Department of Energy

The Department of Energy has responsibility for providing for the long-term energy security of the United States. DOE's Arctic and Subarctic activities support the DOE mission through studies of energy production, relevant atmospheric/environmental measurements, and modeling.

The Arctic and Subarctic activities of the Department of Energy (DOE) include support for projects in three general areas:

- Energy production and power generation;
- Atmospheric/environmental measurements; and
- Modeling related to climate change and other DOE missions.

Assessment of the recoverability and production of methane hydrates and related free-gas accumulations is an important part of these activities. DOE researchers also collaborate with other Federal and state agencies in the development of energy sources that provide affordable and reliable electric power for rural Alaskan villages.

There are compelling scientific reasons to study climatic change at high latitudes, as well as elsewhere. Through its Atmospheric Radiation Measurement (ARM) Program, DOE investigates cloud and radiative processes at the North Slope of Alaska/Adjacent Arctic Ocean site (NSA/AAO), near Barrow, which is now part of the ARM Climate Research Facility, a national user facility. The data are used to refine atmospheric models critical for understanding potential climate change.

The following is a list of DOE projects and programs that are wholly or partly focused on the Arctic.

	Funding (thousands)	
	FY 04	FY 05
Amchitka Island Project	1,533	520
Arctic Energy Office	5,500	7,000
Arctic Methane Hydrates	1,160	4,900
Atmos Radiation Meas Prog	3,200	3,200
Geothermal Activities in Alaska	233	414
Nat Institute for Global Env Change	225	113
Neighborhood Environmental Watch	40	25
Wind Activities in the Arctic	0	1,500
Total	11,891	17,677

Amchitka Island Project

Amchitka Island is located about 1,340 miles southwest of Anchorage, near the western end of the Aleutian Islands. The U.S. Atomic Energy Commission, the predecessor to DOE, conducted three underground nuclear tests on the island in the late 1960s and early 1970s. The first test was part of a program to differentiate between an earthquake and a nuclear detonation. The following two tests were part of the weapons effects program.

In 2004 the Alaska Department of Environmental Conservation approved DOE's National Nuclear Security Administration's Nevada Site Office (NNSA/NSO) closure report for the surface remediation work completed in 2001. The report included a risk assessment for material existing on the surface from past spills. In addition, the Consortium for Risk Evaluation with Stakeholder Participation (CRESP) completed field work as part of an independent assessment to determine if radionuclides from DOE's underground nuclear testing on Amchitka have contaminated the surrounding marine environment. In addition, the study collected geophysical data that will be used to reduce uncertainty in the groundwater modeling completed previously by NNSA/NSO.

In 2005 the CRESP issued the *Amchitka Independent Science Assessment* report, which provided results of the field work carried out in 2004. Researchers sampled biota from seabirds, marine algae, invertebrates, and fish throughout the island. The results showed that radionuclide levels were within the range of biota found in other marine environments in the Northern Hemisphere. In fact, all levels of radionuclides measured "far below" any human health food safety standard.

Arctic Energy Office

With extreme climatic conditions, varying terrain, and areas that are both large and sparsely populated, Alaska provides an opportunity to explore the limits of new energy technologies.

The point of contact for the Amchitka Island, Alaska, Project is Peter Sanders, U.S. Department of Energy, Environmental Restoration Division, Nevada Operations Office, Las Vegas, NV; 702-295-103; sanders@nv.doe.gov.

The point of contact for the Arctic Energy Office is Brent Sheets, National Energy Technology Laboratory, P.O. Box 750172, 539 Duckering Building/ UAF Campus, Fairbanks, AK 99775-0172; 907-452-2559; brent.sheets@netl.doe.gov.

The point of contact for DOE's Methane Hydrate Program is Edith Allison, Exploration Program Manager, Department of Energy Office of Natural Gas and Petroleum Technology, 202-586-1023, Fax: 202-586-6221; edith.allison@hq.doe.gov

DOE's Arctic Energy Office is part of DOE's National Energy Technology Laboratory (NETL). It facilitates research related to fossil energy resources (oil, natural gas, and coal) and remote electrical power generation to address Alaska's unique energy needs.

