



November 2, 2021

Clean Sustainable Energy Authority  
North Dakota Industrial Commission  
600 East Boulevard Ave, Dept 405  
Bismarck, ND 58505-0840

Attention: Mr. Alan Anderson, Clean Sustainable Energy Authority  
Mr. Kelvin Hullet, Bank of North Dakota

Dear Kelvin and Al,

It was good speaking with you today. As discussed, attached please find Bakken Energy LLC's updated application to the Clean Sustainable Energy Authority for a loan of \$100 million and a grant of \$10 million.

As you know, Bakken Energy has an agreement in principle with Basin Electric Power Cooperative to purchase certain assets and equipment from Basin at the Great Plains Synfuels Plant in Beulah, North Dakota, and together with our strategic partner Mitsubishi Power Americas Inc., we will develop the site into a clean hydrogen hub. All of the funds we are seeking from the CSEA will be used for this project. We are very excited and proud of the work we are doing in North Dakota which will contribute to North Dakota becoming a clean energy leader in the United States.

Please note that certain information we are providing to the CSEA with our application is material, non-public information and we request that it be treated as confidential. We have now also included the completed "Confidentiality Request Templated". This information is clearly labeled "confidential" and is contained in the attached PDF named "**CSEA Bakken Energy Application Confidential Information 20211028,pdf**". This confidential information includes, specifically, (i) certain terms of Bakken Energy's agreement in principle with Basin Electric Power Cooperative which are private between Bakken Energy and Basin Electric Power Cooperative and can cause serious harm to both Bakken Energy and Basin Electric Power

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| Bismarck, North Dakota 58504



Cooperative if such information is not treated strictly confidentially, (ii) Bakken Energy's financial projections for the projects described in the application and (iii) a history of Bakken Energy's capital raised.

We also understand that additional funds may become available for clean hydrogen through the CSEA or other state related agencies, and Bakken Energy reserves the right to amend its application to request additional funding as these programs develop further.

We appreciate your consideration of our application and request for funding. Please contact me if you have any questions. We look forward to discussing our application with you.

Kind regards,

*Scott Kaplan*

Scott Kaplan  
Chief Financial Officer  
Bakken Energy LLC  
(917) 539-7777  
skaplan@bakkenenergy.com

Attachments



Clean Sustainable Energy Authority  

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North Dakota Industrial Commission

## Application

Project Title: **Dakota H2 Hub**

Applicant: **Bakken Energy LLC**

Date of Application: **10/22/2021**

Amount of Request

Grant: **\$10 Million**

Loan: **\$100 Million in Two  
Tranches of \$50 Million Each**

Total Amount of Proposed Project:

**\$1.75 Billion**

Duration of Project: **2021 - 2027**

Point of Contact (POC):

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# 1 Abstract

## 1.1 Objective

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**Bakken Energy is seeking a loan commitment from the Clean Sustainable Energy Agency of \$100 million (to be funded in two \$50 million tranches) and a grant of \$10 million.**

Bakken Energy, LLC (“Bakken Energy” or the “Company”) based in Bismarck, North Dakota and Westlake Village, California is a leading clean hydrogen company. Together with our strategic partner Mitsubishi Power Americas Inc. (“Mitsubishi”) we are developing a regional clean hydrogen hub in North Dakota. The Company has an agreement in principle with Basin Electric Power Cooperative (“Basin”) to purchase certain assets and equipment from Basin at the Great Plains Synfuels Plant (“Synfuels Plant”) which the Company and Mitsubishi will work to transform into a world class clean hydrogen hub (“Dakota H2 Hub”). We currently estimate the cost to build the Dakota H2 Hub to be \$1.75 billion and believe it will be one of the largest and lowest cost producers of clean hydrogen in the country when it begins production in mid 2027. We are also evaluating hydrogen storage facilities at the Dakota H2 Hub, which we estimate would add \$200 million to our project costs. None of the proceeds from the loans from the CSEA will go to pay for the salaries or benefits of the Bakken Energy staff as the Company is debt free and has cash to cover the current staff for several years. Bakken Energy is also investing in power projects that will use gas turbines capable of operating with hydrogen as a partial fuel source.

The Dakota H2 Hub will be held in a subsidiary of Bakken Energy. Under our Strategic Partnership Agreement with Mitsubishi, Mitsubishi is entitled to contribute capital and own up to 50% of the Dakota H2 Hub. As of this writing, Mitsubishi has expressed their interest to fund 50% of the equity required for the Dakota H2 Hub. Pending execution of material agreements, the Dakota H2 Hub is expected to reach final financial close in April 2023 with anticipated commercial operation of most facilities by Q3 2027.

To maximize the value of the Dakota H2 Hub, we plan on working with our partner Mitsubishi to connect it to other major regional hubs. As one of the largest and lowest cost producers, we expect we will have demand come to us, and can absorb transportation costs to access non-local markets. The success of the Dakota H2 Hub will position North Dakota to take its rightful place as a leader in the clean energy sector in the US, as it has done in the oil and gas sector.

No major renewable energy or hydrogen project around the world has proceeded without the support of local and national governments. In the August 16th, 2021 press release announcing Bakken Energy and Basin coming to terms on the acquisition and redevelopment of the Synfuels Plant, North Dakota Governor Doug Burgum said: "Today's announcement that Bakken Energy is acquiring the Great Plains

Synfuels Plant to develop a world-class clean hydrogen hub in North Dakota is of historical significance for our state and nation and heralds the extension of North Dakota being home to innovative leadership in fueling and feeding the world.”

Governor Burgum further said, “The North Dakota Hydrogen Hub will lead to the establishment of new industries, create high-paying jobs and the development of new domestic and foreign markets. This project illuminates how the power of innovation over regulation can save versus destroy jobs. Congratulations to Bakken Energy, Mitsubishi Power and Basin Electric for their expansive vision to leverage the existing Synfuels Plant, its talented workforce and North Dakota’s abundant resources to grow our economy and achieve our shared carbon neutrality objectives.”

## 1.2 Expected Results

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The Dakota H2 Hub as currently designed and subject to change is expected to include:

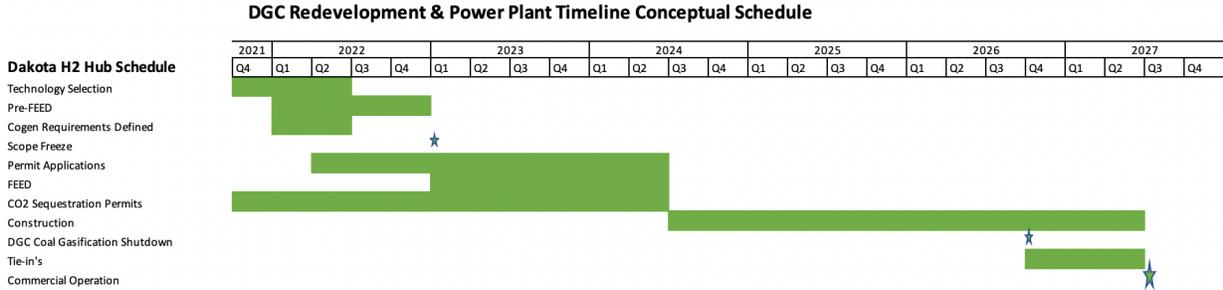
- A new 895 tonne/day (gross total) clean hydrogen production facility (310,000 tonnes/year gross total)
- An existing 1,100 tonne/day (gross total) ammonia (anhydrous) plant which will produce clean ammonia (380,000 tonnes/year gross total)
- New Class VI CO2 injection wells and pipeline for local, permanent geologic sequestration
- An existing United States CO2 pipeline jointly owned with Basin, will be repurposed to import natural gas from the Bakken oil and gas producing region for the production of hydrogen.
- An optional new salt cavern hydrogen storage facility with capacity for 16,000 tonnes of hydrogen storage

As described above, the capital cost of the Dakota H2 Hub including purchase price for the Synfuel Plant from Basin is projected to be \$1.75 billion. Bakken Energy has begun the work to apply for a DOE loan guarantee for 80% of the \$1.43 billion in eligible costs. During the redevelopment phase, the Synfuels Plant is budgeted to incur a total of \$200 million in operating losses and transition costs including Bakken Energy’s commitment to retain employees at least through 2025 which will be financed with equity and debt. Bakken Energy is seeking State of North Dakota funding at the Bakken Energy level to fund its development costs as well as purchase equipment for the Dakota H2 Hub. Separate from the loan guarantee application process, Bakken Energy will be seeking grants, including a share of the \$8 billion in grants provided for in the bipartisan infrastructure bill, if it is enacted. Such grants could cover all or some of the funding for the Dakota H2 Hub including a hydrogen storage facility. The equity needed for the Dakota H2 Hub will depend on the degree of federal and state financial support. Bakken

Energy will fund its equity contribution with cash on hand and the sale of additional equity membership units.

### 1.3 Duration | Timeline

Bakken Energy is actively engaged with commercial counterparties to complete final commercial agreements to secure financing. Major commercial agreements currently under negotiation or to be negotiated and executed include the purchase agreement for the Synfuels Plant, a PPA for power and steam requirements, long term gas supply contracts and third-party offtake agreements associated with the hydrogen production. Pending execution of material agreements, the Dakota H2 Hub is expected to reach final financial close in April 2023 with anticipated commercial operation of most facilities by Q3 2027.



