**ALASKA STATE LEGISLATURE**
**JOINT MEETING**
**HOUSE SPECIAL COMMITTEE ON ENERGY**
**HOUSE SPECIAL COMMITTEE ON ECONOMIC DEVELOPMENT, TRADE, AND TOURISM**
March 3, 2014
8:04 a.m.

**MEMBERS PRESENT**

HOUSE SPECIAL COMMITTEE ON ENERGY

Representative Doug Isaacson, Co-Chair
Representative Pete Higgins
Representative Shelley Hughes
Representative Benjamin Nageak
Representative Andy Josephson

HOUSE SPECIAL COMMITTEE ON ECONOMIC DEVELOPMENT, TRADE, AND TOURISM

Representative Shelley Hughes, Chair
Representative Pete Higgins
Representative Lance Pruitt

**MEMBERS ABSENT**

HOUSE SPECIAL COMMITTEE ON ENERGY

Representative Charisse Millett, Co-Chair
Representative Neal Foster

HOUSE SPECIAL COMMITTEE ON ECONOMIC DEVELOPMENT, TRADE, AND TOURISM

Representative Lynn Gattis
Representative Bob Herron
Representative Craig Johnson
Representative Kurt Olson
Representative Harriet Drummond
Representative Geran Tarr

**COMMITTEE CALENDAR**

PRESENTATION: MERGED ENERGY SOLUTIONS

- HEARD

**PREVIOUS COMMITTEE ACTION**

No previous action to record

**WITNESS REGISTER**

R. MICHAEL SMITH, CEO
Merged Energy Solutions
Los Angeles, California
**POSITION STATEMENT:** Provided a presentation by Merged Energy Solutions.

KURTIS ZELL, Development Coordinator
Merged Energy Solutions
Los Angeles, California
**POSITION STATEMENT:** Provided a presentation by Merged Energy Solutions.

**ACTION NARRATIVE**

8:04:12 AM

**CO-CHAIR DOUG ISAACSON** called the joint meeting of the House Special Committee on Energy and the House Special Committee on Economic Development, Trade, and Tourism to order at 8:04 a.m. Representatives Higgins, Nageak, Hughes, and Isaacson of the House Special Committee on Energy were present at the call to order and Representative Josephson arrived as the meeting was in progress. Representatives Higgins and Hughes of the House Special Committee on Economic Development, Trade, and Tourism were present at the call to order and Representative Pruitt arrived as the meeting was in progress.

**PRESENTATION: MERGED ENERGY SOLUTIONS**

8:05:48 AM

CO-CHAIR ISAACSON announced that the only order of business would be presentations by Merged Energy Solutions on the Multi-Industrial Greenhouse Facility and Transforming Alaska.

8:07:05 AM

R. MICHAEL SMITH, CEO, Merged Energy Solutions, informed the committee Merged Energy Solutions (MES) was founded in 2007 and has evolved from a revenue-based company into a company that creates new technologies to bring new energy into the [power]

system. Further, in response to restrictive federal and state laws limiting some endeavors, the company has developed the multi-industrial greenhouse (MIG). In 2007, the company intended to develop solar energy and biomass gasification energy systems. In Southern California the air quality management division (AQMD) laws were very restrictive on gasification, and as a revenue-driven company, MES discovered the performance of solar energy was unsatisfactory on its own. Thus, in order to comply with AQMD laws, the company began work to improve gasification technology to mitigate emissions. After research and testing MES found the carbon dioxide (CO2) and polluting carbon (NOx) emissions produced by the gasification process could be utilized by building an atypical greenhouse that is hermetically sealed. Mr. Smith directed attention to the PowerPoint presentation entitled, "Multi-Industrial Greenhouse Facility," and said the mission of MES is to renew and build a sustainable Earth by empowering and educating people throughout the world. The company collaborates with nature and technology, and realizes there are food security issues, and so incorporates food, clean water, and more by building state-of-the-art clean energy and agricultural projects such as the multi-industrial greenhouse [slide 1]. An MIG facility is "going through the paperwork" for a site in Riverside, California. The facility is comprised of the following components: concentrated solar thermal, which was chosen because of its longevity, efficiency, and disposal; advanced biomass gasification; geo thermal; high-density vertical farming; aquaculture; water desalination and purification; and an academy of advanced technical science [slide 3]. The concentrated solar panels are located on top of the MIG, which is built in four quadrants, each with a glass roof [slide 4]. The MIG is hermetically sealed, and each environment is computer-controlled so as to grow different plants.

