

FINAL REPORT – Full Report

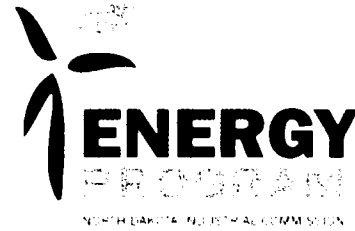
Project Phoenix

Project Number: R-047-059

Recipient: Incho Consulting Group and Newlight Technology

Award Amount: \$196,250

Total Project Costs: \$392,500



Goal of Project:

The long-term objective of the project is to increase the demand for State's renewable energy and natural gas through in-state production of a natural, biodegradable material (AirCarbon – a biodegradable polymer that is a proprietary product of Newlight Technologies) that is a proven alternative to single-use plastics. This goal requires the execution of a set of near-term project phases. The first phase (this project) focused on assessing locations, suppliers, and economics for Newlight Technologies to build a large scale AirCarbon plant in North Dakota.

Each of the key inputs to the plant (renewable energy, gas feedstocks, water, labor, and rail transportation facilities) were assessed with regards to cost, quality/availability, accessibility, and longevity/duration (reliability) in order to present Newlight with locations that optimize economics and the opportunity to build a carbon-negative enterprise.

North Dakota is seeking to attract industries (especially innovative, carbon-negative petro-chem enterprises) that productively utilize its vast energy resources locally (without reliance on pipeline delivery to other states) while reducing gas waste.

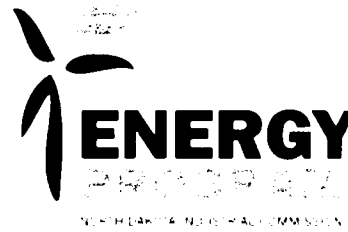
Single-Use Plastics and Newlight's AirCarbon

Single-use plastics made from petroleum are not bio-degradable. They are the cause of massive environmental problems that are forcing many governments to implement or consider restrictions. However, most experts forecast large increases in plastic demand due to the low-cost to produce and the high costs of making materials that have the same performance characteristics.

An estimated 17.6 billion pounds of plastic enter the marine environment every year, resulting in government bans and restrictions on using single-use plastics around the globe. While there have been significant efforts to replace single-use plastics with other biodegradable or recycled-content materials, implementation has been slow due to the lower cost structure and performance characteristics of traditional, petroleum-based plastics.

After 18 years in development, Newlight Technologies has developed and begun commercialization of an innovative and game-changing technology that overcomes those barriers. Founded in 2003, Newlight (www.newlight.com) is a bio-materials company in

Huntington Beach, CA dedicated to producing materials that help improve life. Newlight has developed, patented, and begun commercializing AirCarbon: a natural, regenerative, carbon-negative material that utilizes methane (instead of petroleum) as its carbon base.



AirCarbon is produced by harnessing ocean-based micro-organisms that consume carbon (in the form of methane) and create a polymer by-product (AirCarbon). AirCarbon decomposes rapidly in nature because microorganisms recognize it as a natural food source. It easily melts for forming products (at 350o), is durable in hot and cold conditions, and is dishwasher-safe.

AirCarbon has been shown to be an effective, natural material that can compete with traditional oil-based plastics and Newlight is in the crucial stage of ramping up commercialization. In 2019 Newlight launched the first production AirCarbon plant in Southern California (with a nameplate capacity of 1 million pounds annually). This plant provides the confidence that Newlight can produce AirCarbon at industrial scale. Output from that plant is already being used to manufacture Newlight's two new branded product lines:

- Restore (www.restorefoodware.com) markets and sells cutlery and straws made from AirCarbon;
- Covalent (www.covalentfashion.com) markets and sells wallets, handbags, and other consumer goods usually made from leather but instead made of AirCarbon.

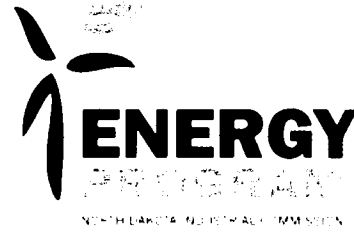
Incoho Consulting Group

Incoho Consulting Group is a management advisory firm that works with business leaders in some of the world's best-known firms. Founded in 2009, Incoho consultants are focused on driving strategic initiatives for leading energy companies.

Incoho has a long-term relationship with Newlight and its founders (both as investors and advisors). Based on preliminary assessments, Newlight and Incoho believe that North Dakota may be uniquely situated to take advantage of this opportunity and are working together to evaluate the potential for a long-term plan to finance and build an AirCarbon plant(s) in North Dakota. For this project, Incoho performed the work and the cost was split evenly between the State and Newlight. Incoho has worked closely with Newlight to ensure that the project was accurate, met Newlight's goals and objectives, and was completed on time and on budget.

Significant Findings:

As mentioned in the application, this project did NOT include a technical evaluation of AirCarbon technology, as this has been validated via many independent endorsements, awards, academic reviews, and a production plant that is selling 100% of its output in a market anxiously looking for a bio-degradable replacement for single-use plastic. Rather, this project was an evaluation of North Dakota resource availability and quality, infrastructure geography, business environment, and location optimization, and matching them up with Newlight's plant and business requirements. This work provides a fact base for Newlight to effectively make a decision on when and where to locate an AirCarbon manufacturing facility in the State that will maximize the economics and minimize any risks based on resource geography and potential industry partners and suppliers.



Incoho evaluated sites with the potential to meet the significant requirements of Newlight and AirCarbon production:

- Requirement that the site has a steady supply of natural gas via pipeline infrastructure that maximizes the methane content, minimizes transmission costs, and provides back-up redundancy via a second source.
- Requirement of minimizing electricity costs and maximizing the ability of Newlight to utilize a high percentage of renewable energy.
- Requirement of minimizing the cost of both ambient cooling water and potable water delivery.
- Requirement for a strong, effective labor pool.
- Strong desire for freight rail service.
- Strong desire to participate in carbon sequestration at some point.

Incoho acquired and utilized ESRI geolocation mapping software to evaluate proximity to gas pipelines, water pipelines, rail, electricity transmission, roads, and other infrastructure in the site analyses.

Incoho also met with many supportive government officials from both counties and the State, as well as many representatives from the businesses that could supply the plant with gas, electricity, and water. This has primarily been done to ensure that the sites have zoning and permitting that enable the infrastructure development and an AirCarbon plant.

Some of the considered sites have more challenges than others. Based on many interviews with State and County agencies, the top scoring sites either are already properly zoned as heavy industrial or would have a very high likelihood of receiving the required zoning and permitting.

Newlight is in the process of digesting this material and information from other sources to determine the next step of commercialization. Site selection for the next large-scale plant will be heavily influenced by this study (although is possible that Newlight will also pursue plants in other states). Site selection will also rely on the State and County's ability to ensure adequate funding for the infrastructure required to support such a petro-chem development.



The State of North Dakota has an ambitious goal of carbon neutrality by 2030. A robust, local petro-chem industry that uses local energy resources in-state can be a significant contributor to this goal. Using those resources to make a bio-degradable material to reduce single-use plastic contributes to the overall environment) making the project even more desirable.

Again, Incoho and Newlight want to thank the Industrial Council, the State and County government employees, and the various industry executives that participated in this project. The overall business environment the State demonstrated was exceptional.

Newlight and Incoho look forward to our continued work with the State, County, and Industry to finalize a location decision and move forward with the overall project. We again thank everyone for the terrific support.