ENERGY FOR A SUSTAINABLE ALASKA

The Rural Conundrum

A COMMONWEALTH NORTH STUDY REPORT

Meera Kohler & Ethan Schutt, Co-Chairs

February, 2012

COMMONWEALTH NORTH

STATEWIDE ENERGY NEEDS TO BE PRIORITIZED NOW

In Alaska today, nearly 80% of rural communities are dependent on diesel fuel for their primary energy needs. The poorest Alaskan households spend up to 47% of their income on energy, more than five times their urban neighbors.

Alaskans have long battled for reliable and affordable energy, yet Alaska boasts an abundance of hydrocarbons, as well as exceptional renewable energy resources. Why, in the midst of plenty, do Alaska's rural communities pay the highest energy prices in the nation? Alaska lacks a clearly articulated policy of mandates and metrics with strong, consistent, and institutional leadership to implement and enforce energy policies and practices. Alaska has the resources to be a global energy leader, but needs the right policy and structure in place. Without a plan, Alaskans cannot benefit from the competition and innovation that are critical to resolving the State's energy challenges. **Commonwealth North therefore recommends that Alaska:**

- Create a statewide energy vision, plan, and implementation strategy by adopting a holistic view of statewide energy sustainability which serves all Alaskans similarly
- Prioritize the interconnection of rural communities into regional electrical transmission grids in order to develop economies of scale, create efficiencies, reduce redundant infrastructure costs, and develop a greater potential for alternative energy projects
- Mitigate the high cost of energy in rural Alaska by reducing diesel consumption through increased efficiencies and utilization of economically viable alternatives
- Empower a statewide entity to coordinate energy generation and transmission project selection and advocate for all regions of the state in a balanced fashion
- Ensure high-value and effective investments in energy projects through the creation of an investment structure that can serve as an aggregator of financing for energy projects, require equal competition amongst funding opportunities across all energy sectors and technologies in order to reduce the cost of energy, design and audit programs to ensure that experienced teams are making accountable procurement decisions, secure long term sustainability of funding by transitioning away from grants and toward other financing options, and providing a "one stop shop" to deal with all permitting regarding energy projects and to assist with information and assistance in working with federal regulators
- Strive to eliminate the need for the Power Cost Equalization Program (PCE) by reducing the electric rates paid by rural consumers to levels comparable to those paid by consumers on the Railbelt through energy conservation measures and the implementation of feasible energy alternatives

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Jan Van Den Top
Christine West - The Business MD
Dean Westlake - NANA Regional Corporation
Michele White
Tim Wiepking

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Study Group Meetings and Presentations

- **Thursday, May 19** - Steve Colt, Associate Professor of Economics, ISER - Rural Alaska Energy Expenditures/Rural Alaska Fuel Transportation and Logistics Costs
- **Friday, May 27** - Meera Kohler, President/CEO, Alaska Village Electric Co-op - A Cooperative Approach to Locally Owned Electric Utilities
- **Thursday, June 2** - Sara Fisher-Goad, Executive Director - Alaska Energy Authority (AEA) - Overview of AEA's Rural and Alternative Energy Programs
- **Thursday, June 9** - Facilitated Discussion
- **Thursday, June 16** - Joel Neimeyer, Federal Co-Chair, Denali Commission & Denali Daniels, Denali Commission
- **Thursday, June 23** - Melody Nibeck, Tribal Energy Program Manager, Bristol Bay Native Association
- **Thursday, June 30** - Christine Klein, Chief Operating Officer, Calista Corporation & Elaine Brown, North Star Gas
- **Thursday, July 7** - Aaron Schutt, Doyon Limited
- **Thursday, July 14** - Chris Lace, The Aleut Corporation and Bruce Wright, Senior Scientist for the Aleutian Pribilof Islands Association - Energy Solutions for the Aleutians - The A-Team Approach to Energy Conservation, Bulk Fuel and Renewable Projects
- **Thursday, July 21** - Jay Hermanson, Director of Energy and Technical Services, NANA Pacific - Project Manager of Denali Commission/NANA Transmission Study, "Distributing Alaska's Power - A Technical and Policy Review of Electric Transmission in Alaska"
- **Thursday, July 28** - Bob Cox, Vice President Petroleum Distribution, Crowley - Petroleum Transportation & Delivery: Understanding Petroleum Retail Rates in Rural Villages
- **Thursday, August 4** - Jimmy Ord, Alaska Housing Finance Corporation, Research & Rural Development, Rural Energy and Housing Programs and Policy Issues
- **Thursday, August 11** - Facilitated Discussion
- **Thursday, August 18** - Facilitated Discussion
- **Thursday, August 25** - Facilitated Discussion
- **Thursday, September 1** - Rich Seifert Energy and Housing Specialist, UAF & Robert Venables, Energy Coordinator for the Southeast Conference
- **Thursday, September 8** - Doug Ott, Project Manager Hydroelectric Programs, AEA, & Kat Keith Wind Diesel Coordinator
- **Thursday, September 15** - Harold Heinze, CEO, Alaska Natural Gas Development Authority
- **Thursday, September 22** - Facilitated Discussion
- **Thursday, October 6** - Facilitated Discussion
- **Wednesday, November 2** - Facilitated Discussion

Executive Summary

The hallmark of a healthy, sustainable community is the availability of reliable and affordable energy. Affordable energy remains unavailable in virtually all of rural Alaska and as a result Alaska's rural and indigenous communities are at severe risk.

Recent studies have demonstrated that the poorest households in rural Alaska spent up to 47% of their income on energy in 2008, more than five times their Anchorage neighbor. Given the meteoric rise in the cost of oil since then, estimates of the burden today are significantly higher.

The Commonwealth North Rural and Alterative Energy Study Group received presentations from regional organizations on energy plans in various stages of developments. Virtually all the plans included some version of renewable energy - generally still in the early concept design stage - and interconnection of communities to that generation source. All the plans appeared to be very high cost, upward of $500 million per region, and none would dramatically lower the cost of energy without massive government subsidies.

The Renewable Energy Fund, established in 2008, is authorized to underwrite $250-300 million of energy projects, but with projects for small communities coming in at $4-5 million each, it is likely that per-community renewable solutions will cost $2 billion statewide, and will at best keep electricity prices stable into the future. Heat and transportation fuel substitutions will greatly increase this number.

This study identifies barriers to electric energy development and offers solutions to overcome those obstacles. Ultimately, this study proposes that Alaska's energy challenge must be tackled in a holistic manner with the development and adoption by the Legislature of an energy plan that systematically addresses these barriers and enables the implementation of solutions to overcome them.

Map of Alaska courtesy of the Renewable Energy Alaska Project

The State of Alaska must acknowledge that energy infrastructure is the essential element of public infrastructure. Absent a viable energy system, all other public infrastructure fails. Schools, public health facilities, water and waste-water systems, airports, public buildings, and all other major attributes of civilized society cannot exist for long without reliable, affordable energy. Investments in these other assets are at risk in today's economic environment and Alaska's citizens accordingly face risks as well.

As the state considers the investment of billions of public dollars in gas pipelines, hydro projects, transmission lines, and other assets to serve urban areas, in effect buying down the true cost of energy for urban Alaskans, it must also consider rural Alaskans. The state must recognize that it is no longer practical to expect complex energy systems to be competently operated and managed in small rural communities and instead must adopt regional planning to best serve Alaskans. Investments in energy efficiencies, hybrid systems to incorporate renewable energies, and transmission grid development all reduce the overall cost to the State and individual Alaskans overtime. Energy infrastructure is a critical area for the State of Alaska, regional organizations, and communities to partner and invest.

This means adopting values that shift to a cohesive view of Alaska energy sustainability that serves all Alaskans similarly irrespective of the political powers at federal, state and local levels that at times can reflect geographic priorities versus a longstanding policy for all Alaskans. Regional focus, structure, and identity may vary, however the overarching objective to provide reliable and affordable energy to all Alaskans should remain constant throughout.

Commonwealth North Study Group Findings

1. Alaska needs a statewide energy vision, plan, and implementation strategy that incorporates a holistic view of statewide energy sustainability which serves all Alaskans similarly

2. The interconnection of rural communities into regional electrical transmission grids develops economies of scale, creates efficiencies, reduces redundant infrastructure costs, and develops a greater potential for alternative energy projects

3. In order to mitigate the high cost of energy in rural Alaska, dependency on diesel consumption must be reduced through increased efficiencies and utilization of economically viable alternatives

4. A single statewide entity could coordinate energy generation and transmission project selection and advocate for all regions of the state in a balanced fashion

5. The State of Alaska could ensure high-value and effective investments in energy projects through:
    - Creating of an investment structure that can serve as an aggregator of financing for energy projects
    - Requirement of equal competition amongst funding opportunities across all energy sectors and technologies in order to reduce the cost of energy
    - Designing and auditing programs to ensure that experienced teams are making accountable procurement decisions
    - Securing long term sustainability of funding by transitioning away from grants and toward other financing options
    - Providing a "one stop shop" to deal with all permitting regarding energy projects and to assist with information and assistance in working with federal regulators

6. Alaska should strive to eliminate the need for the Power Cost Equalization Program (PCE) by reducing the electric rates paid by rural consumers to levels comparable to those paid by consumers on the Railbelt
    - The Regulatory Commission of Alaska should ensure electric utilities that participate in PCE are implementing cost effective energy conservation measures and feasible alternatives to diesel generation in accordance with Alaska Statute 42.45.130

The Rural Alaska Energy Crisis

Twenty percent of Alaska's 710,000 residents live in almost 300 communities spread across 500,000 square miles. While some rural communities are larger - Ketchikan, Kodiak, etc. - most are small. Hub communities such as Barrow, Bethel, Kotzebue, Nome, Dillingham and others are home to 2,500-5,000 people while some 250 communities have populations of 50-1,100. Per capita income is extremely low while costs of goods and services are extremely high. Low income and high costs are among the drivers causing many community members to move to hubs, urban communities, and outside destinations in search of gainful employment and affordable cost of living.

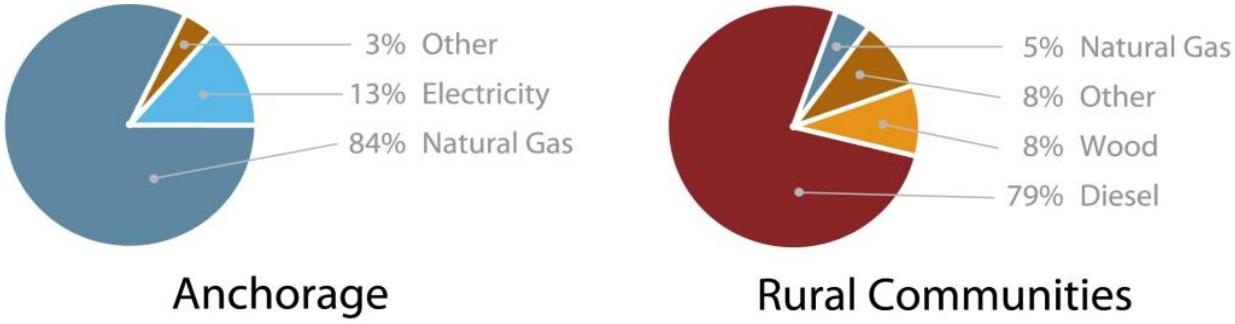
Electricity first appeared in rural villages as a result of resource development and economic opportunities. In the 1950s, electricity slowly made its way into more villages via small generators for local schools. Availability of electricity became more widespread during the 1960s and by the mid-1970s most remote communities had central station diesel generation facilities. The demand for petroleum products continued to rise as the use of outboard motors and snowmachines became more prevalent.

Today, nearly 80% of rural communities are dependent on diesel fuel for their primary energy needs.

Prior to the Arab oil embargo of the early 1970s, diesel fuel and gasoline were available, even in the most remote Alaska communities, for less than $1.00 a gallon. When the commodity price rose dramatically in the late 1970s, subsidy programs were established to reduce the end cost of electricity. When state coffers grew flush with earnings from the Trans-Alaska Pipeline System, efforts were undertaken to assure long-term low-cost electricity for urban areas of the state.

When solutions remained elusive for the vast majority of Alaska, Power Cost Equalization (PCE) was enacted as a solution to keep electricity affordable for residents and public facilities. No solutions were proposed for commercial users, or energy for heating and transportation needs.

