump Stations
 - > MCCs
 - > Analyzer Buildings
 - > Control Rooms
- > Gas Facilities: NGL, LPG, LNG
 - > Compression
 - > Expansion
 - > Refrigeration
 - > Distillation: TEG, Amine
 - > Separation
 - > Heating and Cooling Exchangers

- > Cryogenic Separation
- > Liquefaction/Gasification
- > MCCs
- > Control Rooms

DOWNSTREAM & FACILITIES

- > Dehydration and Amine Treating Units
- > Crude, FCC, Hydro processing, Reforming, Alkylation, Heavy Oil Processing Units
- > Propylene and Butane Recovery
- > Energy Management
- > Cooling Water Systems and Utilities
- > Tank Farms
- > MCC
- > Analyzer Buildings
- > Control Rooms
- > Railcar Loading/Unloading Facilities
- > As-Builds, Walk Downs, Drone Data Collection
- > Natural Gas Liquids Handling, Including Refrigerated and Cryogenic Units
- > Small and Large Capital Project Implementation
- > Management of Change
- > Process Safety Management

OIL & GAS

SERVICES



CONSTRUCTION MANAGEMENT

- > Supply Acquisition
- > Planning
- > Capital Spending Budget
- > Contractor Bid Packages
- > Material Acquisition
- > Planning and Scheduling
- > Field Observation
- > Construction Inspection Services
- > As-Built Laser Scanning

CARBON CAPTURE

- > Survey, Environmental, and Cultural Assessments
- > Carbon Capture Equipment Design
- > Plant Modification Design
- > UAV Drone Flying, Video, Updated Visuals of Site and Pipeline Rout
- > Sequestration Leakage and Vegetation Monitoring

LAND RECLAMATION & RESTORATION

- > Oil Field Spill Assessments and Remediation
- > Survey with optional UAV/ Drone Collection
- > Archaeological Assessment
- > Subsurface Analytics
- > Design
- > Construction Observation and Inspection
- > Post Reclamation Site Assessment
- > Release from Bond Services

SURVEY SERVICES



SURVEY AND MAPPING/GIS

Accurate survey makes accurate projects. Whether it's a survey crew on the ground or a drone in the sky, we collect data quickly and accurately to provide the information you need to identify the lay of the land, and any physical features that may impact your project.

TOPOGRAPHIC DESIGN SURVEY

- > Utilities
- > Industrial
- > Transmission/Distribution
- > Route/Corridors
- > Oil Wells
- > GIS
- > Remote Sensing
 - > UAS Survey/Drone Survey
 - > LiDAR
 - > Aerial Photo Control
 - > Terrestrial 3D Scanning

BOUNDARY SURVEY

- > ALTA
- > Residential Lots
- > Subdivisions
- > As-Builts
- > Cadastral
- > ROW

OIL & GAS SURVEY

- > Well Pad Locations
- > ROW
- > Easement
- > As-Builts

CONSTRUCTION SURVEY

- > Transportation
- > Municipal
- > Civil Sites
- > Airports
- > Oil/Gas Pipelines
- > Windfarms
- > Utilities
- > Industrial
- > Transmission/Distribution Lines
- > Oil Wells



ENVIRONMENTAL SERVICES

ENVIRONMENTAL PLANNING AND SCIENCE

The environment is important to all of us, and sometimes building the infrastructure is the easy part. Down to the smallest details, we consider all environmental and cultural aspects that could impact your project. Effective environmental planning starts your project off right and keeps it moving forward. When you work with us, you get the experience you need with the recommendations you can trust.

ENVIRONMENTAL PLANNING

- > Administrative/Project Record
- > Agency Coordination
- > Environmental Feasibility Studies/ Corridor Studies
- > Environmental Reviews For Grant Applications
- > Federal, State, and Local Permitting
- > National Environmental Policy Act (NEPA) Compliance Analysis and Documentation Including:
 - > Categorical Exclusion (CATEX)
 - > Environmental Assessment (EA)
 - > Environmental Impact Statement (EIS)
- > Public and Stakeholder Engagement

NATURAL RESOURCES

- > Avian/Bat/Raptor Studies and Monitoring
- > Critical Habitat Surveys/ Threatened and Endangered Species Surveys
- > Biological Assessments
 - > Botanical Surveys
 - > Wildlife Surveys
- > Construction and Environmental Compliance
 - > Storm Water Pollution Prevention Plan (SWPPP)
 - > Aquatic Resource Monitoring
- > Habitat Conservation Plans
- > Wetland Delineations and Waters of the US Surveys
- > Streambank Restoration
- > Reclamation Plans

SITE INVESTIGATION & REMEDIATION

- > American Society for Testing and Materials (ASTM) and Limited Phase I/II Environmental Site Assessments
- > United States Environmental Protection Agency (USEPA) Brownfields Redevelopment
- > Soil, Groundwater, Surface Water, Air Sampling
- > Baseline Water Sampling
- > Oilfield Spill Remediations
- > Asbestos/Lead-Based Paint Inspections
- > Spill Prevention, Control, and Countermeasure (SPCC) Inspections

CULTURAL RESOURCES

- > Construction Monitoring
- > History and Architectural History
- > Tribal Consultation
- > Paleontology
- > Prehistoric and Historic Archaeology
- > Report of Investigations
- > Survey, Evaluative Testing, and Mitigation Species Surveys



CULTURE ENHANCES COMMUNITIES

We believe in balance when combining opportunity, development, and culture. A deep history and tradition shape the future of each Tribe, and the right partnership between a Tribal Nation and a firm can help move visions forward. We offer a comprehensive range of planning and engineering services designed to support Tribal communities in their journey toward growth, development, economic diversification, affordable housing, connectivity, safety, sustainability, and resilience.

GRANT WRITING & ASSISTANCE

- > Grant Advocation and Education
- > Grant Identification
- > Grant Writing
- > Grant Negotiation, Administration, and Reporting

LAND USE PLANNING/SITE DEVELOPMENT

- > Master Planning
- > Economic Diversification
- > Site Development
- > Public Input and Tribal Outreach
- > Feasibility Studies
- > Transportation Access and Utilities Planning

RENEWABLE ENERGIES

- > Microgrids
- > Solar
- > Wind
- > Energy Storage
- > Biomass
- > Small-Scale Renewables

ECONOMIC DEVELOPMENT/TOURISM

- > Comprehensive Economic Development Strategies (CEDs)
- > Tourism Development
- > SWOT Analysis
- > Economic Resiliency
- > Economic Feasibility Studies
- > Strategic Direction and Diversification
- > Implementation Plans

UTILITIES & RENEWABLE ENERGIES

- > Utilities
 - > Broadband
 - > Power
 - > Solid Waste
 - > Water
 - > Wastewater
- > Renewable Energies
 - > Microgrids
 - > Solar
 - > Wind
 - > Energy Storage
 - > Biomass
 - > Small-Scale Renewables

ENVIRONMENTAL & CULTURAL RESOURCES

- > Environmental Resources
 - > Construction Monitoring
 - > History and Architectural History
 - > Tribal Consultation
 - > Paleontology
 - > Prehistoric and Historic Archaeology
 - > Report of Investigations
 - > Survey, Evaluative Testing, and Mitigation
- > Cultural Resources
 - > Biological Assessments
 - > Botanical Surveys
 - > Wildlife Surveys
 - > Wetland Delineations and Riparian Surveys
 - > Phase I/II Environmental Site Assessment
 - > NEPA Compliance
 - > Construction Monitoring



CONSTRUCTION SERVICES



CONSTRUCTION ADMINISTRATION

KLJ's construction services and management will turn your projects into reality. Each project is delivered with the quality you expect, on schedule and budget, and follows the defined scope for a successful outcome.

