Solutions to Alaska's Energy Crisis

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Energy costs throughout the United States and Alaska continue to rise at an alarming rate; the rate of this increase and its direct and disparate impact upon residents of rural Alaska has created a crisis. If this situation is not addressed immediately, the way of life that we as Alaskans identify as unique and special may be lost. The energy crisis impacts rural Alaska on both the individual and community level: when communities spend more on fuel, they spend less on key services. Additionally, residents of rural Alaska have to choose between heating their homes, putting fuel in their vehicles, or feeding their families. This kind of deliberation is forcing many rural residents to abandon traditional lifestyles and move to urban centers where fuel, energy, and food are all significantly less expensive, and where key services may be more accessible. The first step in addressing the energy crisis would be to develop a comprehensive statewide energy plan as well as appointing a position in the administration to carry out this plan.

While residents in and around Anchorage enjoy cheap electricity at 13 cents/kWh[1], electricity in rural Alaska can cost as much as 80 cents/kWh[2], more than *six times* as much. The Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage issued a report which estimates that rural households face utility costs that are 50% higher than in 2000.[3] (ISER defined "utilities" as heat, electricity, water and sewer.) Specifically for a gallon of diesel, prices have gone up *83%* in rural communities from 2000-2006. The report adds that low-income households can end up spending 35% of their income on utility costs, while the "typical household" in urban areas may only have to spend 3%. Though rural households use roughly half as much energy as urban households, electricity bills in rural Alaska are almost twice as much.[4]

These alarmingly high prices have created what some have termed "energy refugees," people from rural communities who are driven to regional hubs and urban areas, where energy and other costs of living are more affordable (high energy prices directly affect transportation costs and indirectly affect countless other costs). This rural flight has even caused some schools to shut down.[5] Schools must have at least 10 students to stay open, but with so many families leaving rural Alaska, schools can lose the number of students required for them to stay open. Not only are schools shutting down, some municipal offices have had to close because of the high cost of energy[6].

According to the Alaska Energy Authority's (AEA) Alaska Rural Energy Plan, the high costs of electricity in remote areas can be attributed to the high cost of diesel fuel, from which many of Alaska's rural areas produce their electricity.[7] (Communities on the Railbelt electricity grid produce much of their energy from natural gas.) Diesel has a number of significant issues, such as high transportation costs, which are only becoming more apparent as prices skyrocket. Additionally, rural communities often have to buy large quantities of diesel in the summer to last through the winter so that the fuel can be barged in. However, fuel often runs out and the community will have to fly fuel in, driving costs even higher. Naturally, needing large quantities of fuel means that rural communities need large storage capacities, which drives up construction costs. Furthermore, increasingly stringent environmental regulations mean that many communities need new storage facilities, further driving up fuel costs. Also, there is a relative lack of competition in fuel supply alternatives for small remote markets.

The biggest disadvantage that diesel has when compared with alternative and renewable energy sources is that not only is the price of diesel skyrocketing, communities and consumers must continuously buy diesel to run their generators. On the other hand, wind, ocean, hydro, solar, and geothermal energy are free. There are high upfront costs with new technologies, but the energy source itself is free, unlike diesel and other fossil fuels. Furthermore, many current diesel systems and storage facilities are nearing the end of their lifecycles and must be replaced, further driving up costs of diesel energy.

Even though energy prices in urban Alaska are significantly lower than in rural Alaska, urban Alaska has also faced striking increases in energy costs within the last decade. Anchorage households saw a *91%* increase in prices for 100 cubic feet of natural gas from 2000-2006[8] and it was projected to rise another 30% this year.[9] Prices are rising because of growing demand and also disappearing reserves—80% of the known Cook Inlet reserves have been depleted.[10] Experts say that under current conditions, Cook Inlet gas will not be able to support domestic needs by 2009, in just two years.[11] A natural gas pipeline with a spur to Southcentral Alaska may be done by 2013, but that still leaves a gap of four years.[12] In the past five years, the Anchorage School District has had to increase their budget by almost *$2 million* for electricity.[13] The Fairbanks North Star school district's actual costs for electricity went up more than *$1 million* in just five years, most of which happened in just two school years.[14] Over that time span, that money could've paid for several teachers, about 30 in Anchorage and 15 in Fairbanks.[15]