DOE's Arctic Energy Office, located at the University of Alaska Fairbanks, was first advanced and funded by the Alaska Congressional delegation in FY 2001. A five-year cooperative agreement was signed between the Department of Energy and the University of Alaska Fairbanks to conduct Arctic-related research in two key areas: fossil energy and remote electrical power generation. In addition to coordinating activities with the University, the Arctic Energy Office collaborates with the energy industry and state agencies. The funding profile increased from $1 million in FY 2001 to $7.0 million in FY 2005

Alaska produces nearly 20% of the Nation's oil, has roughly half of the Nation's remaining oil reserves, and contains over half the Nation's coal. Still, there are many technological and economic challenges associated with the discovery and development of these resources because of the geographic, climatic, environmental, and cultural heritages unique to Alaska's Arctic regions. To address the challenges associated with the development of these energy resources, Congress requested that the Secretary of Energy establish an Arctic Energy Office.

Projects completed or underway during FY 2004–2005 include the following.

Tundra Travel Model for the North Slope of Alaska

The results of DOE-sponsored studies are enabling regulators and producers on Alaska's North Slope to determine when oil and gas equipment can be moved overland without risking damage to the tundra. On December 10, 2004, the Alaska Department of Natural Resources opened the east coastal area of the North Slope. This was the earliest opening since 1995 and was two weeks earlier than the previous year. The DOE project investigated the potential for a new standard for tundra travel that will allow exploration activity, including seismic and exploration drilling activity, to be permissible for an increased period of time.

Ice road. Travel across the open tundra with heavy equipment for oil exploration is restricted to winter, when seasonal ice roads can be created.

Water spray truck drawing water from a local North Slope lake. Trucks like this are used to create the ice roads.

Tundra Lakes Water Withdrawals

This project assesses the environmental impacts of pumping more than 15% of the free water from these lakes in order to support time-dependent construction of ice roads in the relatively brief exploration season on the North Slope. Outcomes to date include the following:

- It was found that past withdrawal rates have not resulted in measurable adverse impacts for the Kuparuk area.
- Data collected have enabled the development of lake recharge models to estimate the maximum quantity of water that might be available without adverse environmental impact.
- The Alaska Department of Fish and Game permitted Lake 9817, in the National Petroleum Reserve–Alaska (NPRA), for 30% withdrawal because of their interest/participation in this study (previously 15% withdrawal was the rule).
- The State of Alaska and the Bureau of Land Management are now considering the use of watershed and recharge estimates when issuing water withdrawal permits.

South Central Alaska Natural Gas Supply Study

This study on the future supply of Cook Inlet natural gas, released in 2004, identified key shortages for the local population in natural gas beginning in 2009 unless further exploration and development is conducted. This study was coordinated

with Enstar Natural Gas, Municipal Light and Power, Chugach Electric, the Alaska Gas Pipeline Authority, the Alaska Department of Natural Resources, and the U.S. Department of the Interior. The study played a key role in a recent workshop by the Federal Energy Regulatory Commission on permitting of the Alaska Natural Gas Pipeline project.

South Central/Cook Inlet Gas Spur Pipeline Analysis

The objective of this project, which began in FY 2005, is to compare routes for the installation of a natural gas pipeline between interior Alaska and south-central Alaska. The intent of the study is threefold:

- To identify all possible uses of gas, both traditional and non-traditional, to assist in the sizing of the line;
- To optimize the line routing by understanding permitting, right-of-way, and community and commercial uses; and
- To develop a study of the social impact on the affected communities, both positive and negative.