PROJECT CONTROLS

- > Program Management
- > Project Management
- > Procurement Support

CONSTRUCTION ADMINISTRATION & MANAGEMENT

- > As-Built Drawings
- > Stakeholder Communication
- > Quantity Documentation
- > Punch List Management
- > Critical Path Method (CPM) Schedule Development and Review
- > Constructability Review
- > Resident Engineer
- > Staff Augmentation
- > State/Federal Documentation
- > Project Close Out

MATERIAL TESTING

- > Aggregate Testing and Sampling
- > Bituminous Testing and Sampling
- > Concrete Testing and Sampling
- > Soil Testing and Sampling
- > Laboratory Testing
- > Bituminous Curing

CONSTRUCTION OBSERVATION

- > Field Engineering
- > Field Observation
- > Survey and Staking Coordination
- > Materials Testing Coordination

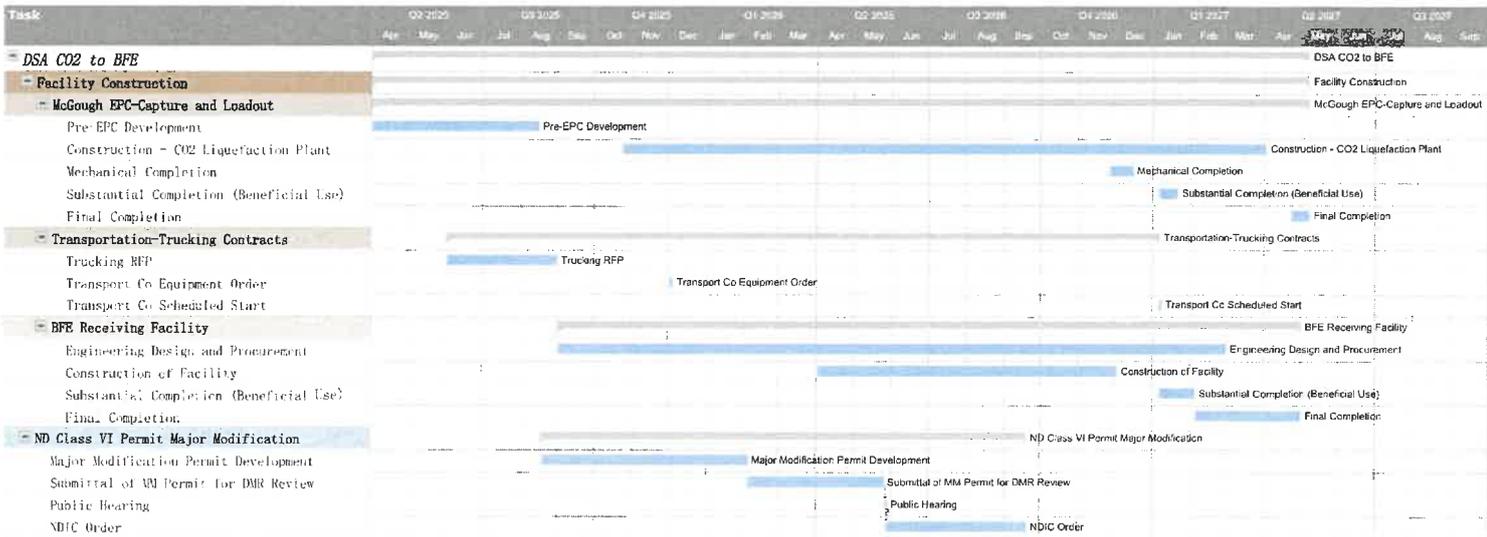
CONTRACTOR SERVICES

- > Critical Path Method Scheduling
- > Time Impact Analysis
- > Claims Support
- > Surface Modeling
- > Maintenance of Traffic Design

ALTERNATIVE DELIVERY

- > Design-Build
- > Progressive Design-Build
- > Construction Manager/General Contractor (CM/GC)
- > Owner Support Services

APPENDIX G
PROJECT SCHEDULE





Clean Sustainable Energy Authority Transmittal Letter

October 15, 2025

North Dakota Industrial Commission
ATTN: Clean Sustainable Energy Program
State Capitol – Fourteenth Floor
600 East Boulevard, Bismarck, North Dakota 58505

Dear Commission Members,

Twelve Benefit Corporation is pleased to submit this application for grant and loan funds under the North Dakota Industrial Commission Clean Sustainable Energy Authority Program.

Twelve is a mission-driven, carbon transformation Public Benefit Corporation, deploying industrial power-to-liquids (PtL) AirPlant™ facilities that convert carbon dioxide into value-added products, such as E-Jet® fuel, a sustainable aviation fuel (SAF) that is a drop-in replacement for Jet-A fuel, and E-Naphtha™ product, a versatile feedstock for specialty and commodity chemical products.

The grant and loan requested in this application will go towards advancing the engineering of the AirPlant™ Two facility, Twelve's flagship commercial-scale plant that will convert carbon dioxide into sustainable aviation fuel. Twelve is requesting both a grant and loan to fund a portion of the near term spend required to complete engineering and secure long lead equipment. Twelve has financing partners in place to support the project development for the plant, and as such, the project does not rely on CSEA funding to move forward. However, CSEA funds will be impactful as it would strengthen the case for deploying the project in North Dakota. CSEA funds would go towards managing early cash flow and ultimately help to enable hundreds of millions of dollars of private investment in North Dakota for the development of the proposed AirPlant™ facility, including construction, commissioning, and operations. Moreover, CSEA funding will accelerate the project, enabling Twelve to pursue simultaneous workflows and parallelization, rather than cost-minimizing sequential workflows. Twelve understands that funding in the current CSEA round is limited and would plan to re-apply in the future if additional funding becomes available.

Sincerely yours,

Andy Stevenson
VP of Commercial
Twelve Benefit Corporation

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title: AirPlant™ Two: Flagship
Synthetic Aviation Fuel Facility

Applicant: Twelve Benefit Corporation
(dba Twelve)

Date of Application: October 15, 2025

Amount of Request
Grant: \$10,000,000

Total Amount of Proposed Project:
\$152M

Duration of Project: 2 years

Point of Contact (POC): Ilana Maccia

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POC Address: 600 Bancroft Way,
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TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

| | |
|---|-----------|
| Transmittal Letter | 1 |
| Abstract | 4 |
| Project Description | 5 |
| Standards of Success | 13 |
| Background/Qualifications | 14 |
| Management | 16 |
| Confidential Information | 16 |
| Patents/Rights to Technical Data | 17 |
| State Programs and Incentives | 18 |
| Appendix A: Tax Liability Statement | 19 |
| Appendix B: Letters of Support | 20 |
| Appendix C: Confidentiality Request (Confidential) | 25 |
| Appendix D: Timetable (Confidential) | 29 |
| Appendix E: Budget (Confidential) | 29 |
| Appendix F: Business Plan (Confidential) | 30 |
| Appendix G: Budgeted Projections (Confidential) | 39 |
| Appendix H: Key Personnel Resumes (Confidential) | 40 |
| Appendix I: Historical Financial Statements (Confidential) | 63 |
| Appendix J: Loan/Loan Guarantee Application (Confidential) | 73 |

ABSTRACT

Twelve is a mission-driven, carbon transformation Public Benefit Corporation, deploying modular power-to-liquids (PtL) AirPlant™ facilities that convert CO₂ into value-added products, such as E-Jet® fuel, a drop-in replacement for Jet-A fuel, and E-Naphtha™ product, a versatile feedstock for specialty and commodity chemical products. Twelve's mission, reflected in its status as a benefit corporation, is to realize sustainable fuel and chemical manufacturing via CO₂ electrolysis. Benefit corporations are for-profit companies that can legally base their business decisions on non-financial factors such as benefit to employees, the community, and the environment. Twelve is proposing to develop its flagship commercial-scale AirPlant™ facility ("AirPlant™ Two") with a capacity of 1,500 to 3,000 barrels per day (bpd) of E-Jet® fuel, representing approximately 20M to 40M gallons of E-Jet® fuel/year and 4M to 10M gallons of E-Naphtha™ byproduct/year. AirPlant™ Two will be co-located with an existing industrial facility in eastern North Dakota, utilizing waste CO₂ from this facility as feedstock for Twelve's process.

Twelve's E-Jet® fuel has >90% reduction in carbon emissions compared to incumbent Jet-A fuel, while Twelve's E-Naphtha™ product is a cradle-to-gate carbon negative drop-in replacement for petroleum-based naphtha, which has an annual US production of over 5 million tons. Twelve's E-Jet® fuel is manufactured using an ASTM-certified pathway (ASTM D7566 Annex A1), and qualified for drop-in use in jet engines at a 50% blend, enabling rapid commercialization. Upon completion, the AirPlant™ Two facility will increase domestic sustainable aviation fuel (SAF) production capability by 5%, cementing North Dakota's leadership in this growing industry.

Objective: Twelve is considering an opportunity to deploy its flagship commercial-scale AirPlant™ facility ("AirPlant™ Two"), in eastern North Dakota, co-located with an industrial CO₂ source, enabling utilization of waste CO₂ to produce sustainable fuels and chemicals. Twelve herein proposes to use Clean Sustainable Energy Authority (CSEA) funds to support the pre-front-end engineering and design (pre-FEED) and FEED stages of the plant. This critical work will provide detailed engineering insight necessary to greenlight the final investment decision (FID), which would ultimately attract large private investments (>>\$100M) into the state for the development of the AirPlant™ facility. The overarching goal of this project is to accelerate the production and deployment of American-made CO₂-derived products, including E-Jet® fuel and E-Naphtha™ product, and grow the United States' and North Dakota's leadership in this emerging and strategic industry.

Expected Results: The proposed AirPlant™ facility aligns with the Clean Sustainable Energy Authority's mission to support the development of large-scale commercial projects that reduce environmental impacts and increase sustainability. The proposed FEED study supported by CSEA funds will generate information needed in order for Twelve to reach FID on a plant that will deploy Twelve's cutting edge CO₂ transformation technology, making North Dakota a world leader in the production of SAF, an expanding industry that is expected to grow to 20-35 billion gallons by 2050.¹

Duration: 2 years for pre-FEED and FEED

Total Project Cost: \$152M for pre-FEED and FEED stages. Requested grant of \$10M will go towards pre-FEED/FEED expenses.

