Emily Ford
Public Outreach Liaison
907.771.3961

AEA Works to Reduce Cost of Energy by Encouraging Innovation

Emerging Energy Technology Fund Spurs New Energy Technology

(Anchorage) – In an effort to reduce the cost of energy in Alaska, sixteen emerging technology projects have been selected to receive grant funds through the Alaska Energy Authority (AEA) Emerging Energy Technology Fund. Projects include increasing energy efficiencies for diesel generators, developing hydrokinetic resources, enhancing wind power and storage capabilities, heat pumps and biomass across the state. Additional information about each project is below:

Alaska Applied Sciences, Inc.: Solid State Ammonia Synthesis Pilot Plant
Location: Juneau
Project Type: Energy Storage

Project Summary:
Alaska Applied Sciences, Inc. proposes to produce ammonia to serve as fuel to provide energy storage and stability to the Alaska Electric Light & Power electrical grid.

As intermittent sources of renewable electricity generation like wind power grows, it becomes a challenge to incorporate them into the grid while maintaining power stability. Energy storage is used to smooth out the peaks and valleys in renewable generation.

This project reduces the energy required to produce the ammonia, suggesting that it will be more economic than traditional methods.

Alaska Division of Forestry: Biomass Reforestation for Boreal Forests
Location: Fairbanks
Project Type: Biomass

Project Summary:
The Alaska Division of Forestry proposes to demonstrate forest regeneration after a biomass harvest by planting un-rooted poplar tree stem-cuttings. Although less energy-dense than other biomass fuel stocks, poplars have much faster growth rates. Stems will be collected in the winter and replanted in the spring.

Biomass is a renewable energy source that can be used to generate electricity or converted into biofuels.

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044

Arctic Sun, LLC: Arctic Thermal Shutters & Doors
Location: Fairbanks
Project Type: Energy Efficiency

Project Summary:
Arctic Sun, LLC proposes improving the energy efficiency of homes in colder climates through arctic doors, arctic shutters and blown-in insulation shutters.

Maintaining climate control in arctic high-efficiency housing has been challenging because of high condensation on doors and windows. The technological improvements proposed by Arctic Sun include improving R-values in the arctic doors; creating exterior arctic shutters that are controlled by an electric drive and use air-tight weather stripping; and shutters for retrofitted fixed-pane windows that can be automatically filled and emptied with insulating beads.

Genesis Machining and Fabrication: Ultra-Efficient Generators and Diesel-Electric Propulsion
Location: Kodiak
Project Type: Diesel Efficiency

Project Summary:
Genesis Machining and Fabrication proposes to demonstrate low-cost diesel electric-power generation and propulsion technology.

The project will demonstrate that a modification to existing motors leads to an increased power density. The proposal also includes novel power electronics designs that can be used in boats for both marine propulsion and to power onboard generators. The two technologies will be demonstrated in phases, initially in a bus and later installed in a former tug boat.

Cold Climate Housing Research Center: Cold Climate Heat Pump Demonstration
Location: Fairbanks
Project Type: Heat Pump

Project Summary:
The Cold Climate Housing Research Center is working to demonstrate the potential for ground source heat pumps (GSHPs) as an efficient and economic heat source in colder climates. This technology has not typically been used in arctic environments.

This project will install a GSHP at the Cold Climate Housing Research Center's research and testing facility in Fairbanks in a narrow band of thawed ground. Several different surface treatments will be modeled and tested to maximize surface heat capture during summer months and to prevent winter heat loss.

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044

Institute of Northern Engineering, UAF: Enhanced Condensation for Organic Rankine Cycle
Location: Fairbanks
Project Type: Heat Recovery

Project Summary:
The University of Alaska Fairbanks seeks to increase the efficiency of an Organic Rankine Cycle (ORC) system by increasing the heat transfer rate of the condenser. The condenser is used to condense vapor into liquid and to remove heat from fluids.

ORCs allow heat recovery from lower temperature sources, like biomass, industrial waste heat, geothermal heat and solar ponds. The low-temperature heat can be converted into electricity.

Institute of Northern Engineering, UAF: Safe and Efficient Exhaust Thimble
Location: Fairbanks
Project Type: Energy Efficiency

Project Summary:
The University of Alaska Anchorage's Institute of Northern Engineering proposes to demonstrate a new design of ventilated exhaust thimbles for wood stoves, oil-fired furnaces, diesel generators and other high-temperature exhaust-generating sources.

Stove thimbles prevent wood framing from igniting from the hot exhaust as it passes through the chimney. In this project, the traditional thimble will be replaced with an insulated and passively-cooled design that draws cool outside air into a chamber surrounding the hot exhaust stack. As the cool air is heated by the exhaust, it rises and draws more cool air into the chamber in a continuous process. The new design eliminates heat loss that accompanies traditional thimbles by maintaining integrity of the building's envelop.

Altaeros Energies, Inc.: High Capacity Airborne Wind Turbine
Location: Delta Junction
Project Type: Wind

Project Summary:
Altaeros Energies, Inc. proposes to demonstrate a 30 kilowatt (kW) wind turbine suspended 1,000 feet above ground by a helium-filled shell.

