

Theme Project Group 3: Energy Issues

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This small but productive breakout group dealt with issues of energy security – not in the ways more commonly assumed, with regards to oil and gas exploration and offshore drilling, but as relates to energy security for northern communities. The topics presented here make significant contributions to the development of self-sufficiency and greater food and energy independence for northerners.

The group heard presentations from Nick Goodman, the head of TDX Power, and Meera Kohler, the head of the Alaska Village Electric Corporation (AVEC), both of which develop and provide power to rural communities in Alaska. While Alaska is rich in a variety of renewable energy sources, including geothermal and wind, the majority of rural communities are reliant on diesel generators to provide them with heat and electricity. The advantage of diesel is that it is easily transportable, storable and is a very reliable energy source. The obvious disadvantage is cost; as oil prices have climbed in the past few years, so have energy bills, up a crippling 350% since 2002. Other major disadvantages include the inherent reliance on outside providers of fuel, ie. it is not something that can be produced locally or nearby, and the high carbon footprint it leaves.

Driven primarily by factors relating to cost, TDX and AVEC have begun looking for reliable, alternative sources of energy. The most promising avenue seems to be wind power. A large number of rural Alaskan communities are located close to or along the shoreline in areas which receive a significant enough amount of wind that it can be harnessed and used as a source of power. Mr. Goodman described the case study of St. Paul Island in the Bering Sea, which commissioned a wind power project in 1999 at the cost of about \$1 million. The capital costs have been paid off, the project produces all of the island's necessary energy without supplement, and the kwh price is very inexpensive.

While wind power, particularly in Alaska, is very attractive, it is a technology still in its infancy and faces many obstacles. First of all, wind, like many other renewable energy sources, is intermittent. You cannot always count on the weather to be windy or

sunny. It is also very difficult to store. Besides the regular consumer desire for reliable power, the very severe conditions faced by Alaskans in the winter dictate that communities cannot be without power for even a relatively short period of time. Thus energy systems for the time being will need to be integrated – relying on a combination of energy sources, most commonly a combination of diesel and wind.

Similarly, because many of Alaska's rural communities are off the 'grid', renewable energy sharing and storing is impossible and utility size energy projects are unfeasible for the average community size. AVEC's community size ranges from 100-1100 people, with an average energy need of 1-2 megawatts. However most commercial and utility-grade wind turbine projects produce on the order of 30 megawatts, with even the smallest producing 5-10 megawatts. The situation is the same with nuclear reactors.

Besides problems of economies of scale, there are significant construction costs to establishing wind regimes in rural Alaskan villages. Softening permafrost means it's much more difficult to anchor foundations than in other locales. And getting heavy equipment to and from some of these communities is a huge and expensive undertaking; as such efforts are being done to dovetail community projects, such as the building of local schools, with the development of wind projects. Geothermal projects face similar constraints, with the drilling for geothermal sources a significant capital cost that cannot always be sustained by such small communities. And of course the soil quality, extreme temperatures and potential for icing in Alaska and the north complicate matters further.

The group also heard from Young Researcher Markus Mager, who discussed the Chena Hot Spring Resorts greenhouse project. As relates to energy issues, Mr. Mager outlined how excess or waste energy (for example from large windpower regimes) can be used to power greenhouses year-round (solar power being ineffective in the dark winters). In terms of the larger theme of self-sufficiency for northern communities, the research demonstrated how a northern greenhouse can be economical and cost-effective.

This type of project has significant potential to provide northern communities with sources of fresh, affordable fruits and vegetables year round. Diet has emerged as a huge problem in the north as communities have turned away from traditional or country foods, as a result of changes in wildlife patterns, climate change, concerns for POPs, and lifestyle changes. Country foods have to a large extent been replaced by processed

‘white man’s’ food, popular due to its convenience, availability and lower price due to its long shelf life. Most fruits and vegetables available in northern communities tend to be expensive and past their peak in terms of freshness and quality. The result has been an increase in obesity and diabetes. Greenhouse projects may be a feasible option to provide northerners with greater food security and healthier, year-round options.

In terms of a work plan leading up to the next NRF in Oslo in two years time, the group intends to focus on self-sufficient, integrated energy systems in rural Arctic communities. Several points were emphasized:

- Energy sources must be constant, not intermittent, and thus integrated;
- training and education will be needed to allow northerners to service and maintain these new types of systems (although it was mentioned that wind turbines have many fewer moving parts than diesel generators);
- better energy storage and reliability options are needed;
- the group would benefit from representation and input from consumers, suppliers, innovators and researchers;
- it would be good to form a circumpolar network of small energy providers and researchers, in particular to provide some economy of scale in the development, testing and purchasing of new technologies;
- finally, it was noted that some islands off the coast of Scotland and Great Britain could make useful case studies of the successful development of self-sufficient integrated systems, and that the session in Norway might focus on these examples.

On a more practical note, the group expressed an interest in obtaining better representation from all eight circumpolar nations for the next NRF, as well the desire to develop a listserv using the Arctic Portal as a networking platform.