

## Oil and Gas Research Program

---

North Dakota

Industrial Commission

### Application

**Project Title: Distributed Ammonia  
Production from Associated Gas**

**Applicant: N-Flex**

**Principal Investigator: Paul Batcheller**

**Date of Application: April 3, 2012**

**Amount of Request: \$1,100,000**

**Total Amount of Proposed Project:**

**\$4,000,000**

**Duration of Project: 18 Months**

**Point of Contact (POC): Paul Batcheller**

**POC Telephone: (605) 261-7943**

**POC E-Mail Address: pbatcheller@n-flex.com**

**POC Address:**

**5708 S. Remington Place #600**

**Sioux Falls, SD 57108**

## TABLE OF CONTENTS

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

|   |                            |
|---|----------------------------|
| <b>Abstract</b>                         | <b>3</b>                   |
| <b>Project Description</b>              | <b>4</b>                   |
| <b>Standards of Success</b>             | <b>13</b>                  |
| <b>Background/Qualifications</b>        | <b>14</b>                  |
| <b>Management</b>                       | <b>17</b>                  |
| <b>Timetable</b>                        | <b>18</b>                  |
| <b>Budget</b>                           | <b>19</b>                  |
| <b>Confidential Information</b>         | <b>20 and<br/>Appendix</b> |
| <b>Patents/Rights to Technical Data</b> | <b>20</b>                  |

**Transmittal and Commitment Letter**

**Affidavit of Tax Liability**

**Statement of status on Other Project Funding**

## ABSTRACT

### Objective:

This project will use the N-Flex production process to capture and convert previously flared stranded gas into a truly valuable asset – anhydrous ammonia – providing fertilizer for farmers in North Dakota and beyond. By harnessing associated gas to produce fertilizer, N-Flex will enable shale oil drilling in North Dakota to go beyond its critical mission of addressing energy independence to also promote the critical issue of food independence as well. North Dakota farmers pay some of the highest prices in the world for anhydrous ammonia and this project will generate a lower cost, locally produced fertilizer that is less subject to the price volatility and occasional supply disruptions farmers are facing in the current fertilizer market.

### Expected Results:

The most important result will be the successful realization of the first N-Flex Distributed Ammonia production unit to operate on a feedstock of associated wellhead-gas. This initial deployment in North Dakota will seek to demonstrate that N-Flex units are capable of converting an under-utilized resource, associated gas, into a nitrogen-based fertilizer at a low-cost – proving both the technical and financial feasibility of the technology. This will provide significant long-term benefits in the form of increased tax revenues and wealth creation for the State of North Dakota, better financial returns for oil production companies and more stable supply of affordable fertilizer for North Dakota's agricultural community. The project will demonstrate that stranded gas – at best a wasted resource and at worst an actual liability – can be turned into asset. The sustainable fertilizer that will be produced locally will relieve stress on the transportation infrastructure and reduce the need to export capital to import fertilizer. The trade and environmental impacts of the project will be substantial. Millions of tons of CO<sub>2</sub> will be reduced, which could potentially be sold as offset credits into the voluntary and compliance carbon-trading markets – generating an additional source of revenue.

### Duration:

This pilot N-Flex installation will take approximately 12 months to install with our final report 18 months from the start of the program. This pilot North Dakota N-Flex installation will be the first of 3 Phases of planned N-Flex deployment in North Dakota. It is our hope that this pilot installation can be partly financed by this grant. This Phase 1 pilot will be implemented according to the following schedule:

| Months                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------------------------|---|---|---|---|---|---|---|---|---|----|----|----|
| Site finalize / permit  |   |   |   |   |   |   |   |   |   |    |    |    |
| Component construction  |   |   |   |   |   |   |   |   |   |    |    |    |
| Skid assembly and prep  |   |   |   |   |   |   |   |   |   |    |    |    |
| Shipping and set up     |   |   |   |   |   |   |   |   |   |    |    |    |
| Testing and adjustments |   |   |   |   |   |   |   |   |   |    |    |    |
| Full-scale operation    |   |   |   |   |   |   |   |   |   |    |    |    |

Agcelerator intends to concurrently begin Phase 2 in early 2013 to deploy the next 20 units. Phase 3 would bring another 20-100 units into production by the end of 2013 or by early 2014.

**Total Project Cost:**

The total project cost will be approximately \$4.2 million, and we are seeking \$1.1 million from this NDIC grant. The \$3.1 million balance will come from Agcelerator LLC, its stakeholder partners and its investors. It is expected that this project can qualify for USDA B&I loan guarantees for up to 80% of the debt. Agcelerator is prepared to make the entire grant contingent upon our reaching the specific goals and milestones listed in the section below.

**Participants:**

N-Flex and our emerging local team will be the lead implementer for this project. N-Flex is a joint venture with Proton Ventures, the inventor of the N-Flex small scale ammonia technology, and we hold the exclusive global rights, to this unique technology.

N-Flex is currently in discussions with a number of oil producers active in North Dakota that are enthusiastic about our value proposition. We are also well positioned financially with the ability to attract additional capital from multiple equity investors and lenders. We would expect that the NDIC grant would be contingent upon the following factors that will assure our ability to succeed:

- A) Agreement with a Producer to install at least 1 unit at one of their sites.
- B) Adequate capital / commitments from investors to cover the equity balance required by lenders
- C) Loan commitment letter from a lender to provide the debt for this initial installation

It should be noted that N-Flex has begun the process of getting our projects qualified for USDA B&I Loan Guarantees that should further help our ability to secure debt quickly and at a low cost.