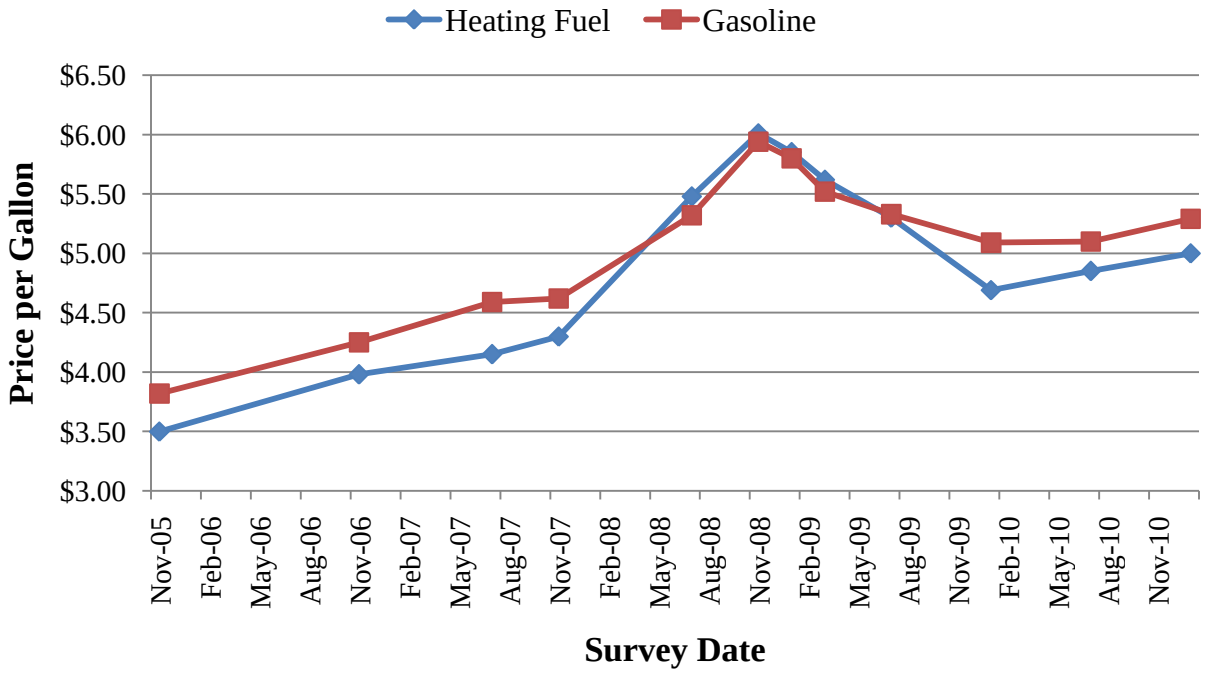
Figure 1 – How Alaskans Heat Their Buildings[1]



[1] Ben Saylor, Sharman Haley, & Nick Szymoniak, *Estimated Household Costs For Home Energy Use* (ISER, May 2008) www.iser.uaa.alaska.edu/Publications/webnote/LLFuelcostupdatefinal.pdf

Today, nearly 80% of rural communities are dependent on diesel fuel for their primary energy needs. There are many factors that contribute to the high and rising cost of diesel. Transportation is a major cost driver; how fuel is transferred (truck, barge, plane) and how far that fuel is transported significantly contributes to total cost. The farther the community is from a hub the greater the cost. Distance also increases costs by the number of times fuel is handled en route and potential transport or handling difficulties, especially if barged on a shallow river or, flown into communities. Year round or seasonal delivery affects cost and a lack of local infrastructure such as local storage capacity, moorage and unloading equipment, and port landing facilities also add costs.

Figure 2 – Trend in Average Alaska Fuel Prices[2]



The Cost of Energy

Energy (electricity, heating fuel and diesel fuel) represents a very significant component of rural Alaskans' annual cash outlay, with the figure approaching or exceeding 40%.[3] In the last five years the price of fuel in Alaska has grown dramatically, particularly affecting rural Alaska where transportation costs are greater. While the State of Alaska does not have a well defined energy plan, there have been recent efforts to develop such a plan. There are numerous regional plans in various stages of development. Regional planning and leadership is a critical component yet none of these plans offer comprehensive relief to the high cost of energy without heavy reliance on significant state funding to buy down the cost of energy to an affordable level.

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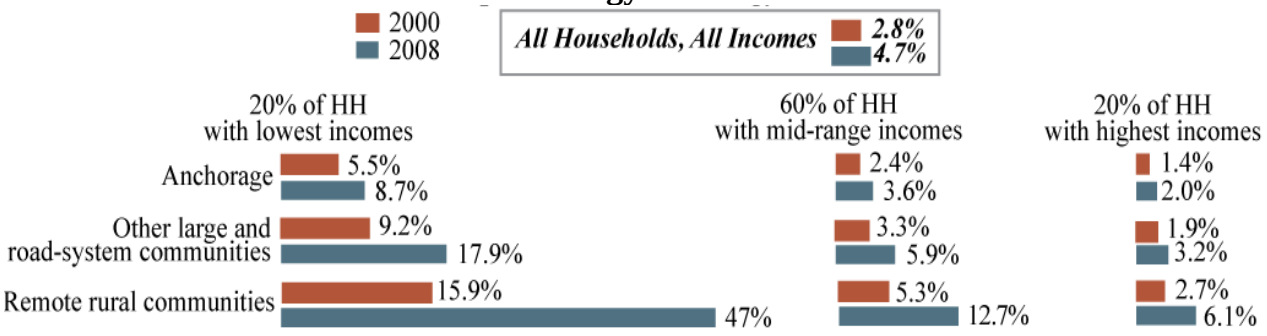
[2] Alaska Department of Commerce and Economic Development Division of Community and Regional Affairs, Research and Analysis Section, *Current Community Conditions: Fuel Process Across Alaska* (Aug 2011) www.dced.state.ak.us/dca/pub/Fuel_Report_Jan_2011.pdf

[3] Nick Szymoniak, Ginny Fay, Alejandra Villalobos Melendez, Justine Charon, & Mark Smith, *Market Factors and Characteristics Influencing Rural Alaska Fuel Prices* (ISER, February 2010) www.iser.uaa.alaska.edu/Publications/webnote/LLFuelcostupdatefinal.pdf

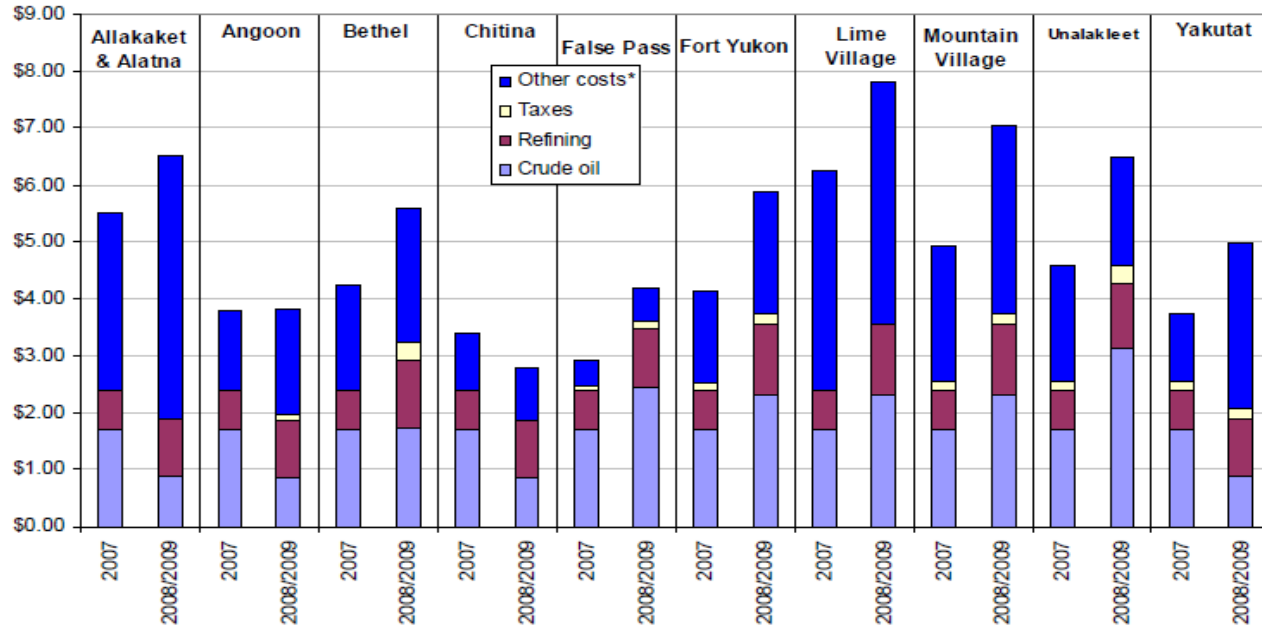
Figure 3 outlines the estimated percentage of household income spent on home energy in a year (2008). Remote households with the lowest incomes face the highest cost burden, estimated in some cases to be 47% of their total income. Even rural households with higher incomes spend nearly twice as much as Anchorage residents spend for energy.

Figure 3 – Estimated Median Share of Income Alaska Households Spend for Home Energy Use[4]



Because energy has been consistently expensive, people in rural places tend to use less than half as much total energy as people with natural gas or hydro power as in Anchorage and Southeast Alaska. In the Yukon-Kuskokwim Region energy is one of the major concerns for families due to the high cost of diesel fuel that ranged from $6.14 to $9.50 per gallon in 2010. Many rural Alaska families struggle to both heat their homes and feed themselves.

Figure 4 – Cost of Diesel Fuel in Selected Communities[5]



[4] Nick Szymoniak, Ginny Fay, Alejandra Villalobos Melendez, Justine Charon, & Mark Smith, *Market Factors and Characteristics Influencing Rural Alaska Fuel Prices* (ISER, February 2010) "HH" Represents Householdswww.iser.uaa.alaska.edu/Publications/webnote/LLFuelcostupdatefinal.pdf

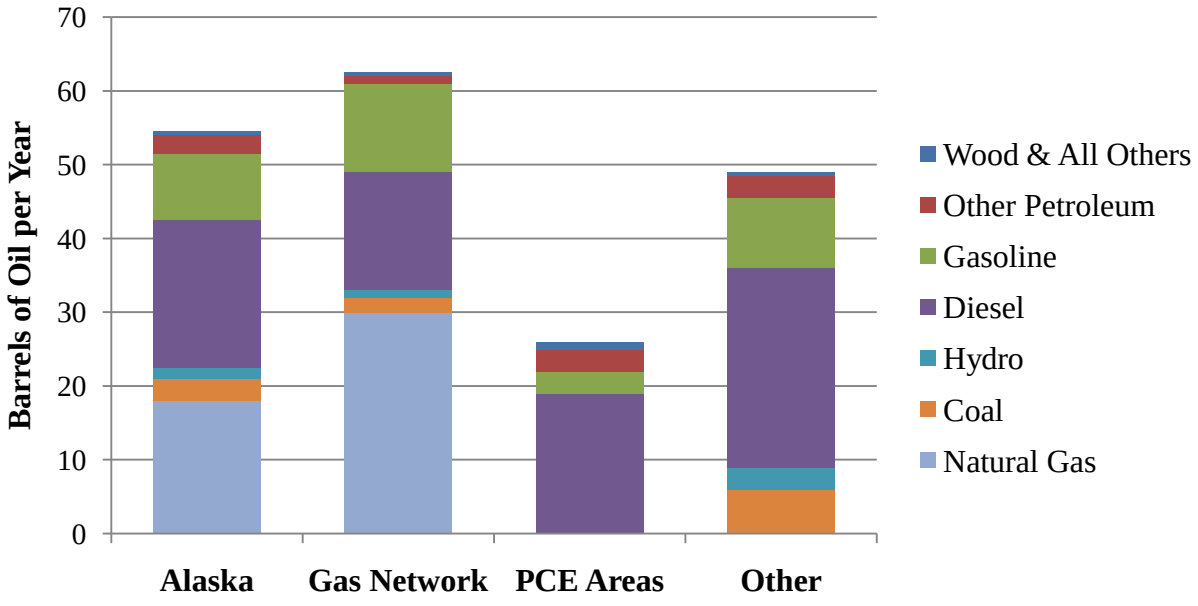
[5] Ginny Fay, Ben Saylor, Nick Szymoniak, Meghan Wilson, & Steve Colt, *Study of the Components of Delivered Fuel Costs in Alaska (ISER, January 2009)* www.iser.uaa.alaska.edu/Publications/fuelpricedeliveredupdate.pdf

Figure 5 – Gulf Coast & Interior Fuel and Gasoline Prices: On & Off the Road System[6]

Gulf Coast	On Road System	Off Road System	Interior	On Road System	Off Road System
Heating Fuel:			Heating Fuel:		
High	$4.30	$6.86	High	$5.50	$10.00
Low	$4.19	$4.28	Low	$4.00	$4.34
Average	$4.24	$5.38	Average	$4.51	$6.27
Gasoline:			Gasoline:		
High	$4.33	$7.07	High	$5.65	$10.00
Low	$4.22	$4.56	Low	$4.04	$5.30
Average	$4.29	$5.54	Average	$4.64	$6.67

Electricity in rural Alaska is delivered by a variety of service providers. Larger utilities like Alaska Village Electric Cooperative (54 communities) and Alaska Power and Telephone (29 communities) serve more than half of Alaska's village residents. Many communities receive central station electricity from a locally owned private or municipal utility. Almost all use diesel fuel for power generation. Electricity cost, $.58-$1.05 per kilowatt-hour, is very high. Even with PCE offsetting the cost of up to 500 kWh for residential users most homes use less than 50 percent of the national average kWh consumption. Commercial users pay the full cost of electricity. Those costs are passed on the consumers.