So what can we do to deal with this very real energy crisis? There are some funding sources that households and communities can turn to. The Power Cost Equalization program (PCE) was established in the 70's in response to high electricity costs, as a stop-gap measure. PCE is a subsidy for those communities with higher electricity costs. The program helps to financially ensure that basic infrastructure and systems are available for rural communities. Other funding programs include the Small Municipal Energy Assistance Program and Municipal Energy Assistance Program (SMEAP and MEAP), Bulk Fuel Revolving Loan Fund (BFRLF), and the Fuel Bridge Loan Program (for those communities which are ineligible for BFRLF). Several organizations have pointed out the need for an increase in bulk fuel loans limits and increases in the loan fund itself. There is also the federal Low Income Home Energy Assistance Program (LIHEAP). Some state organizations have called for a state supplement to LIHEAP.

Besides funding, many organizations, including the State Legislature[a], have called for: instituting an energy subsidy and a sales tax waiver on energy sources, a natural gas pipeline from the North Slope, coal energy and gasification development. Additionally, some organizations have suggested: keeping Alaska's natural resources (oil and gas) in Alaska to benefit residents (instead of exporting those energy resources), oil and gas exploration, opening ANWR for exploration, hybrid vehicles, biofuels, small residential tank and pipe upgrades as well as bulk fuel upgrades, switchgear and heat recovery systems for diesel generators, improvements to rural fuel transportation and delivery, and a statewide energy grid.

Long-Term Solutions

Alaska has incredible energy resources that are largely untapped and undeveloped. In order to most effectively develop and use these resources, we need a comprehensive statewide energy plan and a cabinet-level officer and/or a State Department of Energy charged with carrying out that plan.[16] Although there are a number of communities around Alaska that have already started to develop

[a] See appendix A for table of energy bills currently in Alaska's 25th Legislature

energy sources such as wind power, the process could be more efficient if there were larger-scale strategies and plans in place. The following is a description of promising alternative and renewable energy resources that could very well lift Alaska out of its energy crisis, especially if there were a statewide energy plan to develop these resources.

Wind

Alaska has world-class wind energy resources, especially along the coastal and Western regions of the state. According to the Alaska Rural Energy Report, Alaska has 31 rural communities that pose attractive opportunities for wind energy projects and 17 more communities that pose potentially attractive opportunities.[b] ("Attractive" opportunities pose benefit/cost ratios of 1.0-1.7 and "potentially attractive" opportunities present ratios of .85-1.0 and merit additional study.)

Though the potential for wind power is quite promising, wind energy presents some problems. Most notable is high development and capital costs, which can be exacerbated when communities develop resources on their own, rather than as a part of larger scale efforts. Because the technology is new, wind technology can also suffer from a lack of skilled maintenance workers. Other problems regard logistics, such as securing an optimal location (wetlands and other environments can be challenging to build on), or land ownership and licensing issues. Of course, there are concerns about injury to death to birds, but newer technologies are mitigating those risks. Additionally, there are incentives, like tax credits, that the government can give to producers and developers of wind resources, which hasn't yet been done.

Despite the barriers, there have been several wind projects in the state, including the award-winning wind farm in Kotzebue. The Kotzebue Electric Association (KEA) installed Alaska's first wind-diesel hybrid system in several phases, for a total of 17 turbines with a capacity of 1155 kW. Every year, the wind farm saves up to 100,000 gallons of diesel and provides enough energy to power approximately 250 homes.[17] KEA plans to further expand the wind farm, up to 2-4 MW.

Cook Inlet Region Inc. (CIRI) and enXco Development Corporation have proposed a 50 MW wind farm on Fire Island (just west of Anchorage) which could supply enough power for 16-18,000 average Anchorage homes.[18] Although some are concerned about the potential wind farm's effect of airport radar, a recent Department of Defense report concluded that there was no significant effect (on military radar).[19] The FAA has said that the Fire Island wind project is by no means prohibited, just that some potential issues need to be worked out.[20] Furthermore, the busy Kastrup Airport near Copenhagen, Denmark is near a number of onshore and offshore wind turbines, and they have not affected aviation.[21] CIRI hopes to have the wind farm up and running by 2009.[22]