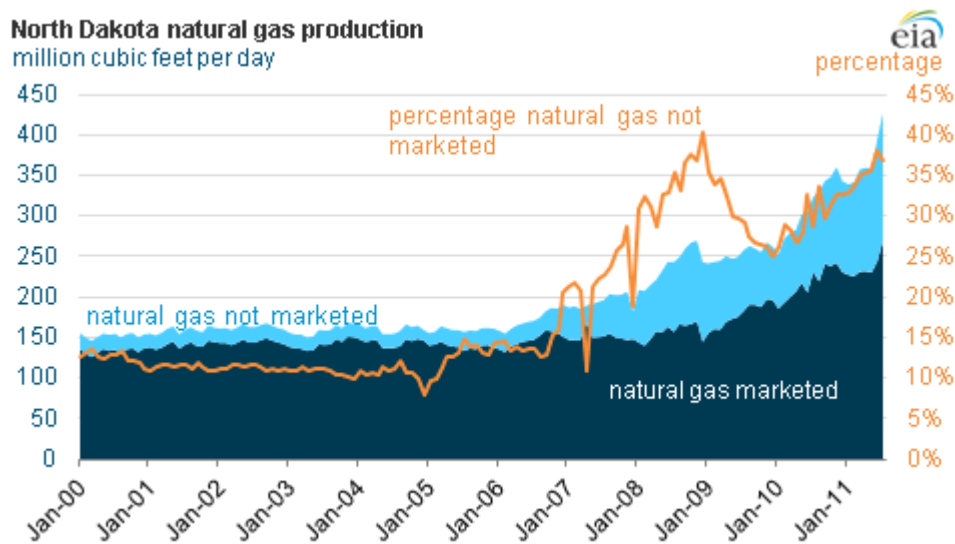
N-Flex is garnering strong support in our efforts and we are confident that we will secure the needed industry and financial partners – and have suggested the above milestones in order to greatly reduce any risks to the State of North Dakota. The NDIC will not have to commit a dollar until the producer agreement is in place and the financial viability is secure.

## PROJECT DESCRIPTION

### Objectives:

The goal of this project is to create added value products from North Dakota's resources in the state while alleviating waste and environmental risk. The unique and proprietary N-Flex distributed production technology will take previously-flared, stranded gas and produce a valuable asset for North Dakota farmers: sustainable fertilizer. Our N-flex Distributed Ammonia technology will enable shale oil drilling to not only address energy independence but to also promote food independence, because the project will generate a fertilizer that is less expensive and less subject to the volatility farmers have to cope with in the traditional fertilizer market.

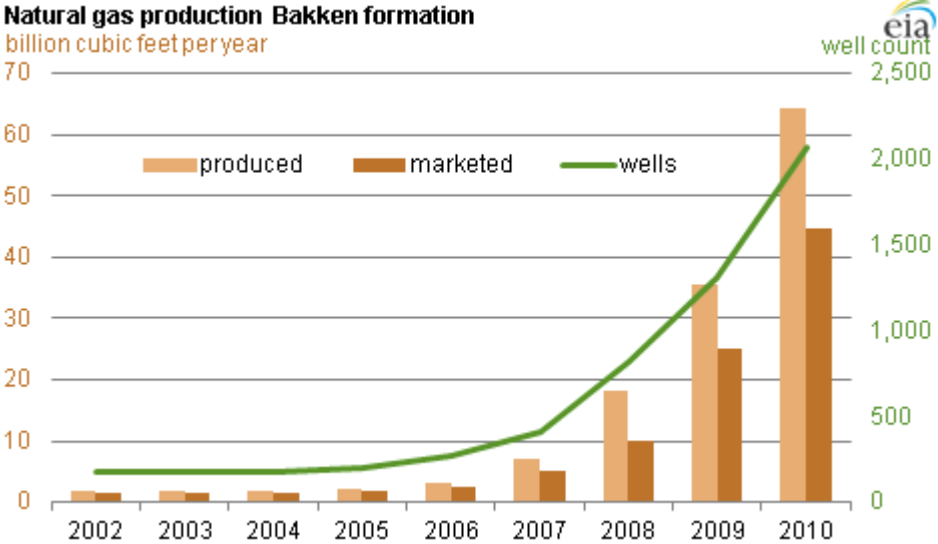
*The Opportunity to Address ND Flaring and Wasted Resources:* The problems with flaring in North Dakota and beyond are well-known, highlighted perhaps most famously in a recent article in the *New York Times*, which reported that about 100 million cubic feet per day, enough energy to heat 500,000 homes, was being flared in the state, amounting to about 30% of total natural gas production produced in the Bakken shale formation. The problem is well-known: a lack of pipeline infrastructure to take the gas to market.



**Source:** U.S. Energy Information Administration, based on the [North Dakota Department of Mineral Resources](#).

Natural gas production in North Dakota has more than doubled since 2005, largely attributable to associated natural gas from the growing oil production in The Williston Basin. Because of the