Injection of Carbon Dioxide for Recovery of Methane from Gas Hydrates

This project investigates the possible use of CO_2 to displace methane in hydrate structures. The process, if successful, will allow for the production of methane from hydrates while stabilizing the hydrate structure. In addition to producing methane from hydrates, it may prove to be a method for sequestering carbon.

Source Rock Potential, Fossil Fuel Resources, and Basin Analyses, Bristol Bay Basin

The current state of geological knowledge of Bristol Bay is insufficient to attract private exploration investment or to allow assessment of potential hydrocarbon resources. Lacking coherent basin analyses integration, the Bristol Bay basin remains enigmatic as a hydrocarbon basin. The first phase of investigating the geological resources of Bristol Bay was completed in the summer of 2004 and has led to renewed interest in oil and gas exploration in this region. The second phase will continue throughout 2005.

Novel Chemically Bonded Phosphate Ceramic Borehole Sealants for Arctic Environments

One of the basic material requirements in exploration and completions operations in permafrost regions is a suitable insulating cement that will keep the permafrost frozen and undisturbed during the production and transport of oil and gas. A novel ceramic borehole cement developed at Argonne National Lab (ANL) may fulfill this need. ANL, in partnership with the University of Alaska, will tailor this cement for permafrost regions and demonstrate its applications in Alaska.

Low Rank Coal Grinding and Boiler Performance

Low rank coal from the Usibelli Mine in Healy, Alaska, is pulverized and used to generate electrical power in Alaska and Asia. Preliminary results support the theory that the coal does not have to be ground as finely as is currently the case, thus lowering operating and maintenance costs.

Beluga Coal Power Study

This study is being developed to look at possible uses of Beluga Field coal, including gasification, power generation, and drying, to take advantage of the coal's location relative to export facilities and to the natural gas infrastructure of south-central Alaska. This project is currently in the scoping stage. It is anticipated that the report will be used by the State of Alaska as part of statewide energy planning.

Rural Alaska Coalbed Methane Local Energy Supply in Rural Alaska

The first phase of this project—the successful completion of a slimhole well—was completed in the fall of 2004 at Fort Yukon. This is the first time that a light-weight drill rig was used to drill through the coals, gravels, and permafrost necessary to produce natural gas from coalbed seams in a remote area. This information will be used to develop an economic model to establish if coalbed methane can replace diesel fuel for generating electricity, thus lowering the production costs and securing a local source of power for remote Alaskan villages. A key component of this study will be to understand the uses of the water that is produced; this source of power may be a source of water to the villages.

Alaska Coalbed Methane Water Disposal Methods: A Review of Available Coalbed Methane Information and Disposal and Treatment Options for Alaska

An important issue to resolve for coalbed methane production is water disposal or treatment methods. This project will collect and analyze

known information about coalbed methane formations, available water-quality data, community systems that could be used for water treatment systems and other water use, and general information for each community needed for evaluating coalbed methane water management issues.

Galena Electric Power: A Situational Analysis

The purpose of the study was to evaluate electrical costs and possible options for electric power for Galena. Options included enhancement of the current diesel generation system, opening a small nearby coal seam and installing a coal-fired power plant, and installing a modular small-scale nuclear reactor (a 10-MW model made by Toshiba). Of these three options, the installation of the nuclear reactor was the most economical. While the study was done with Galena as the basis, the results of the study can be applied at other rural locations with similar conclusions.

Diesel-fueled Solid Oxide Fuel Cell System for Remote Power Generation

Solid oxide fuel cells have been demonstrated to generate electrical power at high efficiency at the 5-kW range when operated on natural gas. However, natural gas is not readily available in remote locations where the value of electrical power is very high, so operating these fuel cells on liquid fuels, preferably diesel fuel, is critical to the use of fuel cells in remote locations. This program is designed to test a solid oxide fuel cell operated using hydrogen from reformed diesel.