Hydroelectric

Alaska has the largest available hydropower potential in the country, with just under 45,000 MW.[23] Hydroelectric power already supplies almost 25% of the state's electricity: currently, 27 projects range in size from the 105 kW project in Akutan to the 126 MW Bradley Lake project which supplies 8% of the Railbelt's energy.[24] However, like any other energy source, hydropower has its issues, including land-ownership and licensing issues. There are also concerns about environmental impacts such as changes in aquatic and stream habitats, alteration of landscapes, effects on water quality and quantity, interruption of fish migratory patterns, and injury or death to fish. Promisingly, 8,000 MW of Alaska's hydropower potential is comprised of "low power" resources (less than 1 MW), which use technologies that don't require dams, thus avoiding many of the environmental impacts.[25] Additionally, "high power"

[b] See Appendix B for a list of wind opportunities and projects in Alaska

resources (greater than or equal to 1 MW) can be used below capacity in order to use conventional turbine technology in configurations that have lower environmental impacts.

The 126 MW Bradley Lake project in Southcentral Alaska has been in commercial operation since 1991 and supplies power to the Railbelt grid.[26] The project provides enough power for up to 36,000 homes a year.[27]

Geothermal

Alaska has four geothermal regions: the Interior Hot Springs, the Southeast Hot Springs, the Wrangell Mountains, and The Ring of Fire, which includes the Aleutian chain, the Alaska Peninsula and Baranof Island.[28] These geothermal resources can be used directly for heat or indirectly for electricity production. However, like many of Alaska's resources, geothermal energy suffers from a lack of proximity to points of use and high capital costs. Problems unique to geothermal energy include location near volcanoes, risk of aquifer disruption, risk of soil contamination if water is not re-injected into the soil, and corrosion of metal pipes containing geothermal steams and gases.[29]

Despite the barriers, Alaska boasts an internationally-recognized geothermal plant: the Chena Hot Springs generators came online in July 2006. The cost of power has been reduced from 30 cents/kWh to 5 cents/kWh and is expected to be even cheaper once project loans have been repaid.[30] This year, the Chena power plant is expected to displace 224,000 gallons of diesel for an estimated savings of $550,000.[31] Studies have estimated that Chena Hot Springs could generate even more power than the current 400 kW, up to 5 MW.[32]

The Naknek Electric Association (NEA) is in planning stages for construction of another geothermal project, a 25 MW plant which could power as many as 30 communities in the Bristol Bay region.[33]

Biomass

Wood: Alaska has seen renewed interest in using sawdust and wood waste as fuel for lumber drying, space heating, and small-scale power production. There is also a renewed interest in converting low-value wood and wood wastes into liquid fuels such as ethanol. In 2000, Dot Lake came online with a wood-fired boiler that provides heat to the washeteria and several homes.[34] The boiler displaces about 1/3 of fuel oil consumption.[35]

Fish Oil: Alaskan fish processors produce approximately 8 million gallons of fish oil, which can be blended with diesel in generators and boilers. In 2001, UniSea Inc. conducted successful tests using fish oil/diesel blends in a 2.3 MW generator.[36] The company uses all of their fish oil in a 50/50 blend in their diesel generator and also uses up to 99% fish oil in their boilers.[37] Emissions testing of the generator showed reductions of up to: 60% in particulates, 33% in carbon monoxide and 78% in sulfur dioxide.[38] There was, however, an 8% increase in nitrogen oxide. During testing, the generators ran normally with no apparent adverse operational or maintenance effects.

Municipal Waste: Alaskans generate about 650,000 tons of garbage a year. Since 1997, Eilson Air Force Base has added 600-3000 tons of "refuse-derived fuel" per year to the coal in their coal-fired power plant.[39] The project has provided up to 1.5% of the base's heat and power needs. Over the next ten years, the Anchorage landfill is expected to produce methane gas with an energy equivalent of about 1.9 million gallons of diesel. The methane can be used to heat nearby facilities or be converted into 2.5 MW of power, enough for about 2,500 homes.[40]

Solar

Alaska has a lot of sun in the summer, but limited solar exposure during the winter, when we have the highest energy demand. Because of high capital costs and low yearly solar output, large-scale projects

are unlikely in Alaska. However, for remote places with relatively small power needs, solar energy can be an excellent choice. Solar will become a more attractive option as the price of solar panels continue to drop and costs of diesel energy continue to rise.[41]

In 2001, Lime Village came online with a 106-panel hybrid solar-diesel-battery system that can generate up to 12 kW. Each solar panel is expected to displace 10 gallons of diesel a year and should last at least 20 years. The project is expected to reduce diesel use by 30% and reduced diesel costs by more than $2,000 just in its first month.[42]