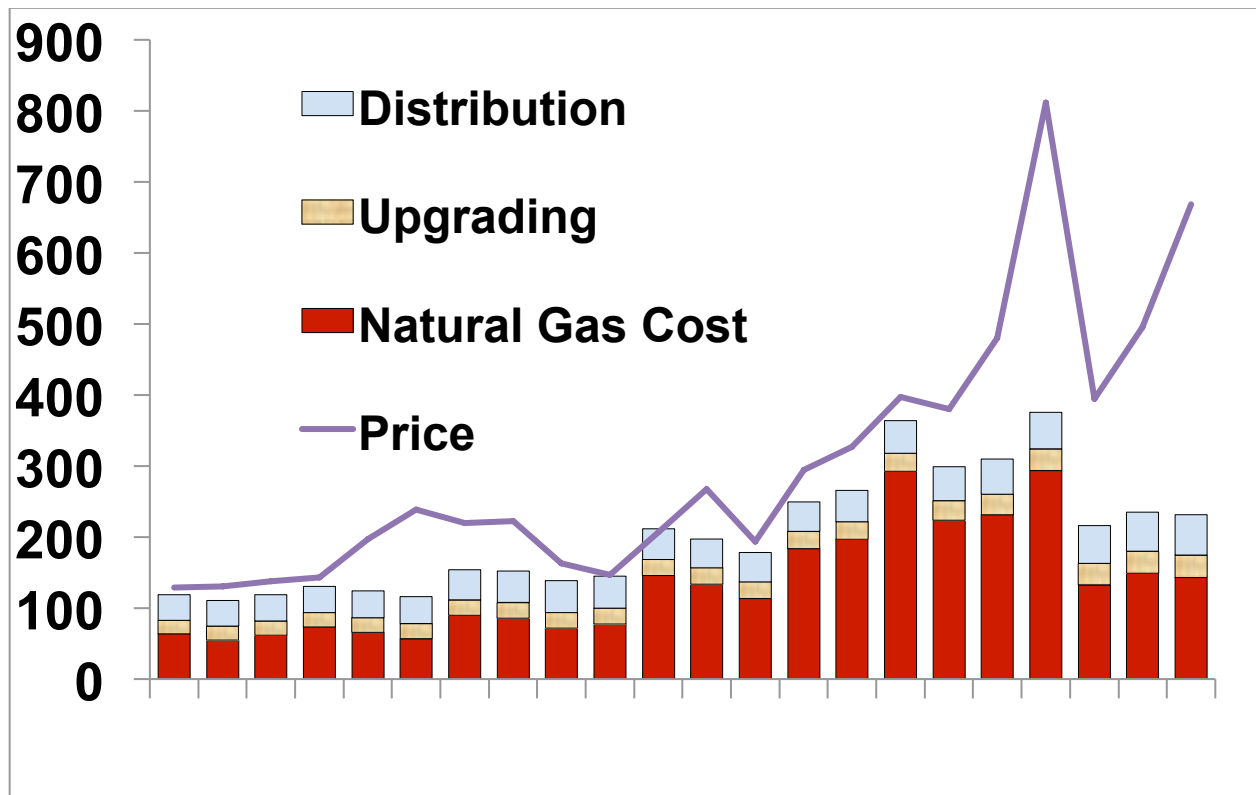
very rapid pace of exploration, it is not possible for the gathering and processing infrastructure to match this growth and over 35% of North Dakota's natural gas production in 2011 was flared or otherwise not marketed. The percentage of flared gas in North Dakota is considerably higher than the national average; in 2009, less than 1% of natural gas produced in the United States was vented or flared. Gas production from the Bakken formation rose more than 20 times 2007 to 2010 (see below).



***The vast majority of the gap between the marketed and produced gas represents flaring, about 30% of total gas production.***

*The Fertilizer Problem:* In just the last decade, 40% of US ammonia production was permanently scrapped, in large part because American producers suffered huge losses from spiking natural gas prices and were unable to compete in the international market. The result is that US farmers are more dependent on foreign fertilizer producers and international price volatility than ever before. While gas prices have declined significantly, replacing dismantled capacity takes years and billions of dollars. At the same time, fertilizer demand from the developing world has skyrocketed, and China is now both the largest consumer and producer of nitrogen – taxing exports to provide its people with affordable food. The US is now importing 60% of its ammonia needs leaving farmers increasingly exposed to a volatile, global commodity. Farmers face additional problems because the current level of transportation infrastructure is insufficient to deliver imported ammonia from ports to users in the Midwest. North Dakota itself experienced fertilizer shortages in the spring of 2011, in part because of these logistics and transport issues associated with serving the Northern Great Plains fertilizer market, which is one of the most logistically challenging markets in North America. Farmers have to deal with the seemingly ever-increasing cost of ammonia that is now competing with international demand and no longer tracking the price of natural gas (see below).

**U.S. Mid West Ammonia Cost vs. Price (\$/Ton)**



*The Solution:* This project will help alleviate BOTH the flaring problem and the fertilizer-supply problem with one sustainable solution that can be implemented locally. The N-Flex technology is deployed on easily movable, skid-based units that will use previously flared well-gas to produce fertilizer. Each N-Flex unit can convert about 140 MCF of associated gas a day to produce 1,100 tons of ammonia per year and significant quantities of NGLs. Using just 10% of gas flared in North Dakota we could produce over 165,000 tons of ammonia creating massive added value in the state and significantly displacing the need for foreign imports. All of this could be done while also reducing emissions of particulate matter, SO<sub>2</sub>, NO<sub>x</sub> and CO<sub>2</sub>.

**Methodology:**

The project will deploy a mobile ammonia production skids that contain all necessary components to knock out the NGLs, condition the associated gas, efficiently reform the methane into hydrogen and produce ammonia. We will deploy existing established technologies that are configured in a unique, miniaturized and efficient way. All components making up the mobile ammonia generation units are proven and currently in operation. The focus of this pilot is to prove the technical and financial viability of this unique configuration on different associated gas conditions and logistical scenarios. Fully understanding the operational costs and resilience of this equipment in the harsh oil field environment will allow us to determine if target margins can be achieved and maintained, hence prove the commercial potential of this solution in North Dakota.

This grant will help finance the first demonstration unit. The first step will be to identify a suitable oil

production site in the state. There are a number of criteria that will be used, but the primary concern will be to identify a site where the associated gas flow is at least 150 MCF per day. We are currently negotiating with multiple producers with wells expected to produce in the range of 600 to 800 MCF/ day soon after completion, an amount that will diminish to about 200 MCF / day over the course of 2 years. Other factors that will be looked at in terms of site selection will include gas composition, proximity to current or future gathering lines, proximity to fertilizer consumption, reliability of gas supply and the variability of the gas composition.