Figure 6 – Primary Energy Consumption Per Alaskan (Barrels of Oil Per Person Per Year)[7]



[6] Alaska Department of Commerce and Economic Development Division of Community and Regional Affairs, Research and Analysis Section, *Current Community Conditions: Fuel Process Across Alaska* (Aug 2011) www.dced.state.ak.us/dca/pub/Fuel_Report_Jan_2011.pdf

[7] Steve Colt, *Fuel Costs, Community Viability, and Alaska Energy Policy Presentation* (May 2011)

Power Cost Equalization Program: A Stop-Gap Measure

Rural residents use less than half as much total energy as people with natural gas or hydro power as in Anchorage and Southeast Alaska.

When the State of Alaska began receiving revenues from the production of North Slope crude oil in the late 1970s, the search began for energy solutions to reduce the end cost of electricity for all Alaskans. Although solutions were identified for 85% of Alaskans, none were forthcoming for rural Alaska.

PCE was established in 1984 as a parity program to lower the end cost of electricity in rural Alaska while projects were built to lower costs in more urban areas – Bradley Lake Hydro to serve the Railbelt, the Northern Intertie to bring low cost gas-fired power to Fairbanks, and hydro projects to serve Valdez, Kodiak, Ketchikan, Petersburg and Wrangell.

PCE is computed for individual communities based on the local cost of service. The maximum cost in FY10 was 81.59 cents and the average cost was 24.91 cents per kilowatt hour. PCE is available only to residential accounts for the first 500 kWh and to community facilities (such as street lights, water/sewer facilities and public buildings) for up to 70 kWh per resident per month. Schools, commercial establishments, and federal or state government offices are not eligible for PCE. Changes to the program since it was first enacted reduced eligibility by more than 40%. Currently, about 30% of kWh sold in eligible communities receives PCE and the total program cost represents 18% of the cost of electricity.

PCE is given directly to the end user in the form of a credit on their electric bill. The utility is then reimbursed when it subsequently collects from the State of Alaska. It is not a funding mechanism for system improvements. In the last 20 years, utility costs increased by 170%. However, total PCE disbursed has only risen by 56%, highlighting the enormous burden being borne by rural electricity consumers.

Retail electric rates in rural Alaska are as low as 15 cents a kWh (North Slope Borough villages – subsidized by the North Slope Borough) and as high as 151 cents kWh (Lime Village) with the average at around 50 cents a kWh. Larger communities' rates are as low as 30 – 40 cents. Rates in most communities average about 60 cents per kilowatt hour.

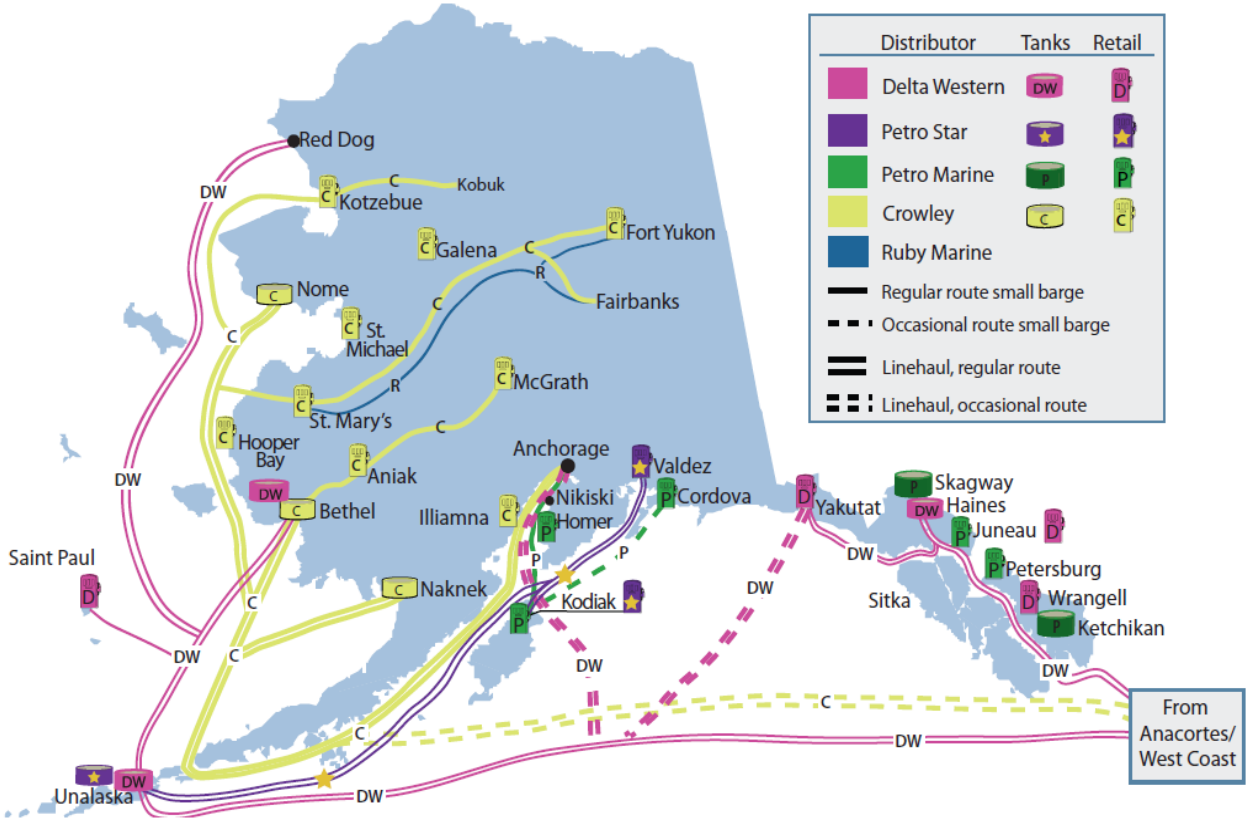
PCE is a stop-gap measure to make a basic amount of electricity affordable for rural residents. Because PCE cannot reduce the cost of electricity for commercial users, high-cost energy continues to be a major impediment to economic development and financial sustainability of remote communities. When long-term energy solutions are established, the PCE Endowment Fund (see appendix) can be dismantled and the subsidy program can be terminated.

Sustainable Energy Development in Rural Alaska

Overcoming Barriers: Connecting Rural Alaska

As concerns mount over fuel prices, long-term energy availability, and climate change, attention is turning toward one of the most pervasive places where energy can be conserved: the supply chain associated with delivering fuel to rural Alaskan communities. The fuel supply chain is the production and distribution network that encompasses the sourcing, transportation, commercialization, distribution, and consumption of diesel fuel in rural Alaska. Roads and transmission lines transport energy between communities. Efficient and strategic development of infrastructure is important to decrease the capital, operations, and maintenance costs associated with energy development in rural Alaska.

Figure 7 – Fuel Distribution Routes in Rural Alaska Markets[8]



Most of rural Alaska communities are road-less and are not interconnected. Community isolation has led to each community having unique and independent infrastructure including schools, rural power systems, bulk fuel systems, airports, and rural health clinics. Each community's infrastructure has unique capital, operations, and maintenance requirements. This redundancy is extremely costly to the State. For some of rural Alaska's 250+ communities, the distance to the

[8] Nick Szymoniak, Ginny Fay, Alejandra Villalobos Melendez, Justine Charon, & Mark Smith, *Market Factors and Characteristics Influencing Rural Alaska Fuel Prices* (ISER Feb 2010) www.iser.uaa.alaska.edu/Publications/componenetsfuelsummaryfinal3.pdf

closest neighboring community is too great to interconnect with either roads or transmission lines. However, for many communities interconnection can play a critical role in reducing the capital outlay of infrastructure and in decreasing the cost of energy. With a better understanding of the rural energy supply chain and strategic development of critical infrastructure, inefficiencies can be identified and strategies to overcome these inefficiencies developed. Strategically placed roads and transmission lines are viable components to promote efficiencies in the rural Alaska energy supply chain.

Strategically placed roads and transmission lines can play an important role in decreasing the capital, operations, and maintenance costs associated with energy development in rural Alaska.

Technical Barriers (Providing Reliable Energy)

Photo courtesy of Alaska Housing Finance Corporation

Commercially available technology can be widely deployed to provide reliable energy solutions to rural communities throughout Alaska. Many of the energy challenges outlined in this report, given infinite levels of money and political will, could be overcome yet sustainable energy solutions must be financeable and ensure reliable and affordable energy for Alaskans that is a challenge for many potential projects.

Integration – Successful integration of many renewable energy sources with base electrical generation into village-scale grids is a significant challenge. In particular, the integration of intermittent renewable energy sources such as wind and solar is an issue. Although headway has been made to address this issue, barriers remain especially as the complexity of the systems increase with higher penetration levels.

Integration multiple energy sources while addressing issues such as seasonality, intermittence, and complicated controls and operations protocols is complex. In Alaska, efforts have been focused on developing wind-diesel systems. These systems have been successful at low and medium wind penetration levels, while high penetration utility systems have not yet been successfully deployed.[9]

Relevant to integration is the need to develop adequate energy storage for village-scale decentralized grids. This technology is a critical component to successfully integrating multiple

[9] "A system is considered to be a high penetration system when the amount of wind produced at any time versus the total amount of energy produced is over 100%. Low penetration systems are those with less than 50% peak instantaneous penetration and medium penetration systems have between 50%-100% of their energy being produced from wind at any one time. Low and medium penetration systems are mature technologies." Denali Commission Emerging Energy Technology Grant, Final Project Descriptions www.denali.gov

energy sources, specifically, those intermittent or seasonal renewable energy resources. Storage technologies range over application (short, medium, and long term), and across technology types (chemical, reservoir, mechanical, and thermal). There has been significant recent progress in battery technology; however, there is currently no cost effective solution to address this barrier in rural Alaska.

Operations and Maintenance – A corresponding issue arising with complex energy systems is the need for sophisticated operations and maintenance. This barrier is broad and encompasses such things as adequate human capacity both statewide and locally, the challenges associated with operating such sophisticated systems in harsh, remote Alaskan conditions, and the limited expertise, resources, and capital available globally for operating and maintaining these systems.

Space Heating – Many energy systems now are capable of addressing electricity generation year-round, but addressing heating needs, particularly during winter months, remains a challenge. Rural communities' prime source of space heat generation today is from diesel and fuel oils. While some communities have localized access to biomass resources, geothermal resources, or even an overabundance of an electrical generation source such as traditional hydro that could theoretically be used for heating, many communities lack a resource that could technically address community heating needs, or the technology is not available to sufficiently exploit the local resource.

Market Barriers (Providing Affordable Energy)

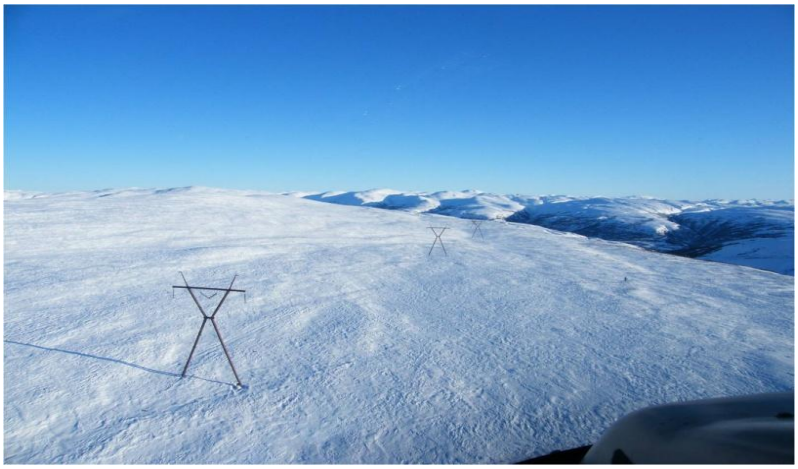


Photo courtesy of the Alaska Energy Authority

The significant barriers to providing affordable energy to isolated communities in rural Alaska are market accessibility, economies of scale, and the cost of energy itself. These barriers increase energy costs by limiting economies of scale, increasing cost of delivery, requiring duplication of services, and hindering access to more efficient diesel and alternative energy generation.

As discussed earlier, nearly all rural villages are dependent on diesel generation. Efficiency of diesel generation is driven by generator size, with larger generators being more efficient, creating more kilowatt-hours per gallon of diesel burned. Small communities typically require small generation units. The small size of these communities results in less efficient generation, increasing the cost of electricity.