Participants: Twelve Benefit Corporation (dba Twelve)

¹ <https://saf.rmi.org/>

PROJECT DESCRIPTION

In 2021, Governor Doug Burgum set an ambitious goal for North Dakota to become carbon-neutral by 2030, emphasizing the pivotal role of innovation in technologies such as carbon capture, carbon storage, carbon utilization, and hydrogen. Twelve is a mission-driven, carbon transformation Public Benefit Corporation, deploying modular power-to-liquids (PtL) AirPlant™ facilities that convert CO₂ into value-added products, such as E-Jet® fuel, a synthetic aviation fuel (SAF) that is a drop-in replacement for Jet-A fuel, and E-Naphtha™ product, a versatile feedstock for specialty and commodity chemical products. Twelve's commitment to sustainability is reflected in its status as a benefit corporation; benefit corporations are for-profit companies that can legally base their business decisions on non-financial factors such as benefit to employees, customers, the community, and the environment. Twelve's technology is an ideal platform for realizing CSEA and North Dakota's carbon-neutrality commitments through the development, commercialization, and deployment of low-carbon technologies and products.

Twelve's mission is to deploy AirPlant™ facilities that use its proprietary CO₂ transformation technology to convert renewable electricity and captured CO₂ emissions into low-carbon fuels and chemicals. Through products such as E-Jet®, which can reduce aviation emissions by more than 90%, and E-Naphtha™, a carbon-negative replacement for petroleum naphtha, Twelve is decarbonizing some of the world's hardest-to-abate industries. Twelve is exploring an opportunity to deploy its flagship commercial scale AirPlant™ facility, AirPlant™ Two, with a capacity of 1,500 to 3,000 barrels per day (approximately 20M to 40M gallons of E-Jet® fuel/year and 4M to 10M gallons of E-Naphtha™ product/year), in eastern North Dakota. This facility would be co-located with an industrial CO₂ source and is expected to utilize 100% of the waste CO₂ from this facility.

Twelve is currently constructing its demonstration-scale facility, AirPlant™ One, in Moses Lake, WA (Figure 1) which is expected to begin operations in late 2025/early 2026. AirPlant™ Two will be a scaled-up version of the AirPlant™ One facility that will bring significant private investment (>>\$100M) into the state while also leveraging and benefitting existing facilities and industries in North Dakota. Specifically, Twelve plans to leverage new wind and solar projects, incentivizing continued expansion of renewables in the region. Moreover, the AirPlant™ Two facility will provide tangible environmental and economic benefits to North Dakota, including conversion of CO₂ that otherwise would have been released into the atmosphere, and supporting possible infrastructure expansions in the region, such as a new natural gas pipeline, rail extension, and transportation.



Figure 1. Left: Twelve broke ground on AirPlant™ One in July 2023. Right: Construction is ongoing and operations are slated to begin in Q4 2025. (*Fischer-Tropsch infrastructure blurred to protect IP*)

Twelve’s process (Figure 2) integrates its patented CO₂ electrolyzers with commercial hydrogen and fuel synthesis modules, reducing technical risk and enhancing scalability. First, CO₂ and water are fed into Twelve’s CO₂ electrolyzers and commercial water electrolyzers, producing CO and H₂ respectively. The CO is then enriched, combined with H₂ to form syngas, and then fed into a Fischer-Tropsch (FT) reactor. The FT reaction results in synthetic crude, a mixture of hydrocarbons with a range of molecular weights. FT is a well-established technology that has been deployed at commercial scale for decades, primarily as a method to produce liquid fuels in geographies with low oil reserves. After FT, a subsequent fractionation step separates SAF and naphtha, both of which will be sold directly to off-takers.

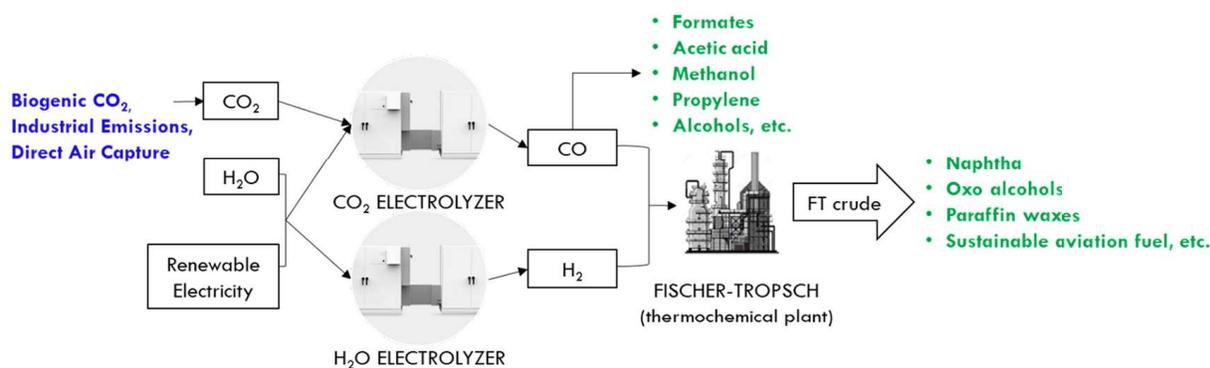


Figure 2. General schematic of Twelve’s electrified CO₂ transformation plant.

Twelve’s E-Jet® fuel is ASTM-certified (ASTM D7566 Annex A1), qualifying Twelve’s fuel for drop-in use in jet engines at a 50% blend, enabling rapid commercialization. This technology platform can be reconfigured to produce other fuels e.g., diesel (Electrol™) and marine fuels (E-Marine™), all from CO₂ waste streams, providing a low-cost and functionally limitless platform to produce valuable energy dense fuels. Recently, Twelve signed the largest PtL SAF offtake agreement to-date with International Airlines Group (IAG) for ~260M gallons over 14 years² and was selected as the only PtL SAF supplier in the Sustainable Aviation Buyers Alliance’s historic collection of SAF certificate purchases³, with purchase commitments from global companies across technology, consulting, pharmaceuticals, and other industries. The global SAF market is projected to grow rapidly in coming years, due to the European Union’s SAF mandate,⁴ policy initiatives in other countries, and voluntary airline demand across the globe.

Naphtha, an FT byproduct, is used as a building block for a wide range of chemicals, including polycarbonates, polyurethane foam, ethylenes, styrenes, and benzene, among others. The global naphtha

² <https://www.twelve.co/post/twelve-and-iag-sign-historic-long-term-multi-million-gallon-saf-offtake-agreement>

³ <https://flysaba.org/2024/04/17/sustainable-aviation-buyers-alliance-announces-historic-agreements-to-purchase-sustainable-aviation-fuel-certificates-to-grow-investment-in-clean-fuel-technologies/>

⁴ https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3525

market is ~\$160B and exhibiting a growth rate of 3.3%.⁵ AirPlant™ Two will produce SAF and Naphtha in a 4:1 ratio, yielding a sizable volume of downstream low-carbon materials and chemicals. Investment in this project would position North Dakota an early leader in the carbon utilization and low-carbon products industry, with commensurate economic and environmental benefits.

This project will significantly accelerate the production of PtL SAF to meet rising airline demands and enable the decarbonization of aviation. Currently, the vast majority of SAF uses biomass-based feedstocks, particularly hydroprocessed esters and fatty acids (HEFAs). Twelve's E-Jet® fuel competes favorably with biomass-derived SAFs, including HEFA-based SAF, in terms of projected future cost, carbon intensity score, and feedstock supply. In general, PtL SAF from CO₂ is expected to take an increasingly large share of the overall SAF demand, especially as the global supply for waste oils that feed into HEFA-based SAF pathways is projected to be capped by the late 2020s, representing 5-10% of the total jet fuel demand. Additionally, the supply of edible oils and sugar feedstocks for HEFA-based SAF will need to be carefully balanced with food production needs, thus constraining HEFA-based SAF for the foreseeable future.⁶

Airline industry leaders and experts alike have expressed concerns around investing heavily in standard biomass-based SAFs given their projected limitations, and view PtL fuels as the most viable pathway of meeting airline decarbonization goals. Lufthansa CEO Carsten Spohr has stated that the scale-up of SAF production to meet airline decarbonization goals "cannot be done on bio-based fuel, it can only be done on e-fuels."⁷ Similarly, Air France CEO Anne Rigail emphasizes the need to diversify SAF feedstocks, saying "we need SAF from biomass but we all know it won't be sufficient by 2030. We need eFuel."⁸ e-fuels/PtL based SAF poses fewer issues than most biomass-based SAF and is also advantageous from a water demand standpoint. Rhodium Group, an independent research provider that combines economic data and policy insight to analyze global trends, describes PtL SAF as "the only SAF technology that has the potential for unbounded production."⁹

Given these constraints of HEFA-based SAF, as well as the coming SAF supply crunch in 2030 that will drive up prices, there is a clear need for rapid deployment of advanced SAF technologies.^{10,11} In light of these trends, Twelve's AirPlant™ facility presents a superb opportunity for North Dakota to invest in and benefit from the promise of this nascent and exciting industry.