After the location for the pilot unit is determined, N-Flex engineers will finalize the technical specifications for the unit, including size, capacity and the precise specs for the compressors, ammonia reactor, storage tank and other ancillary equipment. Once the components skids are completed and the equipment is brought to the site, construction should be completed within 1 month, and testing should begin shortly thereafter. After the initial testing and engineering adjustments are made, full ammonia should begin within 1 month, and we expect to drastically reduce the amount gas previously-flared converting it into ammonia and other saleable hydrocarbon products. When fully operational, we expect the first unit to handle about 142 MCF per day to produce over three tons of ammonia each day along with saleable NGLs and condensates.

One of the key objectives will be to prove the technology's financial viability of taking previously-flared gas and producing, transporting, storing and selling ammonia. Understanding the financial impact of the oil field environment and gas variation is critical to proving commercial viability. The focus of the pilot will be on precisely monitoring all costs and revenue and ultimately comparing them with assumptions as well as stated targets. All project costs will be tracked closely and any expenditure will require approval in order to insure no costs are omitted.

The company will also host periodic update and technology transfer workshops to report to the NDIC and share information with the oil industry. Lessons learned, implementation, operations and financial information will be presented and shared at these workshops. We will coordinate with other oil operator events to maximize participation. This pilot seeks to prove the commercial viability of this solution; if successfully proven, these workshops should encourage the oil operators to conserve more gas by leveraging these demonstrated methods.

#### **Anticipated Results:**

The N-Flex mini-ammonia units are based on well-proven ammonia production technology, but this project will be different. This pilot will complete a crucial first installation at a reduced-scale and based on wellhead gas. We believe our successful deployment will resolve any outstanding engineering/logistical concerns and significantly reduce the cost of engineering future installations. A successful pilot will also provide our financial backers and lenders a greater degree of confidence about both the technology and demand for the N-Flex technology. We could therefore become fully commercial without any future government funding, thereby allowing the company to deploy many more units in North Dakota on a completely private-sector basis.



We believe that it's critical for North Dakota to identify appropriate technologies to maximize the value of associated gas and to provide locally produced nitrogen-based fertilizer at a low-cost – this project can do both. By successfully implementing this first unit we will have demonstrated that stranded gas – at best a wasted resource and at worst an actual liability – can be turned into asset. The project will also confirm that sustainable fertilizer can be produced locally, reducing the stress on limited infrastructure and the need to export capital to import fertilizer. The benefits to ND agriculture and environmental impacts of the project will be substantial. In addition, millions of tons of CO<sub>2</sub> will be reduced, providing positive PR and a potential source of revenue as carbon offset credits sold into the voluntary and compliance carbon-trading markets.

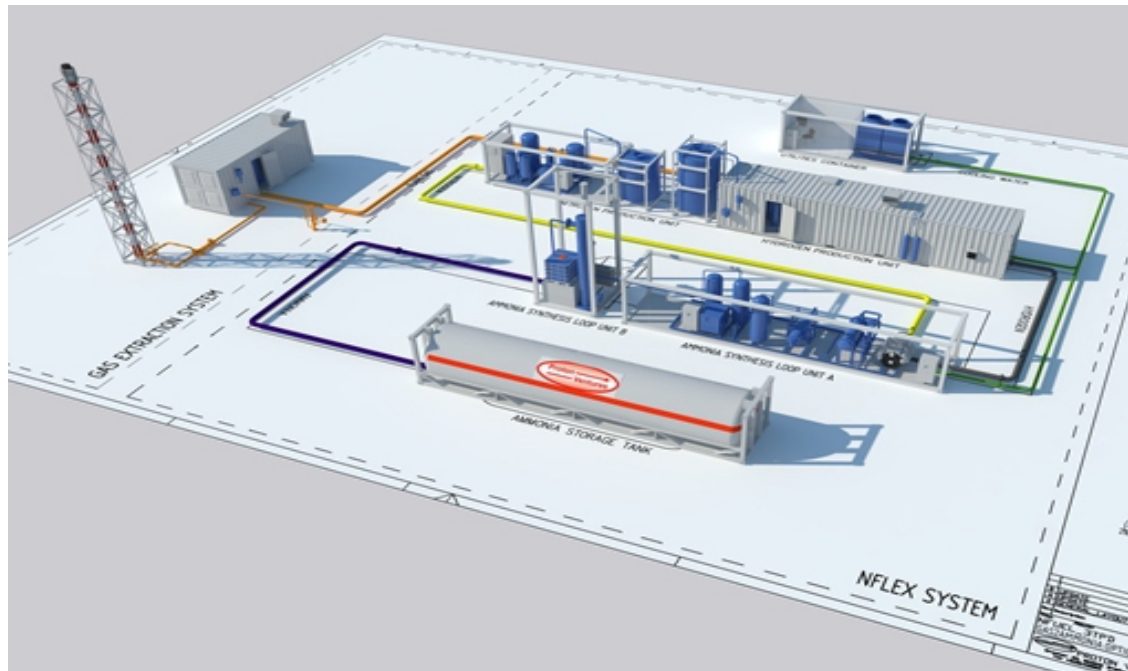
The project will have very specific metrics against which the first unit can be compared. We expect the first unit to capture at least 140 MCF per day and be able to produce more than three tons of ammonia that can be brought to market. At the current price of \$700 per ton of ammonia, 1 N-Flex unit would generate a taxable product worth \$770,000 at current prices, not including the generation and sale of NGLs.

Another result is that the ammonia produced could move beyond fertilizer and provide a critical material for the local power industry. Ammonia is the key reacting agent for SCR (selective catalytic reduction) emissions scrubbing units at fossil fired power plants. For example, a typical 600 MW power plant needs 20 tons of ammonia per day, the equivalent of six N-Flex units. In fact some ammonia producers have cut back industrial sales in favor of Ag customers. At current market levels, ammonia actually accounts for 5% of total costs for coal-fired power generation and the utility industry is similarly exposed to international prices for this commodity (utilities like farmers are not equipped to hedge ammonia risk). On top of all of this, new EPA CSAPR rules will increase the need for SCR NO<sub>x</sub> controls. Another result of this project is that N-Flex will be able to support this critical need to the utility industry, which is necessary to manage NO<sub>x</sub> emissions and reduce ground-level ozone levels that plague so many areas of the US.

