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## Final Report

## Rural Energy Conference Project

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Prepared for:  
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Office of Fossil Energy



# **Rural Energy Conference Project**

## **Final Report**

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Ending Sept 30, 2008

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## **Abstract**

Alaska remains, even at the beginning of the 21<sup>st</sup> century, a place with many widely scattered, small, remote communities, well beyond the end of both the road system and the power grid. These communities have the highest energy costs of any place in the United States, despite the best efforts of the utilities that service them. This is due to the widespread dependence on diesel electric generators, which require small capital investments, but recent increases in crude oil prices have resulted in dramatic increases in the cost of power.

In the enabling legislation for the Arctic Energy Office in 2001, specific inclusion was made for the study of ways of reducing the cost of electrical power in these remote communities. As part of this mandate, the University of Alaska has, in conjunction with the US Department of Energy, the Denali Commission and the Alaska Energy Authority, organized a series of rural energy conferences, held approximately every 18 months. The goal of these meeting was to bring together rural utility operators, rural community leaders, government agency representatives, equipment suppliers, and researchers from universities and national laboratories to discuss the current state of the art in rural power generation, to discuss current projects, including successes as well as near successes.

Many of the conference presenters were from industry and not accustomed to writing technical papers, so the typical method of organizing a conference by requesting abstracts and publishing proceedings was not considered viable. Instead, the organizing committee solicited presentations from appropriate individuals, and requested that (if they were comfortable with computers) prepare Power point presentations that were collected and posted on the web. This has become a repository of many presentations, and may be the best single source of information about current projects in the state of Alaska.

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## ***Executive Summary***

Alaska remains, even at the beginning of the 21<sup>st</sup> century, a place with many widely scattered, small, remote communities, well beyond the end of both the road system and the power grid. These communities have the highest energy costs of any place in the United States, despite the best efforts of the utilities that service them. This is due to the widespread dependence on diesel electric generators, which require small capital investments, but recent increases in crude oil prices have resulted in dramatic increases in the cost of power.

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The conference has been growing over the years, beginning with about 180 registrants at the first conference in 2002, expanding to 502 registrants at the most recent conference in September 2008.

## ***Background***

Most of the United States is serviced by electrical power generated in large central power plants and distributed to residences and businesses through the electrical grid. This allows power from many sources to be mixed, creating a system where the most cost effective power can find the largest markets, and where the redundancy of supply sources create inherent robustness to the system. More than 50% of the electrical market in the US is met by coal fired power plants, as coal is abundant and cheap. Other major sources are from natural gas (less attractive due to recent increases in fuel costs), nuclear, and hydro. Only a small fraction of the grid power is currently generated with wind, and almost none is from the most expensive form of energy, liquid fuels [1], which are used for transportation, but not for stationary power.

However, in Alaska, much of the land is still undeveloped, without roads or power grids, and most of the electrical power is generated using diesel electric generators [2]. The advantages of this form of power generation in remote communities should not be underestimated: diesel generators are inexpensive, transportable, and readily available, and the liquid fuels they use are easy to transport and store, and can be readily dispatched when power is needed. However, diesel fuel is expensive (current prices are \$2.50 per gallon in Fairbanks, and up to \$8.00 gallon in rural communities at the time of writing), resulting in fuel costs of \$.17 to \$.56 per kW-hr of generated electricity. At these prices, alternative energy from local resources such as small scale hydro, wind, fuel cells and hydrogen, solar, geothermal, wave and tidal currents, and small scale hydrokinetic devices might prove to be cost effective.

The issue with these forms of alternative power generation is that many of them have not been demonstrated adequately for utility managers to really know the cost of power from these sources. Small scale hydro is the best understood, but the high capital costs and small markets limit the number of communities where this is a viable solution. Most of the other alternatives have not been demonstrated at sufficient levels for defensible economic analysis to be done (although some of the economics are understood all too well—for example, a solar battery array in a small community proved so uneconomical that no one seemed willing to stand up in public and admit the costs...). When projects are done, however, it is important for this information to be disseminated to as wide an audience as possible.

The purpose for organizing this conference was to create a venue for the people who work in remote rural power to come together and discuss the current state of power generation in rural Alaska and ways of doing better. The rules for presentations were simple: only active Alaskan projects were presented, and proposers were expected to be honest about costs, operational issues, and their overall satisfaction with the process. Failures were to be discussed as well as successes. Industry promoters were not generally permitted to give oral presentations (the exception being a single session in which diesel manufacturers were encouraged to briefly discuss new developments in their product lines, but all brands were discussed in the same session). And sessions were held on every technology of interest. The goal is to find solutions, not to promote any given company or technology.