## 1.4 Dakota H2 Hub Project Cost

The tables below provide an overview of the sources and uses of capital for the Dakota H2 Hub

Dakota H2 Hub Sources & Uses				
<i>US\$ in Millions</i>				
<u>Sources:</u>	<u>Amount</u>	<u>%</u>	<u>Uses:</u>	<u>Amount</u>
Debt			Dakota H2 Hub	<u>\$1,753.6</u>
DOE Loan (1)	\$1,149.7	66%	<b>Total Uses</b>	<u><b>\$1,753.6</b></u>
CSEA Debt (2)	<u>100.0</u>	<u>6%</u>		
<b>Total Debt</b>	<b>\$1,249.7</b>	<b>71%</b>		
CSEA Grant (2)	10.0	1%		
<b>Equity</b>	<b>493.9</b>	<b>28%</b>		
<b>Total Sources</b>	<b>\$1,753.6</b>	<b>100%</b>		

1) DOE Financing for 80% of eligible capex  
2) CSEA = Clean Sustainable Energy Authority

## 1.5 Budget

The table below describes the timing of the capital that will be invested in the Dakota H2 Hub.

<b>Dakota H2 Hub Capex</b>							
<i>\$ in Millions</i>							
<b>Quarterly Capex Through Acquisition of DGC</b>							
	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1 2023
Initial Due Diligence	\$0.4						
Detailed Due Diligence - ATCO SRO2		\$0.8	\$1.9	\$1.9			
Pre FEED - ATCO SRO3		\$1.2	\$1.9	\$1.9	\$1.9	\$1.9	\$1.9
FEED							\$2.0
<b>Total</b>	<b>\$0.4</b>	<b>\$2.0</b>	<b>\$3.7</b>	<b>\$3.7</b>	<b>\$1.9</b>	<b>\$1.9</b>	<b>\$3.9</b>

<b>Annual Capex</b>							
	2021	2022	2023	2024	2025	2026	2027
Initial Due Diligence	\$0.4	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Detailed Due Diligence - ATCO SRO2	\$0.8	\$3.8	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Pre FEED - ATCO SRO3	\$1.2	\$7.4	\$1.9	\$0.0	\$0.0	\$0.0	\$0.0
FEED	\$0.0	\$0.0	\$28.0	\$26.0	\$0.0	\$0.0	\$0.0
Construction	\$0.0	\$0.0	\$0.0	\$74.4	\$197.6	\$197.6	\$148.2
<b>Total</b>	<b>\$2.4</b>	<b>\$11.2</b>	<b>\$29.8</b>	<b>\$100.4</b>	<b>\$197.6</b>	<b>\$197.6</b>	<b>\$148.2</b>

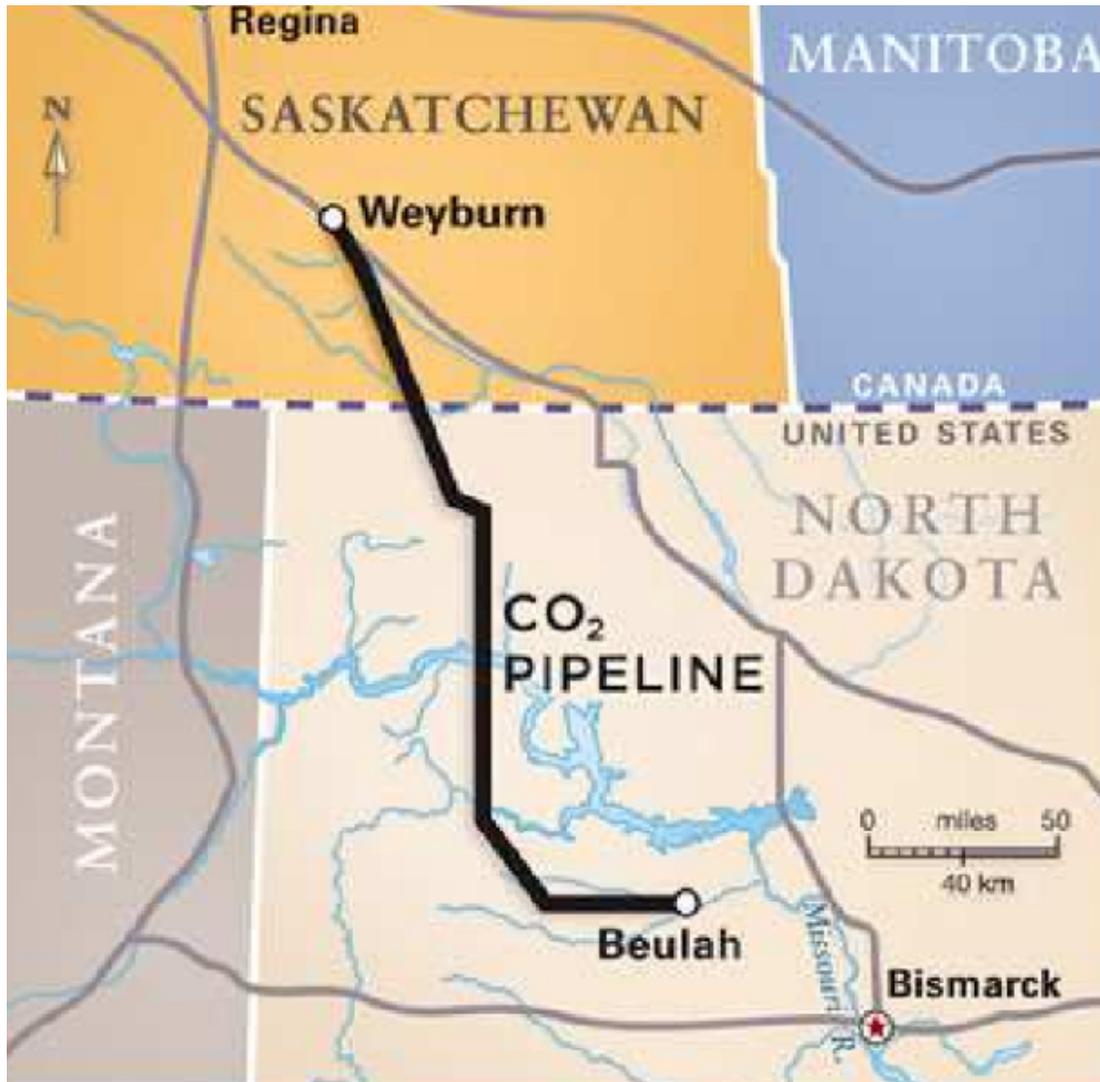
## 1.6 Participants

The opportunity to build a low-cost clean hydrogen hub in North Dakota would not be possible without the ability of Bakken Energy to source low-cost natural gas from the nearby Bakken Field. The development of the Bakken Field over the past two decades has been essential to the United States achieving energy independence from oil producers in the Middle East and now accounts for over 10% percent of US domestic production. North Dakota is among the top three producing states in the United States with Texas and New Mexico. We expect the Bakken Field, and its multiple pay zones and formations to remain a cornerstone of US oil production for the next 30 years. For most producers, the natural gas and natural gas liquids that are extracted at the time of oil production are a by-product and in some cases a nuisance to their extraction of oil. Natural gas and natural gas liquids represent less than 10% of the well production value. In fact, certain pipeline companies are paid to remove the liquids at a negative netback to producers.

The longevity of the Bakken Field is currently being re-evaluated by the United States Geologic Survey, but recent geologic studies and industry estimates have shown an Estimated Ultimate Recovery of 18-24 billion barrels of oil or more than 40 years at current production rates. The natural gas that would be produced in association with that oil is approximately 54 trillion cubic feet or a 50-year supply at current production rates.



2. Souris Valley CO<sub>2</sub> Pipeline Repurposing for Natural Gas Transport – The section of the existing Souris Valley CO<sub>2</sub> Pipeline from Tioga to the Great Plains Synfuels Plant near Beulah, North Dakota will be repurposed for natural gas transportation. Natural gas transported on the repurposed pipeline will be incremental in-state demand and sourced from areas where natural gas would otherwise be at risk of being flared for disposal.



3. Local CO<sub>2</sub> Sequestration – New, local to the Dakota H<sub>2</sub> Hub, CO<sub>2</sub> sequestration wells and transportation will be developed. The development of local, permanent geological sequestration (Class VI) wells for captured CO<sub>2</sub> from the hydrogen production process minimizes energy expenditure and resulting CO<sub>2</sub> from the carbon capture, compression and storage processes.

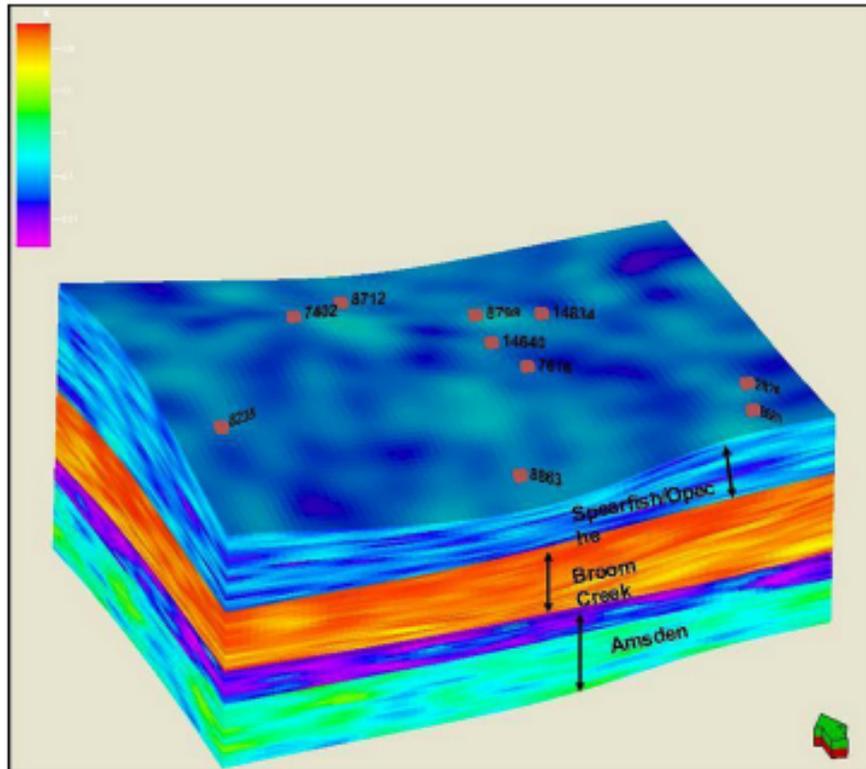


Figure 7. CO<sub>2</sub> storage potential in the Broom Creek aquifer in the bigger Washburn area.

