

**ALASKA STATE LEGISLATURE
HOUSE SPECIAL COMMITTEE ON ENERGY**

March 10, 2011

3:09 p.m.

MEMBERS PRESENT

Representative Neal Foster, Co-Chair
Representative Lance Pruitt, Co-Chair
Representative Bob Lynn
Representative Dan Saddler
Representative Pete Petersen
Representative Chris Tuck

MEMBERS ABSENT

Representative Kurt Olson

COMMITTEE CALENDAR

PRESENTATION(S): DEMONSTRATION BY INNOVA LABS ON REMOTE
AUTONOMOUS HYDROGEN PRODUCTION STATIONS

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

MARVIN ADAMS, President
National Capital
Anchorage, Alaska

POSITION STATEMENT: Testified during the presentation by INNOVA
Labs on remote autonomous hydrogen production stations.

CAREY HILTON, President/CEO
INNOVA Labs
Fort Worth, Texas

POSITION STATEMENT: Provided the presentation by INNOVA Labs on
remote autonomous hydrogen production stations.

ACTION NARRATIVE

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CO-CHAIR LANCE PRUITT called the House Special Committee on Energy meeting to order at 3:09 p.m. Representatives Pruitt, Tuck, Lynn, Saddler, and Foster were present at the call to order. Representative Petersen arrived as the meeting was in progress.

Presentation: Demonstration by Innova Labs on Remote Autonomous Hydrogen Production Stations

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CO-CHAIR PRUITT announced that the only order of business would be a presentation by INNOVA Labs on remote autonomous hydrogen production stations.

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MARVIN ADAMS, President, National Capital, informed the committee he is a life-long Alaskan originally from Yakutat, and provided details of his heritage. He is presently president of the Alaska Native Brotherhood (ANB) Camp 87 in Anchorage. Mr. Adams spoke of his past employment by the Bureau of Indian Affairs (BIA) and of his involvement in several notable projects. He also served as vice-president of Native American Bank, and he described his experience in Alaska in financing and energy development businesses. Addressing the high cost of energy in rural Alaska, he observed that rural residents suffer when forced to choose between heating their homes and buying groceries, clothes, and fuel. However, there is hope because an alternative fuel source that is economical to produce and readily available has been found: Hydrogen. Mr. Adams informed INNOVA Labs of the energy crisis in Alaska, and invited Mr. Hilton to review the situation here. Additionally, Mr. Adams spent an extended amount of time studying hydrogen technology, and discussed the breakthroughs in hydrogen storage with Alaskan energy experts.

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CAREY HILTON, President/CEO, INNOVA Labs, said his company has been working on this technology for about five years and with military and commercial entities for the last one and one-half years. The military and Alaska have a similar need for a portable, autonomous fuel source that is easy to produce and that can be safely stored. INNOVA Labs is different from other hydrogen companies because it has an efficient way to produce and store hydrogen. Typically, hydrogen must be stored at

5,000-10,000 pounds per square inch (psi) capacity in large and heavy tanks, which use as much electricity for compression as for production. However, INNOVA Labs produces the hydrogen with wind, solar, geothermal, tidal, or excess grid power, and then can store it in canisters that are small, high-capacity, and at 200 psi or less. The material inside the canisters is a form of a composite metal hydride that absorbs the hydrogen at a rate of about 500-600:1. For an example, he displayed a small bottle that held 100 liters of hydrogen. Conventional long-term storage of hydrogen at high pressure is not practicable or safe.

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REPRESENTATIVE SADDLER asked what characteristics of hydrogen make it a good choice for fuel.

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MR. HILTON explained hydrogen is one of the most abundant elements in the universe and it is a fairly simple process to get it from water. When hydrogen burns, the byproduct is water vapor, leaving no carbon footprint or environmental impact. It is also a powerful fuel and more efficient than a fossil fuel; in fact, it will boil water three times faster than any other fuel. Hydrogen can be extracted from freshwater or seawater and because Alaska has a lot of water and wind, hydrogen production is a "perfect fit."

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REPRESENTATIVE SADDLER asked how hydrogen could be burned.

MR. HILTON said hydrogen can be used for heating and cooking and also for locomotion after the conversion of small internal combustion engines such as four-wheelers, snowmobiles, outboard motors. It can also provide portable power generation from four-stroke, diesel, or rotary engines converted to use the canisters. Furthermore, many of the materials used to make the pellets in the canisters are made from rare earth elements that are available in Alaska, and which presents an opportunity for manufacturing.

CO-CHAIR FOSTER asked whether hydrogen enriches, or replaces fuel in an engine.

MR. HILTON clarified that he is describing the complete replacement of any fossil fuel by hydrogen.

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REPRESENTATIVE PETERSEN toured a facility in Iowa that was converting engines to be fitted onto small tractors. The only exhaust emitted was a few drops of water.

