Full Presentation before the Senate Subcommittee on Energy
Solutions to Reduce Energy Costs in Rural Alaska

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Introduction

Among the fifty U.S. states, Alaska is perhaps the most unique with respect to energy costs, housing, water and sewer infrastructure, transportation issues, and its role in climate change response issues.

Alaskans pay almost twice the national average annually on energy costs[1]. Rural Alaskans confront an even larger problem, with areas of Western and Interior Alaska estimated to spend approximately $8,000 a year on heat and electricity[1]. The cost of electricity in rural Alaskan communities is the highest in the nation, ranging up to $1.00 per kWh[2]. Low-income residents are the most affected by these high costs, as they pay a much higher percentage of their disposable income on keeping their house warm and the lights on than residents in higher income brackets. These communities were the most impacted when the cost of diesel spiked over the last decade. The cost of operating and maintaining energy and power systems shows the critical need to improve the efficiency of the housing stock in rural Alaska. Cost to distribute power in rural Alaska is estimated at $200,000-$1,500,000 per mile[3]. This factor alone creates a major barrier in furthering the distribution of power generation in those communities.

The dramatic rise of energy costs in Alaska has created a growing interest in affordable, energy efficient commercial building construction and residential housing. A review of the occupied housing in the state indicates that of the 10% of housing is classified as *one-star,* the lowest possible energy rating, and half of these housing units are in rural areas of the state not served by road, rail, or the marine highway. One-star housing units use approximately five times as much energy as newly constructed housing in the state. Furthermore, approximately half of the nearly 250,000 housing units in Alaska were built in the 1970s or 1980s and are approaching the end of their useful life[2]. To compound the housing issues, there is significant overcrowding in rural Alaska, exceeding both the national average of 3.1% and the statewide average of 6%[2].

Aging and poorly designed water and sewer infrastructure has become a great burden on rural Alaska. Water and sanitation challenges have provided a variety of solutions, which include honeybucket haul systems, drilled water well house distribution points, piped systems, and haul systems for safe water.

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[1] 2014 Alaska Housing Assessment. Alaska Housing Finance Corporation and Cold Climate Housing Research Center. Available at: https://www.ahfc.us/efficiency/research-information-center/housing-assessment/

[2] Fay, G., & Meléndez, A. V. (2012). *All-Alaska Rate Electric Power Pricing Structure.* University of Alaska Anchorage, Institute of Social and Economic Research, Anchorage.

[3] NANA Pacific. (2008). *Distributing Alaska's Power: A technical and policy review of electric transmission in Alaska.* Anchorage: Denali Commission.

Rural communities are faced with some of the highest rates of unemployment in the nation. Census "Quick Facts" figures indicate that poverty rates in rural villages averaged 19.4% in 2010.[4] According to the Denali Commission 2014 Annual Report, unemployment rates in many rural Alaskan communities exceed 50%[5].

Transportation of materials, food, clothing, and essential necessities are shipped by either air or barge to all rural communities in Alaska. The logistics of transporting to these communities provides a unique challenge when addressing energy, housing, and infrastructure issues. Due to the short summer barge season, the cost of materials can easily double once transportation costs are factored in. Communities with shallow river systems and lower tides due to climatic changes have additional lightering costs to transport materials from the barge to the dock or landing, resulting in increased costs throughout the state. Regardless of the global price for oil, rural Alaska faces extreme energy costs and pays a fixed price for oil delivery once a year. This unique challenge becomes compounded when combined with funding guidelines for procurement and deadlines.

Alaska is warming at twice the rate of the rest of the United States. The impacts of climate change are highly visible in Alaska, as evidenced by coastal erosion, increased storm patterns, sea ice retreat, melting glaciers, and thawing permafrost (which covers 85% of the state). Adaptation and resiliency measures are essential to protect the people and infrastructure of Alaska. Roads, airports, and housing built on permafrost are highly vulnerable to warming, leading to increased maintenance costs and more frequent disruption in services. Addressing climate change with site-specific foundations, building science ingenuity, and adaptable and/or movable structures has proven to be the most effective approach.

Solutions for Alaska

Supporting projects in Alaska by any organization can be complicated by the very same issues that encumber rural Alaskan communities: high materials costs, limited resources and skilled labor pool, transportation costs and logistics, and complex interagency relationships and cultural values of each community. Projects in these areas are most effectively executed by those who have experience working in these communities and who have experience with overcoming these limitations and challenges. Experience has shown that when a top-down, single-agency approach has occurred for projects in these remote locations, the benefit to and the buy-in from the local communities have been limited at best; additionally, these projects tend to be the most costly.