Objectives: Twelve is exploring an opportunity to deploy its flagship commercial-scale AirPlant™ facility ("AirPlant™ Two"), in eastern North Dakota, co-located with an industrial facility as a CO₂ source. AirPlant™ Two is expected to utilize 100% of the waste CO₂ produced from the industrial facility. The primary objective of this project is to complete the pre-front-end engineering and design (pre-FEED) and FEED stages of the project that will develop detailed insight necessary to make a final investment decision (FID) on the commercial-scale AirPlant™ facility. Secondary objectives include procurement of long lead

⁵ IMARC Group. [Naphtha Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028](#)

⁶ <https://www.twelve.co/post/know-your-saf>

⁷ <https://www.politico.com/newsletters/the-long-game/2023/06/21/the-airline-ceo-pessimistic-about-alternative-fuels-00102870>

⁸ <https://www.flightglobal.com/airlines/air-france-chief-outlines-1bn-saf-cost-challenge/155553.article>

⁹ <https://rhg.com/research/sustainable-aviation-fuels/>

¹⁰ <https://www.rolandberger.com/en/Insights/Publications/SAF-The-time-is-now.html>

¹¹ <https://www.spglobal.com/commodity-insights/en/news-research/latest-news/agriculture/060525-global-saf-supply-to-fall-23-million-mt-short-of-demand-by-2035>

time equipment, selecting technology providers for key process modules, permitting, and development of construction and project execution plans.

AirPlant™ Two will be capable of producing 1,500 to 3,000 barrels per day of value-added products (approximately 20M to 40M gallons of E-Jet® fuel/year and 4M to 10M gallons of E-Naphtha™ product/year). Development of the AirPlant™ facility will ultimately bring large amounts of private investment (>>\$100M) into the state, while also diversifying and growing North Dakota's economy, creating high quality jobs in the clean energy industry, cementing the state's leadership in innovative climate technologies, solidifying a pathway towards domestic energy independence by expanding domestic fuel production, and bolstering the reliability and security of the nation's energy system.

Methodology: The proposed project will cover the pre-FEED and FEED stages of the overall AirPlant™ Two project. These studies will provide the detailed information to make a final investment decision (FID) prior to project implementation and execution. At a high level, the pre-FEED and FEED phases will cover engineering and design work, cost and schedule estimates, project execution plans, vendor agreement and procurement plans, construction execution plans, and permitting strategy of AirPlant™ Two.

Task 1.0: Pre-FEED Study: The pre-FEED engineering and design will be completed by Twelve's in-house engineering team and the selected Engineering, Procurement, and Construction (EPC) firm. This task will bridge the gap between conceptual design and detailed engineering, including scope such as:

- Process technology selection and licensor engagement
- Process flow diagrams
- Mass and energy balances
- Equipment lists including vendors, pricing, and lead times
- Preliminary plant layouts
- Preliminary cost estimates, etc.

In addition to engineering and design, Twelve will engage with FT technology providers and vendors for major equipment. Twelve will leverage learnings from AirPlant™ One as well as insights from the engineering and design process to identify equipment and technology needs. Factors such as performance, cost, and lead time, among others, will be considered and analyzed.

Task 2.0: FEED Study: The FEED will include more detailed engineering and design work done by Twelve's in-house engineering team and the selected EPC firm, which will provide the foundation for final design and construction. This task will include items such as:

- Advanced designs: Finalized process flow diagrams, heat and material balances, piping and instrumentation diagrams, and equipment specifications
- Finalized plant layout
- Permits and approvals from regulatory bodies
- Project and construction execution plans
- Risk mitigation strategies

- Detailed cost and schedule estimates
- Material supply agreements and purchase orders for long lead time items

Anticipated Results: The proposed project will lay the foundation for deployment of AirPlant™ Two, completing the key engineering and design work, cost and schedule estimates, and project and construction plans needed for FID. After FID, the project will result in the construction of a commercial-scale carbon transformation facility in North Dakota that can transform industrial CO₂ into value-added products like E-Jet® fuel and E-Naphtha™ product, which are crucial products for hard-to-abate sectors like aviation and chemical manufacturing.

Specific work products resulting from the proposed pre-FEED and FEED studies include:

- Detailed project schedule and project execution plan, including details on items such as procurement, construction, safety, and permitting
- Engineering and design documents such as: process design criteria, block flow diagrams, process flow diagrams, material selection diagrams, heat and material balances, piping and instrumentation diagrams, etc
- Detailed cost estimates summarizing material costs, equipment costs, operations costs, etc

Successful deployment of AirPlant™ Two will have the following outcomes:

- Support the clean and sustainable energy transition: Aligned with the goals of North Dakota’s Clean Sustainable Energy Authority, Twelve’s facility will have a production capacity of 1500 to 3000 bpd of sustainable aviation fuel. This represents a ~7-15% increase in announced domestic PtL SAF production, and a 5% increase in existing domestic SAF production capabilities (PtL and non-PtL). SAF is a critical tool in decarbonizing the hard-to-abate aviation sector, and PtL SAF like Twelve’s E-Jet® fuel is widely considered to be the most scalable option for meeting the aviation sector’s decarbonization goals.
- Accelerate the production and deployment of American-made CO₂-derived products: In addition to E-Jet® fuel, AirPlant™ Two will produce 4-10M gallons of cradle-to-gate carbon negative E-Naphtha™ product per year, which can be dropped into existing supply chains for the production of primary chemicals and materials ranging from consumer chemicals to foams and plastics.
- Position North Dakota as a leader in emerging industries: AirPlant™ Two will be Twelve’s flagship commercial-scale power-to-liquids plant and will be the largest plant of its kind in the United States. The deployment of this innovative clean and sustainable technology in North Dakota will bring positive publicity and growth to the state.
- Increase domestic energy production: Domestic production of liquid transportation fuels is critical to ensuring energy security, national security, and consumer price stability.
- Create local jobs and economic growth: Twelve will support plant operations and management with local hiring and job training, with an estimated 55 full time employees and 400-600 temporary construction workers. This will lead to economic growth in the region, as well as increase state and local tax revenue.

- **Scalability:** AirPlant™ Two will be the blueprint for Twelve's future plants, multiplying the impact of this project as Twelve deploys replicate AirPlant™ facilities in the future, including possible expansions (eg, 1500 bpd to 3000 bpd).

Facilities and Resources: Twelve is considering a site in eastern North Dakota that would be co-located with an industrial CO₂ source. This area is already zoned for heavy industrial use, and sufficient water and wastewater capacity has been confirmed with the local Rural Water District. There is abundant land available for Twelve's infrastructure. The facility will be adjacent to BNSF rail, which can be used for exporting products from the AirPlant™ facility. Otter Tail Power is in the process of constructing a new 345-kV line nearby, which is expected to be in service by the end of 2028 and will provide sufficient power capacity for the AirPlant™. Twelve has initiated a load study and has entered electric service agreement discussions. Results are expected by early 2026.

Additionally, Twelve is in discussions with reputable developers regarding six renewable energy projects in the region, totaling hundreds of megawatts of power capacity. Twelve plans to execute power purchase agreements (PPAs) to cover hourly matching requirements and is also exploring potential behind the meter projects. Furthermore, Twelve plans to leverage existing North Dakota natural gas infrastructure for certain process needs such as flaring or as a part of the plant's intermittency strategy. This site, which would be secured via lease agreement prior to the FEED study, will be used as the basis for both the pre-FEED and FEED studies prior to the final investment decision. Moreover, Twelve is in the process of executing a contract with the selected EPC firm to support the pre-FEED and FEED studies for the proposed AirPlant™. Twelve has also initiated discussions around feedstock and power purchase agreements.

Techniques to Be Used, Their Availability and Capability: This proposed commercial-scale AirPlant™ facility will deploy point source carbon capture, CO₂ electrolysis, water electrolysis, and Fischer-Tropsch reactors for the integrated CO₂-to-SAF/naphtha production process. A process flow diagram is shared in the appendices. Point source carbon capture technologies have been used commercially and are becoming more widely deployed over time. The third party CO₂ supplier will manage the development of the carbon capture system. Twelve will be leveraging commercially available water electrolyzers and FT reactors. Water electrolyzers have been deployed at scale and are largely derisked, while FT is a well established technology and has been deployed at commercial scales for decades, primarily as a method to produce liquid fuels in regions with low oil reserves but large reserves of feedstocks such as coal.