The project seeks to take advantage of higher and more consistent wind speeds and to demonstrate an energy capacity factor potentially two times greater than tower-mounted wind turbines.

By tethering to a portable trailer, a substantial decrease in installed capital costs is expected. Altaeros plans to commercialize both 30 and 100 kW models.

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044

Oceana Energy Company: Oceana In-Stream Hydrokinetic Device Evaluation
Location: Nenana
Project Type: Hydrokinetic

Project Summary:
Hydrokinetic projects attempt to tap the energy of moving water (kinetic energy) into power. Oceana Energy Company proposes to demonstrate a hydrokinetic device that is designed to capture more energy.

The device will be suspended from a barge during demonstration and testing will occur during the winter months at ACEP's hydrokinetic test bed in the Tanana River at Nenana.

ORPC Alaska, LLC: RivGen Power System Commercialization Project
Location: Nikiski, Igiugig
Project Type: Hydrokinetic

Project Summary:
ORPC proposes to demonstrate the RivGen hydrokinetic device that is mounted on a pontoon support structure, floated to the deployment location and then submerged

Hydrokinetic projects attempt to tap the energy of moving water (kinetic energy) into power. The RivGen device is submerged to capture the energy in the river current. It is scaled down from the 150 kW device currently operating in Maine and planned for the Cook Inlet in 2014. This project will be demonstrated at Nikiski and then again on the Kvichak River at Igiugig for one summer season.

Hatch: Application of Composite Flywheels
Location: Fairbanks
Project Type: Energy Storage
Project Summary:
Hatch is proposing the demonstration of a high-efficiency and lightweight flywheel to provide more stability in wind-diesel systems. Flywheels are rotating mechanical devices that are used to store energy.

As intermittent sources of renewable electricity generation like wind power grows, it becomes a challenge to incorporate them into the grid while maintaining power stability. This project has the potential to integrate more wind power into wind-diesel systems.

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044

Intelligent Energy Systems: Small Community Self-Regulating Grid
Location: Tuntutuliak
Project Type: Wind, energy storage

Project Summary:
IES proposes to provide power grid stability through an advanced control system that uses electrical heating units.

As intermittent sources of renewable electricity generation like wind power grows, it becomes a challenge to incorporate them into the grid while maintaining power stability. High winds produce more power and as a result supply can outpace demand resulting in an increased electrical frequency in the power grid. This project would provide grid stability and could facilitate higher rates of wind penetration in rural communities like Tuntutuliak.

Intelligent Energy Systems: Wind-Diesel Battery Hybrid for Kwigillingok
Location: Kwigillingok
Project Type: Wind, energy storage

Project Summary:
IES proposes to demonstrate the use of high-performance lithium ion batteries, similar to those found in vehicles, to provide short-term energy storage.

As intermittent sources of renewable electricity generation like wind power grows, it becomes a challenge to incorporate them into the grid while maintaining power stability. This project will attempt to maximize the use of wind to displace diesel fuel in Kwigillingok by providing valuable energy storage. Diesel fuel savings are expected to exceed 50 percent for wind-diesel system operations without storage and 10 to 15 percent for diesel-battery system operations.

Boschma Research, Inc.: BRI Cyclo-Turbine Energy Production
Location: Nenana, Igiugig
Project Type: Hydrokinetic

Project Summary:
Hydrokinetic projects attempt to tap the energy of moving water (kinetic energy) into power. Boschma Research, Inc. proposes a river-bottom mounted cyclodial turbine hydrokinetic device on the Tanana and then Kvichak rivers. Cyclodial turbines are effective in compact sizes.

This device also includes a debris guard and technologies enabling use in slower currents. Both a 3kW and a 5kW unit will be tested, first in the Tanana River and then in Kvichak River at Igiugig during summer months.

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044

Marsh Creek, LLC: High Efficiency Diesel Electric Generator Set
Location: Fairbanks
Project Type: Diesel Efficiency

Project Summary:
March Creek, LLC proposes increasing fuel efficiency for diesel electrical generation.

A permanent magnet "soft torque" coupling will allow the diesel engine to operate at significantly lower rotational speed when power demand is low, increasing fuel efficiency.

Northwest Arctic Borough: Arctic Field Testing and Power Curve Verification of the Renewegy VP-20 Wind Turbine
Location: Kotzebue
Project Type: Wind

Project Summary:
The Northwest Arctic Borough proposes a 20 kW wind turbine that is erected using hydraulic jacks to tip the turbine into place, creating active pitch and yaw control.

Pitch and yaw are rotations and movements (demonstrated in the picture in an aircraft)

The tipping mechanism eliminates the need for a crane or tower climbing during installation or maintenance. The turbine is also designed to periodically increase blade speed for ice control.

The list of Emerging Energy Technology Fund projects can be viewed at akenergyauthority.org. The Alaska Energy Authority is a public corporation of the state. AEA's mission is to reduce the cost of energy in Alaska.

###

813 West Northern Lights Boulevard Anchorage, Alaska 99503 **T** 907.771.3000 **Toll Free** (Alaska Only) 888.300.8534 **F** 907.771.3044