Administration, maintenance and operations, capital expenditures, and availability of renewable energy resources are all negatively impacted by community size and limited access. The

operating cost, excluding fuel, of a large generator versus a small generator is negligible. There is little additional labor cost incurred by a large tank farm as compared to a small tank farm. The administration costs related to reporting, managing, and ordering fuel are similar for small and large utilities.

Market Accessibility – As most rural communities are located in remote, distant, or often difficult to access areas this barrier is primarily a transportation issue. The availability of convenient and reliable transportation methods and the access to transmission corridors help reduce the cost of energy. Access challenges not only affect the types of energy solutions that can be implemented, but how they can be implemented. In terms of reliability, this reduces available options, and in terms of affordability, makes projects more expensive.

Economies of Scale – Similar to market access challenges, the economies of scale of the average rural Alaska community pose a substantial barrier to leveraging sustainable and affordable energy solutions. Many energy solutions require conditions where capital, operational, and management costs can be distributed among a large user base and/or a large energy demand. There are various methods currently being used to address this issue such as cooperative utility ownership and fleet management, but all face challenges unique to isolated communities.

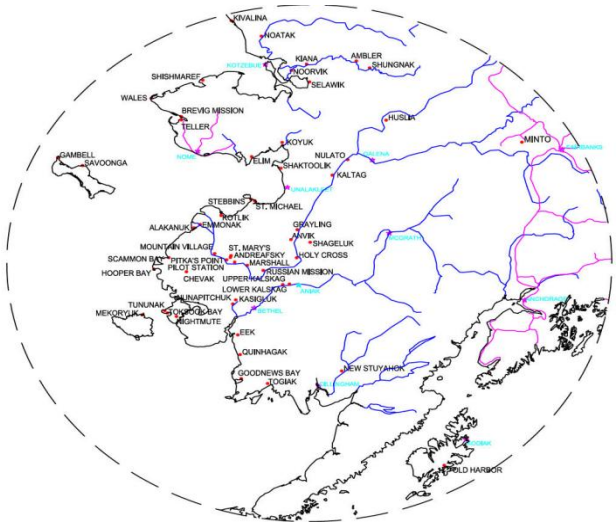
Cost of Energy – Finally, the high cost of energy itself is a market barrier. It is mentioned here because in terms of economic development, long term sustainability, and many other social issues, this is a substantial market barrier for rural Alaskan communities. Local companies cannot afford to do business because the cost of energy is too prohibitive. Bringing down the cost of energy will increase business activity in these remote regions and help promote economic development throughout Alaska.

As more communities become connected through interties the benefits of higher efficiency generators and operating economies become more pronounced.

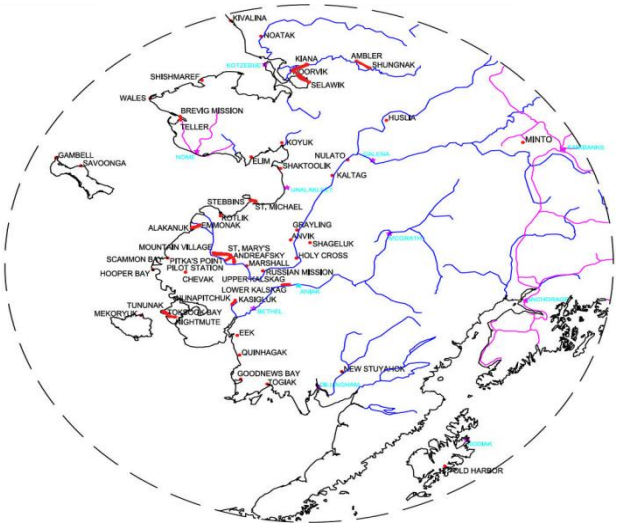
Interties in Rural Alaska

One way to mitigate the high costs driven by small community size and remote locations is to connect communities by interties. The capital cost of a new small 1-1.2 megawatt power plant is approximately $4-5 million dollars. Interties cost $250-400,000 dollars per mile. While the cost of interties vary with distance, climate extremes, and geography the capital costs for interties are generally less than duplicate generation plants for communities within ten to twenty miles of each other. As more communities become connected, the benefits of higher efficiency generators and operating economies become more pronounced.

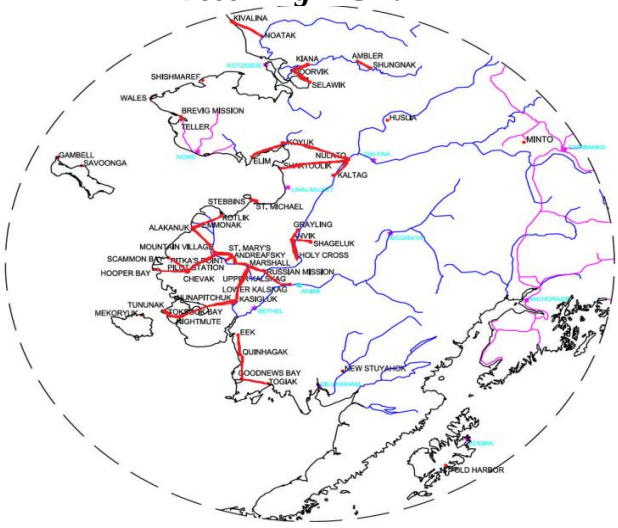
Current Southwest Alaska Communities



Potential Future Interties



Becoming A Grid



As an example, there are twelve communities within roughly a twenty five mile radius of Bethel. Interconnecting these communities could significantly reduce the cost of electricity in the surrounding villages in the following ways:

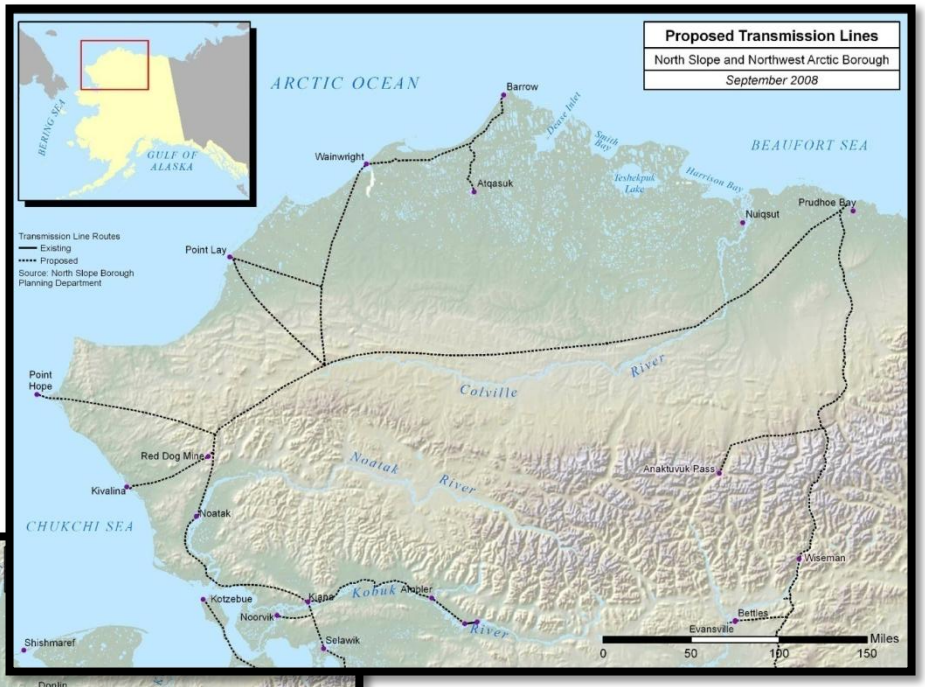
- Reduced Delivery Cost – Bethel is a hub community with significant fuel storage. By locating generation for all the communities in Bethel, the cost of reloading fuel into secondary barges for delivery to smaller communities would be eliminated significantly reducing the cost of diesel used for electric generation.
- Higher Efficiency Generation – While generation would need to be maintained throughout the system for emergency back-up, most generation would be provided by large generation plants located in Bethel. Since the efficiency of diesel generation is driven by generator size, this would result in lower fuel usage per kilowatt hour generated and lower electric costs.
- Better Access to Renewable Energy – By linking villages with interties, the opportunity exists to utilize renewable energy sources. Larger base loads will allow for greater use of wind resources and communities that have no access to renewable energy can use resources available in other locations. One potential opportunity is to maximize renewable energy by identifying the ideal location for a resource such as wind, and consolidating generation in that location, thereby lowering maintenance and operating costs by centralizing expertise and equipment.

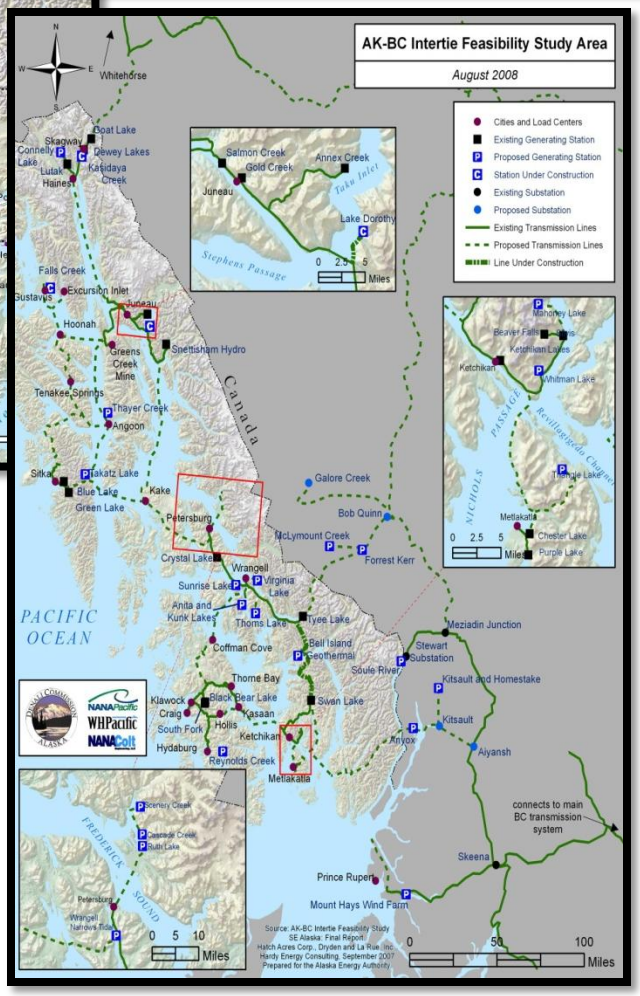
Creating interties between communities has compelling advantages and will play a significant role in reducing electric costs in rural communities. Complicating the implementation of even a partial rural grid is the organization of electric generation across communities. While some villages are served by broad based organizations such as AVEC and Alaska Power and Telephone, many more are independent, stand-alone organizations. The structure of these organizations varies from cooperatives to municipalities, tribes, and private corporations. Integrating this disparate industry will require cooperation between communities, regulatory agencies, and electric companies.

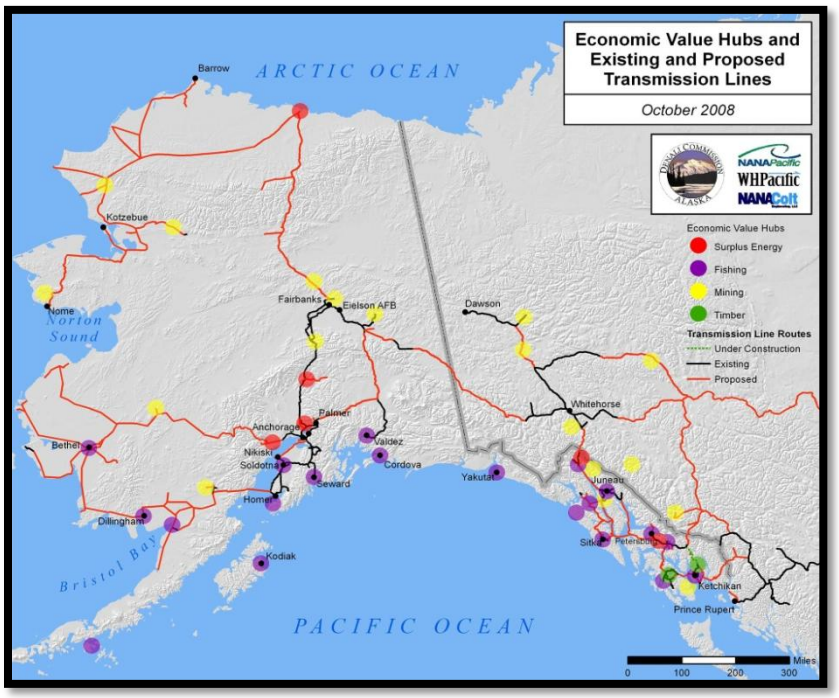
While interties cannot reduce energy costs for all communities in rural Alaska, the vast majority would benefit from the development of connectivity. As village clusters begin to connect, the advantages of connecting these clusters into an expanding grid will increase. The development of regional energy grids will regionalize energy efficiency and allow for more economic energy project decision making. The connection of regional grids into a statewide grid could dramatically reduce the cost of energy in rural Alaska.