## 2.2 Objectives

- The purpose of the Dakota H<sub>2</sub> Hub is to establish one of the largest and the lowest cost clean hydrogen production hub in the country in the shortest amount of time, continue employment of the Synfuels Plant jobs, become a center of innovation and economic development, reduce site CO<sub>2</sub> emissions by 6 million tons/year and put North Dakota on a path to permanently solving its natural gas flaring problem.
- The Hub's gross clean hydrogen capacity will be 310,000 tonnes/year, which will be produced at a cost our engineers estimate at approximately \$1.20/kg, close to the cost of industrial grey hydrogen

- Members of the workforce at the Synfuels Plant will be retained and coal gasification related employees will be retrained for the Hub. There will be a surge in employment during construction and long-term employment in the region will grow as the Hub grows and attracts industries seeking low-cost clean hydrogen.
- The dramatic reduction in CO<sub>2</sub> emissions is the result of ceasing coal gasification and the very high level of carbon capture and sequestration of CO<sub>2</sub> in our Dakota H<sub>2</sub> Hub design.
- The Project will be a large scale in-state utilization of natural gas and the beginning of solving flaring by productively and responsibly using North Dakota natural gas in North Dakota.

## 2.3 Methodology

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### 2.3.1 Use of Funds

In order to meet project timeline targets and bring the Dakota H<sub>2</sub> Hub online in early 2027, Bakken Energy is currently incurring significant costs in connection with the project development work related to the Dakota H<sub>2</sub> Hub and the acquisition of the Synfuels Plant. These costs include engineering, legal, financial, communications and related expenditures. CSEA support in the form of a grant and loan will be paired with Bakken Energy's current cash and new capital being raised to support these critical expenditures.

### 2.3.2 Tasks Necessary to Accomplish Project Goals

Due to the fact that our Dakota H<sub>2</sub> Hub project is a brownfield project and presents significant potential for the repurposing of existing Synfuels Plant assets the methodology employed differs substantially from a greenfield development project.

The first phase of the Dakota H<sub>2</sub> Hub project involves several levels of due diligence to assess the existing Synfuels Plant equipment, processes, operations and environmental conditions at the site. Subsequent phases of our project differ from a greenfield project as well due to the fact existing equipment and processes will be integrated with new equipment and processes for the production of clean hydrogen and clean ammonia.

Supporting the technical and environmental due diligence and engineering efforts Bakken Energy has and will continue to engage the best financial, legal and strategic communications resources to ensure the Dakota H<sub>2</sub> Hub maximizes the securing of available federal and state grants, loans, incentives and credits.

### 2.3.3 Environmental Impacts

The Synfuels Plant is powered by coal fired generation and several of the products currently produced from the coal gasification process are hydrocarbons that are combusted and produce CO<sub>2</sub> emissions. The Dakota H<sub>2</sub> Hub will obtain power and steam from low carbon sources and the CO<sub>2</sub> capture rate on the autothermal reformation process used to produce hydrogen will capture in excess of 95% of the CO<sub>2</sub> produced. It is estimated that the site will realize a reduction of more than 6 million tonnes per year of CO<sub>2</sub> emissions when our hydrogen production facility begins commercial operations in 2027.

### 2.3.4 Economic Impacts

DGC currently employs approximately 500 employees. Due to the longstanding financial challenges faced by DGC the prospects for ongoing employment at the Synfuels Plant at present levels are not favorable. The Dakota H<sub>2</sub> Hub will provide the best possible outcome for the existing DGC employees in the short and long term. As part of our agreement with Basin Electric, Bakken Energy will offer continued employment at least through 2025 with exceptions for employees who retire, resign, or are terminated for cause. Beyond 2025 the Dakota H<sub>2</sub> Hub will require the experience and skills of the existing workforce to inform and support the redevelopment effort and in serving clean hydrogen and ammonia production roles.

During the construction period for the redevelopment of the Synfuels Plant from mid 2024 thru mid 2027 the workforce will average 1,000 and peak at 2,000.

## 2.4 Facilities

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The Synfuels Plant holds a distinguished place in American history as a pioneer in the development of alternative sources of energy. As an established, large-scale producer of synthetic fuels, the Synfuels Plant uniquely provides the existing infrastructure and processes required to accelerate its transformation into one of the largest and lowest-cost producers of clean hydrogen and ammonia in the United States.



The Synfuels Plant will be reconfigured to utilize natural gas to produce synthesis gas (syngas) and then modify the existing product slate to produce hydrogen as a low carbon intensity fuel for internal use, electric power production, blending into existing natural gas pipelines, existing and expanded ammonia production and other transportation and industrial applications.



## 2.5 Resources

- Our current estimate is that the Dakota H2 Hub will require \$1.75 billion of capital of which we estimate \$494 million will be equity from Bakken Energy.
- Mitsubishi has indicated an interest in investing up to 50% of the Dakota H2 Hub.
- Bakken Energy expects equity commitments from several multinational companies that are focused on clean hydrogen solutions as well as institutional investors with dedicated clean energy funds.

- As a low-cost producer of clean hydrogen and with adequate federal and state support, we believe our returns on this investment will exceed the necessary threshold to attract these strategic and institutional investors.
- The Bakken Energy team has raised many billions of dollars of capital as both investment bankers and principals in private equity firms.
- We are currently raising up to \$65 million in additional capital from strategic partners (including entities which may be interested in off taking our Dakota H2 Hub capacity)
- To fund ongoing costs in connection with the acquisition of the Synfuels Plant and project development work and the purchase of equipment on the Dakota H2 we have been working with the DOE Loan Program Office (LPO) on a loan guarantee that may represent 80% of the eligible costs of the project including the acquisition of existing Synfuel Plant assets, new equipment to produce clean hydrogen and the construction period interest expense.
- We are also evaluating the option of building a hydrogen storage facility, an important component to establishing a hydrogen distribution system. We will vigorously pursue grants and loan guarantees from the DOE for storage.
- Full funding commitments for the Dakota H2 Hub are expected by December 2022 and the closing of the acquisition of the Synfuels Plant with Basin is expected April 2023 at which point we will fund the purchase of equipment at the Synfuels plant.

## 2.6 Techniques to Be Used, Their Availability and Capability

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Bakken Energy evaluated the Synfuels Plant for its potential to be redeveloped into a world class hydrogen production facility. The plant currently gasifies locally mined lignite coal into a synthetic gas, and further processes this synthetic gas into variety of end products, including natural gas, ammonia, urea, ammonium sulfate, CO<sub>2</sub> (for Enhanced Oil Recovery) plus several hydrocarbon products derived from the coal gasification process and isolated gases produced from air separation (e.g., Tar Oils, Phenol, Naphtha and Krypton/Xenon gas and liquid nitrogen).

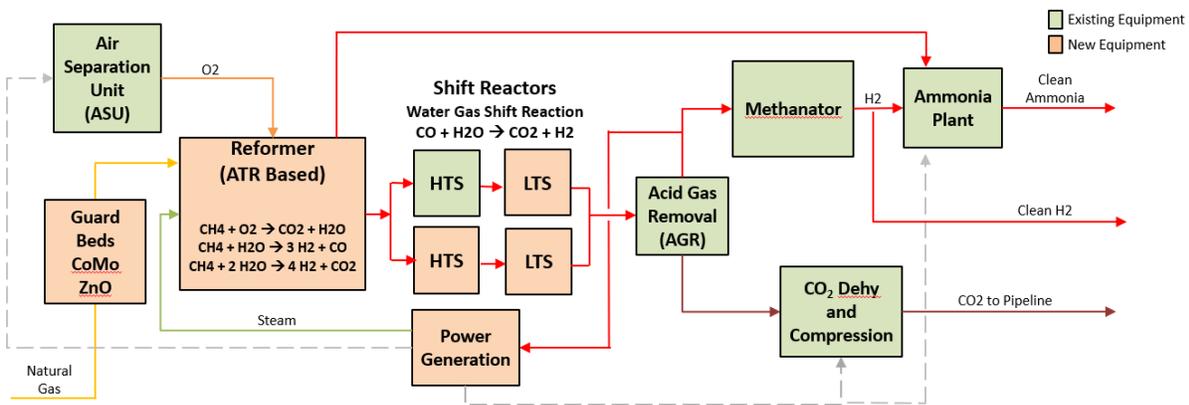
The existing coal gasification and our proposed hydrogen production processes share many subprocesses and processing units and our redevelopment will leverage the existing equipment and processes to minimize redevelopment costs.

The processing units that will be repurposed as part of our redevelopment include:

- Two Train Air Separation Units (ASU)
- Two Train Rectisol Units

- Methanation Unit
- Ammonia Unit
- CO2 Compression Unit
- Urea Production Facility

The redevelopment will include the addition of a world class natural gas autothermal reformer (ATR) to produce syngas and clean hydrogen with > 95% carbon capture and less than 2 kg of CO2 produced for each kg of hydrogen produced. This new design utilizes the full capacity of the existing ASU, shift conversion, carbon capture and existing methanation, capacity additions in the water shift will also be required. This new reformer will produce approximately 895 gross metric tons/day of hydrogen. This state-of-the-art ATR technology ensures the highest CO2 capture rates for hydrogen production. The existing ammonia plant would continue to operate on a synthetic feed stream that closely resembles the current feed.



