



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

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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.

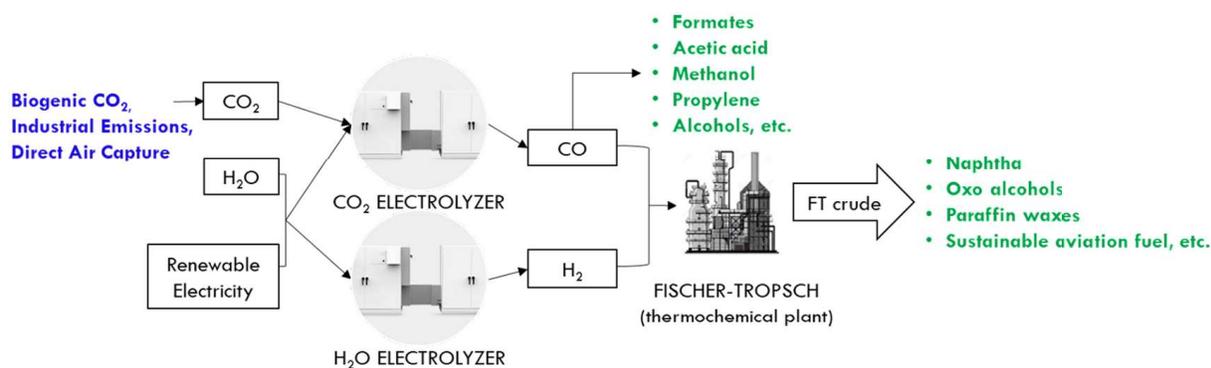


Figure 2. General schematic of Twelve’s electrified CO₂ transformation plant.

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.