MR. HILTON advised that most hydrogen vehicles are running from high-pressure hydrogen in an internal combustion engine or from high-pressure hydrogen in fuel cells. This approach is expensive, inefficient, and has many problems. INNOVA Labs has taken a holistic approach on a small scale that allows a small operation to produce, store, and use hydrogen in a safe manner. He displayed a slide of a small power generator with a two hundred cubic centimeter (200cc) engine that weighs about eighty-five pounds and can produce five kilowatts of power. Mr. Hilton said INNOVA Labs will provide at a later date a demonstration of a generator or a four-wheeler in operation. He restated that the INNOVA Labs approach is a holistic approach of production and storage to provide the "whole package." He displayed a slide of a remote charging station that was designed to be airdropped to locations with a water source and provide a self-sufficient source of power. The hydrogen production stations are scalable and can be sized to produce and store what is needed.

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REPRESENTATIVE SADDLER asked for a description of "charging" the hydrogen.

MR. HILTON explained that a remote production station will use water and electricity from wind or solar to break the water down into hydrogen and oxygen through a very sophisticated method of electrolysis. Afterward, the oxygen is vented or used separately, and the hydrogen is stored in a large vessel. The canisters are connected to the vessel and charged with the hydrogen until needed. As this is hydrogen gas, this is an efficient way to store energy.

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CO-CHAIR PRUITT asked if saltwater can be used in the production of hydrogen.

MR. HILTON advised that either a pre-filter system cleans and desalinates the water before it reaches the hydrogen generator, or the electrolyzers can be changed to accept saltwater.

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REPRESENTATIVE PETERSEN asked whether the system can generate the electricity it takes to create the hydrogen.

MR. HILTON said that may be possible in the future. At this time, the system is not perpetual. He then presented a slide showing the inside of a production station, and a slide showing a still stimulation of a station producing hydrogen using electricity from a wind turbine. The next slide showed a large, fully charged canister penetrated by gunfire, but not damaged by any type of explosion. He advised the committee that the pellets inside the canisters are programmed to stop working when exposed to the atmosphere thus there is no worry of "runaway hydrogen." In addition, canisters can be stacked, are approved for use by the U.S. Department of Transportation, and can be transported all over the world by air or ground shipping.

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MR. HILTON returned to the potential of using Alaska as a source for rare earth elements; in fact, INNOVA Labs could have a self-fulfilling relationship with Alaska as it would be an end-user and also a source for the materials in the canisters. Additionally, INNOVA Labs will develop and provide hydrogen conversion kits for oil stoves, portable generators, ATV's, snowmobiles, and boats.

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CO-CHAIR PRUITT asked for the cost.

MR. HILTON estimated that a 6,000-9,000 liter per hour production facility, including thousands of conversion kits and training, will cost in the \$3-\$3.5 million range. Three facilities spread around the state could be built for approximately \$7.8 million.

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REPRESENTATIVE LYNN surmised there are military applications for the production facilities.

MR. HILTON agreed, and said he could not speak to military applications or testing. In further response to Representative Lynn, he confirmed that INNOVA Labs is the sole source of this product at this level. There are other sources for hydrogen, but his company's methods are the most efficient, and possess a ready-to-use, practical application.

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CO-CHAIR FOSTER asked for a comparison of the cost to one gallon of gas.

MR. HILTON advised that a 400cc engine needs 5.5 gallons of gas; alternatively, the engine could be powered by three canisters for approximately \$0.35 per liter. At this time the gasoline gallon equivalent (GGE) is \$2.00, and if a system were connected to existing wind power, the cost would be pennies.

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REPRESENTATIVE TUCK asked how the use of hydrogen fuel affects engine life.

MR. HILTON observed that hydrogen burns cleaner than any other fuel; in fact, engines will last longer because they burn cooler. Gasoline and diesel fuel work under pressure and combustion creates carbon build-up. For the long-term, the cost of maintenance and service will be reduced. Typically, four-stroke engines burning gas have 26 percent efficiency, and when they burn hydrogen there is 60-120 percent efficiency.

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REPRESENTATIVE SADDLER questioned INNOVA Lab's focus on small scale operations, rather than on "mega-generation."

MR. HILTON explained that INNOVA Labs is a no-debt small company and large scale operations are beyond its budget. For the most part, the key focus of his company is on the safe storage of hydrogen. In further response to Representative Saddler, he said the hydrogen is stored molecularly into the materials in the canisters; the hydrogen is bonded to the materials at a very high capacity.

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REPRESENTATIVE SADDLER asked for the British thermal unit (Btu) equivalent.

MR. HILTON stated the formula varies, and noted that hydrogen burns and ignites 5,000 times faster than gasoline; he offered to provide comparison data at a later date.