To service the Dakota H2 Hub, the existing CO2 pipeline from the Synfuels Plant that transports CO2 to oil producers in Saskatchewan, Canada will be partially re-purposed and reversed in order to flow partially stranded low-cost natural gas to the Dakota H2 Hub. The southern portion of this 205 mile pipeline, approximating the route from Tioga, ND to the Synfuels Plant will need approximately \$40 million in modifications to its gathering and compression facilities to reverse the flow and carry natural gas. Basin will continue to own 100% of the existing pipeline north of Tioga and serving the Canadian market.

The gas requirements of Dakota H2 Hub are an estimated 140 million standard cubic feet of natural gas per day. The US portion of the pipeline will be owned 50:50 between Basin and Dakota H2 Hub. Natural Gas prices at the Dakota H2 Hub are expected to be lower than sourcing of natural gas from the Northern Border Pipeline. For modeling purposes, we have assumed that natural gas will be sourced for \$0.25 per mmbtu below the cost of gas otherwise sourced from Northern Border Pipeline as a local captive pipeline. As mentioned above, current estimates suggest the Bakken Formation has a 50 year supply of natural gas.

North Dakota is blessed with extensive geological formations that could be candidates for hydrogen storage. Storage will be a key element of a hydrogen transportation and distribution system. We are

exploring storage capability similar to the Advanced Clean Energy Storage (ACES) project in Delta, Utah, which will support their production of 450 tonnes of hydrogen per day and store 5,500 tons of hydrogen.

The ACES project has applied for a \$598 million DOE loan guarantee. On September 9, 2021, Mitsubishi and Chevron U.S.A, Inc announced that Chevron, through its New Energies Division, would be [acquiring an equity interest in the existing ACES project in Delta, Utah](#), which is a joint venture between Mitsubishi Power and Magnum Development. Our current design is for a 16,000 tonnes salt cavern hydrogen storage facility which would represent 22 days of net production and we believe would be an excellent candidate for Federal grant support as DOE energy policy seeks to develop a dependable network.

## 2.7 Environmental and Economic Impacts while Project is Underway

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The purpose of the Dakota H2 Hub is to establish one of the largest and the lowest cost clean hydrogen production hub in the country in the shortest amount of time, continue employment of the Synfuels Plant jobs, become a center of innovation and economic development, reduce site CO2 emissions by 6 million tons/year and put North Dakota on a path to permanently solving its natural gas flaring problem.

The Dakota H2 Hub project will result in a significant economic impact to the general Beulah – Hazen area and surrounding regions during the Synfuels Plant redevelopment construction period. The estimated construction labor force will reach its peak of 2,000 in late 2025, early 2026 with an average 1,000 over the period from Q2 2024 to Q2 2027.

The history of industrial development in the United States has closely followed regions that have developed low cost, environmentally acceptable energy sources. The discovery of oil in western Pennsylvania in 1859 and Texas in 1901 transformed those regions and created offshoots of industries from refining to plastics to tires. The unique attributes of North Dakota with the Bakken Formation, the pipeline infrastructure, the North Dakota primacy law, vast storage capabilities for CO2 sequestration and a pre-existing industrial complex in the Synfuels Plant provides North Dakota with the potential to not only become a Hydrogen Hub but also a CO2 sequestration Hub for the surrounding region once critical mass is reached. In addition, with cheap low-cost energy from Hydrogen and other clean sources as well as North Dakota's geological stability and cool climate, it should be a Hub for data centers and other 21<sup>st</sup> century energy intensive businesses. Moreover, if as predicted, clean fertilizer becomes a requirement for much of agriculture, low-cost, close by clean ammonia can be a tremendous advantage for North Dakota farmers versus those who receive shipments from further away.

Our project's need for natural gas helps solve two issues that North Dakota faces. By requiring the gathering and transport of natural gas, we lower the flaring which might otherwise limit oil production.

Additionally, the natural gas we consume ultimately has its carbon elements captured and permanently sequestered.

## 2.8 Ultimate Technological and Economic Impacts

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For most of the past decade, low natural gas prices have made coal gasification uneconomical. The burden of the substantial losses at the Synfuels Plant has been borne by ratepayers of Basin. The sale of the Synfuels Plant not only provides prospective relief for ratepayers, but also preserves the employment base at the Synfuels Plant for decades. The greater than one-billion-dollar construction project will also add to the employment base of central North Dakota.

The creation of a low-cost hydrogen hub in North Dakota for truck transportation using fuel cell technology will be important as battery technology is not practical. In addition, clean ammonia can be produced at the Dakota H2 Hub at approximately the same cost as industrial ammonia without the negative carbon emissions so that North Dakota farmers can be clean without a cost disadvantage.

## 2.9 Why Project is Needed

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This project will maintain North Dakota's leadership in the utilization of natural resources for energy consumption. Previously, the State has been a pioneer in coal gasification and large-scale hydraulic fracturing. As carbon intensive energy production is declining in the State and around the Nation, North Dakota must respond to the demand for cleaner energy production solutions. While intermittent renewables are part of that solution, baseload power from hydrogen and large truck mobility from fuel cells demands that clean hydrogen must also be part of the solution and this project is perfectly suited for North Dakota to answer that demand both in scale and cost.

Our strategy is to begin with the acquisition of the Synfuels Plant and to redevelop it into one of the largest and lowest cost single source of clean hydrogen production in the country when it comes online in mid 2027. The low cost is largely the result of redeveloping the Synfuels Plant which is a unique facility; we believe that this low cost will not be achieved by anyone else for the foreseeable future. The Dakota H2 Hub will be a fully integrated hub, including storage, transportation and local utilization.

To maximize the value of the Dakota H2 Hub, we plan on working with our partner Mitsubishi to connect it to other major regional hubs. As the largest and lowest cost producer, we expect we will have demand come to us, and can absorb transportation costs to access non-local markets.

We believe that the market for clean hydrogen is a developing market and expect demand to surge between now and the financing of the Dakota H2 Hub, and beyond. We are actively pursuing current

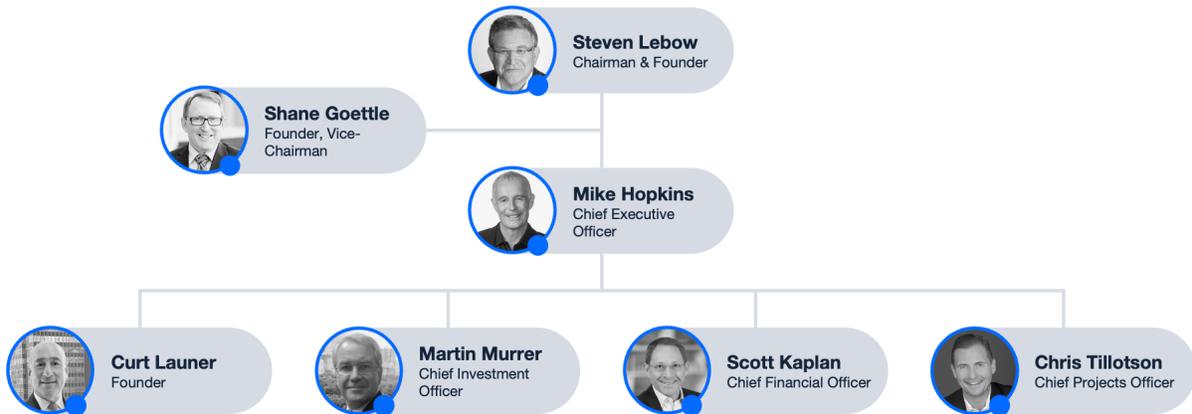
contracting opportunities including discussions with buyers interested in 100% of our clean hydrogen capacity on a long-term basis. We are open to the long-term contracting of our capacity depending on price and creditworthiness.

On a parallel basis we are looking at local and export markets for clean ammonia which we can produce instead of clean hydrogen as market conditions warrant. Our growth plans include the future expansion of our capacity to produce clean hydrogen from natural gas as well as the development of clean hydrogen from electrolysis powered by renewables. There is significant existing and potential wind power in the area of the Dakota H2 Hub which can be economically used for clean hydrogen leveraging the clean hydrogen assets put in place based on the lower cost clean hydrogen from natural gas.

### 3 Management

Bakken Energy is a Delaware limited liability company that is [led by a team](#) of experienced entrepreneurs, innovators, company builders, financiers, investment bankers, energy sector executives and project developers.

#### Bakken Energy Management Team



Bakken Energy has assembled a group of Advisors, including several prominent North Dakota individuals, who are well known, respected leaders that complement the Company’s management team and provide important insight and business development contributions.

#### Bakken Energy Advisors



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## 4 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 May 2019, Bakken Energy raised \$200,000 from the sale of Convertible Notes to the Bank of North Dakota and the North Dakota Development Fund. These Convertible Notes were repaid on October 22, 2021.

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## 5 APPENDIX 1 – Background | Qualifications

On June 2, 2021, Bakken Energy and Mitsubishi Power signed a partnership agreement to create a world-class clean hydrogen hub in North Dakota. In the [press announcement](#), Bakken Energy and Mitsubishi Power jointly stated the hub will be composed of facilities that produce, store, transport and consume clean hydrogen and be connected by pipeline to other clean hydrogen hubs being developed throughout North America.

On August 16, 2021, Bakken Energy announced it had reached agreement with Basin Electric Power Cooperative on key terms and conditions to purchase the assets of the Dakota Gasification Company, a subsidiary of Basin Electric, and the owner of the [Great Plains Synfuels Plant \(“Synfuels Plant”\)](#).

New, world-class clean hydrogen production facilities generally require up to 10 years to begin producing hydrogen and develop regional infrastructure and applications. We estimate that the redevelopment of the Synfuels Plant will cut this time in half and produce an estimated 310,000 gross metric tons of clean hydrogen per year. This production will use locally sourced feedstock and employ established production and carbon capture processes to produce the clean hydrogen.