#### **Facilities:**

N-Flex is a joint venture with Proton Ventures, the inventor of the N-Flex technology, and we have the global exclusive license to deploy the technology. These units can be powered by either gas or electricity and mounted on skids to be repositioned quickly. The units would have a fully-automated process with controls designed for safe operation. No operators will be required on site. The Haber Bosch process will be used and optimized for the “mini-scale” requirements for particular sites of varying sizes. Because the units will be skid-mounted on wheels, even the most stranded gas resources can be reached with distributed operations to reduce transport and logistics. The ammonia production unit will have a long life of about 30 years. Separate hydrogen and nitrogen production units are rated for at least a 20-year useful life. Also crucial is the fact that the N-Flex unit will never interfere with oil production, and it is possible to generate any needed power using a portion of the collected gas. The N-Flex units themselves will have a relatively small footprint -- consisting of a few shipping containers onsite.

Below is a schematic of the distributed ammonia production facility. The actual facility should have a smaller footprint with less space between the skids.



#### Resources:

##### People/Companies

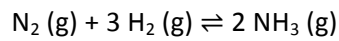
- N-Flex staff and management
- Oil Producers
- Local Electric Utilities
- Equipment manufacturers
- State: NDIC-Oil and Gas Research Council, ND Dept. of Health, ND Dept. of Commerce
- Equipment
  - Nitrogen gas generator
  - Compressors
  - Ammonia reactor
  - Remote monitoring and control equipment
- Finance
  - Founders
  - Investors / Lenders
  - Equipment financiers
  - State and Federal economic assistance programs
- Knowledge
  - Oil and gas industry advisors
  - Equipment manufacturers
  - Ammonia sales experts

### **Techniques to Be Used, Their Availability and Capability:**

The N-Flex project will utilize existing and proven “off the shelf” equipment, including the following:

- Steam gas reformer
- N<sub>2</sub> generator
- Syngas compressor
- Recycle compressor
- Ammonia reactor + loop ancillaries
- Storage tank
- Control system

The technology will use the Haber Bosch process, which involves the reaction of nitrogen gas (N<sub>2</sub>) and hydrogen (H<sub>2</sub>) to produce ammonia, according to the formula below:



The company has sourced all necessary equipment and configured it in a fully enclosed, mobile, skid-mounted manner. The proprietary solution leverages commercially available equipment packaged to ensure efficient installation and re-deployment. Components have been carefully selected to maximize reliability, flexibility and emission reductions.

About 3 times during the 18 month program N-Flex will organize workshops to share the insights gained with oil operators and the community. The workshop will include the lessons learned during the project, and their benefits to the oil & gas operators.

### **Environmental and Economic Impacts while Project is Underway:**

The N-Flex process seeks to improve both the environmental and economic impact of North Dakota.

Each unit will be able to prevent the flaring at least 140 MCF per day. This gas will have the NGLs separated and sold while the units use 100MCF of methane and ethane gas to produce 3.3 short tons of ammonia per day or 1,100 tons per year -- further reducing emissions by displacing the production of energy-intensive fertilizer. At the current price of \$700 per ton of ammonia, the unit will generate a taxable product worth \$770,000 per year. In addition, the ammonia will be produced right in counties that are also major areas of anhydrous ammonia consumption as fertilizer. Over 60% of ammonia is imported and often shipped from the U.S. gulf straining limited transportation infrastructure and dramatically increasing the cost to ND farmers. N-Flex will reduce the need for these imports and reduce the stress on overloaded transportation lines. In addition to the ammonia, C<sub>3</sub>+ and NGLs (natural gas liquids) will be able to separated and sold to market, creating additional taxable revenue. The positive economic impacts will be shared among, the oil operators and local farmers who will have a less expensive source of fertilizer that they can apply in multiple applications of smaller quantities in order to save money, increase efficacy and reduce the potential for nitrogen run-off. The state government will benefit through increased income taxes and Oil and Gas severance payments.

### **Ultimate Technological and Economic Impacts:**

The scientific and technical contribution is the commercial application combining existing technologies, and applying in an innovative way to a new and business model. If the project is commercially successful and scalable, it will demonstrate the state's leadership in efficient resource management, improve the environmental profile of both the oil and agriculture industries and increase the overall value of the state's resources while increasing tax and severance revenues. In addition, this project should make oil production more profitable, environmental and improve the working environment for those in the field. Successful validation will also enable the widespread commercial deployment of new alternative cleaner ammonia production technologies and techniques, many of which are not currently used anywhere else. Agcelerator expects to demonstrate an ongoing positive economic impact through the creation of additional state tax revenue during future commercial deployments. Job creation, resource conservation, emission reductions and improved economic conditions for users of fertilizer are all anticipated outcomes that contribute to the positive economic impact of this solution.

### **Why the Project is Needed:**

This project is completely aligned with NDIC, OGRC & EmPower ND Goals:

- The mission of ND DMR's Oil and Gas Division is to "encourage and promote the development, production, and utilization of oil and gas in the state in such a manner as will prevent waste, maximize economic recovery, and fully protect the correlative rights of all owners to the end that the landowners, the royalty owners, the producers, and the general public realize the greatest possible good from these vital natural resources."
- One of the ND Oil and Gas Research Council's Statutory Goals & Purposes is to: "Encourage, and promote the use of new technologies and ideas that will have a positive economic and environmental impact on oil and gas exploration, development, and production in North Dakota." (Emphasis added.)
- **OGRC "Grant priority is to be given to those development projects, processes, ideas, and activities which meet the following goals and objectives:"**
  - Positively affect ultimate recovery from North Dakota's existing oil and gas pools.
  - Identify oil and gas exploration and production technologies presently not used in North Dakota.
  - Maximize the market potential for oil, natural gas, and the associated byproducts produced therewith
  - Improve the overall suitability of the oil and gas energy industry in North Dakota through the development of new environmental practices that will help to reduce the footprint of oil and gas activities
  - Develop baseline information that will lead to other projects, processes, ideas and activities.