CHAIR HUGHES asked when the facility will be built.

MR. SMITH said the facility is in the permitting and environmental impact report (EIR) process at this time. The facility will be operating in mid-2016.

REPRESENTATIVE HIGGINS asked how the facility is financed.

MR. SMITH said private money is financing the $300 million project because it was difficult to get government funding.

REPRESENTATIVE HIGGINS was pleased that private funds were obtained because that indicates the project is feasible.

MR. SMITH confirmed that the design does not use solar photovoltaic (PV) because that system would have to be subsidized to be profitable. The chosen design has a very attractive return and obtained private money, using a public-private financing arrangement as the facility is located on public land with a 50-year lease-purchase agreement. In response to Chair Hughes he said the land is from the City of Riverside, which is a municipality. In further response, he said the facility could operate in the Antarctic if there were a fuel source.

8:22:06 AM

CO-CHAIR ISAACSON inquired as to the type of fuel needed.

MR. SMITH said MES has 14 new patents on power source technologies such as a water gravity system that generates power from running water.

REPRESENTATIVE HUGHES asked whether the facility would be economic in another climate.

MR. SMITH said yes, depending on the size of the facility. He returned attention to concentrated solar thermal and explained that the system uses a mirror and focuses all of its direct light to a heating element filled with magnesium oil, which then transfers its heat to a boiler, then to steam, then to a co-generator to produce electricity [slide 5]. The system is very efficient, but very large in size; however, MES has made the technology smaller so as to function in the MIG facility.

CO-CHAIR ISAACSON asked for the wattage produced from the smaller panels.

8:26:46 AM

MR. SMITH related the smaller panels create 20-40 megawatts maximum. The facility site in Riverside is 120 acres, but the systems are scalable and the technologies will work independently, although multi-use is cost effective and more efficient. He described the principles of how concentrating solar thermal works [slide 6]. Unlike solar PV, this system is not feasible for individual residential installations at this point. In response to Co-Chair Isaacson, he said the excess heated water can be diverted to a storage tank instead of to a generator.

REPRESENTATIVE HUGHES inquired as to whether the reflection of the sun off of snow helps a solar energy system.

MR. SMITH said no, because solar panels need direct sunlight in order to absorb rays from the sun. The mirrors are installed on a computerized tracking system to follow the sun all day.

REPRESENTATIVE HIGGINS asked where the system has been tested in cold climates, and observed that regions of Alaska have very short periods of light in the winter.

8:34:03 AM

MR. SMITH clarified that the facility does not rely solely on solar thermal, but operates in combination with the advanced biomass gasification (ABG) which can use municipal solid waste (MSW) or any biofuel as feedstock to produce energy day and night. The ABG system solves several problems by creating energy and diverting trash from landfills, thereby saving water contamination from methane. The ABG system first separates the waste, and then uses the remainder for feedstock [slides 7 and 8]. Some systems are incinerators, which put carcinogens into the air, but ABG uses heat, liquid, and feedstock to burn and liquefy most of the waste to produce synthetic gas (syngas), ash, and purified water. The syngas can then be used to generate electricity or to make synthetic diesel fuel - which burns 98 percent clean - and other byproducts at a rate of 55 gallons of synthetic diesel fuel for every single ton of MSW. Another byproduct is ash that can be used in concrete, asphalt, fertilizer, or as a soil conditioner. Also, for every 50 gallons of fuel, 100 gallons of purified water is produced. The feedstock for the system can be agricultural, such as dead trees or wood chips, or MSW [slide 9]. In Southeast Asia, MES is using water hyacinth for feedstock.