A Vision for a Connected Alaska

Development of rural interties is an infrastructure investment which fosters efficiency and reduces redundancy. Interties not only improve access to reliable and affordable energy, but also to health care and educational opportunities.







Diagrams courtesy of the Denali Commission from their December 2008 intertie study entitled, "Distributing Alaska's Power: A technical and policy review of electric transmission in Alaska."

Overcoming Barriers: Definitive Statewide Leadership

Alaskan have long battled for reliable and affordable energy. This is ironic because Alaska boasts an abundance of hydrocarbons, as well as exceptional renewable energy resources such as wind, tidal, hydro, geothermal, and biomass. Even more paradoxically, dusty shelves groan beneath the weight of energy studies, energy plans, and energy task force reports. There are clearly charted pathways forward, but inadequate progress taken down those paths.

Why, in the midst of plenty, do Alaska's rural communities pay the highest energy prices in the nation?

Why, in the midst of plenty, do Alaska's rural communities pay the highest energy prices in the nation? While there are technological, financial, and regulatory obstacles that inhibit the State and local communities' ability to make better use of these resources, structural barriers have proven the greatest impediment to achieving greater energy independence, self-sufficiency, and affordability. In spite of good intentions, Alaska lacks a clearly articulated policy of mandates and metrics with strong, consistent, and institutional leadership to implement and enforce energy policies and practices. Alaska has the resources to be a global energy leader, but needs the right policy and structure in place. Without a plan, Alaskans cannot benefit from the competition and innovation that are critical to resolving the State's energy challenges.

Photo courtesy of the Denali Commission

Energy Needs Clear Direction: A State Energy Plan

While many tout the state's aspirational goals, they do not carry the weight of clear policy directives. The lack of a comprehensive state and regional energy policy is a significant factor in the state's inability to make meaningful and sustained progress towards affordable energy in rural Alaska. Establishing a statewide energy policy will require leadership, commitment, and buy-in from all stakeholders. This also means establishing and agreeing to a paradigm shift in the current framework that treats Railbelt and rural communities separately and is typically highly

Alaska lacks a clearly articulated policy of mandates and metrics with strong, consistent, and institutional leadership to implement and enforce energy policies and practices.

dependent on the political hierarchy. A plan should include the adoption of values that shift to a more cohesive view of Alaska energy as a package, serving all Alaskans similarly irrespective of the political powers at federal, state and local levels.

This effort could be led by a nonpartisan stakeholder panel, similar to the House Energy Committee stakeholder working group which convened in 2009 and ultimately recommended an energy policy accepted by the Legislature in 2010. The energy policy was the first step toward establishing long term objectives while de-politicizing energy decisions in Alaska. Optimally, current elected leaders would establish such a group to provide input on the characteristics of a state energy plan and use the input as the basis for legislation.

A starting point for establishing such a framework would be to identify shared values, common interests, and mutual benefits. This could start at a statewide level and make its way to regional energy planning, and ultimately to local decision making. A common framework for energy decision making would provide consistency at all levels and chart the path for implementation.

Energy Needs A Champion: Centralized State Leadership

The lack of a powerful, institutional champion has caused Alaska's energy development to drift, and has resulted in fitful progress that is reflected in the costly subsidy and grant programs in use today.[10] The state desperately needs agency leadership with the ability to coordinate energy project selection, communicate and advocate for all regions of the state in a balanced fashion, and take a leadership role in state government. Alaska Housing Finance Corporation (AHFC) is the designated entity for receiving State Energy Program funding from the U.S. Department of Energy. AHFC collaborates with the Alaska Energy Authority (AEA) through a Memorandum of Agreement which outlines the relationship between the agencies and provides for the coordination of activities. AHFC has successfully worked with AEA for many years with this arrangement. Additionally AHFC has implemented successful end use energy efficiency programs on its own. Energy resource development such as natural gas and oil production activities are handled in other areas of state government, further compounding a lack of consistency. Without a clear policy and a streamlined approach to overseeing all energy activities in Alaska, one can understand the difficulty in making progress.

The State of Alaska should move to develop a statewide entity that coordinates energy generation and transmission projects. Its purpose would be to generate, transmit, and sell electricity to local electric distribution companies. One impact of such an organization is that cost considerations would be evaluated on a broad regional basis, rather than on a community by community basis. By changing the focus decision making regarding interties, renewable

[10] These parallel subsidies include royalty free natural gas for the Railbelt and the PCE program for rural Alaska.

resources, and generation will be driven by financial results, improving efficiencies, and lowering costs.

A statewide entity would oversee all facets of energy in Alaska consistent with the adopted energy policy and vision. The following characteristics should also be considered:

- Autonomy to execute statewide energy activities as established in an adopted energy plan. Legislative actions should be consistent with the adopted energy plan and the oversight of implementation should not be impeded by the political process.
- Capacity to implement a policy would require a commitment of funding to assure adequate staffing to carry out the vision and policy implementation. Critics of creating a centralized state energy entity believe that creating more government is not the answer. This new model would assure that existing structures are supported and streamlined. Efficiency should be the main goal, while additional government and costs should be avoided.
- Regional leadership organization's involvement is integral in policy development and implementation. Residents of the regions should have a voice throughout the development process and implementation. Existing processes should be utilized when possible to further streamline and coordinate development. In establishing the implementation strategy, the identification of the levels of responsibility should be carefully thought through, vetted, documented, and monitored for efficiency. One guiding principle should be the recognition that local involvement is core to any planning process and produces the most sustainable results. Communication and efficient execution at local, regional, state, and federal levels can be challenging, yet critical to executing an energy plan in a consistent and cohesive way.

Regional and community leadership are integral in policy development and implementation in order to produce the most sustainable results.

Energy Needs Consistency: Achieving a Vision

Energy development in Alaska is fragmented because decision making is scattered, accountability cannot be assigned, and a great deal of money is used inefficiently. Sustainable and affordable energy development requires economies of scale to justify large infrastructure investments as well as a wide range of local energy solutions. This calls for a common, unifying and compelling vision. This vision should be something that the recommended stakeholder panel fully articulates, but should include:

- An Alaska with the most energy efficient people in the nation
- An Alaska which is a global leader in creating and exporting energy expertise and technology, both in the clean use of hydrocarbons as well as renewable energies
- An Alaska which is energy self-sufficient, supplying all of our own energy needs
- An Alaska where every community has access to reliable and affordable energy
- An Alaska that utilizes an efficient, smart, state-wide energy delivery system serving all Alaskans equally

Overcoming Barriers: Sustainable Project Financing

Photo courtesy of the Alaska Housing Finance Corporation

Federal, state, and local governments, and private sector investors have invested billions of dollars in rural Alaska energy projects and programs over the past 40 years, yet rural communities are still paying the highest energy costs of anywhere in the nation. Alaska should consider new mechanisms and changes to the existing structure that will ensure high-value and effective investment in the future. The State of Alaska must develop an investment structure that clearly articulates public sector program goals, translates those goals into measurable objectives, and assesses how well programs have made progress toward those objectives. This is particularly important in light of declining federal investment dollars. Alaska cannot expect the same level of federal funding it has enjoyed in the past and so should take the following steps.

Create an investment structure that can serve as an aggregator of financing for energy projects. This structure should be under the purview of the previously mentioned statewide energy entity. Such an investment structure would provide services and benefits critical to reducing the cost of energy to all Alaskans. Such an agency would take advantage of larger economies of scale to aggregate community project costs. It would help local stakeholders with minimal experience by providing administrative expertise for project development, collecting and incorporating local input, coordinating bids when appropriate, operations, and reporting. This additional structure would ensure accountability to investors and allow for additional public/private investment opportunities.

Alaska's energy policy should be technology neutral seeking the most cost effective and efficient options.

Require equal competition among funding opportunities across all energy sectors and technologies in order to reduce the cost of energy to the end user. Alaska's energy policy should be technology neutral seeking the most cost effective and efficient options. The current Alaska Energy Authority project selection process for the renewable energy fund is competitive among projects, and should be driven by cost-effective investments rather than technology categories. All energy requirements should be considered including heating, electricity, and transportation fuels. There are cost effective projects such as increasing the efficiency of rural diesel systems and using heat from diesel systems to displace fuel oil heating which should also be considered.

Design and audit programs to ensure that experienced teams are making accountable procurement decisions. In the long term, government support programs such as grants or loans will only be sustained and funded if they are effective and accountable in their uses of public money. As a rule, the benefits of all state funds should accrue 100% to the benefit of the end user. State government programs should not dissuade free enterprise private sector capital, but rather should encourage and facilitate private sector investment whenever possible. Funding decisions should be based on which projects have the greatest cost savings, community support, and stable funding scheme in order to ensure projects completion

Ensure long term sustainability of funding by transitioning away from grants and toward loans backed other financing options. Programs should shift to increase equity participation to expand the availability and impact of limited government funding and increase private participation and ownership, and improve loan repayment prospects. The Denali Commission includes a process to review business plans of rural energy projects to ensure projects meet the Denali Commission's sustainability criteria. Many rural Alaska communities have submitted requests for energy projects that are already in the queue waiting for federal funding that may not be available. The project list and project requirements should be revised to reflect expectations that local communities will have to increase their local contribution toward infrastructure in order to be considered competitive in a more constricted federal grant funding environment. Increasing local match requirements, which could include in-kind labor or resources if local cash resources are not available will ensure local community buy-in, support, and project viability. It should be noted, however, many existing electric utilities have little to no equity investment. Incurring debt will add costs such as depreciation and debt service, which will likely increase the retail cost of energy.

Navigating Alaska's Regulatory and Permitting Landscape

Energy development in rural Alaska is regulated by numerous state and federal agencies. Each of the following agencies outlined in the regulatory road map is involved in supporting, permitting, and/or regulating energy projects in Alaska. Additionally local city and tribal governments, Alaska Native Corporations, and public interest groups are also involved. These regulators are important in ensuring the sustainable use of state and federal land, but together create an extremely complex and difficult regulatory road to navigate. The following diagram outlines the steps necessary to complete an energy project and the key state departments, federal agencies, and national organization that impact energy generation and transmission in Alaska.

Rural energy projects are developed in four phases; (1) Outreach and Stakeholder Engagement, (2) Project Feasibility Analysis, (3) Engineering Design and Permitting, (4) and Construction. The first two phases are the most important in determining if a project is feasible and has community support.

Converging on a set of solutions for complex problems, such as those encompassing the rural Alaska energy challenges calls for a flexible, yet structured decision-making processes. The complexity of this multi-dimensional challenge is a function of numerous drivers, including technical, economic, cultural, regulatory and political components. Some of these drivers are quantitative (e.g. technical or economic), while others are likely to remain qualitative, regardless of the level of study devoted to understanding their behavior (e.g. cultural or political).

When a rural community is considering an energy project the local champions should begin by exploring the available energy opinions and engaging potential stakeholder partners. Project selection should ultimately include prescriptive methods for resource assessment followed by ranking of energy alternatives based on fuel cost savings, efficiency gains, project capital and operating costs, time to implementation, scalability/applicability to a variety of rural communities, as well as environmental impacts.

As a community weighs its options, this project roadmap can act as a tool to better understand the regulatory and permitting process and which state and federal agencies should be contacted at each phase of the project. This is not an all inclusive list of project steps or regulatory agencies, only a framework to better understand the regulatory and permitting process. Furthermore all permitting should be completed in parallel to the financing and engineering tasks to shorten the overall project timeline and help ensure project success.