North Dakota's Comprehensive State Energy Policy encourages the more efficient use of existing resources for the benefit of its citizens. This solution will provide realistic and significant advancement toward that goal without any negative tradeoffs. The project will cost-effectively reduce flaring while also producing a vital commodity to North Dakota's agricultural community. There are few ways in which the state could solve its large flaring problem from oil production while ALSO solving the problem of fertilizer supply – all in a manner that produces other environmental benefits. In short, this project is needed because it can solve these problems and illustrate the state's leadership position in innovative thinking around the challenges of sustainable oil and gas production.

### **STANDARDS OF SUCCESS**

*Standards of Success should include: The measurable deliverables of the project that will determine whether it is a success; The method to be utilized in measuring success; The value to North Dakota; An explanation of what parts of the public and private sector will likely make use of the project's results, and when and in what way; The potential that commercial use will be made of the project's results; How the project will enhance the education, research, development and marketing of North Dakota's oil and natural gas resources; How it will preserve existing jobs and create new ones; How it will otherwise satisfy the purposes established in the mission of the Program; How it will be reporting on the success of the project.*

- Success will be demonstrated through the commercial validation and consequential wider deployment and adoption of the N-Flex technology solution as measured by the ability to sustain business operations at the end of the pilot project and to maintain a net profit margin.
- Proving new more efficient technology configurations not currently used in oil & gas operations, will be demonstrated through the commercial validation of the solution and creation of a new source of in-state fertilizer production
- Reduced flaring of the gas currently being wasted at a well site, monitoring and reporting volumes of gas being utilized and recycled during the project and in all ongoing operations. Agcelerator anticipates the flaring reduction to be over 140 MCF per day per unit.
- Payback to the State: N-Flex expects that the funds requested in this grant proposal will be repaid to the State of North Dakota in the form of additional production tax revenue and added value creation for both the Oil industry and Agriculture. At current gas, ammonia and NGL price levels, our estimates show that each ton of fertilizer and it's associated products would earn the state an additional \$102 in additional taxes and oil and gas severance. This means that this first N-Flex unit could generate \$112,090 a year in additional revenue—and our intention is to deploy 50 to 100 over the next couple of years. In addition, Agcelerator's ability to reduce flaring emissions lowers the environmental risk and improves air quality to the

benefit of both the oil and gas industry and the citizens of North Dakota.

- The public and private sector will benefit from the projects results through the education of the oil and gas industry via technology workshops. The workshops will explain the financial and operational benefits of new solutions and demonstrate new methods for better resource management.
- N-Flex will provide detailed reports to the Commission at the 6, 12 and 18-month intervals from the date funds are received documenting: how monies were spent, amount of gas recycled, emissions reduced and additional state production tax revenue generated.

### **BACKGROUND/QUALIFICATIONS**

*Please provide a summary of prior work related to the project conducted by the applicant and other participants as well as by other organizations. This should also include summary of the experience and qualifications pertinent to the project of the applicant, principal investigator, and other participants in the project.*

#### **Paul Batcheller – Co-Founder**

Paul is a Partner at PrairieGold Venture Partners and leads the firm's Greentech investment initiative. He oversees all aspects of the firm's investment activities, from sourcing, structuring and negotiating investments to serving as a board member for portfolio companies. Paul has extensive experience working with companies developing, scaling-up and commercializing various industrial process technologies. Currently he serves on the boards of ZeaChem, tenKsolar and Agrivida and oversees the firm's investment in General Compression. Prior to joining PrairieGold, Paul served as an advisor to Senator Tom Daschle, working on economic, science and technology issues.

Paul also serves as a board member for several organizations that work in the areas of economic development, technology transfer and innovation, including SD Bio, Dakota Development Resources, and the State of South Dakota's Research and Commercialization Council, which oversees the State's 2010 Research Centers and its commercialization and technology transfer efforts.

#### **Neil Cohn – Co-Founder**

Neil has over 20 years experience pioneering environmental and natural resource markets. Neil spent a decade with Glencore International developing emerging commodities markets in Latin America, India and China. In 1998 Neil established the environmental finance desk at Natsource, facilitating over 100 million tons of carbon offset projects and building Natsource into the largest private sector environmental infrastructure fund with over \$1.4 Billion under management. In 2008 Neil established

the US operation for Macquarie Bank's Environmental Financial Products division where he recognized the need and opportunity to the waste to resources focus on agriculture that lead to the Agcelerator.

Neil is an advisor on sustainable agriculture to Richard Branson's Carbon War Room and the State of California's Climate Action Registry.

#### **Hans Vrijenhoef – N-Flex Technology Developer / Co-Founder**

Hans has been working since 1982 in the field of ammonia production and storage as well as in related products such as nitric acid, urea. He is co-founder of MICRO Chemie BV, an independent Dutch Ammonia Storage company, operating in the Port of Rotterdam, which has been sold lately to OCI.

Hans studied chemical engineering at the University of Delft and started his career at Esso Chemie BV and later at Kemira Agro in The Netherlands and had various jobs in engineering and management. After closure of the ammonia plant operations, Vrijenhoef started his own development company under the name Proton Ventures BV, which realized various projects in last years, such as the MICRO Chemie terminal in Rotterdam, the AS BCT terminal in Estonia (ammonia and UAN), the utility operations at Midden-Europoort and at Kemira Polymers in the Botlek.

After 30 years focused on the production and storage of anhydrous ammonia, Hans identified the opportunity to develop skid-mounted units to convert stranded gas and power to ammonia. Hans developed the N-Flex technology in partnership with Casale Ammonia Technologies, one of the original and most respected ammonia technology companies. Under Hans' leadership, Proton has entered in a JV with N-Flex that has the exclusive global rights to the N-Flex distributed ammonia production technology.