The core innovation of Twelve's AirPlant™ facilities is Twelve's proprietary CO₂ electrolyzers, which converts CO₂ into a low temperature, low pressure stream of CO, a critical step in enabling further processing to value-added products like SAF and naphtha. Twelve deployed a commercial prototype of its CO₂ electrolyzer in its Alameda, CA facility in 2022 and is in the process of completing the construction of a fully integrated CO₂-to-fuels pilot plant in Moses Lake, WA. The deployment of these clean energy technologies will support the CSEA goals of furthering low-emission technologies and products, yielding increased economic benefits and positive environmental health benefits, while also supporting North Dakota's rising leadership in innovative and vital climate technologies.

Twelve will work with a Tier 1 EPC, and the engineering design and cost data will be generated using recognized industry standard engineering practices and cost-estimating techniques.

Environmental and Economic Impacts while Project is Underway: There will be no environmental impacts during the pre-FEED and FEED stages of the project. Economic impact will include payments to project partners once contracts are executed and payments to state agencies for permitting fees.

Ultimate Technological and Economic Impacts: The proposed flagship commercial-scale AirPlant™ facility will have a production capacity of approximately 20M-40M gallons of SAF/year. The project will attract large amounts of private investment (>>\$100M) for the project development and will create significant economic impact during the construction and operational phase of the project, including job creation, tax payments, and revenue to the local area and state. During the construction phase, the AirPlant™ facility is expected to create 400-600 temporary jobs during construction and commissioning of the facility. In addition to those temporary jobs, AirPlant™ operation is expected to create ~55 high quality permanent jobs such as technician, operator, plant engineer, and manager roles associated with the operation of the plant. These facilities will create demand for more clean technology jobs throughout the nation's supply chain, including for the manufacture of electrolyzer components and supplies, as well as distribution and use of electrolyzed products. Furthermore, electrochemistry is a key tool in decarbonization and is fundamental to clean hydrogen, ammonia, cement, and energy storage technologies. As we grow and train our workforce, we are contributing to domestic expertise across these critical industries and supporting the transition from traditional energy industries, such as oil & gas, to clean energy. Twelve's Engineering and Plant Design team and design partners include myriad oil & gas veterans with skills transferable to Twelve's technology and PtL SAF as a whole.

The AirPlant™ Two project is expected to have minor environmental impacts that may include heavy vehicle road use, noise pollution from construction, local pollution from construction and traffic, and possible effluents from the plant. We predict these negative impacts will be contained to the tract immediately surrounding the site. The selected EPC firm will be responsible for properly collecting, treating, and/or removing waste materials. Furthermore, an environmental study plan will be completed prior to construction to ensure any required mitigation is implemented.

Twelve's AirPlant™ facility will have major environmental benefits by utilizing hundreds of thousands of metric tonnes of CO₂ from industrial processing, which would either be emitted into the atmosphere or need to be captured and stored in other forms.

Successful completion of AirPlant™ Two would establish PtL as a scalable technology platform for SAF production, with significant implications for North Dakota's role in US fuel independence and e-fuel leadership. In 2023, the US imported 1.9 billion gallons of jet fuel, representing 15% of domestic jet fuel consumption in the same year (12.8 billion gallons). The majority of this fuel was imported from South Korea (58%), followed by Kuwait (11%), and Canada (9%). Though there are currently no significant geopolitical barriers to continued importation of jet fuel from these countries, growing demand for aviation is expected to introduce additional supply constraints. Moreover, US jet fuel inventories stood at 34 million barrels at the end of 2022, the lowest since 1990. There is therefore a clear national security imperative for increased domestic jet fuel production, with PtL SAF constituting its most sustainable and resilient form. AirPlant™ Two, representing a ~7-15% increase in announced domestic SAF PtL capacity, would cement North Dakota's leadership in this emerging and critical industry.

Twelve's unique process has multiple touchpoints across the petrochemicals value chain, enabling flexibility in downstream operations. The intermediates and products formed during Twelve's process – CO, syngas, synthetic crude, and naphtha – connect to a broad range of chemicals with high life cycle GHG emissions. For example, naphtha can be used in existing pathways for primary chemicals as defined by the IEA¹² (e.g., ethylene, propylene, and BTX), which account for approximately two-thirds of the emissions from the chemicals industry as a whole.¹³ Similarly, CO can be used for the production of

¹² <https://www.iea.org/energy-system/industry/chemicals>

¹³ <https://sciencebasedtargets.org/resources/files/SBTi-Chemical-Sector-Status-Report.pdf>

formates, acetic acid, methanol, propylene, or alcohols. Acetic acid is particularly noteworthy as acetic acid synthesized at industrial scale is 60% CO by weight. Moreover, acetic acid is used to synthesize widespread polymers such as polyethylene terephthalate (PET) and ethylene-vinyl acetate (EVA), which are used in a myriad of applications, including foams, paints, adhesives, and food. These examples highlight the platform nature of Twelve's carbon transformation technology, which can provide product flexibility in a quickly evolving market, with the potential for the production of other products from the AirPlant™ facility.

The successful completion of AirPlant™ Two will result in a commercial-scale facility capable of transforming waste CO₂ into value-added products, namely E-Jet® fuel and E-Naphtha™ product. This facility will serve as the design basis for other commercial scale plants on Twelve's deployment roadmap, accelerating the deployment of additional plants and ultimately enabling high-volume domestic production of low-carbon fuels and products.

Why the Project is Needed: Decarbonizing the chemicals industry is a daunting task, due to the vast number of producers generating more than 70,000 individual end products. Because most commodity chemicals are sold through massive supply agreements, it is challenging for a small chemicals manufacturer to enter the commercial supply chain. Twelve aims to address this issue by decarbonizing the chemical building blocks used to synthesize chemicals, materials, and fuels. As chemical manufacturing is the largest contributor to US industrial GHG emissions, decarbonizing the carbon-based building blocks – which are currently derived from petroleum – will have cascading effects throughout the supply chain.

The aviation industry in particular has few options available for decarbonization. Unlike ground transportation which can be electrified via electric vehicles, air transportation is dependent on energy-dense liquid fuels. Current battery technology does not have sufficient energy density for commercial air travel. Furthermore, aviation is highly regulated and requires the use of fuels that are in-line with ASTM standards. Twelve's E-Jet® fuel aligns with ASTM D7566 Annex A1, which enables it to be used in commercial aircraft at up to a 50% blend today. This allows for rapid commercialization and adoption, as Twelve can leverage existing fueling infrastructure and commercial aircraft.

Deploying Twelve's carbon transformation technology at commercial-scale requires deep technological and economic insight. The pre-FEED and FEED studies proposed in this project will produce detailed engineering documents including technical specifications, economic projections, and cost models prior to any construction. This information will be used by Twelve and other stakeholders to determine the overall technical and economic feasibility of the project prior to FID.

This project will deliver a wide range of benefits to North Dakota:

1. Environmental Impacts

- a. The proposed project will transform hundreds of thousands of metric tonnes of waste CO₂ into value-added products, which otherwise would have been directly emitted into the atmosphere and/or need to be captured and stored in other forms.
- b. The lifecycle carbon intensity of the E-Jet® fuel produced at this AirPlant™ facility is >90% less than that of fossil jet fuel, and E-Jet® fuel is drop-in ready to existing jet engines, enabling immediate decarbonization of air travel.
- c. The E-Naphtha produced at this AirPlant™ facility will be carbon negative and can be dropped into existing industrial and chemical supply chains to replace fossil-based naphtha.

2. Economic and Industry Impacts
 - a. This project is anticipated to create 400-600 temporary jobs for construction and commissioning, and ~55 high quality permanent jobs such as technician, operator, plant engineer, and manager roles for the operation of the plant.
 - b. This project will accelerate the production of PtL SAF to meet airline demands and enable the decarbonization of aviation. Currently, the vast majority of SAF uses biomass derived feedstocks, which are limited by arable land, water availability, and competing uses. PtL SAF from CO₂ will need to take an increasingly large share of the overall SAF demand in order to meet carbon neutrality goals.
 - c. This project will provide a pathway for workers in traditional energy industries to transition to clean energy, as many skills are transferable to Twelve's process. Twelve plans to provide job training to help workers transition from analogous industries.
 - d. This commercial-scale AirPlant™ facility will diversify and grow North Dakota's economy while cementing the state's leadership in the low-carbon fuels and commodity chemicals industries.

3. Utilizing and Expanding North Dakota's resources
 - a. Natural Gas
 - i. Twelve has been in discussions with the local natural gas provider (Montana-Dakota utilities) and has confirmed sufficient natural gas capacity in this area. The project will build a new line to tap into existing natural gas infrastructure for flares and as a part of the facility's intermittency strategy (if wind or solar production is low, natural gas can be used to make fuel and reduce electricity demand from water electrolyzers for a brief period of time).
 - b. Expansion of renewable energy projects
 - i. Twelve has initiated discussions with four reputable renewable energy developers and independent power producers for six North Dakota projects, encompassing hundreds of megawatts, which would cover 100% of AirPlant™ Two's electricity requirements. Twelve plans to execute PPAs to cover hourly matching requirements and is also exploring potential behind the meter projects.
 - c. Leveraging existing railways
 - i. The proposed site has direct access to BNSF rail and Twelve has initiated discussions regarding the feasibility of expanding rail infrastructure, as well as utilizing rail to export product from AirPlant™ Two.

