AREWG
Arctic Renewable Energy Working Group

The group's mission is to benefit Arctic communities by identifying and addressing critical renewable energy and energy efficiency research needs.

The US Arctic Research Commission coordinates the Arctic Renewable Energy Working Group (AREWG) to promote research on renewable and efficient energy systems in remote Arctic communities. Integration of renewable resources and supporting technologies into a community's current power generation capacity has the potential to increase local employment and decrease air pollution, carbon footprint and, ideally, cost to consumers. Pushing the boundaries of energy efficiency and conservation are critical components of this effort. The AREWG is composed of Alaska-based energy experts familiar with the energy challenges facing remote villages. Many members have spent years working directly with rural communities. While the initial focus of this group is on remote Alaskan communities, the group intends to expand its scope to include circumpolar remote Arctic communities in the future.

Fossil fuels are by far the most common means of providing energy for heating, electricity, and transportation in remote Alaskan communities that are disconnected from a centralized power grid (Figure 1). In these communities, fuel cost burden is often voiced as the priority concern for rural residents. Indeed, a 2008 study showed that the estimated median share of income spent on rural home energy is 12% and 47% for mid- and low-range income families, respectively, compared to 3.6% and 8.7% for the same income groups in Anchorage, Alaska's largest city[1]. The challenges of transporting fossil fuels to these remote communities, the high cost of fuel storage, the adverse effects of fossil fuel combustion on the environment and human health, and the price volatility of oil have resulted in the need to develop and advance renewable energy options and energy-efficient technologies and behaviors.

The impacts of climate change (e.g., thawing permafrost, erosion, flooding, ecosystem changes, threats to subsistence practices and resources) are disparately felt in communities throughout the Arctic. The continued burning of fossil fuels, though minor at the village scale as compared to industrialized areas, will amplify these impacts, and provides additional incentive to reduce the dependence of remote Alaskan communities on oil as a primary power generation source (Figure 1b).

FOCUS AREAS

The working group will focus on the following topics with respect to remote Arctic communities:

- New options for home heating and electricity aimed at increasing efficiency/use of renewable energy and reducing heating oil consumption
- Storage of energy produced by renewables, with particular focus on improved battery technology
- Indirect community benefits of renewable and efficient energy use that do not get figured into typical renewable energy cost/benefit analyses
- Increasing potential for industry investment in remote renewable energy projects (decreasing uncertainty by identifying and mitigating risk)

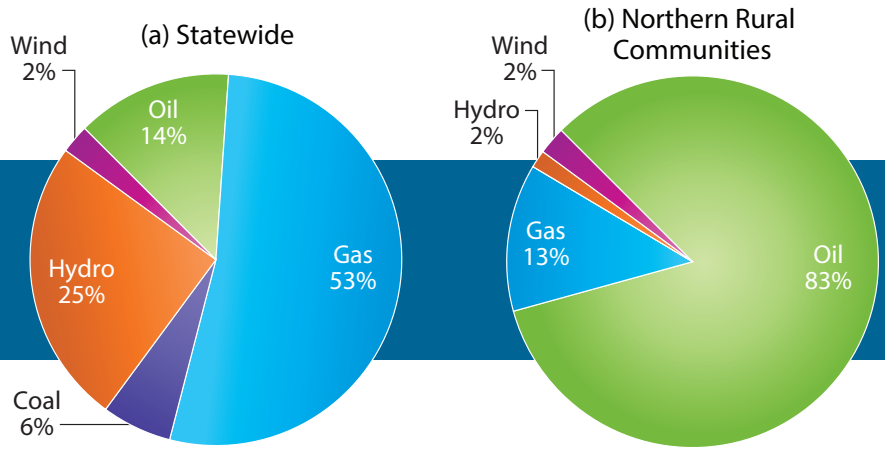

FIGURE 1. Alaska power generation by source for 2013. Note that the Northern Rural Communities pie chart excludes the Southeast, Kodiak, Copper River/Chugach, and Railbelt AEA Energy Regions. *Data provided by Alaska Energy Authority (AEA)*

[1] Saylor, B., S. Haley, and N. Szymoniak. 2008. *Estimated Household Costs For Home Energy Use*, ISER, May 2008, 10 pp., http://www.iser.uaa.alaska.edu/Publications/webnote/LLFuelcostupdatefinal.pdf.