Rural Alaskan projects are best executed when collaborative efforts between agencies and stakeholders are promoted; when community members are engaged to apply their knowledge, skills, and resources to expand community development; and when entrepreneurship and capacity building endeavors are promoted throughout rural Alaska to promote self-reliance and decrease community dependence on agency support. Established organizations in Alaska such as CCHRC, DOE's Office of Indian Energy, and Alaska Native Tribal Health Consortium, to name a few, have a long history of working with rural communities, leveraging existing resources, overcoming logistical constraints, and successfully seeing their projects to completion.

[4] http://quickfacts.census.gov/qfd/states/02000lk.html

[5] Denali Commission. (2011). *Annual Report 2011.* Anchorage.

Cold Climate Housing Research Center

Cold Climate Housing Research Center (CCHRC) is a 501(c)(3) Fairbanks-based nonprofit that was established in 1999 to research, test, and develop the materials and technologies to provide healthy, durable, and economically sound housing for the people of Alaska. Over the past 15 years, CCHRC's mission has evolved from a relatively narrow research mission to one of a comprehensive community development agency providing a wide variety of business innovation and development services to communities and private-sector partners through a program initiative called the Sustainable Northern Communities (SNC). To accommodate CCHRC's expanding menu of innovation and development services, the U.S. Economic Development Administration (EDA) provided funding ($1,900,000) in 2011 to construct additional facility space (7,500 sf) to support the SNC Program Initiative.

Through the SNC Program, CCHRC has been working to improve the efficiency and effectiveness of community development efforts in rural Alaska through promoting more collaborative efforts between agencies and stakeholders; engaging community members to apply their knowledge, skills, and resources to bolster community development; and promoting entrepreneurship and capacity-building throughout rural Alaska to promote self-reliance.

These projects engage the community from the design stage through the construction phase, including community design meetings, workforce training, and consulting and quality control throughout the construction and occupancy of the home. CCHRC has developed regional prototype homes that are tailored to geographic and climate conditions, helping communities construct demonstration homes that can then be reproduced by local labor. For example CCHRC partnered with the Association of Village Council Presidents (AVCP) in Bethel to design and oversee construction of two "integrated truss" duplexes for the local aviation school in 2014. The "integrated truss" design reduces construction time and cost, and provides an energy efficient, airtight envelope that can withstand the wet, arctic climate of the region. CCHRC is now working with AVCP to develop a truss plant to local timber harvest operation in Bethel that would create local capacity and reduce the cost of building materials.

Since 2008, CCHRC has worked with more than a dozen communities around Alaska to design energy efficient, healthy, affordable housing that is appropriate for the climate and culture of the residents. These homes have reduced energy use by 80% on average, through innovative approaches to design, building science, and transportation. A high-performance, low cost prototype home built in Atmautluak in 2013, for example, used less than 200 gallons of heating oil during the first year of occupancy, compared to 1,200 gallons for the average house in Bethel region. The project also reduced square construction costs by using local labor and a simple, innovative design.

CCHRC's Fairbanks-based facility provides space to bring together experts in the fields of sustainability and resiliency, cultural vitality, building science and design, renewable energy, local workforce training, health, and regional economic development, through a holistic community development approach that starts with the people.

Recommendations

The Department of Energy's (DOE) Alaska office has created a draft action plan that would meet the U.S. government's strategic priorities outlined for the Arctic in the National Strategy for the Arctic Region, we ask that you consider specific language from that plan in the Energy Bill to codify and fund the following recommendations:

1. Expand Alaska Office of DOE

With Alaska as the strategic energy center of the US, an appropriately sized DOE presence and staff in Alaska is essential to orchestrate and sustain activities outlined in the National Strategy for the Arctic Region (NSAR) as well as all other DOE efforts in the state. Investments should be made to properly fund and staff the DOE Office of Indian Energy to help meet the needs of communities in rural Alaska. One federal employee for DOE is not sufficient to manage national and regional Arctic issues for which this office is responsible. While the Office of Indian Energy has established strong interagency relationships across the state, the office needs more personnel to be effective.

2. Create a National Arctic Energy Laboratory in Alaska

The federal government, through the U.S. Economic Development Administration, invested in CCHRC's Sustainable Northern Communities addition (completed in 2013) specifically for this purpose. The addition has appropriate space for research and collaboration and demonstrates the most energy efficient building science and mechanical systems in the Arctic today. The Research and Testing Facility (the farthest north building earning the highest LEED designation), resides in the heart of Alaska, an ideal climate for research, testing, and development of new emerging technologies for the Arctic.

