Small Scale Modular Nuclear Power: An Option for Alaska?

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The rising cost of energy, especially in rural Alaska, is threatening the sustainability of rural communities and creates a hindrance to economic development. Solutions for reducing the cost of energy include renewable as well as nuclear power. A new generation of small modular reactors (SMRs) are being developed by national laboratories and private industry. SMRs may offer appropriately sized nuclear energy for small isolated electric grids and other energy demands such as mineral mining activities. Potential advantages include standardized design, manufacturing, and permitting; high quality control, shorter construction times; and reduced financing charges during construction. At the request of the Alaska Legislature, the Alaska Center for Energy and Power in collaboration with the Institute of Social and Economic Research investigated the current state of SMR technology and conducted a screening economic analysis of where in Alaska the technology could potentially reduce energy costs. We found that SMRs are in a "pre-commercial" phase and no small scale nuclear reactor technology for commercial power plants are currently approved or licensed for use in the US. No SMR systems are expected to be in service before 2020. All of the current SMR designs announced for development in the US are sized at 10 MW or larger, a size too large for most rural communities. Since SMR technology has not reached commercialization, our economic analysis is subject to significant cost uncertainties. In Fairbanks SMR technology becomes viable at mean crude prices above $90/bbl, in Bethel above $190/bbl, and in Anchorage at natural gas prices above $10/mcf. For all other locations analyzed, current SMR technologies require crude oil prices exceeding $300/bbl.