STANDARDS OF SUCCESS

Completion of the proposed project will yield pre-FEED and FEED studies for Twelve's flagship commercial-scale AirPlant™ facility, co-located with an industrial facility in North Dakota. This AirPlant™ facility would have a capacity of 1,500 to 3,000 barrels per day (bpd) of E-Jet® fuel. The project will be considered successful if the pre-FEED and FEED studies successfully inform FID by providing a technically sound design package, cost estimate, and schedule estimate for the AirPlant™ project.

The success of the AirPlant™ facility, which will be constructed and operated following FEED and FID, will be determined by its economic and community benefits. Specifically, the AirPlant™ facility should establish and cement North Dakota's leadership in the PtL fuels and low-carbon chemicals industry,

attracting additional investment through the public and private sector for this and other projects. Additionally, the AirPlant™ facility should reduce the carbon emissions of an existing industrial facility in North Dakota while supporting the construction of hundreds of megawatts of new renewable energy projects. Finally, the AirPlant™ facility should create 400-600 temporary construction jobs and ~55 permanent high quality jobs, and result in additional commercial offtake agreements for low-carbon fuels and chemicals.

BACKGROUND/QUALIFICATIONS

Twelve is a leader in the emerging carbon transformation industry. The design of Twelve's commercial-scale electrolyzer has already been validated for CO production and will be further validated in a fully integrated, demonstration-scale CO₂-to-fuels plant upon startup of AirPlant™ One in Moses Lake, WA. Guided by a team with decades of collective experience in project development, Twelve has demonstrated its expertise in project deployment by designing and building the facility in Moses Lake encompassing all project development workstreams such as detailed engineering, supply chain, procurement, and fabrication and installation. Twelve has completed key milestones such as the necessary permitting processes (e.g. the Washington State Environmental Policy Act (SEPA) review) and receiving, installing, and integrating key process equipment such as the water electrolyzer. The demonstration plant is anticipated to begin operations in late 2025/early 2026. Learnings from the engineering and development of this demonstration plant will be applied to the proposed commercial plant in North Dakota.

In addition to having viable commercial prototypes, a low-risk scale up strategy, and a clear technical roadmap for further performance improvements, Twelve also has deep experience in plant design and execution, having almost completed the full design and construction for the Moses Lake demonstration plant in partnership with a Tier 1 EPC. Furthermore, a conceptual design for the proposed commercial scale plant has already been completed, including preliminary equipment sizing and a Class 4 cost estimate. Twelve's internal plant design team is led by Andre Gomes, an engineering professional with decades of experience across industries spanning oil and gas, hydrogen, carbon capture, renewable energy, power generation and electrical distribution, and construction.

Twelve's team combines cutting-edge scientific expertise in the field of CO₂ electrolysis, commercial experience in scaling electrochemical technologies, deep expertise of fabrication processes across multiple manufacturing scales, established relationships with material vendors, successful startup experience, and an understanding of the global energy system. Together, the team has designed and deployed a TRL 6 commercial electrolyzer prototype, and has designed and is nearing completion of construction on a CO₂ transformation plant in Moses Lake, WA. This project will be led by the following members of Twelve's staff with support from many others on the design, operations, and engineering teams. Twelve will work closely with a Tier 1 EPC for the design of the plant.

Nicholas Flanders, co-founder and Chief Executive Officer, holds an MBA and an M.S. in engineering from Stanford University. Twelve is his second startup, after his time as COO at a high-growth technology company, Levo, which counts Sheryl Sandberg and Warren Buffett as supporters. He oversaw the company's growth from 5 to 30 employees, from zero to millions of dollars in revenue, and from angel round to Series B financing. Prior to Levo, Nicholas worked in McKinsey's cleantech practice, performing client work in seven countries. He was featured among Forbes 30 Under 30 in Energy, 2016. Nicholas has

formal training in techno-economic analysis and lifecycle assessments of clean energy technologies. He leads Twelve's business development and commercialization efforts.

Andre Gomes, Vice President of Plant Design and Execution, has decades of industry experience as a project director across oil and gas, hydrogen, carbon capture, renewable energy, power generation and electrical distribution, and construction. He leads the development of Twelve's Moses Lake AirPlant™ and Twelve's Engineering and Plant Design team, which will complete the FEED package for the proposed plant.

Gregor Thomson, Senior Project Execution Manager, has over 35 years of experience in petrochemicals and biofuels, including 12 years as a Project Manager for Fulcrum BioEnergy's SAF plant. At Twelve, he leads pre-FEED development activities for demonstration- and commercial-scale facilities, including technology, licensors, scope evaluations, scheduling, and cost estimates.

Nick Taylor, Engineering Manager, has 10 years of experience as a process engineer and chemical process technologist. His expertise includes process hazard analysis, process design, modeling, and process spec development. He manages Twelve's internal Plant Design team members.

Anna Rozenberg, Principal Process Engineer, has over 25 years of experience in process engineering and technology development which includes design and evaluation of the new and existing chemical, refining, and midstream plants. She has worked for a variety of engineering companies and is a subject matter expert in Safety Instrumented Systems. As a Principal Process Engineer, she will be involved in the design and construction of the proposed plants.

Matt Norlander, Senior Staff Electrical Design Engineer, Matt is a registered electrical professional engineer with over 9 years of experience at the Chevron Richmond refinery in electrical project engineering, working in both capital projects and plant support roles. As the AirPlant™'s team's electrical subject matter expert, he will be guiding and overseeing the design and construction of the electrical power infrastructure for the CO₂-to-SAF plants. He will also support the EPC's electrical infrastructure design based on the reliability philosophy, as well as reviewing, revising and approving electrical design deliverables.

Elliot Rueb, Senior Director of Procurement, is a leader in procurement and supply chain supporting infrastructure development and construction for capital expansion of EV manufacturing and e-fuels facilities in North America and Europe. Elliot and his team lead the procurement of equipment and supplies for Twelve's AirPlant™ facilities, preparing requests for quotes and issues purchase orders based on the documentation issued by the engineering firm. The procurement team also requests services from contractors and negotiates labor rates, the cost of the services, and the timeframe for service execution.

Andy Stevenson, VP of Commercial, has 15 years of experience in energy project development, commercialization of new clean energy technologies, and climate change policy. At Twelve, he leads the teams completing site selection, feedstock procurement, SAF offtake partnerships, public policy efforts, and grants.

Jimmy Chuang, Chief Financial Officer, he leads all aspects of Twelve's financial operations, especially fundraising and structuring for both corporate and project level needs. He recently moved from serving as CFO for Strata Solar, the largest vertically integrated solar and energy storage player in the US, where he led billions of dollars in project financing, including debt, sponsor equity and tax equity. Jimmy has originated and closed every type of financing vehicle deployed within the solar and energy storage industry, while facilitating the creation of multiple fundraising solutions including GP/LP investment

vehicles and private yieldco as well as pioneering the industry's first investment grade securitizations, levered tax equity partnership flip structures, non-recourse development financing and tiered letter of credit facilities.

MANAGEMENT

Twelve's Engineering and Plant Design team will manage and oversee the project to ensure it is being carried out on schedule and successfully meets the objectives. Twelve has developed an organizational structure that grants the Engineering and Plant Design team the agility and resources to design the proposed commercial scale plant, while ensuring adequate information flow from other parts of the organization. During the design process, a dedicated team of designers, engineers, and analysts within Twelve will work alongside the EPC team to find gaps, work to make processes more efficient, and define processes for the first time. Twelve's Senior Director of Project Controls will lead the development and monitoring of evaluation points that will be used during the course of the project. Evaluation points will include reviews of pre-FEED results prior to the start of FEED, regular check-ins between Twelve's internal team and the EPC, and regular monitoring of alignment towards the budget and schedule.

Twelve's Engineering and Plant Design team will provide project management, project controls, administrative, fiscal, design, and communications support. The management and operational strategy of the team will include weekly team meetings, bi-weekly vendor meetings, monthly project meetings, and quarterly stakeholder reviews. The primary work streams include: 1) equipment design and procurement; 2) EPC management for process and plant design; and 3) project controls including cost and schedule management. Twelve has selected an EPC who will work closely with the Engineering and Plant Design team for the delivery of final FEED documents, assisting with procurement, and selecting and managing the construction contractor.

The Engineering and Plant Design team will also work with the EPC, vendors, and the Procurement team to ensure all equipment meets design specifications and is cost effective. The team will provide all applicable data to external experts hired to handle different aspects of the project and site design. Safety and environmental experts will facilitate Process Hazard Analysis (PHA) and HAZOP studies, provide guidance on Process Safety Management certification for the site, and assist with any environmental review activities and air permitting.