Did you know?

In rural Alaskan communities, almost 90% of total residential energy use is for home heating.[3]

Energy efficiency and well-maintained diesel power generation are essential to stable heat and electric energy use on isolated grids in remote communities. However, dependence on fossil fuels can be minimized through both efficiency and conservation practices and integration of renewable resources (e.g., biomass, geothermal, hydro, solar, wave/tidal, wind) with well-maintained diesel systems.

Currently, the remoteness and limited accessibility of these isolated communities pose a significant financial challenge to the goal of integrating renewable energy sources into their energy source portfolio. However, when viewed over the long term, considering the potential for advances in and reduced costs of technology, renewable resources may play a "key role in providing a local, clean, and inexhaustible energy"[2] source. Microgrid advances and fuel switching technologies (between fossil fuels and renewable sources), such as enhanced battery storage capacity, are considered important steps toward expanding the use of renewable energy sources in rural Alaska.

Initial working group efforts will be concentrated on the heating needs of isolated Alaskan villages. To move forward with this effort, a heat-focused workshop was held in January 2016. Based on workshop discussions, a heat-related research plan will be developed for rural Alaska that focuses on reducing heating oil consumption, increasing energy efficiency, and integrating renewable energy. For more information on this working group and the heat-related research plan, see the working group web page at https://www.arctic.gov/arewg/index.html.

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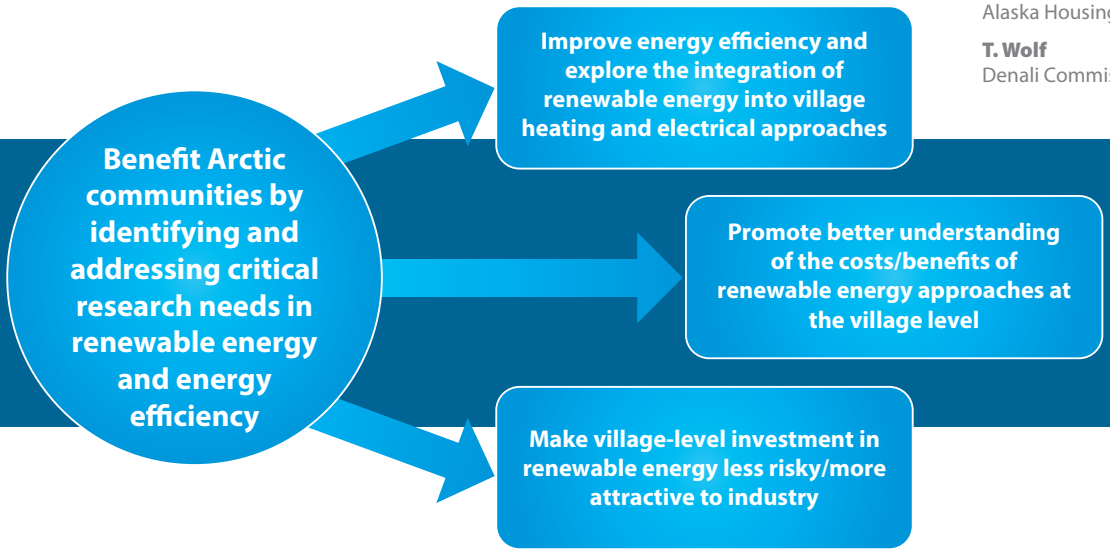

FIGURE 2. The AREWG has identified three specific objectives as areas of focus.

[2] Alaska Energy Authority & Renewable Energy Alaska Project. 2016. *Renewable Energy Atlas of Alaska: A Guide to Alaska's Clean Local and Inexhaustible Energy Resources*,19 pp, http://alaskarenewableenergy.org/wp-content/uploads/2016/07/RenewableEnergy-Atlas-of-Alaska-2016April.pdf.

[3] WHPacific with Brian Saylor and Associates, CTG Energetics and Craciun Research Group. 2012. *Alaska Energy Authority End Use Study*, 151 pp. http://www.akenergyauthority.org/Content/Efficiency/EndUse/Documents/AlaskaEndUseStudy2012.pdf.