Our transformation of the Synfuels Plant into the Dakota H2 Hub will discontinue the practice of lignite coal gasification which made sense when the Synfuels Plant was originally conceived and natural gas in the region was expensive and in short supply. Many of the processes and equipment required to convert lignite coal to synthetic natural gas are the same as those required to convert natural gas to clean hydrogen. Our redevelopment of the Synfuels Plant will reduce CO<sub>2</sub> emissions by more than 6 million tonnes per year. This more than 6 million tonnes per year reduction in CO<sub>2</sub> emissions takes into account the existing Synfuels Plant carbon capture program and their recently announced plans to increase capture rates.

North Dakota’s plentiful resources in the form of natural gas and water supply provide the feedstocks required to develop world-class, clean hydrogen production. The state’s geological attributes provide the ability to develop both underground hydrogen storage and wells for permanent carbon dioxide sequestration. The combination of low-cost feedstock availability, geological features and magnitude of assets included as part of the Synfuels Plant agreement result in our ability to transform the Synfuels Plant into one of the largest and lowest cost clean hydrogen facility in the United States.

The transformed Synfuels Plant will form the nucleus of the Dakota H2 Hub, designed to aggressively advance regional, national, and global decarbonization objectives through the development of clean hydrogen applications for the agriculture, power, transportation, and industrial sectors. Bakken Energy is in the process of developing additional locations to further develop its hydrogen network.

The Bakken Field has been plagued by extraordinary levels of natural gas flaring. This is a waste and has the worst possible impact on the environment and local communities. There is very little in-state utilization of natural gas so the only outlet for natural gas is to export it out of state, primarily in the Northern Border Pipeline. There is inadequate infrastructure to export all the gas produced so the gas that cannot be exported is flared. The root cause of flaring is that North Dakota, unlike all other gas producing states, does not utilize its own gas. The solution is to utilize the natural gas in state. The Dakota H2 Hub will be among the first major uses of natural gas in State and will go a long way to solving the flaring problem.

The Department of Energy Loan Program Office (“LPO”) has issued more than \$35 billion of loans and loan guarantees for more than 30 projects and has a proven track record including transforming existing energy infrastructure, reviving nuclear construction, accelerating growth of utility-scale solar and wind, expanding domestic manufacturing of electric vehicles, and improving the lives of all Americans by catalyzing new energy technology and creating jobs.

LPO’s in-house team has decades of financial, technical, legal, and environmental experience that it can leverage to deploy more than \$40 billion in loan and loan guarantee authority currently available.

The Dakota H2 Hub has been identified by the LPO as a potential participant in the loan program and the company intends to apply by the end of the year. The level of request will be for 80% of the \$882 million eligible construction costs of the Dakota H2 Hub. Depending on market needs and in the absence of grants, we may also apply for LPO loans or loan guarantees for Hydrogen Storage projects. For modelling we have assumed a rate on the 30-year loan of 2% per annum with an upfront credit charge of 10%. A critical element of that DOE Loan Application is section G. 2.g which will ask us to identify “...State incentives or other assistance on which the Project relies including grants, tax credits and other loan guarantees to support the financing, construction and operation of the Project”. Our success in receiving these Federal Loans and Guarantees, according to our advisors, will in part depend on whether the State also stands financially behind our Project. Thus, Bakken Energy believes that a funding commitment from the CSEA might be instrumental in receiving Hundreds of Millions of support from the Federal Government.

The highest and best use of our production will depend in part on governments, farm, non-profits and corporations’ policies enacted over the next several years as we prepare for production in mid 2027. Based on discussions with potential off-takers, we expect the market for our clean hydrogen to be in the \$2-\$3/kg range at the plant gate.

In addition, selling our hydrogen may also earn us production tax credits as provided for in the current Reconciliation bill. The proposed credits are a sliding scale based on carbon intensity of the clean hydrogen produced. If these credits become law, our clean hydrogen could qualify for as much as \$3/kg and there is a cash pay option in lieu of a credit against taxes.

Local and regional uses of hydrogen may include clean ammonia and other downstream fertilizer products for farmers, transportation fuels for trucks and other fuel cell vehicles, aviation fuel, metals production, chemical/industrial processes and fuel cell backup power. In the [2021 AMR Plenary Session](#), Dr. Sunita Satyapal does an exceptional job of describing the hydrogen program.

While using our clean hydrogen capacity to produce and sell clean hydrogen appears to have compelling economics at this time, we also have the optionality of using some or all that capacity to produce clean ammonia. Clean ammonia may have federal and/or state financial incentives but at this time those are not defined as they are for clean hydrogen. Ammonia does have the advantages of a better-established local market as fertilizer and much lower cost of storage and transport. The biggest opportunity for clean ammonia may be export markets as evidenced by the recent announcement by Mitsubishi and Shell Corporation regarding an Edmonton, Canada based project to ship ammonia to Japan. The Japanese Ministry of Economy, Trade and Industry projects Japan will require 3 million tonnes of fuel ammonia by 2030 and 30 million tonnes by 2050. Our preliminary research suggests that Korea may also require substantial shipments. While the location of the Dakota H2 Hub is not optimal for export, the large volumes and low costs justify investigating export markets.

With respect to clean hydrogen production, we are exploring what we can contract for future off-take in the next six to nine months without committing ourselves in the meantime. Our strategy is to line up the best sales contracts while we see how the market for clean hydrogen develops, including government incentives and new higher value applications. This will best inform us as to what we want to contract for and what, if any, we want to have to hold as merchant capacity. At this time, the highest value application seems to be fuel for hydrogen trucks, and we have been approached by a truck manufacturer with an expressed interest for up to 100% of our clean hydrogen production at a price over \$2/kg. Hydrogen blended into natural gas pipelines particularly to address heat content issues and hydrogen for power are also being explored but the economics are not yet clear.

## 5.1 Mitsubishi Power

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Mitsubishi Power Americas, Inc. (Mitsubishi Power) headquartered in Lake Mary, Florida, employs more than 2,300 power generation, energy storage, and digital solutions experts and professionals. Employees are focused on empowering customers to affordably and reliably combat climate change while also advancing human prosperity throughout North, Central, and South America.

Mitsubishi Power's power generation solutions include gas, steam, and aero-derivative turbines; power trains and power islands; geothermal systems; PV solar project development; environmental controls; and services. Energy storage solutions include green hydrogen, battery energy storage systems, and services. Mitsubishi Power also offers intelligent solutions that use artificial intelligence to enable autonomous operation of power plants. Mitsubishi Power is a power solutions brand of Mitsubishi Heavy Industries, Ltd. (MHI).

Headquartered in Tokyo, Japan, MHI is one of the world's leading heavy machinery manufacturers with engineering and manufacturing businesses spanning energy, infrastructure, transport, aerospace, and defense.

### **5.1.1 Hydrogen Combustion Experience**

In January 2018, Mitsubishi Power announced that it successfully demonstrated up to 30% hydrogen co-firing capability with its state-of-the-art dry low NO<sub>x</sub> combustion system used in advanced class G and J-Series gas turbines. This milestone is the result of over 50 years of combustion experience with fuels ranging from 5% to 90% hydrogen content.

Mitsubishi Power's roadmap to 100% hydrogen capability leverages the multi-cluster combustor developed from Mitsubishi Power's IGCC technology, which was already tested successfully on 80% hydrogen, and has been operating since 2018 at the Osaki Cool Gen project on a hydrogen and carbon monoxide syngas. Validation of the multi-cluster combustion system with 100% hydrogen capability is targeted to be complete in 2025.

As the hydrogen infrastructure advances, the transition to increased hydrogen co-firing can be accommodated by equipment modifications to the gas turbine and auxiliary systems.

Mitsubishi Power has developed significant expertise over the past 50 years in the utilization of fuels ranging from 5% to 100% hydrogen content. These fuels include refinery off-gas, coke oven gas, and syngas produced from gasification. Mitsubishi Power began its development of hydrogen rich fuel combustion systems in the late 1960's to utilize gas turbines in applications fueled by coke oven gas. During the following decades Mitsubishi Power added both refinery off-gas and syngas capabilities to its hydrogen rich fuel portfolio.

To date, Mitsubishi has over 3.5 million actual operating hours of experience co-firing hydrogen at 29 units; 400,000 of those hours demonstrated co-firing with over 80% hydrogen. In May of 2018, Mitsubishi Power announced its participation in the conversion of a gas turbine combined-cycle unit at Vattenfall's Magnum plant in the Netherlands to 100% hydrogen firing by 2025.



comprehensive plan to sequentially transition from coal, to natural gas and finally to renewable hydrogen fuel, and creates a roadmap for the global industry to follow. This transition will start in 2025, when the turbines will be commercially guaranteed capable of using a mix of 30% hydrogen and 70% natural gas fuel. This fuel mixture will reduce carbon emissions by more than 75% compared to the retiring coal-fired technology. Between 2025 and 2045, the hydrogen capability will be systematically increased to 100% renewable hydrogen, enabling carbon-free utility-scale power generation.

MHPS partnered with Magnum Development to develop the Advanced Clean Energy Storage project adjacent to IPP.

### **Capital Power (Alberta, Canada)**

Capital Power has ordered two Mitsubishi Power M501JAC gas turbines to repower its Genesee Units 1 and 2 in Alberta, Canada, from coal to natural gas. The units will combine best-in-class Mitsubishi Power air-cooled combustion turbines and heat recovery steam generators with the existing steam turbine generators. The plant will provide 1,360 megawatts (MW) of net capacity, and carbon emissions intensity will decrease by approximately 60 percent to a level below the Alberta Technology Innovation and Emissions Reduction (TIER) regulation benchmark.