Rural Alaska Regulatory and Permitting Roadmap

PHASE 1: Assess Community Energy Need (1 Year)

I. Explore Local Energy Options and Engage Community Stakeholders

PHASE 1: Regulatory/Permitting Agencies to Contact

- Alaska Energy Authority (AEA)
- US Army Corps of Engineers (USACE)
- AK Dept. of Fish and Game (ADF&G)
- Denali Commission
- US Fish and Wildlife Service (USFWS)
- Regional Corporations
- Village Corporations

PHASE 2: Project Feasibility Analysis (1-2 Years)

I. Business and Financing Plan Development
   a. Resource Assessment
   b. Site Selection
   c. Conduct Feasibility Study
   d. Financing Agreements
   e. Environmental Impact Statement/ Environmental Assessment

II. Decide Whether to Proceed

PHASE 2: Regulatory/Permitting Agencies to Contact

- AK Dept. of Environmental Conservation (DEC)
- AK Division of Mining, Land and Water Management (DMLWM)
- AK Dept. of Transportation & Public Facilities (DOT/PF)
- Army Corps of Engineers (USACE)
- Advisory Council on Historic Preservation (ACHP)
- Bureau of Indian Affairs (BIA)
- Bureau of Land Management (BLM)
- Coast Guard
- Department of Defense (DOD)
- Forest Service
- National Parks Service (NPS)
- Office of Project Management and Permitting (OPMP)
- State Historic Preservation Office (SHPO)

PHASE 3: Engineering Design and Permitting (2-5 Years)

I. Project Design
   a. Construction Permit(s)
   b. Supplier/Controller Contracting

II. Energy Transmission & Site Approval(s)

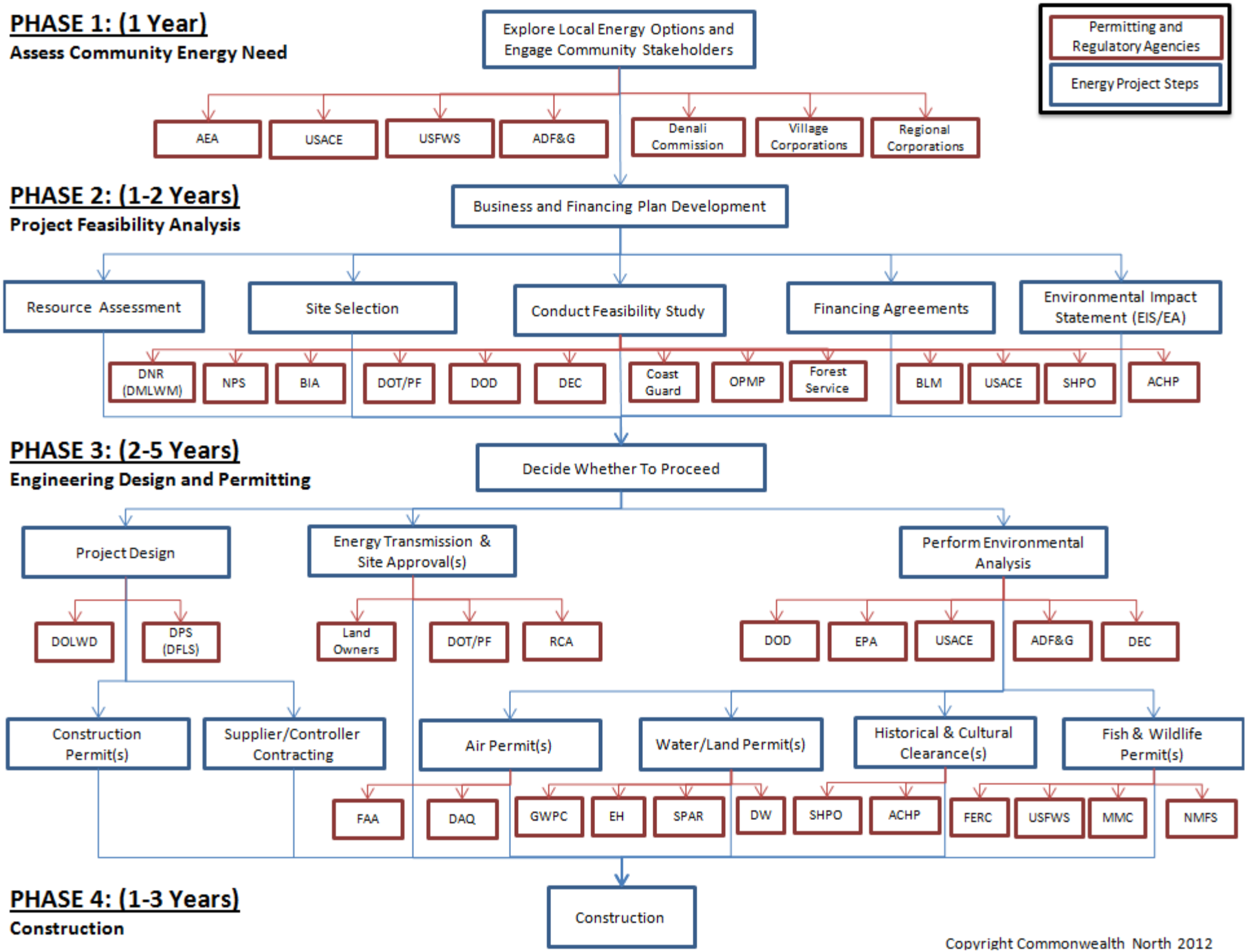
III. Perform Environmental Analysis
   a. Air Permit(s)
   b. Water/land Permit(s)
   c. Historical & Cultural Clearance(s)
   d. Fish & Wildlife Permit(s)

PHASE 3: Regulatory/Permitting Agencies to Contact

- AK Dept. of Labor and Workforce Development (DOLWD)
- AK Dept. of Transportation & Public Facilities
- AK Dept. of Fish and Game (ADF&G)
- AK Dept. of Environmental Conservation (DEC)
- Advisory Council on Historic Preservation
- Army Corp of Engineers (USACE)
- Department of Defense (DOD)
- Division of Air Quality (DAQ)
- Division of Environmental Health (EH)
- Division of Fire & Life Safety (DFLS)
- Division of Spill Prevention & Response (SPAR)
- Division of Water (DW)
- Environmental Protection Agency (EPA)
- Federal Aviation Administration (FAA)
- Federal Energy Regulatory Commission (FERC)
- Fish and Wildlife Service (FWS)
- Ground Water Protection Council (GWPC)
- State Historic Preservation Office (SHPO)
- Land Owners
- Marine Mammals Commission (MMC)
- National Marine Fisheries Service (NMFS)
- Regulatory Commission of Alaska (RCA)

PHASE 4: Construction (1-3 Years)

I. Construction



Appendix

Renewable and Alternative Energy Options

Although Alaska has vast identified energy options, they can be extremely difficult to harness due to the high costs of materials, permitting, technology, transportation, limited accessibility, daunting geology, and climate of many rural communities. Alaska has tremendous potential to mitigate high energy costs and displace millions of gallons of diesel by using local renewable and alternative energy resources. Here is a quick breakdown of the potential energy resources available to some areas in rural Alaska.

Winter Heating Wood on Yukon River at Ruby

Biomass – Biofuels in Alaska include timber, sawmill wastes, fish byproducts, and municipal waste. Most rural communities have access to at least one form of biomass. The primary challenges are harvesting and transporting biomass resources. Abundant wood fuel at relatively low cost is the primary way to promote savings by biomass energy use. The highest savings are derived when wood fuel is a byproduct of wood processing such as in the creation of wood pellets for stoves.

Chena Hot Springs Generators

Geothermal – Alaska has great geothermal energy potential in the Interior hot springs, the Southeast hot springs, the Wrangell Mountains, and along the Aleutian chain. The heat generated by natural hot springs and volcanoes can be used directly or for electric production. Another potential use is ground source heat pumps which use the relatively constant surrounding earth or sea water temperature to provide heating or cooling. The primary challenge for geothermal energy in rural Alaska is the remote location of geothermal resources relative to the population centers and grids. Their remoteness is a significant impediment to develop and manage the resource in an economic manner.

Bradley Lake Hydro Project

Photos courtesy of the Alaska Energy Authority

Hydroelectric – Hydroelectric energy offers reliable base load power and generally delivers energy at a stable price over a long period of time. Most hydroelectric facilities have a potential life of 50-100 years. Alaska has been harnessing hydroelectric energy since the late 1800s and it now supplies over twenty percent of Alaskans' energy needs. Although hydroelectric power is widespread in certain regions of the State, particularly Southeast Alaska, the potential for even more hydro energy exists. Alaska

has 40% of the United States' untapped hydropower with an estimated 192 billion kWh energy potential. There are around 99 indentified sites with a positive potential for future hydro development in Alaska.[11] With 423 MW already installed in Alaska, hydropower is a mature, proven technology that can greatly reduce the cost of energy.

25 kW Turbine at Eagle

Hydrokinetic – This energy resource is relatively new and still in the pre-development stage, but has the potential to provide a large amount of energy because of Alaska's extensive coastline and abundance of rivers. Alaska has one of the best resources for tidal energy in the world, especially along the Aleutian chain. Unfortunately, the sparsely populated region has very low demand for energy. One of the better prospects for wave energy is Yakutat, Alaska.

Photo courtesy of the Denali Commission

Conventional Gas Stove

Natural Gas – Natural Gas is the cleanest fossil fuel and is currently produced and consumed throughout the State of Alaska. Though natural gas does not have the same btu content as diesel it is a much cheaper locally available natural resource. Over 236 TCF of technically recoverable natural gas has been identified on the North Slope. Cook Inlet has also supplied Southcentral with gas for many years and with a rejuvenated exploration effort could potentially supply many parts of the state with natural gas.

Exit Glacier Chalet

Propane – Propane can be utilized for home heating, cooking, and fleet vehicles throughout Alaska. Propane has the potential to serve many rural communities which will never benefit from a gas pipeline and provides an attractive clean burning alternative to diesel. Propane is an understood fuel source which is currently used in many rural communities on a smaller scale. Alaska North Slope propane resources have been estimated to be between 40,000-80,000 barrels/day. Propane is not a ground contaminant and has a carbon footprint and emission levels which are far below

[11] Alaska Energy Authority & Alaska Center for Energy and Power, *Alaska Energy: A First Step Toward Energy Independence* (January 2009) www.akenergyauthority.org/PDF%20files/AK%20Energy%20Final.pdf

diesel. Propane could be barged and trucked in to many of these communities the same way diesel is today. The Institute of Social and Economic Research recently analyzed how propane prices might compare to crude oil prices and estimated the price of propane delivered could be a viable option.[12]

Denali National Park

Solar – Solar energy is an option though significantly challenged by Alaska's shortened solar cycle during the winter months. Solar energy's greatest potential is in meeting small, low-powered off-grid energy needs. To use solar energy effectively, energy storage is necessary so that the acquired energy can be used over a longer period of time. Most solar development in Alaska is in remote areas for individual residences or services like weather stations where the cost of alternative electrical generation is extremely high. Utility-scale solar power plants are uneconomical in Alaska with today's technology.

Pillar Mt-Kodiak

Photo courtesy of the Alaska Center for Energy and Power

Wind – High velocity winds are standard in many parts of Alaska and can be harnessed to mitigate diesel consumption. Alaska's best wind resources are found in the western and coastal regions, but there are wind opportunities throughout the state. At least 134 rural communities have a viable wind resource.[13] Wind turbines use aerodynamic force to convert the wind's kinetic energy into mechanical energy. Wind energy can be used to supplement diesel consumption, however wind is an intermittent source of power and is only viable if there is already base load generation or battery storage. Based on systems installed through 2009, more than $87 million has been invested in wind energy in Alaska, at least $23 million of that by native corporations and other private capital. Alaska now has over 13.1 MW of installed wind capacity.[14]

Alaska has tremendous potential to mitigate high energy costs and displace millions of gallons of diesel by using local renewable and alternative energy resources.

[12] Ginny Fay & Tobias Schwoerer, Eco*nomic Feasibility of North Slope Propane Production and Distribution to Select Alaska Communities* (June 2010) www.iser.uaa.alaska.edu/Publications/Schwoerer_ay2010propane_phase2final.pdf

[13] Alaska Energy Authority & Alaska Center for Energy and Power, *Alaska Energy: A First Step Toward Energy Independence* (January 2009) www.akenergyauthority.org/PDF%20files/AK%20Energy%20Final.pdf

[14] Alaska Center for Energy and Power, Wind-Diesel Applications Center www.uaf.edu/acep/alaska-wind-diesel-applic/

Power Cost Equalization Program Legislative History

The purpose of the PCE Program is to reduce the electric rates paid by rural consumers to levels comparable to those paid by consumers in Anchorage, Fairbanks, and Juneau.

During the past thirty years, four different programs have subsidized rural electric rates:

- Power Production Cost Assistance Program (PPCA) Fiscal Year 1981
- Power Cost Assistance Program (PCA) Fiscal Year 1982 into Fiscal Year 1985
- Power Cost Equalization Program (PCE) Fiscal Year 1985 into Fiscal Year 1994
- Power Cost Equalization Fund and Rural Electric Capitalization Fund (PCE-REC) Fiscal Year 1994 to Fiscal Year 1999
- Power Cost Equalization Fund (PCE) Fiscal Year 1999 to Present

Photo courtesy of the Alaska Housing Finance Corporation

The five programs share some common characteristics. Each program reimbursed rural utilities a percentage of their eligible costs when those costs exceed *entry* rate, now known as the *floor*. For example, the first program, PPCA, reimbursed 85 percent of a utility's costs in excess of 7.65 cents/kWh to generate and transmit electricity. Each program also set a maximum *ceiling* rate. In the case of the PPCA program, the ceiling rate was 40 cents/kWh. Therefore, the PPCA program reimbursed a utility for 85 percent of its eligible costs over 7.65 cents/kWh but below 40 cents/kWh.