CCHRC is an established research center whose work has resulted in energy-efficient building systems being implemented and applied throughout Alaska to help homeowners and communities save money and resources. Researchers study the performance and economics of various building techniques and products in the lab and in the field. Specific research focus areas include thermal performance and moisture control in the building envelope, thermal interactions between foundations and frozen ground, energy-efficiency and efficacy of heating and ventilation systems for cold climate structures, and the testing of renewable energy system performance in the Arctic. CCHRC's Building Science Research program is staffed with engineers and scientists that collectively have broad backgrounds in heat and mass transfer, arctic engineering, data acquisition and management, material science, research design, programming, and project management.

Additionally, CCHRC's Policy Research program supports the CCHRC mission through research, consulting, advocacy, and information systems development. Policy projects are closely engaged with key agencies policy makers in an effort to inform energy efficiency and housing policy with sound building science. CCHRC's Policy Research program has resulted in improvement to the home energy rating standards used by builders, energy rates and lenders, guided the development of statewide energy efficiency policies, informed policymakers and housing authorities at local, state and federal levels about the state of housing in Alaska, and developed data collection capabilities for answering vital, long-term building science, energy, economic, and policy questions.

CCHRC has two decades of statewide innovation and experience entirely focused on holistic, sustainable, cost-effective construction that meets the needs of Arctic communities. We have the capacity and talent to expand our activities to become the Arctic Energy Laboratory for the Nation. Furthermore, as the Department of Defense and the U.S. Coast Guard build critical national and homeland security infrastructure, villages relocate, and communities upgrade energy supply chains and infrastructure, the costly mistakes of the past can be prevented by integrating proven Alaska-pioneered solutions, as CCHRC has done since inception.

3. Fund Existing State Energy and Weatherization Programs that Work

Co-fund with the state of Alaska, existing state energy and weatherization programs that are successful such as the Renewable Energy Fund and the Emerging Energy Technology Fund. For over 10 years, these programs have demonstrated significant improvements in energy efficiency from both the energy production and energy consumption sectors and they continue to push the envelope for new solutions that work for Alaskans.

While direct subsidies provide needed emergency assistance, the Weatherization Assistance Program provides long-term reductions in energy costs for Alaskans. Statewide, the average home participating in this program reduces its energy use by 28% and saves an estimated $1,300 in energy costs per year, though the savings vary by region, with some areas on average saving more than $3,500 a year after being retrofit[6]. With more than 16,500 homes having participated in the Weatherization Assistance Program between 2008 and the end of March 2015[7], low-income Alaskans throughout the state are estimated to be saving approximately $22.1 million each year in energy costs.

Saving energy also has the capacity to produce more jobs. By reducing the need to purchase imported heating fuel, more money is available to be used in the local economy in rural areas. In areas using natural gas, this limited resource can be conserved for future generations and the savings are available to be spent locally, helping to create jobs. It is estimated that the spending from this additional available income creates 11 jobs for each million dollars of energy saved annually[8]; annual savings from the Weatherization Program are $22.1 million, equivalent to 242 permanent jobs. In addition, jobs are created to perform the actual retrofit of the buildings, with an estimated 7 direct jobs and 5 indirect jobs created for every million dollars of public spending[9]. The Weatherization program has expended $307 million between 2008 and March 2015[10], creating an estimated 3,684 jobs over the history of the program. Nationally, for every $1 invested, weatherization returns $2.51 in energy and non-energy-related benefits[11].

Look to Alaska for Solutions

As you look to solidify national support and understanding about the strategic importance of the Arctic, know that behind you stand a broad, highly engaged team of leaders across Alaska working on the many challenges and turning them into opportunities for our state as well as our nation. Solutions for the north will not come from the “Outside” but from the people that live on this ground and breathe this air.

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[6] CCHRC estimates using Alaska Retrofit Information System data

[7] Ord, Jimmy. “Alaska Housing Finance Corporation Weatherization and Home Energy Rebate Program Updates.” 6/1/2015

[8] Goldsmith, S., Pathan, S, Wiltse, N. “Snapshot: The Home Energy Rebate Program.” Institute of Social and Economic Research and Cold Climate Housing Research Center. May, 2012. Available at: http://www.cchrc.org/sites/default/files/docs/HERP_snapshot.pdf

[9] ibid

[10] Ord, Jimmy. “Alaska Housing Finance Corporation Weatherization and Home Energy Rebate Program Updates.” 6/1/2015

[11] US DOE. Weatherization and Intergovernmental Program. Available at: http://www1.eere.energy.gov/library/pdfs/48098_weatherization_assisprog_fsr4.pdf