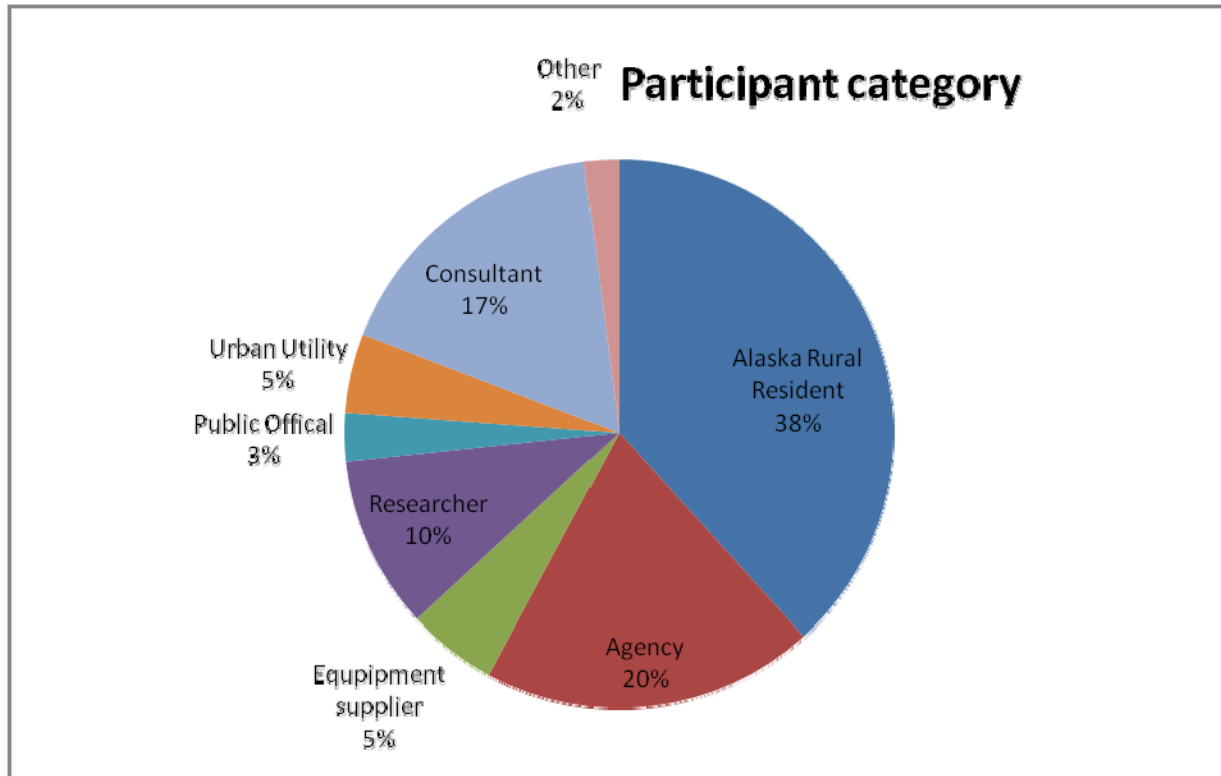
## **Results**

A total of five conferences were held at approximately 18 month intervals. At each of these conferences, presenters were encouraged to prepare PowerPoint files, which were collected and then made public on the UAF AETDL Web site. This site itself has become the best record of the conference. This site is at:

<http://www.alaska.edu/uaf/cem/ine/aetdl/conferences/>

There are thousands of pages of information on this web site, on many topics. Given the uncertain longevity of web information, we are providing copies of all the information in electronic form as the documentation for this final report.

The conference is intended to attract people from a wide variety of backgrounds, and the diversity of participants can be seen thorough a scan of the attendee list. A summary of the number of participants from each category for the 2008 conference is shown in Figure 1.



**Figure 1 Participation in the 2008 Rural Energy Conference by category.** Note the heavy participation by Alaska Rural Residents. The “Other” category includes participants from Conservation groups, oil companies, the press, and the Canadian consulate.

A complete list of attendees at each of the conferences can be found on the web site, or the attached CD.

## ***Acknowledgements***

In the absence of a formal structure responsible for the organization of the conference, this event occurs because of the willingness of individuals and their employers to participate. These individuals have included:

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Kathy Petersen, University of Alaska Fairbanks  
Julie Philibert, University of Alaska Fairbanks  
Dennis Witmer, University of Alaska Fairbanks

In addition to the generous funding from the US DOE, the following major supporters should be recognized:

The Alaska Energy Authority has been a major funder of this conference, especially through the use of their employees time and facilities.

The Denali Commission, for providing travel grants for residents of Alaskan Villages to attend the conference. The presence and participation of these rural residents is an important part of the tone of the conference, as their presence reminds all participants of the personal cost of high energy in these places.

Corporate sponsors have included many of Alaska's urban utility companies, equipment suppliers, and National Laboratories.

## **References**

1. USDOE. *Energy Information Agency Web Site* 2008 [cited; Available from: <http://www.eia.doe.gov/>.
2. Colt, S., *Rural Hydro Screening Analysis*. 1997.

## **Attachments**

CD containing the collected conference schedules, attendee lists, and presentations from the five conferences held in Alaska, 2002-2008.

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