Ocean

Alaska has 34,000 miles of coastline, making it one of the best ocean energy resources in the world. The total wave power on southern Alaska's coast alone is estimated to be almost 300 times the amount of electricity that Alaskans use every year![43] However, like other renewable energy sources around the state, the problem with wave energy is the lack of proximity of the resource to the area of demand. The Ocean Renewable Power Company (ORPC) is planning to test a tidal generator in the Knik Arm next year.[44] If that works, ORPC will test a full-scale prototype. If that works out, a four-generator module could be installed in Cook Inlet beginning in 2012. Studies show that the Cross Sound in the Southeast shows an annual average energy potential of 1750 MW, enough to meet the region's energy needs and even export energy to Canada.[45]

Short-Term Solutions

Although moving toward alternative and renewable energy sources seems to be the best long-term goal, Alaskans need short-term solutions as well. Rural energy efficiency could be increased by approximately 25% which could result in 33% savings on household electric bills and 10% savings on heating fuel.[46] The Alaska Housing Finance Corporation (AHFC) houses the Research and Rural Development Department (R2D2). R2D2 has energy efficiency programs for schools and other community buildings as well as a weatherization program for low income households. The AHFC also provides interest rate reductions on home loans for people who buy new homes with energy star rates of 5 or higher as well as rate reductions for energy improvements to older, existing home purchases. To apply for programs, please contact your area's program provider.

Additionally, the Denali Commission and Alaska Energy Authority (AEA) have requested Letters of Interest for developing alternative/renewable energy and energy efficiency projects in Alaska. The Commission and AEA want to create an inventory of these types of projects that are in or are moving toward development, so that they can design programs to provide technical and/or financial assistance to potential project developers. The letters are due by 5:00 pm on Friday, August 31.

Communities can also save money with upgrades. In the 90s, improvements in fuel efficiency saved rural Alaskan utilities roughly 5.5 million gallons of fuel a year.[47] Over the next 10 years, fuel efficiency may be able to improve an additional 7.6%. The AEA has a bulk fuel upgrade program which provides funding for code-compliant bulk fuel tank farms in rural communities.

In addition to state programs, homeowners can do a number of things on their own, such as install solar panels and small wind generators. Home solar and wind generators could even make money for homeowners if and when Alaska decides to require net metering, where utilities buy excess power generated from solar panels or wind turbines. (The Golden Valley Electric Association already does this.) Other efficiency measures include replacing inefficient lighting, appliances, fixtures, and heaters. Particularly, authorities recommend replacing incandescent light bulbs with compact fluorescent light bulbs (CFL's), and replacing old refrigerators, freezers, and televisions with Energy Star versions. The potential savings on your electric bill can be tremendous. Here are some potential annual savings

when you switch to more efficient appliances: CFL's, $32 per bulb; Energy Star refrigerators, $100; Energy Star freezers, $30, Energy Star TV's: $37, pot burner/cook stoves: $700, central boilers: $200, hot water heaters: $800![48]

Energy efficiency upgrades can make a big difference in schools, too. Rural Alaskan schools could save up to 50% on electricity and 50% on heating fuel as a result of replacing lighting, appliances, fixtures, and HVAC equipment.[49] Urban schools could also benefit from energy efficiency upgrades, as we saw that the Anchorage and Fairbanks school districts had to increase their budgets by millions for electricity alone.

Where Do We Go From Here?

We can see that the energy crisis is not something that affects only rural Alaska or urban Alaska, but is a problem for the whole state. As such, we need to attack the problem as a state. There are a number of Alaskan organizations that are calling for a comprehensive statewide energy plan and a cabinet-level officer and/or a State Department of Energy charged with carrying out that plan. In the meantime, there are things that we can do, such as institute the short-term solutions (outlined above) in homes, schools and businesses and support development of alternative and renewable energy sources. But these short-term measures can only go so far. You as citizens, politicians, and policy-makers need to push for a cabinet-level officer and/or State Department of Energy charged with effectively and efficiently bringing Alaskans up out of this energy crisis.