8:44:57 AM

MR. SMITH summarized other MES technologies: geo-thermal technology has been advanced with new drilling techniques [slide 10]; using three technologies, a MES 150-acre MIG facility can generate 20-40 megawatts (MW) - while consuming 3-4 MW - and can power 2,400 homes; the facility is impervious to an electromagnetic pulse (EMP) attack, earthquakes, tsunamis, and other disasters [slide 11]. Regarding advanced high-density vertical farming and aquaculture systems, he said MES uses no pesticides, man-made fertilizers, or genetically modified

organisms (GMOs) in its advanced high-density vertical farming system, resulting in healthier products [slides 12-14]. The high-density vertical farming system is combined with aquaculture and uses water infused with fish fertilizer and other nutrients. No hormones are used in the aquaculture system and the fish swim against a current to stay healthy. Using these techniques, the 120-acre facility can produce an amount equivalent to that of 3,000 ground acres, and of a higher quality.

8:51:36 AM

MR. SMITH directed attention to MES's water desalination technology [slide 15]. Typical water desalination processes deposit brine back into the ocean that can kill nearby organisms. The MES system uses a plasma reactor that separates many of the molecules attached to water so that when the water passes through the nano-filtration system the water is cleaner and better tasting. The system does not use chlorine or fluoride in stored water. He stressed that this is not a reverse osmosis system; in fact, the water is run through a gasification system that separates the salts and dissolves all of the brine [slide 16]. In response to Co-Chair Isaacson, he explained that the "good" salts are used to generate a revenue stream and the "bad" salts are used in fuel. Mr. Smith returned to the MES system of aquaculture, explaining that opposing flow technology causes the fish to swim against a current thereby producing a healthy fish [slide 17]. In response to Co-Chair Isaacson, he said national research labs agree. Typical fish farms do not have other systems working with them; if using all of the components of the MIG system, pure water is constantly supplied and the fish excrement is extracted.

8:57:58 AM

REPRESENTATIVE NAGEAK asked whether the aquaculture system only uses freshwater.

MR. SMITH acknowledged that MES has not raised saltwater fish, but would be interested in doing so. He concluded that the production of produce and fish is a natural combination in order to grow healthy products, save land, and reduce water consumption [slides 18-20]. Mr. Smith then directed attention to the Academy of Advanced Technical Science (TAATS), and expressed his company's belief that what is lacking today in education is the knowledge of combining technology and agriculture [slides 21 and 22]. Most students today are

inclined toward technology and are unaware of agriculture, thus TAATS allows interested students to learn new technologies, combine agricultural techniques with advanced technology, and develop new ideas; in fact, there is the possibility of TAATS becoming an extension course at the University of California, Davis. In closing, Mr. Smith summarized that an average 120-acre MIG will employ three shifts of 540 people - with others in supporting services - for a total of 3,000 jobs [slide 24]. Annual production will be: 9 million gallons of synthetic fuel; 40 MW of electricity; 90 million pounds of organic produce, which is enough to feed 300,000 people; 5 million pounds of fish; and 1.5 million gallons of potable water per day [slide 23].

9:04:24 AM

REPRESENTATIVE HUGHES asked for the annual operating costs of the facility.

MR. SMITH answered $2.7 million per year. In further response to Chair Hughes, he said the operating costs are approximately one-third of the total cost of traditional farming, aquaculture, and fuel production methods.

CO-CHAIR ISAACSON estimated that producing 9 million gallons of synthetic fuel with $2.7 million in operating costs would earn $34 million from one revenue stream.

MR. SMITH offered to provide a summary of cost breakdowns; on a gross revenue basis, annual revenue estimates are $34 million from agriculture and $30 million from energy.

9:08:03 AM

REPRESENTATIVE NAGEAK requested additional information on how to compare revenue streams with those of existing industry.

MR. SMITH gave an example of fish that costs an average of $6 per pound, and that the MIG can produce and sell fish for $4 per pound, meaning the business model stands at an approximate 25-26 [percent] return on investment. However, the MES business model is not to generate a lot of money, but to develop the ability to provide food, power, and water in an economical fashion.

CO-CHAIR ISAACSON acknowledged the relevancy of this topic to Alaska and the country.

9:10:44 AM

CO-CHAIR ISAACSON passed the gavel to Chair Hughes.

CHAIR HUGHES expressed her interest in receiving more information about the facility in the future.