When costs exceeded the ceiling rate of 40 cents/kWh, the initial PPCA program paid 100 percent of a utility's excess costs. Subsequent programs differ from the PPCA program in that they did not reimburse any costs beyond their ceiling rates. The first PPCA program also defined *eligible costs* differently from the three subsequent programs. PPCA reimbursed a utility for production and transmission costs but not for distribution and administration costs. The subsequent programs permitted reimbursement for all of these costs.

The biggest difference between the initial and successor programs was the imposition of caps on the costs eligible for reimbursement on a per customer basis. The initial PPCA program reimbursed a utility for all of its eligible costs regardless of who consumed the electricity. All three successor programs limited reimbursement to apply to only a certain amount of kilowatt hours sold to each residential or commercial customer but made special provisions for community facilities. For example, the PCA program reimbursed eligible costs for the first 600 kWh/month consumed by each residential or commercial customer. If a customer exceeded the cap of 600 kWh/month, then they received no subsidy for amounts of electricity consumed in excess of the 600 kWh/month.

The three successor programs treated community facilities in a manner distinct from the other types of customers. Sales of electricity to community facilities qualified for a subsidy on the basis of a set number of kilowatt hours per month per community resident. For example, the PCA program reimbursed eligible costs for providing community facilities with electricity on the basis of 55 kWh/month per resident. If a community had 100 residents, then the first 5,500 kWh of electricity sold to the community facilities would qualify for the subsidy; conversely, consumption above 5,500 kWh/month would receive no subsidy. The programs defined community facilities as water and sewer facilities, public outdoor lighting, charitable educational facilities, or community buildings whose operations were not paid for by the state, federal government or private commercial interest.

The initial formula of the newest program, the PCE and Rural Electric Capitalization Fund, varied from the formula of its immediate predecessor, the PCE Program, in two aspects. The entry, or base rate, rose by one penny from 8.5 cents/kWh to 9.5 cents/kWh. The cap for reimbursing eligible costs for residential and commercial consumptions also fell from 750 kWh/month to 700 kWh/month per customer.

In 1993, SB 106 established the PCE Fund, formerly known as the PCE and Rural Electric Capitalization Fund, as a separate fund with an initial appropriation of $66.9 million with 3% of the funds available for rural electric project grants. The following fund sources were established for PCE:

- $66.9 million appropriation to the newly created PCE fund
- 40% of future Four Dam Pool debt service – estimated to provide approximately $4.0 million per year for PCE
- Interest earned on the unexpended balance in the PCE Fund

It also enacted limits on costs eligible for PCE during Fiscal Year 1994. During the state fiscal year that began July 1, 1993, the power costs for which power cost equalization were paid to an electric utility were limited to minimum power costs of more than 9.5 cents per kilowatt-hour and less than 52.5 cents per kilowatt-hour. During each following state fiscal year, the department must adjust the power costs for which power cost equalization may be paid to an electric utility based on the weighted average retail residential rate in Anchorage, Fairbanks, and Juneau.

In 1999, SB 157 enacted provisions that excluded previously eligible commercial customers from participating in the program, and reduced the monthly cap of 700 kWh/month for residential customers to 500 kWh/month. It also raised the "base" from the prior 9.5 cents/kWh to 12 cents/kWh, effective 7/1/99. During each following state fiscal year, the power costs for which power cost equalization may be paid to an electric utility will be based on the weighted average retail residential rate in Anchorage, Fairbanks, and Juneau; however, the power costs cannot be set lower than 12 cents per kWh.

This legislation also amended the PCE funding sources as follows:

- The percentage of Four Dam Pool debt service allocated for PCE was increased from 40% to 60%. This 20% increment was previously allocated to the Power Project Fund loan program.

- The NPR-A special revenue fund was added as a potential source of PCE funding.

In 2008 in special session, when the price of crude oil hit $147 a barrel, the Legislature raised the ceiling on allowable costs to $1.00 a kWh. This provision was set to expire on June 30, 2009 but action was taken that year to set the ceiling at that level on a permanent basis going forward.

Power Cost Equalization Endowment Fund

Photo courtesy of the Denali Commission

In 2000, HB 446 established the PCE Endowment Fund as a separate fund of the Alaska Energy Authority. The fund consists of; (1) legislative appropriations to the fund that are not designated for annual expenditure for the purpose of power cost equalization; (2) accumulated earnings of the fund; (3) gifts, bequests, contributions of money and other assets, and federal money given to the fund that are not designated for annual expenditure for power cost equalization; and (4) proceeds from the sale of the Four Dam Pool power projects to the power purchasing utilities under a memorandum of understanding dated April 11, 2000, between the Alaska Energy Authority and the purchasing utilities.

An initial appropriation of $100 million was made into the PCE Endowment Fund from the Constitutional Budget Reserve. In addition, sale of the Four Dam Pool projects was finalized in January 2002, which resulted in a deposit of approximately $84 million to the Fund.

The Endowment Fund is invested and managed by the Alaska Department of Revenue to earn 7%. 7% of the PCE Endowment Fund's three year monthly average market values may be appropriated to the PCE Rural Electric Capitalization Fund for annual PCE program costs. Most of the funding needed to support the PCE program in future years is anticipated to come from earnings of the Endowment Fund.

The PCE Endowment Fund was further capitalized with a General Fund appropriation of $182.7 million in October 2006, and $400 million in July 2011. The total invested assets of the fund as of September 30, 2011 were $681,616,886, with the fund posting a year-to-date loss in 2011 of just over $74,000,000.

Glossary of Key Alaska Energy Regulators

State of Alaska Regulators and Permitting Authorities

Alaska Railroad Corporation (ARRC)
Department of Commerce, Community & Economic Development (DCCED)

- Alaska Energy Authority (AEA)
- Alaska Industrial Development and Export Authority (AIDEA)
- Division of Economic Development
- Regulatory Commission of Alaska (RCA)

Department of Environmental Conservation (DEC)

- Division of Air Quality
- Division of Environmental Health (EH)
- Division of Spill Prevention and Response (SPAR)
- Division of Water

Department of Fish and Game (DF&G)
Alaska Department of Labor and Workforce Development (DOLWD)

- Alaska Occupational Safety and Health Program (AKOSH)

Department of Natural Resources (DNR)

- Alaska Coastal Management Program (ACMP)
- Division of Forestry
- Division of Geological & Geophysical Surveys
- Division of Mining, Land and Water Management
- Office of Project Management and Permitting (OPMP)
- State Historic Preservation Office (SHPO)

Department of Public Safety

- The Division of Fire and Life Safety

Department of Transportation and Public Facilities (DOT/PF)
Mental Health Trust Lands
University of Alaska Land Management

Alaska Railroad Corporation (ARRC) – If a project is being developed on Railroad lands or near rail lines the Railroad must be consulted and agreements attained. The Alaska Railroad Corporation owns real estate holdings consisting of approximately 36,228 acres of land. Of this amount, roughly 13,738 acres or 38 percent are devoted to right-of-way and another 4,520 acres or 12 percent are used for railroad operations. The remaining 17,970 acres or 50 percent is available for lease. alaskarailroad.com

Department of Commerce, Community & Economic Development (DCCED)

- **Alaska Energy Authority (AEA)** – A public corporation of the state with a separate and independent legal existence created in 1976 by the Alaska Legislature. It constructs, acquires, finances, and operates power projects and facilities that utilize Alaska's natural resources to produce electricity and heat. www.akenergyauthority.org
- **Alaska Industrial Development and Export Authority (AIDEA)** – Promotes, develops, and advances economic growth and diversification in Alaska by providing various means of financing and investment. www.aidea.org

- **Division of Economic Development** – Helps businesses and developers navigate the network of programs offering technical assistance and support for start-ups, expansions, and relocations. It has a development section that provides specialized assistance to Alaska industries and a financing section that administers loan programs designed to promote Alaska industries. www.dced.state.ak.us/ded
- **Regulatory Commission of Alaska (RCA)** – Alaska Statutes 42.04 - 42.06 and other statutes authorize the Commission to regulate public utilities by certifying qualified providers of public utility and to ensure that it provides safe and adequate services and facilities at just and reasonable rates, terms, and conditions. It issues certificates of public convenience which describe the authorized service area and scope of operations of the utility. It regulates the rates, services, and practices of utilities that meet the criteria for a certificate of public convenience and necessity. rca.alaska.gov

Department of Environmental Conservation (DEC) – Controls water, land, and air pollution in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well being. Provides policy direction for the department, coordination of investment and service delivery, ensures that public concerns are fully considered in department decisions and actions, establishes department objectives and assures performance, serves as spokesperson for the Governor on environmental matters, and issues decisions on administrative appeal requests. dec.alaska.gov

- **Division of Air Quality** – Controls and mitigates air pollution to conserve clean air under the Federal Clean Air Act and state law in Title 44 & 46. It also provides health advisories and suggested protective actions. dec.alaska.gov/air
- **Division of Environmental Health (EH)** – Deals with safe drinking water, food, and sanitary practices. Provides businesses with standards to protect the environment and provide safe food and drinking water to Alaskans. dec.alaska.gov/eh
- **Division of Spill Prevention and Response (SPAR)** – Prevents spills of oil and hazardous substances, prepares for when a spill occurs, and responds to protect human health and the environment. dec.alaska.gov/spar
- **Division of Water** – Improves and protects water quality. Establishes standards for water cleanliness, regulates discharges to waters and wetlands, provides financial assistance for water and wastewater facility construction, trains, certifies and assists water and wastewater system operators, and monitors and reports on water quality. Also monitors the Stormwater prevention permit (SWPPP) and waste water discharge permits. dec.alaska.gov/water

Department of Fish and Game (DF&G) – Plays an advisory role if a project disturbs important wildlife habitat or has linear components (roads and transmission lines) which may hinder wildlife movements or affect hunting and fishing access. DF&G is consulted by other federal and state agencies regarding wildlife impacts and mitigation measures that are included in land use or other project-related permits. DF&G reviews National Environmental Policy Act (NEPA) documents and provides substantive comments directly to action agencies. Also permits navigable water and anadromous fish on state lands. www.adfg.alaska.gov

Department of Labor and Workforce Development (DOLWD)

- **Occupational Safety and Health Program** (**AKOSH)** – Services are focused on reducing occupational fatalities, injuries and illnesses. The Enforcement Section performs inspections based on complaints and targeted programs and issues monetary citations for serious violations of standards. Operates an occupational safety and health program in accordance with Section 18 of the Occupational Safety and Health Act of 1970. labor.alaska.gov

Department of Natural Resources (DNR)

- **Alaska Coastal Management Program (ACMP)** – *This program sunset June 30, 2011.* Provides stewardship for Alaska's rich and diverse coastal resources to ensure a healthy and vibrant Alaskan coast that efficiently sustains long-term economic and environmental productivity. Most proposed activities in the coastal zone must meet its standards and go through a public comment period. Though this program sunset, many proposals are being developed to redesign the program and bring it back. www.alaskacoast.state.ak.us
- **Division of Forestry –** If a project is being developed on state forest lands than the Division of Forestry should be consulted and permits attained. Provides for fish and wildlife habitat, clean water, opportunities for recreation and tourism, and minerals. A DNR Management Plan guides the use of each State Forest. forestry.alaska.gov/stateforests.htm
- **Division of Geological & Geophysical Surveys** – Tasked with determining potential for mining and energy resources, groundwater, construction materials, and geologic hazards. Energy program field research includes opportunities for industry sponsorship and collaboration in annual oil and gas related field programs. Online access to an inventory of fully digital DGGS and USGS publications are available for download. www.dggs.dnr.state.ak.us
- **Division of Mining, Land and Water Management** – Provides for the use and protection of Alaska's state owned land and water. When all land conveyances under the Alaska Statehood Act are complete, the division will be responsible for over 100 million acres of uplands, including non-petroleum minerals in these lands. It also manages Alaska's 65 million acres of tidelands, shore lands, and submerged lands, including some 34,000 miles of coastline and has jurisdiction over all of the State's water resources, equaling about 40% of the entire nation's stock of fresh water. Authorizes plans of operation for mineral development, ice roads, support facilities and camps, gravel sales for road construction and private development, access for public and private entities across state lands and waters including power and telephone lines, and for developing land use plans to guide the use, development, and disposal of state lands. dnr.alaska.gov/mlw
- **Office of Project Management and Permitting (OPMP)** – Coordinates the review of larger scale projects in the state. A project coordinator is assigned to each project in order to facilitate interagency coordination and a cooperative working relationship with the project proponent. Deals with a diverse mix of projects including transportation, oil and gas, mining, federal grants, ANILCA coordination, and land use planning. The project coordinator facilitates these connections for the project and helps to steer the project or the plan through the State approval process. dnr.alaska.gov/commis/opmp
- **State Historic Preservation Office (SHPO)** – Reviews all proposed projects that could potentially impact historical sites or cultural resources and consider whether historical

properties on the site are eligible for listing under the National Register of Historic Places. This only applies to projects receiving federal or state funding, are on State or Federal land, or need state or federal permits. This review is an important consideration in final site selection when historic properties are involved.
dnr.alaska.gov/parks/oha/shpo/shpo.htm