Twelve has created a Management of Change (MOC) process with documentation. Twelve's MOC process aligns with OSHA's required elements of MOC. All design documents and equipment specifications are reviewed by the Engineering and Plant Design team. All reviews are managed to ensure all documents and equipment are reviewed for quality and design suitability. Document revisions are recorded and monitored in the document management list to ensure all team members and external vendors are working off the most current version.

CONFIDENTIAL INFORMATION

Twelve is submitting a confidentiality request and the sections of the application designated as confidential as part of the appendices (appendix C through J).

PATENTS/RIGHTS TO TECHNICAL DATA

Twelve maintains an extensive patent and trade secret portfolio covering proprietary reactor materials, hardware, operations, and plant integrations. Thus, Twelve intends to reserve the intellectual property rights to any new such material, hardware, operations, and plant integrations developed during the scope of this project, as well as any associated experimental data or models generated during the scope of this project. Additionally, in the event that Twelve is contractually obligated to protect the intellectual property rights of a third party developed during the scope of this project, such as pre-FEED and FEED designs prepared by an EPC contractor, Twelve intends to comply with with such contractual obligations by taking necessary efforts to protect those third party rights.

STATE PROGRAMS AND INCENTIVES

On April 7, 2025, Twelve and its site selection consulting partner, Global Location Strategies (GLS), issued a Request for Proposal document to the North Dakota Department of Commerce and local economic development corporation. The purpose of this RFP was to gather initial information about state and local incentives that will be applicable to support development of the project. On April 17, 2025, the North Dakota Department of Commerce provided an Incentives Overview outlining the programs that Twelve would be eligible for.

Agreements have not yet been negotiated or executed agreements for these programs, but Twelve and GLS will seek the following:

- **Income Tax Exemption:** A corporate income tax exemption of up to five years is available for new or expanding primary sector businesses certified by the North Dakota Department of Commerce. The exemption applies to state corporate income tax liability generated by the new or expanded project and may provide substantial savings depending on profitability. In some cases, an additional five-year exemption may be approved for a business expansion at a different location. The exemption is not transferable, cannot be carried forward, and requires application to the Tax Commissioner within one year of commencing operations. Since the benefit depends on taxable income once operational, and cannot be sold or applied against other obligations, the true value of this exemption is often diminished compared to front-loaded or refundable incentives.
- **PACE Interest Buydown:** North Dakota's Bank of North Dakota (BND) administers the Partnership in Assisting Community Expansion (PACE) program, which provides interest buydown on qualifying business loans. The program is designed to make financing more affordable for new or expanding primary sector businesses by reducing the effective interest rate. Local communities are required to contribute a portion of the buydown, with participation levels varying by region. The maximum eligible project size is capped at \$5 million in total investment for the standard PACE program, although variations such as AgPACE or FlexPACE exist for agricultural processors and other qualifying projects. The buydown is applied directly against the borrower's interest obligation, lowering financing costs but not providing cash to the company. As the incentive value is limited by loan size, terms, and local participation, the true value is project-specific and generally more modest compared to direct tax abatements or exemptions. Based on information

provided by the ND Department of Commerce, we expect the total state and local value of PACE to be \$714,286.

- **Sales Tax Exemption:** Sales and use tax exemption is available for new or expanding manufacturers purchasing machinery or equipment used directly in the manufacturing process. The exemption applies to equipment installed in a new manufacturing plant or as part of a qualifying physical or economic expansion. Qualifying equipment must be used more than 50% of the time in manufacturing, and may also include certain R&D or design-related equipment. Non-qualifying items include general building systems, consumables, repair parts, and tools. The exemption is not automatic—an application must be submitted to the North Dakota Tax Commissioner for approval, or taxes must be paid upfront with the opportunity to claim a refund.
- **ND New Jobs Training:** Mechanism for primary sector businesses to secure funding to help offset the cost of training new employees for business expansion and/or startup. Funds may be obtained in the form of a grant or loan.
- **Property Tax Exemption or PILOT:** A new or expanding business project may be granted a property tax exemption for up to five years. An extension is available for projects located on property leased from a government entity. In addition to, or instead of, an exemption, local governments and project operator may negotiate payments in lieu of property tax for a period of up to 20 years.
- **Advance ND Loan:** The North Dakota Development Fund’s Advance ND awards “deal-closing” low interest loans to companies considering a new industrial project in North Dakota. Advance ND will serve as a financial incentive for those companies whose projects would contribute significant capital investment, add value to North Dakota resources, and provide new employment opportunities to the state’s economy. Based on Twelve’s capital investment, the maximum \$20,000,000 will be sought for the project. Because Advance ND is required to be the “last money in” to support a project, it is critical that Twelve first identify the funding that will be made available through other state programs, including CSEA.

Appendix A
Industrial Commission
Tax Liability Statement

Applicant: Twelve Benefit Corporation

Application Title: AirPlant™ Two

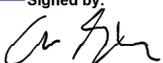
Program:

- Lignite Research, Development and Marketing Program
- Renewable Energy Program
- Oil & Gas Research Program
- Clean Sustainable Energy Authority

Certification:

I hereby certify that the applicant listed above does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

Signature

Signed by:

7B9ED3C58D04481...

Title VP Commercial

Date 10/1/2025

Appendix B: Letters of Support

October 13, 2025

Clean Sustainable Energy Authority
State Capitol, 14th Floor
600 E. Boulevard Ave., Dept. 405
Bismarck, ND 58505-0840

RE: Letter of Support for Twelve's Air Plant Project in North Dakota

Dear Clean Sustainable Energy Authority,

On behalf of the North Dakota Department of Commerce, I am pleased to provide this letter of support for Twelve's proposed Air Plant project in North Dakota.

This investment will establish a state-of-the-art facility producing sustainable aviation fuel precursors and other low-carbon products using carbon transformation technology. The project is expected to create 50 permanent, high-quality jobs in the region, along with hundreds of construction jobs during development. In addition, the project will drive significant demand for local services and infrastructure, creating long-term economic benefits for North Dakota.

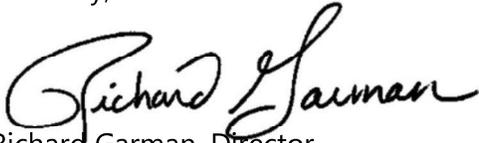
This scale of investment highlights the importance of close collaboration between Twelve and state and local partners to ensure the project's success. Over the past nine months, the North Dakota Department of Commerce has been supporting Twelve's development and site selection team as they continue to evaluate the feasibility of locating this project in North Dakota.

This project aligns with the mission of the Clean Sustainable Energy Authority (CSEA) by advancing sustainable energy development, diversifying North Dakota's economy, and positioning the state as a leader in the next generation of low-carbon industrial innovation. Incentive support from the CSEA will help ensure that this transformational project is realized here in North Dakota, generating both economic growth and environmental leadership.

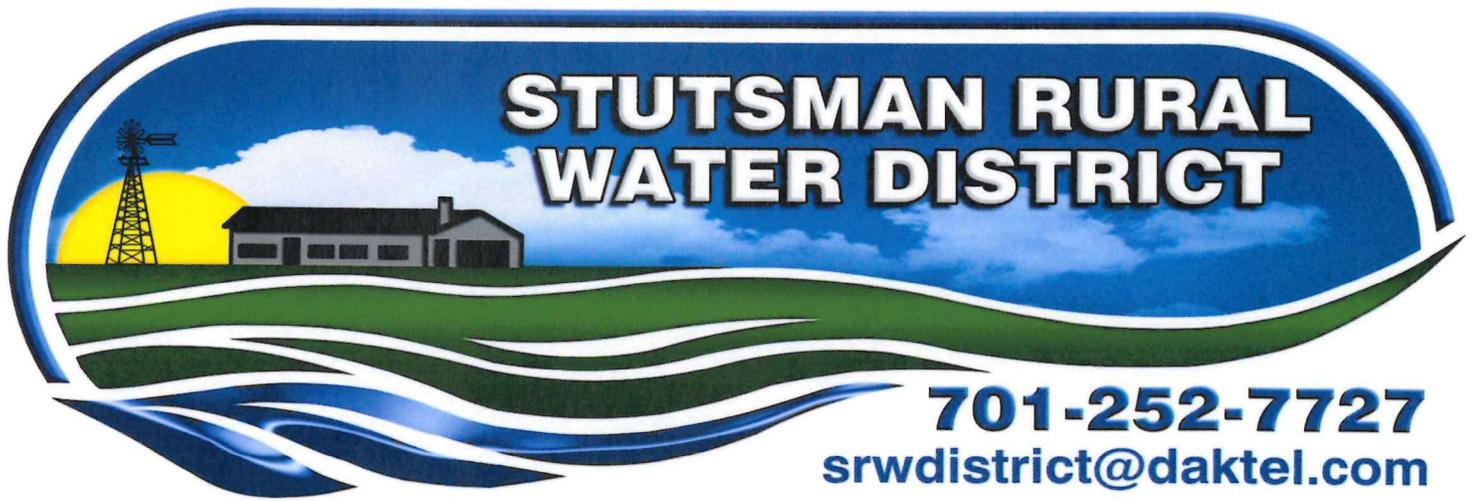
Commerce is committed to supporting Twelve throughout the development process, including continued project management support and concierge service navigating North Dakota's permitting and incentives processes. We are confident that the project will deliver meaningful benefits to our community, the state, and the nation.