9:13:03 AM

KURTIS ZELL, Development Coordinator, Merged Energy Solutions, informed the committee he is a resident of Alaska and is very familiar with the aviation industry here. Mr. Zell posed the question of how to build infrastructure for energy, transportation, economics, mining, or other industry, in Alaska's remote areas. He suggested the use of airships is applicable for the oil and gas and timber industries, and for alternative shipping methods. Other uses include disaster relief and medical response. He directed attention to the PowerPoint presentation entitled, "Transforming Alaska," adding that airships bring opportunities for new jobs building airfields, because Ted Stevens Anchorage International Airport could only accommodate five airships, and he suggested new fields in Palmer or Willow would be needed [slides 2-4].

CHAIR HUGHES asked for background information on Sky Lift Aeronautics.

9:17:49 AM

MR. SMITH, speaking as the chairman of Sky Lift Aeronautics, said a MES project in the "north Pacific" needed transportation for fuel to an area where tanker ships could not be used. That project led to Sky Lift Aeronautics partnering with Lockheed Martin Corporation (Lockheed) to obtain the worldwide rights to the marketing, sales, and leasing of the aircraft.

CO-CHAIR ISAACSON observed that mining in Alaska is in the Interior and the Far North, and pointed out that Fairbanks International Airport is very large and accommodating. He asked if the ships are not suited for very cold weather, and why the focus is on Southcentral.

MR. SMITH said there is no need to focus on one area providing there is sufficient population to staff the maintenance, repair, and operations (MRO) station. The airships operate most efficiently in cold weather, and remain operational within a temperature range of -40 degrees to 160 degrees Fahrenheit.

CO-CHAIR ISAACSON encouraged the presenters to look at the Interior for staging the aircraft.

9:22:55 AM

REPRESENTATIVE NAGEAK inquired as to the size of the aircraft.

MR. SMITH responded that at this time the aircraft are designed in three variants: the 500-ton hybrid aircraft will have a payload of 300 automobiles, and its dimensions are 742 feet long, 394 feet wide, and 202 feet high; the dimensions of the 100-ton model are 423 feet long, 185 feet wide, and 117 feet high; the dimensions of the 25-ton model are 276 feet long, 157 feet wide and 75 feet high.

REPRESENTATIVE NAGEAK related that the high cost of freight is hurting those who live in rural Alaska villages, and he gave an example of the cost of shipping meat. The high cost of shipping prevents opportunities for every kind of economic growth, and he encouraged the presenters to consider a route that would service all eight villages on the North Slope, thereby reducing costs to the residents.

MR. SMITH pointed out the advantages of the hybrid aircraft over fixed-wing aircraft are the costs of fuel and operation. The cost of operation is about one-eighth, and the dynamics of this type of aircraft - equipped with 450-cubic-inch Mercedes engines powered by diesel fuel - allows for more efficiency than transportation by fixed-wing aircraft or barge. Further, the hybrid aircraft cost less money and have twice the capacity of most fixed-wing aircraft.

9:29:19 AM

MR. ZELL, in response to Chair Hughes, explained after the agreement with Lockheed is finalized, Lockheed will build the 25-ton model and the aircraft will be seen in Alaska by February, 2015. In further response to Chair Hughes, he clarified that the only aircraft of this type that Lockheed has built is an 80-foot-long hybrid which is not in commercial or military application, but is an experimental aircraft.

REPRESENTATIVE HIGGINS asked for the altitude and weather conditions under which the aircraft can fly.

MR. ZELL answered that the ceiling is 20,000 feet and ideally the airships fly at 10,000-15,000 feet. Almost any type of weather condition is acceptable except for extreme headwinds, which are not expected at flying altitude. Mr. Zell said the manufacturer expects to increase the horsepower of the engines to address the issue of strong winds. He returned to mining applications such as those needed for the proposed Pebble Mine, the NOVAGOLD Donlin Gold mine, and the mines in Nome [slide 5]. He stressed that shipping, transportation, and freight applications would make sense for rural Alaska, and airships would serve as safe alternatives to ice road trucking to and from the North Slope [slides 6 and 7].

CO-CHAIR ISAACSON asked for the range of an airship.

9:33:59 AM

MR. ZELL responded that a 25-ton aircraft has a range of about 1,400 nautical miles carrying a net payload of about 40,000-50,000 pounds. He cautioned that the flight time would be regulated by the certification from the U.S. Department of Transportation, Federal Aviation Administration (FAA). In further response to Co-Chair Isaacson, he confirmed that the aircraft could "cover" Alaska and upper Canada; in fact, the 100-ton model will have a range of about 3,000 nautical miles and the 500-ton model will have a range of about 6,000 nautical miles.