Future DOE–University Collaborative Research

The Alaska North Slope contains over 20 billion barrels of heavy/viscous oil, the largest unexploited heavy oil resource in the United States. Industry has just begun to use new advanced technologies to tap a portion of this relatively shallow oil resource in the Schrader Bluff and West Sak formations on the North Slope. The potential production rates may approach 150,000 barrels per day by 2010. Conventional heavy oil recovery techniques are not practical because of the proximity of this shallow oil to the permafrost layer. To fully exploit the extra heavy oil resource, significant new advances in production technology are needed. Shallow gas resources are plentiful in Alaska and include coal bed natural gas in rural Alaska and methane hydrates on the North Slope. The methane hydrate resource on the North Slope is in close proximity to the heavy/viscous oil resources and can potentially be used to enhance the recovery of the heavy oil resources. With support from NETL's Arctic Energy Office, the University of Alaska Fairbanks is making these areas a major research focus and is working with industry to develop and test the essential technology.

Basin-Oriented Carbon Dioxide-EOR Assessment

In 2004, the DOE Office of Fossil Energy initiated a series of basin-oriented CO_2-Enhanced Oil Recovery (EOR) studies to examine the potential for economically recovering the oil remaining in mature fields in the U.S. using CO_2-EOR technologies. An initial scoping effort identified 490 reservoirs, with 113 billion barrels of "stranded" oil in place, that screen favorably for CO_2-EOR based on economics, technological issues, and the feasibility for benefit from CO_2 injection. Given these initial findings, detailed basin-oriented assessments were undertaken in six states or regions. Although the final reports have not yet been released, draft reports have been circulated in Alaska as part of the peer review process. Preliminary results show the North Slope and Cook Inlet regions of Alaska hold 45 billion barrels of stranded oil, of which an additional 12 billion could be recoverable using CO_2-EOR technology.

Oxygen Transport Ceramic Membrane–University of Alaska Fairbanks

The purpose of this project is to develop an innovative "electro-ceramic membrane" that separates oxygen from the air and uses it to convert natural gas to chemical "building blocks" that can be used to synthesize clean liquid fuels. Successful development of this membrane technology could lead to ways for converting remote natural gas reserves on the North Slope into clean-burning motor fuels. In turn, gas-to-liquid (GTL) processes could extend the lifetime of the Trans Alaska Pipeline System (TAPS). Preliminary analyses suggest that a 30–50% cost savings in the production of synthesis gas can be achieved.

Operational Challenges in Gas-to-Liquid Transportation–University of Alaska Fairbanks

This three-year comprehensive research program has examined the operational challenges of transporting GTL products through the existing TAPS. This study effort was designed to augment a project titled "Study of Transportation of GTL Products from Alaskan North Slope (ANS) to Market" and provide practical insights on the successful future commercialization of GTL technology in Alaska, including the feasibility of moving GTL

products through the TAPS and the impact of GTL movement on TAPS operation.

Arctic Methane Hydrates

The DOE Office of Oil and Natural Gas supports research and policy options to ensure clean, reliable, and affordable supplies of oil and natural gas for American consumers. The Alaska North Slope contains huge gas hydrate deposits, which have the potential to provide the U.S. with needed supplies of clean-burning natural gas starting in 2015. The U.S. Geological Survey estimates that roughly 45 Tcf (trillion cubic feet) of methane is stored in the form of hydrate beneath the North Slope permafrost. DOE is involved in projects aimed at evaluating the methane hydrate resource and potential production technologies on the North Slope of Alaska.