Department of Public Safety

- **The Division of Fire and Life Safety** – Approves construction, repair, remodel, addition, or change of occupancy of any building/structure, or installation or change of fuel tanks before any work is started. Has statewide jurisdiction for fire code enforcement and plan review authority. Plans and specifications regarding the location of the structure on the property, area, height, number of stories, occupancy, type of construction, interior finish, exit facilities, electrical systems, mechanical systems, fuel storage tanks and their appurtenances, automatic fire-extinguishing systems, and fire alarm systems must be submitted for examination and approval. dps.alaska.gov/fire

Department of Transportation and Public Facilities (DOT/PF) – DOT/PF permits are needed if power lines are located along roadways or airports maintained by DOT/PF. www.dot.state.ak.us

Mental Health Trust Authority – If a project is being developed on Mental Health Trust Lands than the Trust must be consulted and permits attained. Trust land resources are located throughout the state and are managed separately from other State of Alaska lands. The 1994 settlement reconstituted the Trust, and the related legislation transferred nearly one million acres of land to the Trust Authority. www.mhtrustland.org

University of Alaska Land Management – If a project is being developed on University lands then the University must be consulted and permits attained. UA Land Management is responsible for managing, developing, acquiring and disposing of all University real property. The University currently owns and manages approximately 147,000 acres of land.www.ualand.com

Federal Regulators and Related National Agencies

Advisory Council on Historic Preservation (ACHP)
Army Corps of Engineers (USACE)
Coast Guard
Department of Agriculture (USDA)
- Forest Service

Department of the Interior (DOI)
- Bureau of Indian Affairs (BIA)
- Bureau of Land Management (BLM)
- Fish and Wildlife Service (USFWS)

Environmental Protection Agency (EPA)
Federal Aviation Administration (FAA)
Federal Energy Regulatory Commission (FERC)
Ground Water Protection Council (GWPC)
Marine Mammal Commission (MMC)
National Marine Fisheries Service (NMFS)
National Park Service (NPS)

Advisory Council on Historic Preservation (ACHP) – An independent federal agency that promotes the preservation, enhancement, and productive use of the nation's historic resources. Ensures federal agencies act as responsible stewards of the nation's resources when actions affect historic properties. www.achp.gov

Army Corps of Engineers (USACE) – Regulates the placement of fill in wetlands and other waters of the U.S. and placement of structures in navigable waters. Regulates all discharge of dredged or fill material into US waterways. www.poa.usace.army.mil

Coast Guard – Determines if the installation of any structure will pose potential adverse impacts to the users of waterways. Conducts risk assessments to determine if the installation will require Private Aids to Navigation (PATON). www.uscg.mil

Department of Agriculture (USDA)
- **Forest Service** – A major land manager within the Tongass National forest in Southeast Alaska and the Chugach National Forest in Southcentral Alaska. If a project is being developed on US Forest Lands then the Forest Service must be consulted and permits obtained. www.fs.fed.us

Department of the Interior (DOI)
- **Bureau of Indian Affairs (BIA)** – Manages natural resources on trust lands representing 55 million surface acres and 57 million acres of subsurface minerals estates, economic development programs, implementation of land and water claim settlements, housing improvement, disaster relief, and repair and maintenance of roads and bridges. Tribes can also create lease agreements under the Indian Mineral Development Act. www.bia.gov
- **Bureau of Land Management (BLM)** – Manages activities on the 225 million acres of federal onshore lands in Alaska. Issues grants for electrical power generation, transmission and distribution systems, reception of electronic signals and other means of

communications, highways, railroads, and other facilities or systems which are in the public interest. www.blm.gov

- **Fish and Wildlife Service (USFWS)** – FWS is the primary wildlife agency on federal land which regulates activities affecting threatened and endangered species and establishes federal interagency consultation. Should be involved early in any proposed project. Authority is defined in the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and the Fish and Wildlife Coordination Act. alaska.fws.gov

Environmental Protection Agency (EPA) – Sets and enforces standards on air and water quality. When Congress writes an environmental law, the EPA implements it by writing regulations and setting national standards that states enforce through regulations. If states fail to meet the national standards, the EPA will step in. Nearly half the budget goes into grants to state environmental programs, non-profits, and educational institutions. www.epa.gov

Federal Aviation Administration (FAA) – The primary agency responsible for air safety and hazards to navigable airspace or communications/navigation technology. Regulates all projects that present a potential hazard to air safety. www.faa.gov

Federal Energy Regulatory Commission (FERC) – An independent agency that regulates the interstate transmission of electricity, natural gas, and oil. Also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines. Also regulates the sale of natural gas and oil for resale in interstate commerce and approves the sitting and abandonment of interstate natural gas pipelines and storage facilities. Generally not important in energy projects in rural Alaska unless that energy is being transferred into Canada. www.ferc.gov

Ground Water Protection Council (GWPC) – A national association of state ground water and underground injection control agencies whose mission is to promote the protection and conservation of ground water resources. It provides a forum for stakeholder communication and research in order to improve government's role in the protection and conservation of ground water. www.gwpc.org

Marine Mammal Commission (MMC) – An independent U.S. Government agency that provides independent oversight of the marine mammal conservation policies and programs being carried out by federal regulatory agencies. mmc.gov

National Marine Fisheries Service (NMFS) – Responsible for all marine mammals, anadromous and marine fish species, and Essential Fish Habitat. Oversees proposed projects with marine components or involve crossing anadromous streams with roads or power transmission structures. Also has purview over endangered species listings including beluga whales and polar bears. Authority comes from the ESA, Marine Mammal Protection Act, and the Magnuson-Stevens Fisheries Conservation and Management Act. www.fakr.noaa.gov

National Park Service (NPS) – Conserve the scenery and the natural and historic objects and the wildlife to leave them unimpaired for the enjoyment of future generations. National parks cover approximately 54 million acres of land in Alaska. www.nps.gov/akso

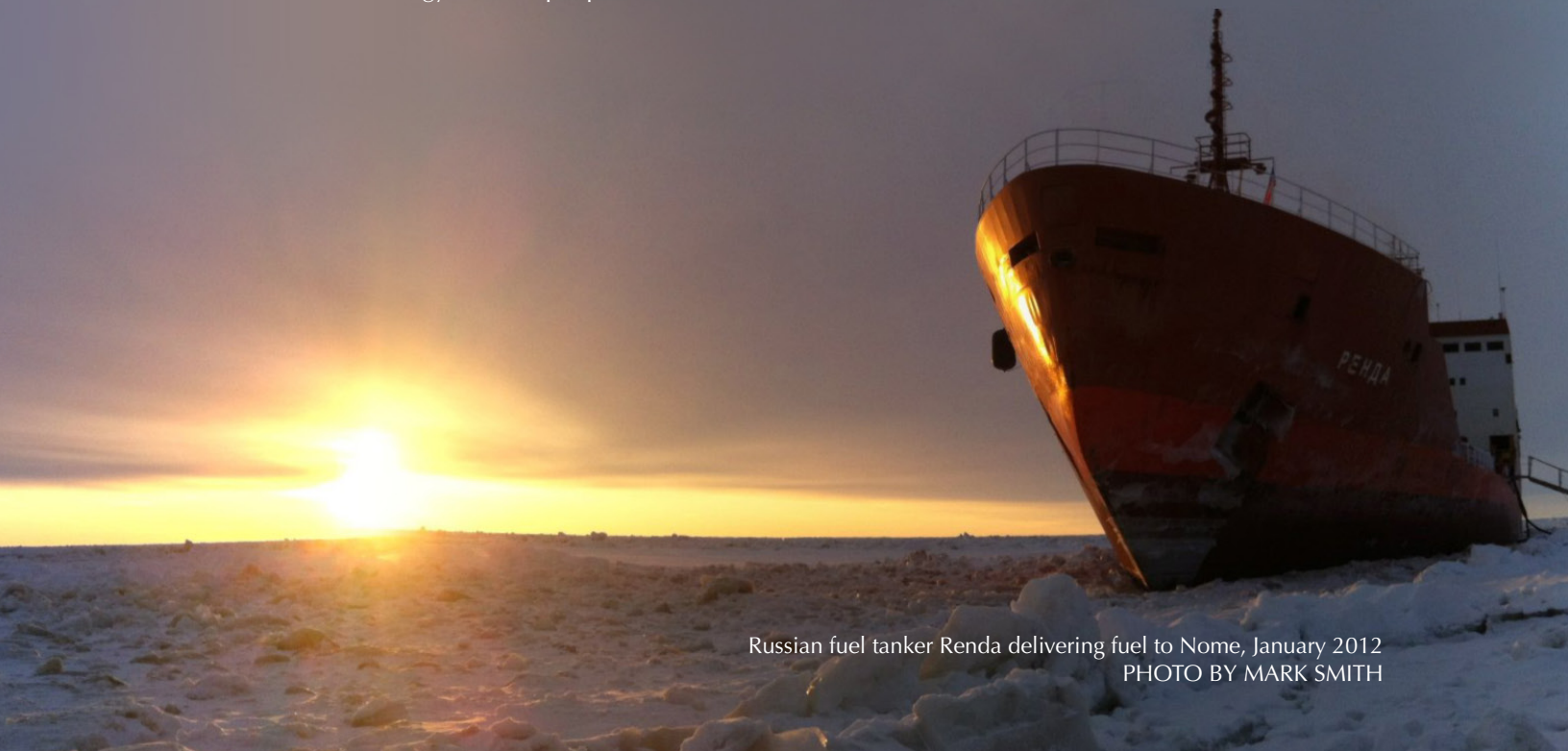
RELIABLE AND AFFORDABLE ENERGY IS CRITICAL

Energy infrastructure is the essential element of public infrastructure. Absent a viable energy system, all other public infrastructure fails. Schools, public health facilities, water and waste-water systems, airports, public buildings and all other major attributes of civilized society cannot exist for long without reliable, affordable energy. Alaska needs:

A Clear Direction Set by a State Energy Plan
A Champion With Centralized State Leadership
Consistency Toward Achieving a Vision

The State of Alaska must adopt values that shift to a cohesive view of Alaska energy sustainability that serves all Alaskans similarly. Regional focus, structure, and identity may vary, however the overarching objective to provide reliable and affordable energy to all Alaskans should remain constant throughout. **An energy future for Alaska can be achieved:**

- Which is energy self-sufficient, supplying all of our own energy needs
- With the most energy efficient people in the nation
- Which is a global leader in creating and exporting energy expertise and technology, both in the clean use of hydrocarbons as well as renewable energies
- That utilizes an efficient, smart, state-wide energy delivery system serving all Alaskans
- Where every community has access to reliable and affordable energy



Russian fuel tanker Renda delivering fuel to Nome, January 2012
PHOTO BY MARK SMITH

The hallmark of a healthy, sustainable community is the availability of reliable and affordable energy. This remains unavailable to virtually all rural Alaskans and as a result Alaska's rural and indigenous communities are at severe risk.

COMMONWEALTH NORTH

Commonwealth North was co-founded by former Alaska Governors Walter Hickel and William Egan.

Commonwealth North provides an educational forum where opinion leaders and activists in Alaska can gather to review public policy issues and topics affecting the state. Commonwealth North is a non-partisan organization where cultural and professional diversity is welcomed. Monthly forums are held to hear from renowned speakers on a wide variety of stimulating and controversial subjects. Working committees, called Study Groups, are formed by its membership to research critical issues and to produce reports or publications. Commonwealth North is funded by individual memberships and private sector funds.

The Commonwealth North Rural Energy Study Committee Members

Co-Chairs Meera Kohler and Ethan Schutt, Julie Anderson, Ethan Berkowitz, Chris Birch, George Cannelos, Del Conrad, Denali Daniels, Mark Foster, Pat Galvin, Duane Heyman, Lonnie Jackson, Wilson Justin, Christine Klein, Mary Knopf, Kaye Laughlin, Marilyn Leland, Katie Marquette, Iris Matthews, Kate McKeown, Jason Meyer, Michael Moora, Christian Muntean, Karthik Murugesan, Kirk Payne, Mary Ann Pease, James Posey, Colleen Richards, Chris Rose, Debra Schnebel, Tiel Smith, Jan Van Den Top, Christine West, Dean Westlake, Michele White, and Tim Wiepking

The full Energy Report, with links to additional information, may be found at www.commonwealthnorth.org.

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