The M501JAC gas turbines are hydrogen-capable to support future decarbonization. They will be able to operate on a mixture of natural gas and up to 30 percent hydrogen. The units can be converted in the future to operate on 100 percent hydrogen for zero carbon emissions, enhancing Capital Power's standing as among the cleanest large-scale power generators in Canada.

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## 6 APPENDIX 2 – Dakota H2 Hub Project Phases

**The Dakota H2 Hub project phases in sequential order are as follows:**

- Preliminary Due Diligence (Complete)
- Detailed Due Diligence (In Progress)
- Pre – Front End Engineering and Design (In Progress)
- Front End Engineering and Design
- Construction
- Commercial Operations

In the following sections an overview of the tasks and deliverables for each of the project phases will be provided.

### 6.1 Preliminary Due Diligence

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During the Initial Due Diligence phase of the project engineering, legal, tax and financial consultants were engaged to review data room materials and engage Basin Electric and DGC personnel to aid our technical assessment of Great Plains Synfuels Plant assets and processes and our broader understanding of the operations, legal, financial, regulatory and environmental matters as they pertain to existing coal gasification operations and future clean hydrogen production.

The scope for the preliminary technical/engineering due diligence was as follows:

- Conduct an initial, high-level inventory of existing equipment/processes, and assess ability to reuse/retrofit existing equipment for a new gas reformer build.
- Propose technologies for a new natural gas reformer installation, and prepare a preliminary block flow process diagram, showing potential H2 production capacities for a new build.
- Develop an initial, Class V capital cost estimate and schedule to redevelop assets and maximize the H2 production capabilities using existing infrastructure where practical.
- Conduct an initial, high level environmental, regulatory appraisal of the site including reclamation obligations.
- Provide a high-level understanding of regulatory/environmental strategy for the redevelopment of the facility and identify any opportunities or concerns leveraging existing permitting and environmental work.

The scope for the preliminary financial due diligence was as follows:

- A financial assessment of the Synfuels Plant focused on an understanding the contractual commitments, cost structure and other future obligations that would be impacted by the conversion of the facility to a hydrogen production facility. The project deliverables for this phase were as follows:

## 6.2 Detailed Due Diligence

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The scope for the detailed technical/engineering due diligence is as follows:

- Conduct a detailed assessment of the condition of key existing equipment/processes that could be used for H<sub>2</sub> and/or ammonia production and assess ability to reuse/retrofit such existing equipment for a new gas reformer build. This will include assessment of current condition (including nondestructive testing where appropriate), operating costs implications, identification of any equipment that will need to be replaced or modified to extend the remaining life to 30 years of operating life.
- Engagement with technology licensors, where required and appropriate
- Conduct a detailed environmental assessment of facility, including regulatory reclamation obligations and an environmental site assessment (including soil testing where appropriate), to determine retirement and reclamation costs.
- Define the scope and cost estimates for the demolition and disposal of existing equipment that will not be used in the redevelopment of the facilities to H<sub>2</sub> production (for example, the existing coal gasifiers). This scope will include estimates and plans for the disposal of waste hazardous products.
- Define, quantify, and outline a preliminary plan for limiting potential environmental liabilities.
- Develop an Initial Operations Plan. The operations plan will provide the overall management hierarchy and will consider all aspects of the operation i.e., operations and maintenance, engineering, accounting, safety, production planning etc.

The Detailed Due Diligence project deliverables are:

- Summary Report summarizing major findings, opportunities and concerns based on scope items
- Operations Plan
- O&M Staffing Plan

## 6.3 Pre-FEED (Front End Engineering and Design)

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The scope for Pre-FEED is as follows:

- Conduct a process technology selection process to determine the base line process configuration and mass balance.
- Conduct a Power and Steam Supply Option Evaluation: This study will examine the low CI power and steam generation options available for the project to incorporate into the process.
- Conduct a process evaluation of existing assets that are to be re-used in the redevelopment.
- Conduct Mechanical Integration and Tie ins Assessment.
- Conduct Electrical Integration and Tie ins Assessment.
- Complete a Balance of Plant, Utility and Outside Battery Limit Assessment: Identify the scope for the utilities and offsites portion (Tank storage, rail, water, waste, pipelines etc.) of the project and integrate into the Project Execution Plan. This includes confirming capacity, route, applicability of rights of way for planned use, and review of applicable codes or regulatory regime for the following specific pipeline systems:
  - Repurpose of the existing CO2 pipeline for natural gas supply
  - Repurpose of the existing synthetic natural gas pipeline to potential hydrogen delivery to Northern Border Pipeline.
  - New CO2 pipelines for CO2 sequestration
- Engage with appropriate consultant and regulatory bodies to define the Carbon Intensity calculation methodology for the project, and how it will apply to the redevelopment and the production of low carbon hydrogen and ammonia.
- Engage and manage a third party regulatory/environmental consultant to prepare the regulatory applications for the redevelopment effort (excluding CO2 sequestration activities). This will include the required air and noise modeling.
- Engage and manage a third party to develop a preliminary CO2 Sequestration Strategy in the DGC area.

The Pre – FEED project deliverables are:

- Summary Report - report summarizing major findings and opportunities
- Develop a preliminary Project Execution Plan (“PEP”): the PEP will involve a mapping out of the FEED and the Construction phases. Some of the items to be identified are contracting strategy, tie in strategy.
- Develop the Design Basis Memorandum (“DBM”): The DBM will be developed once the technology selection process is complete and the scope of the redevelopment is finalized. The DBM is a document that outlines a detailed scope of work for completion of the project.
- Develop the Class IV Capital Cost and O&M Estimate: The project capital cost and O&M Estimates will be developed based on the final technology selection, PEP and DBM.
- Develop the Project Schedule: The project schedule will be developed based on the final technology selection, PEP and DBM.

## 6.4 Front End Engineering and Design (FEED)

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Note: Additional detailed scope and deliverables for the FEED phase will be defined in Pre-Feed phase.

- Develop Piping & Instrumentation Diagrams (P&IDs)
- Conduct Hazard and Operability Study (HAZOP)
- Define major equipment specifications, RFPs and prepare procurement contracts
- Implement Execution Strategy (EPC Lump sum, EPCM, other)
- Engage constructors/define construction strategy
- Support regulatory application review.
- OSBL Interconnection Agreements (natural gas, electrical, water, other)
- Develop Operations Strategy
- CO2 sequestration pilot wells

## 6.5 Construction

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Note: Additional detailed scope and deliverables for the FEED phase will be defined in Pre-Feed and FEED phases.

- Procure Equipment
- Complete Detail Design
- Select construction contractors and complete construction
- Implement Operations Strategy – Develop O&M manuals, procedures and plans
- Commissioning and start up
- Turn over to operations

## 6.6 Resources

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### 6.6.1 ATCO Energy Solutions

ATCO is a diversified global corporation with investments in Structures & Logistics, Utilities, Energy Infrastructure, Retail Energy, Transportation, and Commercial Real Estate. With operations along the full length of the energy value chain, ATCO has the expertise to help their partners, communities, and governments in the transition to a lower-carbon future.

ATCO is an industry leader in decarbonization by advancing a variety of clean technologies including hydrogen, solar and hydroelectric power and integrated energy solutions including off-diesel initiatives for remote Indigenous communities. Last year, ATCO reduced 90% of the direct greenhouse gas emissions from their portfolio (almost 7.5 million tonnes) and generated over \$71 million in net economic benefit for the 50 Indigenous partnerships with which they have worked.

#### SELECTED HYDROGEN PROJECTS

##### Operating

- Integrated Microgrid | Clean Energy Innovation Hub (W Australia) - an integrated microgrid composed of solar + electrolysis + fuel cell technology.

##### Under Development

- Fort Saskatchewan Hydrogen Blending Pilot (Fort Saskatchewan, Alberta, Canada) – demonstrate 5% blend into the local natural gas grid
- 10 MW Clean Energy Innovation Park (W Australia) – production of 4 t/d of green hydrogen for local markets.
- ATCO/Suncor Partnership in a 350 MMSCFD World-Scale Blue Hydrogen Facility (Alberta, Canada) – incorporating >95% capture and sequestration, H<sub>2</sub> storage, and supply low carbon hydrogen for local industry and utilities.

### 6.6.2 University of North Dakota Energy & Environmental Research Center (EERC)

The EERC is a leader in developing new technologies and practical solutions to critical energy challenges. Their core research priorities are the cornerstone for the development of innovative, practical, and cost-effective energy and environmental solutions: Coal Utilization & Emissions, Carbon Management, Oil & Gas, Alternative Fuels & Renewables, and Energy and Water.

The EERC is partnering with Bakken Energy (formerly Bakken Midstream Natural Gas LLC), Neset Consulting, and others to conduct a \$10,000,000 field study to determine the feasibility of developing salt caverns for hydrocarbon storage in Western North Dakota. The study will provide valuable information and advance underground hydrogen storage development efforts and the establishment of the hydrogen economy in North Dakota.

### **6.6.3 Crowley Fleck**

Crowley Fleck PLLP is one of the oldest and largest law firms in the upper Midwest region. The law firm has over 170 attorneys practicing in the areas of commercial litigation, insurance defense litigation, natural resources, mining and energy law, healthcare, commercial transactions, banking and finance, creditors rights, real estate transactions and development, tax and estate planning and administration, intellectual property matters, employment law, and governmental affairs and lobbying.

Crowley Fleck has offices throughout Montana, North Dakota, and Wyoming, including offices in Billings, Bozeman, Butte, Helena, Kalispell, and Missoula, Montana; Bismarck and Williston, North Dakota; and Casper, Cheyenne, and Sheridan, Wyoming.

Bakken Energy has worked with Crowley Fleck on previous projects and will engage the firm as required to support our broader Dakota H2 Hub efforts.