The Hot Ice well was drilled during the 2002–2003 and 2003–2004 winter drilling seasons, at a location approximately 40 miles southwest of Prudhoe Bay, Alaska. The well was drilled as part of a two-year, cost-shared partnership between DOE, Anadarko Petroleum Corp., Maurer Technology Inc., and Noble Engineering and Development. It was drilled to test an Upper West Sak potential hydrate accumulation, based on updip hydrate shows in nearby Cirque and Tarn wells. The Hot Ice well was drilled to a depth of 2300 feet. Although the Upper West Sak sands lie within the theoretical Hydrate Stability Zone, and they have very good reservoir quality, they did not contain any hydrate. Instead of hydrate, the project team encountered free gas and water in the target interval. The project successfully developed and demonstrated for the first time a number of innovative technologies, including Anadarko's Arctic Drilling Platform, a mobile hydrate core analysis laboratory, and a new application of a continuous coring rig. A 3D vertical seismic profile at the well indicated possible hydrate deposits updip and east of the well site. Analyses of the core, log, and seismic data from the well indicate that the hydrate in this region occurs in patchy deposits and may require a high methane flux from the subsurface in order to form more continuous drilling prospects.

In 2000, BP Exploration Alaska, Inc. proposed to provide a state-of-the-art 3-D seismic survey over its Milne Point production unit to provide a starting point for a full evaluation of the feasibility of commercial production from Arctic hydrates. Phase 1 resulted in the delineation and characterization of more than a dozen discrete gas hydrate accumulations within the Milne Point Area. Phase 2 provided detailed analyses and evaluation of the prospects identified in Phase 1 in order to develop a detailed and specific plan for potential Phase 3 field operations. Highlights of this work include:

- Geophysical modeling that has enabled the correlation of seismic attributes with critical hydrate reservoir parameters such as zone thickness and hydrate saturation; and
- Confirmation of up to 33 Tcf of resource in place in the Eileen trend, with up to 12 Tcf technically recoverable.

Phase 3, which began October 1, 2005, will include the drilling of one or more wells through the hydrate stability zone, with comprehensive petrophysical analyses of targeted zones. This drilling will test the geophysical prospecting technologies and enable the selection of target zones and field parameters for potential Phase 4 production testing.

Atmospheric Radiation Measurement Program

The ARM program, DOE's principal climate change research effort, seeks to resolve scientific uncertainties about global climate change, with a specific focus on improving the performance of general circulation models (GCMs) used for climate research and prediction. The ARM program focuses on one critical feature of the GCMs: the

A small fraction of the instrumentation at the Atqasuk, North Slope of Alaska ARM Climate Research Facility.

transport of solar and thermal radiation (sunlight and radiant heat) through the earth's atmosphere to and from the earth's surface. Within this area the greatest uncertainties are associated with clouds: their formation, quantitative description, behavior, and optical characteristics as influenced by atmospheric and underlying surface conditions.

The point of contact for the ARM program is Dr. Wanda R. Ferrell, Atmospheric Radiation Measurement Program Manager, Climate Change Research Division, SC-23.3, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC 20585; 301-903-004; wanda.ferrell@science.doe.gov; see www.arm.gov.

ARM created a number of long-term, highly instrumented climate research sites in carefully selected locations around the world. The site locations were selected to provide laboratories in different climate regimes for studying clouds and radiation with the intent of improving the models. Three Cloud and Radiation Testbed (CART) sites were developed, each with facilities at more than one location. The first site, in the U.S. Southern Great Plains in Oklahoma, began operations during 1992. The Tropical Western Pacific (TWP) site began phased operations in 1996 and has facilities in Manus, Nauru, and Darwin. The third site, the North Slope of Alaska and Adjacent Arctic Ocean (NSA/AAO) at Barrow, was dedicated in July 1997 and ramped up operations over the following year. Subsequently an outlying facility was established at Atqasuk, 100 km inland from Barrow.

In FY 2004, the fixed CART sites, together with the ARM Mobile Facility, were declared by DOE to be a National User Facility: the ARM Climate Research Facility (ACRF). With that declaration, the ACRF became available, through a proposal process, to researchers from around the world.

During this reporting period, several field experiments took place at the NSA/ACRF site. Here, we focus on the two most significant: the Mixed-Phase Arctic Cloud Experiment (M-PACE), and the Boundary Layer Cloud Experiment (BLCE).

Support crew for the University of North Dakota Citation research aircraft used in the Mixed-Phase Arctic Cloud Experiment.