#### **Glen N. Buckley – Anhydrous Ammonia Partnerships / Sales / Logistics**

Glen is the Chief Economist and a Partner at NPK Fertilizer Advisory Service. NPKFAS is a consulting company focused primarily on advising dealers and farmers on issues relating to the fertilizer industry. Prior to joining NPKFAS, Glen retired from CF Industries where he served as the Chief Economist and Director of Agribusiness Analysis for almost 30 years.

Glen is the Past Chairman of the U.S. Grains Council and recently received a Lifetime Achievement Award from that organization. He has also served as Chairman of a number of other industry organizations including the Ag Chemical Division of the American Marketing Association, TFI's Economics Council and the International Fertilizer Association's Demand Working Group. He has also served on the Board of Directors as well as other leadership positions in a number of other industry organizations including the Potash and Phosphate Institute, the National Council of Farmer Cooperatives, the Agricultural Industry Coalition and the Agribusiness Industry Council of the National Corn Growers Association.

### **Amy Yoder – Agricultural Industry Partnerships**

Amy is a 20-year veteran of the agricultural industry and currently serves as the President and CEO for Arysta North America. Amy grew up raising cattle in Michigan along with 800-acres of corn, soybeans and wheat. Amy's MSU degree landed her a job as a crop consultant and launched her career working closely with growers, distributors, retailers, and universities to promote new and developmental agricultural practices and products. Amy has lead key divisions of several of the major agricultural companies and has served on boards of various agricultural associations and universities and was recognized as Atlanta's top business woman in 2008.

### **John Shinn – Oil & Gas Technology**

John is a PhD Chemical Engineer (UC Berkeley 1979) and recently founded SynPatEco technology advisory after 32 years with Chevron in process research, development and commercialization, global issues management, carbon markets, and sustainable technology deployment.

While with Chevron John implemented sustainable development programs and projects on six continents over two decades. John has extensive experience in flaring reduction including:

- Leading Chevron's flaring reduction planning resulting in 50% reduction in 5 years,
- Active involvement in the planning and execution of multiple flare reduction and other gas projects worldwide (such as West African Gas Pipeline, Angola LNG, Gorgon),
- Supporting the organization and successful operation of the World Bank's Global Gas Flaring Reduction Partnership (GGFR),
- Serving as principle author of the petroleum industry's international guidance document on gas flaring reduction, and
- Serving as elected leader of the joint oil industry association's Climate Change Working group.

Through SynPatEco John is currently involved in partnerships with the World Bank, US Department of Energy, Engineers Without Borders, and is a key advisor to N-Flex focused on the effectiveness and deployment of technology solutions to global energy, environmental and social challenges.



## MANAGEMENT

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

The project will be managed by N-Flex, a company founded by Neil Cohn, Paul Batcheller and Hans Vrijenhoef. The core value of the company is to use our advanced logistics and portfolio of proprietary technologies to convert stranded resources to high value commodities on a decentralized basis. Our goal is to provide value to both the owners of the stranded resource and the agricultural community that will benefit from the local source of fertilizer. We are in the process of finalizing our North Dakota based project execution team that will work closely with Paul, Neil, Hans and John to implement all construction and operation of equipment. We are in the process of hiring local execution team with oil field experience. This team will work closely with our Chief Technology Officer, John Shinn, who formerly led the global flare gas solutions initiative for Chevron. Proton Ventures will be training our North Dakota crew and John Shinn will take an active role guiding our local project execution team to implement all construction and operation of equipment.

The below timeline indicates planned Interim and final reports to the NDIC/OGRC. We also intend to provide periodic reports to provide a high level status of each scope of work.

Below are major components of our business and the Agcelerator lead for each area.

- *Capitalization* – Initial capitalization was provided by the founders. Additional funding has been arranged from major private equity investors subject to project milestones. (Paul/Neil)
- *Project finance* – We expect to gain access to USDA B&I loan guarantees covering up to 80% of our debt to enable us to access debt at very competitive rates. (Paul/Neil)
- *N-Flex Equipment Construction* – Proton Ventures / Casale will build the first units in Europe with the hope that construction and assembly shifts to the US within 18 months.
- *Gas treatment equipment* – We have firm quotes from multiple suppliers. (John Shinn/Neil)
- *Ammonia Sales* – We are in the process of agreeing partnerships with cooperatives and growers. (Glenn Buckley/Neil/Paul)

- *Operations* – N-Flex units are fully automated and need oversight only about once a week. We will have staff onsite at least twice a week. (John Shinn)
- *Permitting* – Discussions underway with the State agencies. (Neil)

**TIMETABLE**

*Please provide a project schedule setting forth the starting and completion dates, dates for completing major project activities, and proposed dates upon which the interim reports will be submitted.*

Following is the timeline to implement the project:

|  | 2011 | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 |
|--|------|----|----|----|----|----|----|
| Engineering & Equipment Specified  | √    |    |    |    |    |    |    |
| Advanced level of interest from oil producers  | √    |    |    |    |    |    |    |
| Advanced ammonia off-take negotiations   | √    |    |    |    |    |    |    |
| Investor capital contingent upon milestones  | √    |    |    |    |    |    |    |
| Secure funding & setup controls  |      |    |    |    |    |    |    |
| Finalize site identification/permits and sign agreement with oil producer                |      |    |    |    |    |    |    |
| Sign agreements with buyers of the ammonia and other hydrocarbon products                |      |    |    |    |    |    |    |
| Begin construction (compressors, gas treat, storage tank, N2 generator, ammonia reactor) |      |    |    |    |    |    |    |
| Install gas treatment / NGL knock-out at sites   |      |    |    |    |    |    |    |
| <b>Issue Interim Report to NDIC/OGRC.</b>  |      |    |    |    |    |    |    |
| Operate gas treatment and prepare for N-flex   |      |    |    |    |    |    |    |
| Receive N-Flex equipment and install   |      |    |    |    |    |    |    |
| <b>Issue Interim Report to NDIC/OGRC.</b>  |      |    |    |    |    |    |    |
| Begin preliminary testing of ammonia production process; identify technical              |      |    |    |    |    |    |    |
| Finalize all testing and begin full-scale operation; Conduct workshops/lessons           |      |    |    |    |    |    |    |
| Provide plan for dissemination of technology information; start roll out next 20 units   |      |    |    |    |    |    |    |
| <b>Issue Final Report to NDIC/OGRC.</b>  |      |    |    |    |    |    |    |