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REPRESENTATIVE PETERSEN asked for the cost of a conversion kit for a snowmobile or four-wheeler.

MR. HILTON said a pilot projection is \$400 per kit. In further response to Representative Petersen, he restated that storage is in the pellets, which could be manufactured in Alaska along with the canisters.

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CO-CHAIR FOSTER recalled that hydrogen is used by the Space Shuttle, and asked for more information on its combustion.

MR. HILTON said when it is stored in the pellets, it is not hydrogen, and if the canister is breached, what is there is released into the atmosphere instantly. In further response to Representative Foster, he advised that a production station producing 9,000 liters per day uses 50-60 kilowatt hours (kWhs) of electricity.

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CO-CHAIR FOSTER asked whether there is a loss of power when an engine is fueled with hydrogen.

MR. HILTON reported a quality engine conversion will result in more torque and power with hydrogen fuel.

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REPRESENTATIVE TUCK expressed his belief that this product would provide the solutions for the energy storage problem at the Alaska Wind-Diesel Applications Center in Fairbanks and for other problems in rural areas.

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CO-CHAIR PRUITT asked for the amount of water needed for a 6,000-9,000 liter per day production station.

MR. HILTON stated generally, 1,000 liters of hydrogen is produced from one liter of water. In response to Representative Saddler, he added that the energy value depends on how the fuel is used. These are applications that his company has not considered before and engineering data will be forthcoming; however, he opined 1,000 liters of hydrogen "has a lot of energy value."

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REPRESENTATIVE LYNN asked for information on INNOVA Labs and its founder.

MR. HILTON gave his personal background, and relayed that INNOVA Labs has been quietly conducting research and development for five years in the field of hydrogen.

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CO-CHAIR FOSTER asked how hydrogen differs from fuels made from corn oil.

MR. HILTON reminded the committee the bio-fuel industry requires a product to grow, although the two industries can work together to complement each other. There is a possibility that bio-waste can be used to produce hydrogen in the future.

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CO-CHAIR FOSTER spoke to Mr. Hilton's background.

MR. HILTON added that INNOVA Labs employs a staff of PhDs and engineers.

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REPRESENTATIVE SADDLER, noting that every fuel source has critics, asked for the downside of this process.

MR. HILTON acknowledged the downside is the slow speed of development. He pointed out that this process has no environmental impact, does not dismantle an existing industry, and is safe. In further response, he said he was invited to come to Alaska by Mr. Adams.

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REPRESENTATIVE PETERSEN asked for the cost of the container.

MR. HILTON estimated that the canisters now cost hundreds of dollars because they are made in small quantities. In fact, the major cost is the pellets made of rare earth elements. Ultimately, these costs will be reduced dramatically. He shared his vision of the future.

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MR. HILTON, in response to Representative Lynn, said INNOVA Labs has six employees.

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CO-CHAIR PRUITT asked Mr. Hilton for his expectations for INNOVA Labs.

MR. HILTON said his company is focused on the following: improvements to the canisters; increasing the efficiency of the electrolizer; getting hydrogen production stations in use; continuing the research and development of the best products possible.

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REPRESENTATIVE SADDLER asked Mr. Adams about financing efforts.

MR. HILTON indicated that his company is raising capital; however, government funding is needed to get the technology to people. In further response to Representative Saddler, he said that propane is safe to transport and has an existing distribution infrastructure, but there is no competition between the two fuels, and they can work together. In response to Co-Chair Pruitt, he said that the canisters can be charged and discharged with an almost zero loss of fuel, thus their lifespan is unknown; however, it is forecast that the containers will store for 10 years. In further response regarding charging stations for cars, he indicated that it takes over one hour for the pellets in a large container to absorb the hydrogen.

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REPRESENTATIVE SADDLER asked whether INNOVA Labs has any government funding for research and development.

MR. HILTON said no.

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REPRESENTATIVE PETERSEN suggested applying for renewable energy grants from the Alaska Energy Authority (AEA).

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CO-CHAIR PRUITT expressed his hope that rural Alaska can benefit from this new technology and thanked the presenters.

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MR. ADAMS questioned how the state can help INNOVA Labs develop this infrastructure. The technology to have production stations operating by late 2011 is available now. He said he was aware of the AEA Emerging Energy Technology Fund grant program and suggested a good demonstration project for the state would be to build three production stations.

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CO-CHAIR PRUITT offered that AEA has the means to advance this type of project.

MR. ADAMS cautioned that the AEA application limited the volume that an applicant could request. He restated his interest in meeting the immediate need by making this a mandate from the legislature.

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CO-CHAIR PRUITT acknowledged that the presentation has opened a discussion on the great potential for this technology.

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ADJOURNMENT

There being no further business before the committee, the House Special Committee on Energy meeting was adjourned at 4:32 p.m.