### **6.6.4 North Dakota Guaranty & Title**

Guaranty & Title Co. is a full-service title company that serves the upper Midwest.

Bakken Energy has worked extensively with North Dakota Guaranty & Title on past projects to perform examinations of North Dakota land records to determine ownership and to provide an overview of encumbrances that may significantly affect the eventual development of the property in accordance with the site requirements.

### **6.6.5 Barr Engineering**

Barr provides engineering and environmental consulting services to clients across North America and around the world. Barr has extensive experience with the Great Plains Synfuels Plant. Bakken Energy and Mitsubishi Power are working with Barr to define their scope of involvement on the current and subsequent phases of the project.

### **6.6.6 Grant Thornton LLP**

Grant Thornton provides financial due diligence support related to the acquisition of the Synfuels Plant and general accounting advisory services to the Company.

### **6.6.7 Latham & Watkins LLP**

Latham & Watkins provides legal services in connection with the acquisition of the Synfuels Plant and general legal counsel to the Company.

### **6.6.8 Boundary Stone Partners**

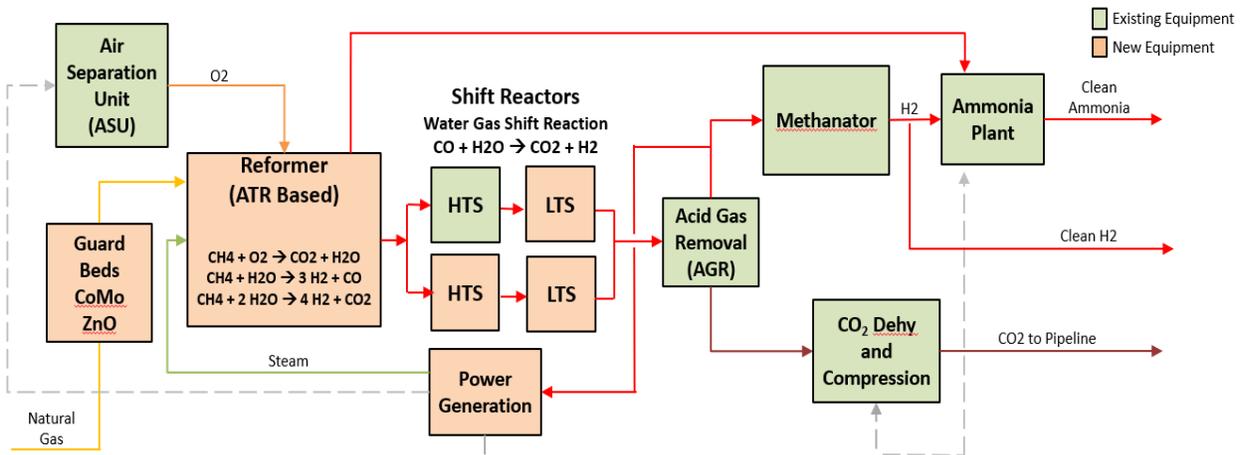
Boundary Stone Partners was founded by two former Chiefs of Staff at the United States Department of Energy. Launched in the summer of 2013, Boundary Stone Partners has worked with more than 60 companies in technology sectors with diversity spanning the renewable energy and commercial space flight. Their clients include some of the most established names in global business, as well as some of the most exciting startup companies in the country. Boundary Stone Partners provides strategic communications advisory services to the Company in connection with the Dakota H2 Hub and is leading our DOE Title XVII Loan Guarantee application preparation process.

## 7 Appendix 3 – Technical Information

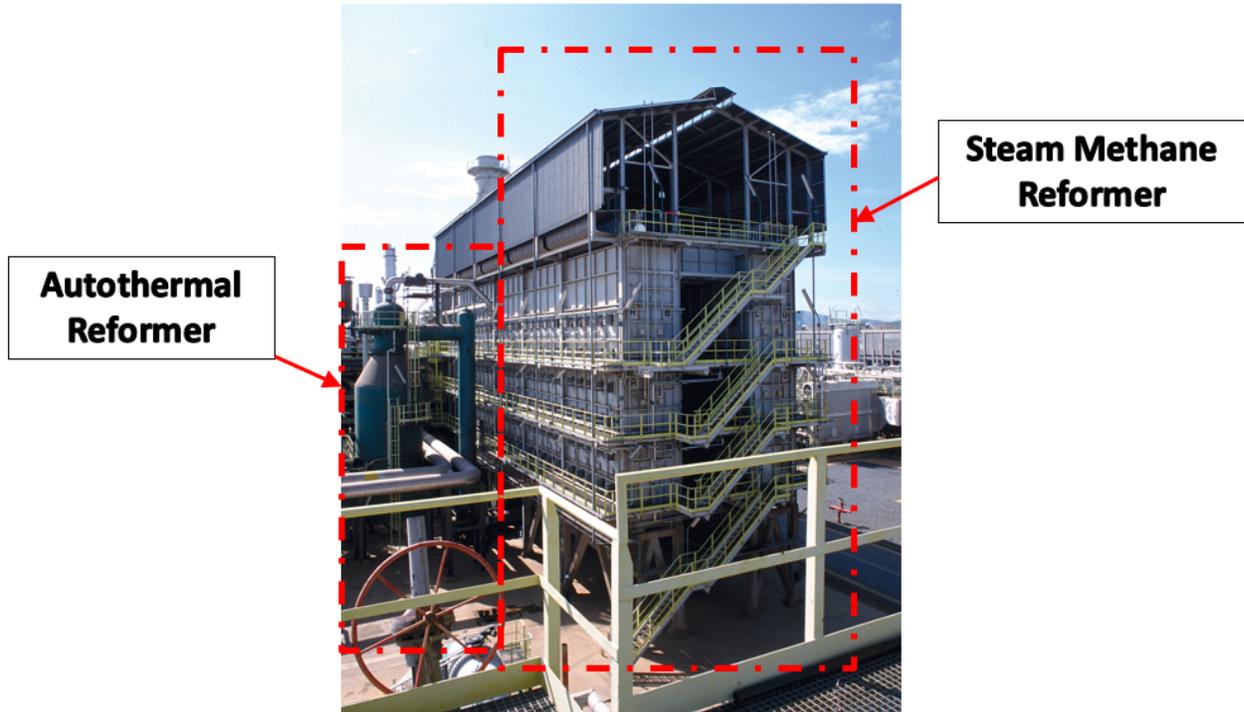
### 7.1 Technological Impacts

The Dakota H2 Hub will use advanced ATR (autothermal reforming) hydrogen production technology and capture 95% of the carbon emissions and use clean sources of power and steam production in the production of clean hydrogen and ammonia products. ATR technology was selected over steam methane reformation (SMR) and other technologies to maximize CO<sub>2</sub> capture rates and the repurposing of existing Synfuels Plant infrastructure and processes.

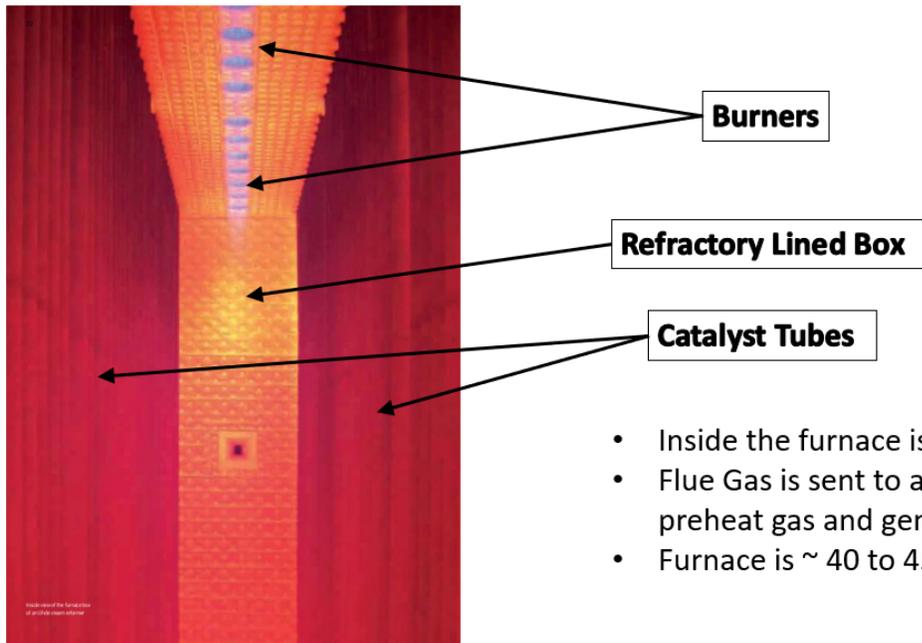
The flowsheet below shows the extensive repurposing of existing equipment and processes that are achieved using the autothermal reforming hydrogen production technology which fully leverages the existing, large two train air separation unit which provides oxygen required for the ATR process. By reusing the equipment and processes shown in the flowsheet the capital requirements for our project are reduced by more than \$500 million when compared to a greenfield development and time to market is reduced by a minimum of 5 years.



## 7.2 Comparing-Contrasting ATR and SMR



### 7.2.1 SMR Based Hydrogen Production



- Inside the furnace is typically 1000 to 1100 °C
- Flue Gas is sent to a heat recovery section to preheat gas and generate steam.
- Furnace is ~ 40 to 45 feet high.

- The SMR process gets its heat of reaction from external combustion i.e. burners inside a furnace heating catalyst tubes where the reactions take place.
- The process uses air as opposed to oxygen therefore no Air Separation Unit (ASU) is needed.
- Furnaces are very large and make up a significant portion of the plant CAPEX. They usually contain 300 to 600 individual high nickel alloy tubes.
- Most conventional SMR processes have a Pressure Swing Adsorption (PSA) unit to purify the hydrogen. The impurities trapped in the PSA (tail gas) are sent to the reformer to be used as fuel gas.
- In general, technology providers offer post combustion CO<sub>2</sub> capture which is more expensive, less energy efficient and less effective (up to 90% capture rate) than pre-combustion capture.