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Appendices

Appendix A: Bills Currently in Alaska's 25th Legislature (2007-08)

Bill Subject	Bill ID	Prime Sponsors	Status*	Meets EPSR?**	Revenue Source	Description
Alternative Energy Fund	HB 63	Thomas, Gardner	(H) CRA 1/16/07	yes	Alaska Energy Authority funds appropriated by legislature	Grants for alternative energy projects, with a priority for projects in areas where fossil fuel costs are higher
Renewable Energy Fund	HB 152	Harris	(S) FIN 5/2/07	yes	Alaska Energy Authority funds appropriated by legislature, gifts, bequests, and contributions from other sources, federal money, interest earned on fund balance, investments managed by Dept. of Revenue	Grants for feasibility studies, reconnaissance studies, energy resource monitoring and construction of new wind, solar, geothermal, wave, tidal, low-emission biomass, river in-stream and hydropower projects or natural gas projects or transmission or distribution infrastructure. Natural gas projects must benefit communities of 10,000 or less and not have viable renewable energy resources
Renewable Energy Fund	SB 96	Ellis	(S) RES 2/26/07	yes	Alaska Energy Authority funds	Largely similar to HB 152, plus must generate more than 50 kW and distribute to more than twenty (20) end users
Fire Island Wind Farm	HB 73	Crawford, Gruenberg	(H) FIN 1/16/07	yes	Railbelt energy fund	A grant of $24,000,000 for construction of a wind farm on Fire Island and for transmission lines to connect it to existing infrastructure in Anchorage.
Fire Island Wind Farm	SB 44	McGuire	(S) RES 1/16/07	yes	Railbelt energy fund	Same as above (HB 73).
Hydrogen Energy	HB 56	Crawford, Doll	(H) FIN 5/10/07	yes	Executive director of AEA to seek federal and private sources of	Creation of a hydrogen energy partnership within the AEA to facilitate the development of a

					funding.	hydrogen fuel and hydrogen-source products industry based on non-carbon-emitting energy sources.
Coal Gasification	HB 229	Chenault	AWAIT TRANS-MIT GOV 5/12/07	yes	The Alaska Railroad Corporation may finance all or part of the project through the issuance of up to $2,900,000,000 in bonds.	Authorizes the Alaska Railroad Corporation to do a Kenai Gasification Project. Low sulfur coal from Healy will be taken to Kenai, where a low-emission coal gasification plant and electrical generation plant will be built. Will provide Agrium with feedstock, electricity for the regional power grid, and carbon dioxide for oil recovery in Cook Inlet.
Energy Efficiency (Light Bulbs)	HB 219	Kawasaki	(H) L&C 3/26/07	yes	None.	Home and office light bulbs must have an energy efficiency rating of 40 lumens per watt or better.
Energy Subsidy	HB 221	Nelson	(H) CRA 3/26/07	yes	General fund.	A high energy cost offset fund.

***Status Abbreviations**
(H): Action taken in the House
(S): Action taken in the Senate
CRA: Community and Regional Affairs Committee
FIN: Finance Committee
RES: Resources Committee
AWAIT TRANSMIT GOV: Awaiting transmittal to the Governor
L&C: Labor and Commerce Committee

****Meets EPSR**: Does the bill meet the recommendations of the State of Alaska Energy Policy and Strategy Recommendations, Final Report provided to Governor Sarah Palin?

Appendix B: Wind Opportunities and Projects in Alaska

Highly Attractive Opportunities:*
St. Paul
Andreanof
Pedro Bay
Platinum
Deering
Chefornak
Gambell
False Pass
Akutan
Nightmute
Kipnuk
Kwigillingok
Kongiganak
Hooper Bay
Perryville
Savoonga
Wales
Nunapitchuk
Chevak
Toksook Bay
Kokhanok
Akiachak
Point Lay
Kwethluk
Mekoryuk
St. George
Brevig
Unalaska
Tununak
Egegik
Atmautlak

Potentially Attractive Opportunities:*
Kasaan
Sand Point
Anaktuvuk
Pilot Point
Craig
Point Heiden
Quinhagak
Bethel
Newtok
Nelson Lagoon
Goodnews Bay
Tenakee Springs
Shishmaref
St. Mary's
Kotzebue
Old Harbor
Kake

Current wind projects:
Kotzebue
St. Paul
Port Heiden and Pilot Point
Selawik
Toksook Bay, which also supplies Nightmute and Tununak
Kasigluk, which also supplies Old Kasigluk and Nunapitchuk.

Wind Projects Planned in:
Sand Point
Nikolski
Hooper Bay
Chevak
Gambell
Wales
Savoonga
Anchorage (Fire Island)

*Source: Alaska Rural Energy Plan, Volume III: Wind Power, Appendices A and E