Mixed-Phase Arctic Cloud Experiment

M-PACE took place during September and October 2004. As the name implies, it studied clouds that consisted of a mix of water droplets and ice crystals—the most difficult type of cloud to model and also a type of cloud capable of producing icing conditions dangerous to aircraft.

M-PACE was the largest field experiment conducted at the NSA/ACRF to date. It involved operations at six locations, two manned and one unmanned research aircraft, routine weather balloon launches at four locations, the installation and operation of a transportable ARM facility at Oliktok Point near Prudhoe Bay, and the operation of several "visitor" instruments that were deployed specifically for M-PACE. These various capabilities were tended by approximately 50 researchers from a dozen institutions.

Although the data sets acquired during M-PACE will be studied for years, certain results have already been noted:

- All sampled clouds contained liquid water (the lowest temperature sampled was –30°C). This finding may potentially be explained by the very low numbers of ice nuclei observed during the experiment. Indications are that models are highly sensitive to ice nuclei concentrations and nucleation mode. Models typically cannot maintain liquid without low ice nuclei amounts.
- Initial indications are that models perform reasonably well within the Arctic region, but far from perfectly. For instance, the European Center for Medium Range Weather Forecasting Cloud Model simulations include cloud amounts that tend to be too small, with too little liquid. However, the model simulation does capture the main features of Arctic cloud evolution.
- A large number of aircraft-measured vertical profiles taken over surface remote sensing sites documented mixed-phase cloud profiles, providing detailed microphysical characteristics, including liquid/ice fractions throughout the atmosphere. These measurements, coupled with the ground-based measurements, provide a high-quality data set. This data set will be valuable for studying the detailed processes determining the microphysical characteristics of mixed-phase clouds, for investigating parameterization of these characteristics, and for testing remote sensing algorithms.

Boundary Layer Cloud Experiment

BLCE, which took place during July and August 2005, focused on low-level liquid water clouds. The objective was to understand the coupling between the underlying surface and the properties of the low-lying clouds. BLCE was a smaller experiment than M-PACE, but was still quite intense. Weather balloons were launched from both Barrow and Atqasuk six times a day for four weeks running, and various additions to the standard NSA/ACRF instrument suite were deployed in support of BLCE. The latter included sensible

Additional instrument shelters and topside deck for "visiting" upward-looking instrumentation installed at the Barrow, North Slope of Alaska ARM Climate Research Facility during FY 2005.

and latent heat flux measuring instrumentation deployed not only at the ACRF locations at Barrow and Atqasuk, but also at Pt. Barrow, a few meters from the shore, as well. The Pt. Barrow instrumentation characterized the air mass advecting over the land from the ocean environment.

A secondary goal of the field experiment was to acquire extensive radiosonde (weather balloon) data sets for all times of day to drive radiative transfer simulation codes for comparison with observed radiative fluxes measured at the ground.

Besides field experiments, this reporting period was notable for significant additions and improvements to the NSA/ACRF facilities. Instrument shelter space was approximately doubled at Barrow, while high deck space for deploying upward-looking instrumentation was increased by about 50%. The additional space is welcome, as the NSA/ACRF had become increasingly space-limited. More users means more demands on space.

Geothermal Energy Activities in Alaska

The point of contact for the Geothermal Program is Ray Fortuna, Office of Energy Efficiency and Renewable Energy (EE-2C), U.S. Department of Energy, Washington, DC 20585; 202-586-1711; Raymond.Fortuna@hq.doe.gov.

In FY 2004, GeoPowering the West (DOE's geothermal outreach program) and the State of Alaska hosted a two-day meeting at Chena Hot Springs near Fairbanks. This meeting galvanized the Alaska GPW Working Group and focused state attention on Chena.