Thank you for your consideration of Twelve's Air Plant project. Please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Richard Garman". The signature is written in a cursive, flowing style.

Richard Garman, Director
Economic Development & Finance Division
North Dakota Department of Commerce



Clean Sustainable Energy Authority
State Capitol 14th Floor
600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Re: Letter of Support for Twelve's Air Plant Project in North Dakota

Dear Clean Sustainable Energy Authority,

On behalf of the Stutsman Rural Water District (the "District"), I am pleased to provide this letter of support for Twelve's proposed Air Plant project (the "Project") in North Dakota.

This investment will establish a state-of-the-art facility producing sustainable aviation fuel and other low-carbon products using carbon transformation technology. The Project will create permanent, high-quality jobs in the region, along with hundreds of construction jobs during development. In addition, the Project will drive significant demand for local services and infrastructure, creating long-term economic benefits for North Dakota. This scale of investment highlights the importance of close collaboration between Twelve and state and local partners, including the District, to ensure the project's success.

Twelve and the District are engaged in ongoing discussions regarding the Project and have entered into a letter-of-intent for the District to provide the required quantity of raw industrial water to the Project and the ability for the Project to return wastewater to the city.

We believe this project aligns directly with the mission of the Clean Sustainable Energy Authority (CSEA) by advancing sustainable energy development, diversifying North Dakota's economy, and positioning the state as a leader in the next generation of low-carbon industrial innovation. Incentive support from the CSEA will help ensure that this transformational project is realized here in North Dakota, generating both economic growth and environmental leadership.

The District is committed to supporting Twelve throughout the development process, including providing water and wastewater services. We are confident that the project will deliver meaningful benefits to our community, the state, and the nation.

Thank you for your consideration of Twelve's Air Plant project. Please feel free to contact me if you have any questions.

Sincerely,



Geneva Kaiser
General Manager
Stutsman Rural Water

215 South Cascade Street
PO Box 496
Fergus Falls, Minnesota 56538-0496
218 739-8200
www.otpc.com



October 15, 2025

Clean Sustainable Energy Authority
State Capitol 14th Floor
600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Re: Letter of Support for Twelve's Air Plant Project in North Dakota

Dear Senator Patten and Representative Bosch,

We're pleased to provide this letter of support for Twelve's proposed Air Plant project in North Dakota.

This investment will establish a state-of-the-art facility producing sustainable aviation fuel and other low-carbon products using carbon transformation technology. It will create permanent, high-quality jobs in the region, along with hundreds of construction jobs during development. And it will drive significant demand for local services and infrastructure, creating long-term economic benefits for North Dakota.

This scale of investment highlights the importance of close collaboration between Twelve and state and local partners, including Otter Tail Power Company, to ensure the project's success.

We believe this project aligns directly with the mission of CSEA by advancing sustainable energy development, diversifying North Dakota's economy, and positioning the state as a leader in the next generation of low-carbon industrial innovation. Incentive support from CSEA will help ensure that this transformational project is realized here in North Dakota, generating both economic growth and environmental leadership.

Otter Tail Power currently serves three value-add agricultural customers producing sustainable fuels in North Dakota. We're committed to supporting Twelve, as a value-add agricultural customer, throughout the development process, including providing the electrical capacity needed to operate the facility and entering into a long-term electric services agreement.

We're engaged with Twelve in ongoing discussions and recently executed a letter of intent to complete the study work required for Air Plant Two to connect to the grid in this area. The agreement would produce overall system net benefits to our existing customers and ensure we're protecting our existing customers from risks related to project development. We're confident the project will deliver meaningful benefits to our community, the state, and the nation.

Thank you for your consideration of Twelve's Air Plant project. Please feel free to contact us if you have any questions.

Sincerely,



Mark Bring
Director
Public Policy and Government Affairs



Chris Waltz
Manager
Sales and Implementation



INDUSTRIAL COMMISSION OF NORTH DAKOTA
CLEAN SUSTAINABLE ENERGY AUTHORITY

Governor
Kelly Armstrong
Attorney General
Drew H. Wrigley
Agriculture Commissioner
Doug Goehring

Clean Sustainable Energy Authority Advisory Board

January 29, 2026 9:00 AM

Bank of North Dakota Room #238

1200 Memorial Highway, Bismarck, ND

Or Microsoft Teams

[Join the meeting now](#)

Or call in (audio only)

[+1 701-328-0950,,963527793#](tel:+17013280950963527793)

(9:00 am)

- I. Call to Order and Determination of Quorum and Opening Comments – *Rep. Glenn Bosch and Sen. Dale Patten, Co-Chairs*

(approximately 9:10 am)

- II. **Consideration of Meeting Minutes from the following meetings:** (Attachments XX)
- a. January 17, 2025 Meeting to discuss Rainbow Energy project loan
 - b. August 4, 2025 Policy Meeting and Project Updates
 - c. October 3, 2025 Meeting to discuss Minnkota's Project Tundra loan
 - d. November 13, 2025 Meeting to discuss Cerilon's GTL project loan

(approximately 9:15 am)

- III. Reports – *Jordan Kannianen* (Attachments XX)
- a. Project Management and Financial Reports
 - b. Report on January 13th, 2026 CSEA Technical Committee Meeting

(approximately 9:55 am)

- IV. **Declaration/Consideration of Conflicts of Interest**

- V. Review of Grant Round 5 Applications

Each application will include a summary from the Industrial Commission followed by a presentation by the Applicant and CSEA board member questions

****Tentative list subject to actions of Technical Committee****

(approximately 10:00 am)

- a. C-06-A – Hybrid Service Rig; Submitted by Foremost Well Service; Total Project Costs: \$3,000,000; Amount Requested: \$1,500,000 grant (Attachment XX)

(approximately 10:30 am)

- b. C-06-B – Lithium for Clean Energy Delivery: Demonstration from Produced Water; Submitted by Sustainable Projects Group Inc. - SPGX; Total Project Costs: \$19,047,839; Amount Requested: \$9,523,919 grant (Attachment XX)

(approximately 11:00 am)

- c. C-06-C – ND Lithium-Ion Battery Manufacturing Plant; Submitted by Packet Digital, LLC; Total Project Costs: \$100,827,845; Amount Requested: \$2,297,376 grant, \$18,842,659 loan (Attachment XX)



- d. C-06-D – The Forge Project; Submitted by AmeriCarbon Forge, LLC; Total Project Costs: \$100,000,000; Amount Requested: \$40,000,000 loan (Attachment XX)

Recess for Lunch

(approximately 12:45pm)

- e. C-06-E – The Forge Project: Rare Earths and Critical Materials Integration; Submitted by Ore Spring Materials, LLC; Total Project Costs: \$4,500,000; Amount Requested: \$2,250,000 grant (Attachment XX)

(approximately 1:15 pm)

- f. C-06-F – Northern Plains Nitrogen – Nitrogen-based Fertilizer Plant; Submitted by Northern Plains Nitrogen, Inc.; Total Project Costs: \$2,200,000,000; Amount Requested: \$20,000,000 grant (Attachment XX)

(approximately 1:45 pm)

- g. C-06-G – Commercial Deployment of Carbon Dioxide Capture, Transport, and Storage for Dakota Spirit AgEnergy; Submitted by Harvestone Low Carbon Partners; Total Project Costs: \$94,513,473; Amount Requested: \$20,000,000 loan (Attachment XX)

(approximately 2:15 pm)

- h. C-06-H – AirPlant Two: Flagship Synthetic Aviation Fuel Facility; Submitted by Twelve Benefit Corporation; Total Project Costs: \$152,000,000; Amount Requested: \$10,000,000 grant (Attachment XX)

Recess – 15 minutes

(approximately 3:00 pm)

Consideration of motion to enter Executive Session pursuant to N.D.C.C. 54-63.1-06 and 44-04-19.2

- i. *Review of Confidential Application Attachments* (Confidential Attachments XX)

- VI. Report on Confidential Bank of North Dakota Information– *Kelvin Hullet* (Confidential Attachment XX)

(approximately 4:00 pm)

Meeting Returns to Open Session

- VII. **Vote on funding recommendations for each application**
- VIII. Other Business
- IX. Adjournment

***Bold items require Committee action.**