## 7.2.2 ATR Based Hydrogen Production



- The ATR process gets its heat of reaction from internal partial combustion i.e. oxygen injected into the process in the ATR vessel combusts with natural gas to give provide the heat of reaction.
- The process uses oxygen to achieve internal partial combustion therefore an Air Separation Unit (ASU) is needed. An ASU is a significant CAPEX expenditure.

- Because there is no external combustion, and the process pressure is high, a pre-combustion CO<sub>2</sub> capture scheme is relatively efficient, inexpensive and can get CO<sub>2</sub> capture in excess of 95%.
- Power demand is higher for ATR based processes than SMR due to the ASU's needs therefore generation plants are typically needed/justified.
- Conventional wisdom is that SMR is lower CAPEX below a certain size of plant, where larger plants can justify the installation of the ASU, Cogen and ATR because of a much better economy of scale.

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## 8 Letters of Support



October 25, 2021

Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson:

It is with great pleasure that Basin Electric Power Cooperative (Basin Electric) wishes to provide a letter of support for Bakken Energy as a part of their application to the Clean Sustainable Energy Authority (CSEA).

Basin Electric is a not-for-profit generation and transmission cooperative owned by 131-member cooperative systems across nine states serving 3 million consumers. We pursue a smart and affordable energy strategy, and take advantage of the benefits of renewables while maintaining baseload that ensures the reliability our members expect.

Earlier this year we announced our intent to sell the Great Plains Synfuels Plant to Bakken Energy to redevelop the plant into the largest and lowest-cost, clean hydrogen production facility in the United States. The commitment from the Bakken Energy executive leadership team, and their strategic partner Mitsubishi Power Americas, Inc., provided Basin Electric the confidence that this team will fully execute and transform the Great Plains plant into a showcase of clean hydrogen development.

We have been dedicated to a sale that would create the best option for our employees, our members and area communities. Approval of this application helps support that dedication by securing existing jobs at the plant, as well as helping to create new jobs during the redevelopment of the facility. The creation of a hydrogen hub also falls in line with the objective of the CSEA by making the state a world leader in production of clean sustainable energy that diversify and grow the state's economy. We see this as a tremendous value to the state of North Dakota.

We hope you'll agree by approving this application.

Sincerely,

A blue ink handwritten signature, appearing to read "Paul Sukut", with a long horizontal flourish extending to the right.

Paul Sukut  
Project Manager & Former CEO

# International Brotherhood of Electrical Workers

MARK D. HAGER, INTERNATIONAL VICE PRESIDENT  
Eleventh District – Missouri, Iowa  
Nebraska, North Dakota, South Dakota



6601 Winchester Ave., Suite 150 Kansas City, MO 64133  
Phone (816) 358-4632  
FAX (816) 358-5642  
E-mail: ivpd\_11@ibew.org

October 27, 2021

Mr. Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson:

As International Vice President of the Eleventh District of the International Brotherhood of Electrical Workers (IBEW), it is with great pleasure that I provide a letter of recommendation for Bakken Energy as a part of their application to the Clean Sustainable Energy Authority (CSEA).

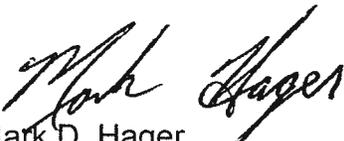
The IBEW has over 3,000 members working in electrical generation and transmission, construction, energy and other related industries in North Dakota and is the union that represents approximately 375 bargaining unit members that are currently employed at the Great Plains Synfuels Plant.

The commitment from the Bakken Energy executive leadership team, and their strategic partner Mitsubishi Power Americas, Inc., to redevelop the Great Plains Synfuels Plant into a showcase of clean hydrogen development is very meaningful to our members and their continuing employment at the facility in North Dakota.

Approval by CSEA of the Bakken Energy application helps support and secure existing jobs at the plant, as well as helping to create new jobs during the redevelopment of the facility. The creation of a hydrogen hub also falls in line with the objective of the CSEA by making the state a world leader in production of clean sustainable energy that will diversify and grow the state's economy.

We see this as a tremendous value to the state of North Dakota and hope you will agree by approving this application.

Sincerely,

  
Mark D. Hager  
International Vice President

MDH:kjd



October 25<sup>th</sup> 2021

W. James Powell  
Vice President Clean Fuels  
ATCO Energy Solutions  
5302 Forand St SW  
Calgary, AB, Canada T3E 8B4

Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson,

Please accept this letter of recommendation in support of Bakken Energy's development of the North Dakota Hydrogen Hub, and their application to the Clean Sustainable Energy Authority (CSEA). Truly, this project has the potential to make North Dakota a world leader in the production of low-carbon hydrogen and to further diversify and grow the state's economy by leveraging its incumbent strengths.

ATCO is a diversified global corporation with investments in Structures & Logistics, Utilities, Energy Infrastructure, Retail Energy, Transportation, and Commercial Real Estate. With operations along the full length of the energy value chain, we have the expertise to help our partners, communities, and governments in the transition to a lower-carbon future. We have long been an industry leader in decarbonization by advancing a variety of clean technologies (e.g. hydrogen, solar and hydroelectric power) and integrated energy solutions (e.g. off-diesel initiatives for remote Indigenous communities). Last year alone, we reduced 90% of the direct greenhouse gas emissions from our portfolio (almost 7.5 million tonnes) and generated over \$71 million in net economic benefit for the 50 Indigenous partnerships with whom we have the privilege to work.

Our partnership with Bakken Energy reflects our commitment to create a cleaner energy future, and we strongly encourage CSEA's support of the North Dakota Hydrogen Hub. The proposed project's use of otherwise flared North Dakota natural gas as feedstock will reduce emissions and environmental impacts and help to establish North Dakota within the global hydrogen economy—supporting the state's incumbent industries while seeding entirely new clean opportunities.

Sincerely,



W. James Powell  
Vice President Clean Fuels  
ATCO Energy Solutions



Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson,

As CEO of First International Bank & Trust, I am voicing my full support of Bakken Energy and their application to the Clean Sustainable Energy Authority (CSEA).

As a financial industry expert, I can tell you there is no better team to lead the energy industry revolution in our state than the executive leadership team at Bakken Energy. With their partner Mitsubishi Power Americas, they are poised to establish North Dakota as a leader in the clean energy sector.

I've personally trusted in Bakken Energy's commitment and ability to produce clean, sustainable energy through a large-scale, commercial hydrogen hub by participating in multiple rounds of private investment in the company.

I've chosen to invest in this company because I recognize the tremendous value this project brings to the state through job security, job creation and the overall economic and environmental impact we will have when we fully unitize the natural gas we produce.

Bakken Energy is leading the way in the clean energy sector and I am hopeful the CSEA will recognize their work by fully supporting this application.

Thank you,

A handwritten signature in black ink, appearing to read 'Stephen L. Stenehjem', with a small flourish at the end.

Stephen L. Stenehjem  
CEO & Chairman  
First International Bank & Trust



2 | EXTRAORDINARY  
0 | BANK OF THE YEAR™  
1 |  
8 | *Winner*

Eugene Nicholas  
505 Broadway N.  
Ste 302  
Fargo, ND 58102

October 27, 2021

Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson,

I write to you today to respectfully ask the Clean Sustainable Energy Authority (CSEA) to approve the application submitted by Bakken Energy.

As a North Dakota native, former state legislator and long-time businessman, I believe the project proposed by Bakken Energy meets and exceeds the mission of the CSEA to enhance the production of clean sustainable energy and will make North Dakota a leader in clean sustainable energy.

The executive leadership team at Bakken Energy has committed nearly a decade to investing, researching, and developing ways to create a value-added natural gas industry in the state, similar to the value-added agriculture industry I helped bring to the state during my more than 30 years of service in the state House of Representatives.

I fully believe in, and financially support the goals of Bakken Energy and their partner, Mitsubishi Power Americas to redevelop the Great Plains Synfuels Plant into the largest and lowest-cost, clean hydrogen production facility in the United States.

We have always been innovative in North Dakota - no matter the industry - from ag to energy to aviation. We must continue to deliver that same innovation as the needs of our world evolve to need a cleaner source of fuel and power. I believe that Bakken Energy is poised to lead the next wave of North Dakota ingenuity.

Best Wishes,



Eugene Nicholas

# Ronald D. Offutt

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October 26, 2021

Al Anderson  
Clean Sustainable Energy Authority  
State Capitol 14th Floor  
600 E. Boulevard Ave. Dept. 405  
Bismarck, ND 58505-0840

Dear Mr. Anderson,

As a longtime North Dakota businessman, I am pleased to submit a letter of support for Bakken Energy's application to the Clean Sustainable Energy Authority (CSEA).

Bakken Energy is leading our state in development of the clean energy industry. The goals of the company to deliver world-class energy transition solutions align perfectly with the mission of the CSEA to support the technologies that reduce environmental impacts and increase sustainability of energy production and delivery.

I'm confident the executive team at Bakken Energy has the combined investment and the technical expertise to lead North Dakota through the clean energy revolution.

Now is the time to create another value-added industry in North Dakota that supports job retention and growth and adds another revenue stream to the economy.

I urge the CSEA independent reviewers, the technical review committee and ultimately, the North Dakota Industrial Commission to approve this application so we can further advance the clean energy industry in North Dakota.

Regards,



Ronald D. Offutt

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## CONFIDENTIAL Appendix 4

INFORMATION PROVIDED IN A SEPARATE DOCUMENT

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# CONFIDENTIAL Appendix 5

INFORMATION PROVIDED IN A SEPARATE DOCUMENT