Also in FY 2004, DOE initiated a cost-shared geothermal resource exploration with the Chena Hot Springs Resort. The exploration consisted of performing geophysical surveys, creating geologic and surface temperature maps, drilling shallow temperature gradient holes, and conducting geochemical analyses of thermal water. After the analysis of field data is completed, a conceptual geological model of the Chena Hot Springs system will be created and a drill site will be selected.

In FY 2005, DOE initiated a cost-shared initial phase of field verification of a low-temperature energy conversion system with the Chena Hot Springs Resort. This consisted of securing the financing, permits, documentation, etc. necessary for the project to proceed into actual design and construction of the power plant in the second phase.

National Institute for Global Environmental Change

The point of contact for the NIGEC program is Dr. Jeff Amthor, NIGEC Program Manager, Climate Change Research Division, SC-23.3, U.S. Department of Energy, 1000 Independence Ave., SW, Washington, DC, 20585; 301-903-2507; jeff.amthor@science.doe.gov.

Through NIGEC, university scientists can apply for DOE research support to study the ecological effects of climatic change in Alaska (and all other states). In FY 2004, two projects were funded in Alaska. One study is examining the effects of climate on plant pests (pathogens and insect feeders). The results so far indicate that a warmer summer would reduce pathogen damage on alder trees but that warming would increase damage from insects. Changes in plant pests caused by any climatic changes such as warming have important implications for the production of ecosystem goods and services in Alaska. The study is continuing in FY 2005. The second study was completed in FY 2004. The results indicated that warming in the Arctic near the elevational treeline (the maximum elevation at which trees grow) has the potential to reduce tree growth near the treeline. An implication is that high-elevation forest health in Alaska could be diminished by further warming in the Arctic.

Neighborhood Environmental Watch Network: NEWNET

NEWNET is a network of environmental monitoring stations and data storage and data processing systems, with public access to the data through the Internet. This allows interested members of the public to have constant access to the stations so they can observe the results at any time.

NEWNET was started in 1993 with stations in Nevada, California, Utah, and New Mexico. It is based on concepts developed by DOE for the Community Monitoring Program at the Nevada Test Site Nuclear Testing Facility. These concepts

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The point of contact for the Department of Energy Wind Activities in Alaska is Dennis Lin, Office of Wind and Hydropower Technologies (EE-2B), Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Washington, DC 20585; 202-586-7285; Dennis.Lin@ee.doe.gov

date back to the Three Mile Island nuclear power reactor accident in the late 1970s. Five stations are located in Alaska: in Barrow, Fairbanks, Kotzebue, Nome, and Seward. A station manager from each community is trained in station maintenance and has access to researchers and support organizations that can provide technical assistance if needed. Station managers serve as liaisons to their communities and can help citizens understand the measurements.

Stations vary in configuration. Most NEWNET stations have sensors for monitoring wind speed and direction, ambient air temperature, barometric pressure, relative humidity, and ionizing gamma radiation. Some stations have tipping bucket rain gauges, and others have additional radiation sensors. Other types of sensors are being investigated for air quality measurements. The Alaska stations are being set up in collaboration with the Alaska Department of Environmental Conservation and the University of Alaska Fairbanks. More information on NEWNET, including readings from NEWNET stations, can be found on the web at http://newnet.lanl.gov/.

Wind Activities in the Arctic

A project initiated by the Alaska Wind Energy Authority was begun in FY 2005. The project will support the design and construction of wind energy power plants that demonstrate the feasibility and methods necessary for widespread adoption of wind energy systems in rural Alaska. The project objectives include:

- Lowering and/or stabilizing the cost of power generation in rural Alaska;
- Increasing the knowledge base of wind resource data and wind energy systems for Alaska;
- Producing a summary document for wind turbine foundation design in permafrost and situations without large equipment;
- Improving the understanding of wind-diesel integration issues related to available control system packages;
- Starting the NEPA Process for at least two probable wind sites (Dillingham, Naknek); and
- Supporting the construction of a viable wind project in rural Alaska.

Two of the more than a dozen wind turbines forming the wind farm at Kotzebue, Alaska.