## BUDGET

Please use the table below to provide an **itemized list** of the project’s capital costs; direct operating costs, including salaries; and indirect costs; and an explanation of which of these costs will be supported by the grant and in what amount. The budget should identify all other committed and prospective funding sources and the amount of funding from each source, differentiating between cash, indirect costs, and in-kind services. Justification must be provided for operating costs not directly associated to the costs of the project. Higher priority will be given to those projects that have matching private industry investment equal to at least 50% or more of total cost. (Note ineligible activities or uses are listed under OGRP 2.02) **Please feel free to add columns and rows as needed.**

| Associated Gas to Ammonia Production   |                     |                     |              |                     |              |                     |           |
|--|---------------------|---------------------|--------------|---------------------|--------------|---------------------|-----------|
| 18 Month Project: Capture and convert well gas into ammonia on a distributed basis |                     |                     |              |                     |              |                     |           |
| Project Associated Expense   | Total               | NDIC                | %            | Agcelerator Cash    | %            | Agcelerator In-Kind | %         |
| N-Flex Unit Equipment  | \$ 3,100,000        | \$ 1,100,000        | 35%          | \$ 2,000,000        | 65%          | \$ -                | 0%        |
| Shipping Equipment   | \$ 50,000           | \$ 0                | 0%           | \$ 50,000           | 100%         | \$ -                | 0%        |
| Gas/Liquid Treatment Equipment   | \$ 400,000          | \$ 0                | 0%           | \$ 400,000          | 100%         | \$ -                | 0%        |
| Site permits / preparation   | \$ 25,000           |                     | 0%           | \$ 25,000           | 100%         |                     |           |
| Installation / Adjustment  | \$ 25,000           |                     | 0%           | \$ 25,000           | 100%         |                     |           |
| Operator & Maintenance   | \$ 100,000          | \$ -                | 0%           | \$ 100,000          | 100%         | \$ -                | 0%        |
| Engineering and Mgmt. Consultants  | \$ 100,000          | \$ -                | 0%           | \$ 100,000          | 100%         | \$ -                | 0%        |
| Internal staffing  | \$ 200,000          | \$ -                | 0%           | \$ -                | 0%           | \$ 200,000          | 100%      |
| <b>TOTAL</b>   | <b>\$ 4,000,000</b> | <b>\$ 1,100,000</b> | <b>27.5%</b> | <b>\$ 2,700,000</b> | <b>67.5%</b> | <b>\$ 200,000</b>   | <b>5%</b> |

Please use the space below to justify project-associated expenses, and discuss if less funding is available than that requested, whether the project’s objectives will be unattainable or delayed.

**CONFIDENTIAL INFORMATION**

*Any information in the application that is entitled to confidentiality and which the applicant wants to be kept confidential should, if possible, be placed in an appendix to allow for administrative ease in protecting the information from public disclosure while allowing public access to the rest of the application. Such information must be clearly labeled as confidential and the applicant must explain why the information is entitled to confidentiality as described in North Dakota Century Code 54-17.6. Oil and gas well data that is a result of financial support of the Council shall be governed by North Dakota Century Code 38-08-04(6).*

**N-Flex will also submit our financial model and a powerpoint presentation about the N-Flex opportunity that should both be considered confidential information.**

**PATENTS/RIGHTS TO TECHNICAL DATA**

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

**N-Flex has the global rights to N-Flex distributed ammonia production technology that has been developed by Proton Ventures of The Netherlands. N-Flex technology has been developed in partnership with several global leaders in their respective technologies and maintains exclusive access to components such as small-scale Ammonia reactor loops from Casale Ammonia.**

**Affidavit of Tax Liability**

I, Neil Cohn, certify that N-Flex does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

\_\_\_\_\_

Neil Cohn

\_\_\_\_\_

Date

**STATUS OF ONGOING PROJECTS (IF ANY)**

If the applicant is a recipient of previous funding from the Commission, a statement must be provided regarding the current status of the project.

N-Flex has not received any previous funding from the Commission.

## APPLICATION CHECKLIST

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

|                          |                                    |
|--------------------------|------------------------------------|
| <input type="checkbox"/> | Application                        |
| <input type="checkbox"/> | Transmittal Letter                 |
| <input type="checkbox"/> | \$100 Application Contribution     |
| <input type="checkbox"/> | Tax Liability Statement            |
| <input type="checkbox"/> | Letters of Support (If Applicable) |
| <input type="checkbox"/> | Other Appendices (If Applicable)   |

When the package is completed, send an electronic version to Ms. Karlene Fine at [kfine@nd.gov](mailto:kfine@nd.gov), and 2 hard copies by mail to:

Karlene Fine, Executive Director  
North Dakota Industrial Commission  
State Capitol – 14<sup>th</sup> Floor  
600 East Boulevard Ave Dept 405  
Bismarck, ND 58505-0840

For more information on the application process please visit:  
<http://www.nd.gov/ndic/ogrp/info/ogrcsubgrant-app.pdf>

Questions can be addressed to Ms. Fine at 701-328-3722 or Brent Brannan at 701-425-1237.