CO-CHAIR ISAACSON surmised the 100-ton model should travel from Fairbanks to the end of the Aleutian Island chain.

MR. ZELL said correct.

9:35:53 AM

REPRESENTATIVE HIGGINS asked about the safety of the airships.

MR. ZELL said the manufacturer has performed many tests. The helium is compartmentalized inside the balloon part of the airship, thus it can maintain loft with a certain number of breaks in the skin as a result of gunfire. In further response to Representative Higgins's question related to combustion, he said he was unaware of any "massive" problems caused by electrical strikes. In response to Chair Hughes, he confirmed that hydrogen is highly explosive but helium is not. In response to Representative Nageak, he said the speed of the 25-ton model is about 70 knots.

MR. SMITH assured the committee that lightning has no adverse effect on the airship as it is not constructed of aluminum framing, but in each lobe of the aircraft there is a ballonet, which holds three internal bladders filled with air. Helium is used for a structural element and creates the framing in an aerodynamic shape, and the [exterior] fabric is a polymer, which is impervious to lightning. The only metal used is attached to the bottom of the vehicle.

9:41:30 AM

MR. ZELL returned to the presentation and advised MES believes the airships could transport oil and liquefied natural gas (LNG) from Prudhoe Bay to Valdez in a more efficient and environmentally friendly method than through a pipeline [slide 10].

CHAIR HUGHES referred to slide 9 and asked for an explanation of the scenes depicted.

9:42:54 AM

MR. ZELL said the airship depicted is either the 25-ton or 100-ton model; better renderings are on slides 29-33. In further response to Chair Hughes he said the pilot sits in the front. He then pointed out the airship can land on the ground, water, or snow, and only requires a 1,500 foot "strip" for landing and takeoff.

REPRESENTATIVE HIGGINS asked how much helium is needed for the 25-ton model.

MR. ZELL was unsure. Returning to the transportation of oil and gas, he provided an image of an airship designed to transport LNG [slide 15]. He suggested that airships could be a viable alternative for the transport of goods, people, and freight throughout Southeast Alaska, rural areas, and the Aleutian Islands in support of tourism, with the additional option of using the airships as cruise ships [slide 16]. There was discussion about airships as a possibility for tourism and for the transport of passengers, but the company is waiting for guidelines from FAA regarding passenger service.

9:51:25 AM

MR. SMITH, in response to Chair Hughes, said FAA will require that the airships are in operation for one year before approving a passenger load. At this time the 25-ton model is approved for up to 15 passengers. In further response, he confirmed that the 500-ton model will carry 2,200 passengers.

MR. ZELL restated the multiple applications for the aircraft: tourism; disaster relief; emergency medical response; as part of the Alaska Marine Highway System; support for the oil and gas industry; and to lower the cost of in-state and out-of-state shipping, especially for rural Alaska.

REPRESENTATIVE PRUITT asked whether an airship could lift a drill-rig out to a site, and how the cost would compare to the cost of normal transportation over an ice road.

MR. ZELL was unsure of the weight of a drill-rig; however, the airship can be used as a crane, thus portions of a rig could be transported outside of the cargo bay. He said he was unsure of what producers pay to transport drill-rigs by conventional shipping methods.

9:58:14 AM

REPRESENTATIVE PRUITT inquired as to whether MES has potential clients in Alaska. He asked when and where MES is prepared to provide services.

MR. ZELL closed by saying that MES is moving forward quickly and aggressively with its manufacturer. The timeline is to have the airship flying within 12 months. There has been contact with logistics and mining companies in Alaska who are interested in the future of the airship.

10:00:00 AM

MR. SMITH added that MES has had discussions with Lynden Air Cargo and others, and as soon as the agreement with Lockheed is finalized, MES will present its full marketing strategy to all of the interested clients in Alaska.

10:02:07 AM

**ADJOURNMENT**

There being no further business before the committee, the joint meeting of the House Special Committee on Energy and the House

Special Committee on Economic Development, Trade, and Tourism was adjourned at 10:02 a.m.