

Kenai Peninsula Borough

Resilience & Security Advisory Commission

MEMORANDUM

TO: Peter Micciche, Borough Mayor
CC: Marcus Mueller, RSAC Staff Liaison
Kevin Lyon, Planning and Operations KPBSD
Cindy Ecklund, RSAC Assembly Liaison
Michele Turner, Borough Clerk
Robert Ruffner, Planning Director

FROM: Scott Waterman, Resilience & Security Advisory Commission Chair

DATE: November 14, 2023

RE: Suggestions for activities for US EPA Climate Pollution Reduction Grants

Funding opportunities for a heat pump pilot program, energy efficiency measures, and the landfill gas project could be available through the Climate Pollution Reduction Grants administered by the U.S Environmental Protection Agency. The Alaska Municipal League and the Alaska Dept. of Environmental Conservation are working with local governments on a state-level plan required by the grant. In its meetings with the Alaska Municipal League, the borough should advocate for the inclusion of the projects outlined in this memo, which would make the borough eligible to begin seeking funding for them in spring 2024.

"The Kenai Peninsula Borough Assembly created the Resilience and Security Advisory Commission via Ordinance 2020-25, which states "the commission will advise the administration and assembly on developing sustainability solutions for the Kenai Peninsula Borough to promote the economic security, safety, self-reliance, and wellbeing of its inhabitants."

This memo outlines three possible avenues for grants under this funding opportunity. These are:

- 1) Add Heat pumps: Adding heat pumps to the common areas of three remote schools currently barging and trucking in expensive propane.
- 2) Efficiency in Schools: explore efficiency measures in borough-funded schools. The graph included in this memo outlines high use - high energy cost schools likely to produce the greatest opportunities for energy and cost savings.
- 3) Collect Landfill Gas: the collection and use of landfill gas at the central peninsula landfill. would avert both expenses for borough tax payers and carbon emissions.

Add Heat Pumps

Cold climate air source heat pumps can provide significant heating cost savings for Kenai Peninsula Borough schools that are heated with fuel oil and propane. Nanwalek, Seldovia and Port Graham are three high cost - high use schools. Other schools in areas not supplied with natural gas may also benefit from this type of measure.

The RSAC recommends pursuing at least one demonstration project to assist the KPB School District staff in understanding the operation and maintenance of heat pumps for future integration into the schools. The paper also explores potential funding sources for financing the heat pump installations.

Though heat pump technology is not new, improvements over the past 10 years made the technology in cold climates a viable option for space heating. New cold climate testing standards and certifications have improved the ability to model the performance of heat pumps in cold climates. Alaska southcentral coastal regions with modest winter temperatures can achieve higher heat pump efficiencies, thus greater potential savings to investment, than colder more interior regions. These include the communities of Homer, Seldovia, Port Graham, Nanwalek and Seward as prime candidates for heat pumps at this time. MoosePass, Cooper Landing, and Tyonek may be future candidates for this technology

The economics of displacing heating oil or propane from existing boilers with heat pumps will vary depending upon the percent of heating fuel to be displaced. Targeting a displacement of 80% - 90% of the heat load will likely result in the highest return on the heat pump investment. This would assume the existing fuel burning boilers are maintained. In an attempt to achieve 100% of the design heat load will require substantially more investment, with a potential lower return on investment than implementing other energy saving measures available. Adding additional heat pump capacity in the future should be considered in the process.

Utilizing a heat pump calculator developed for Alaska, (<https://heatpump.cf/>) a sample modeling of the economics of utilizing heat pumps in the Port Graham School is provided. Port Graham was selected as it appears to have one of the highest energy costs per square foot of the non-natural gas heated schools. Schools such as Sedovia, Port Graham and Nanwalek utilize propane as a heating fuel source offering even greater cost savings over oil heated schools. Factors such as, logistics of travel and other related issues have not been fully addressed in this paper. Thus, Port Graham was somewhat arbitrarily selected to be evaluated, though the economics are very favorable to all the non-natural gas heated schools within the Kenai Borough.

Analyzing the energy cost between an efficient heat pump (HSPF 11) assuming an electric rate at \$0.25/kWh and both propane and heating oil at \$5.50/gallon for the S. Kachemak Bay schools, estimates the heat pump will require 9 kWh to displace one gallon of propane, and 13 kWh to displace one gallon of heating oil.

Estimated Savings per gallon of are as follows:

Propane : $\$5.50/\text{gal} - (9\text{kWh} \times \$0.25/\text{kWh}) = \$3.25$ per gallon propane displaced

Heating oil : $\$5.50/\text{gal} - (13\text{kWh} \times \$0.25/\text{kWh}) = \$2.25$ per gallon of heating oil displaced.

Many, if not all, of the schools were audited over 10 years ago through the Alaska Housing Finance Corporation (AHFC) energy audit programs. To assist in promoting heat pumps in these schools, RSAC has reached out to AHFC and has expressed an interest in providing follow-up energy audits of these schools with an emphasis on utilizing heat pumps to displace heating oil and propane. These updated on-site audits will provide a more accurate assessment than provided in this brief paper. Timing of such follow-up energy audits is unknown at this time. It should be noted the economic analysis provided in this paper clearly demonstrates the huge potential of savings by utilizing heat pumps and strongly supports moving forward with a demonstration project without waiting for updating the school energy audits.

Assumptions:

From the dated available energy audit information and more recent info from the Borough for the Port Graham School, the heat pump savings analysis assumed a fuel use of 12,000 gallons of propane per year. Conventional 80% gas boilers, with a total school heating design load of 350,000 Btu/hr heating and 12,568 square feet were assumed. The Port Graham school gym is estimated to consume 4000 gallons of propane per year for space heating for this simple analysis.

A single air source heat pump was selected to provide 80%-90% of the heating requirements of the school gym. The heat pump model LG LMU480HHV was selected for the analysis. This model is listed as meeting the EnergyStar Cold Climate Heat Pump requirements, providing some assurance they have been designed and tested for cold outdoor temperatures. Dozens of other makes and models are available and may meet or exceed the efficiency and cold weather performance of the sample model chosen for this analysis.

Cost:

The estimated cost of installing the single 4-ton air source heat pump with two indoor heads in Port Graham is unknown at this time. The estimated cost for installing the unit in Seward AK, with the local heat pump installer would likely be in the \$8,000 - \$10,000 range. A cost of \$15,000 was used for the installation in Port Graham for this analysis. This does not include any outside engineering or project management costs as the project is relatively simple.

Possible other sources of financing:

HEA - Line of Credit Program. (Up to \$10,000, 5yr, 8%)

HEA - Heat Pump Rebate Program (\$1000)

Dept of Energy - Renew America's Schools Grant, FY2024 funding to be announced

RESP - Rural Energy Savings Program USDA-Rural Development

Utility On-bill payment programs - HEA? SES?

Legislative Financing

Green Bank

The Kenai Borough School District should be eligible for a \$10,000 HEA Line of Credit Loan, along with the \$1000 rebate for the demonstration project. The additional cost over the \$10,000 loan could come from the first year fuel cost savings or in-kind installation assistance. A proposal to the HEA Board of Directors for additional loan fund opportunities should be considered as the installation of heat pumps in their service area will result in a substantial benefit in additional sales to the utility.

Efficiency in Schools

The Kenai Peninsula Borough school district spends around \$5.5 million per year to heat and power school buildings, around \$750 per student. Energy efficiency measures could lower these costs, without impacting instruction. Borough schools vary widely in their energy efficiency (measured in cost per square foot), suggesting that there is substantial room for improvement, and savings, in the worse performing schools.

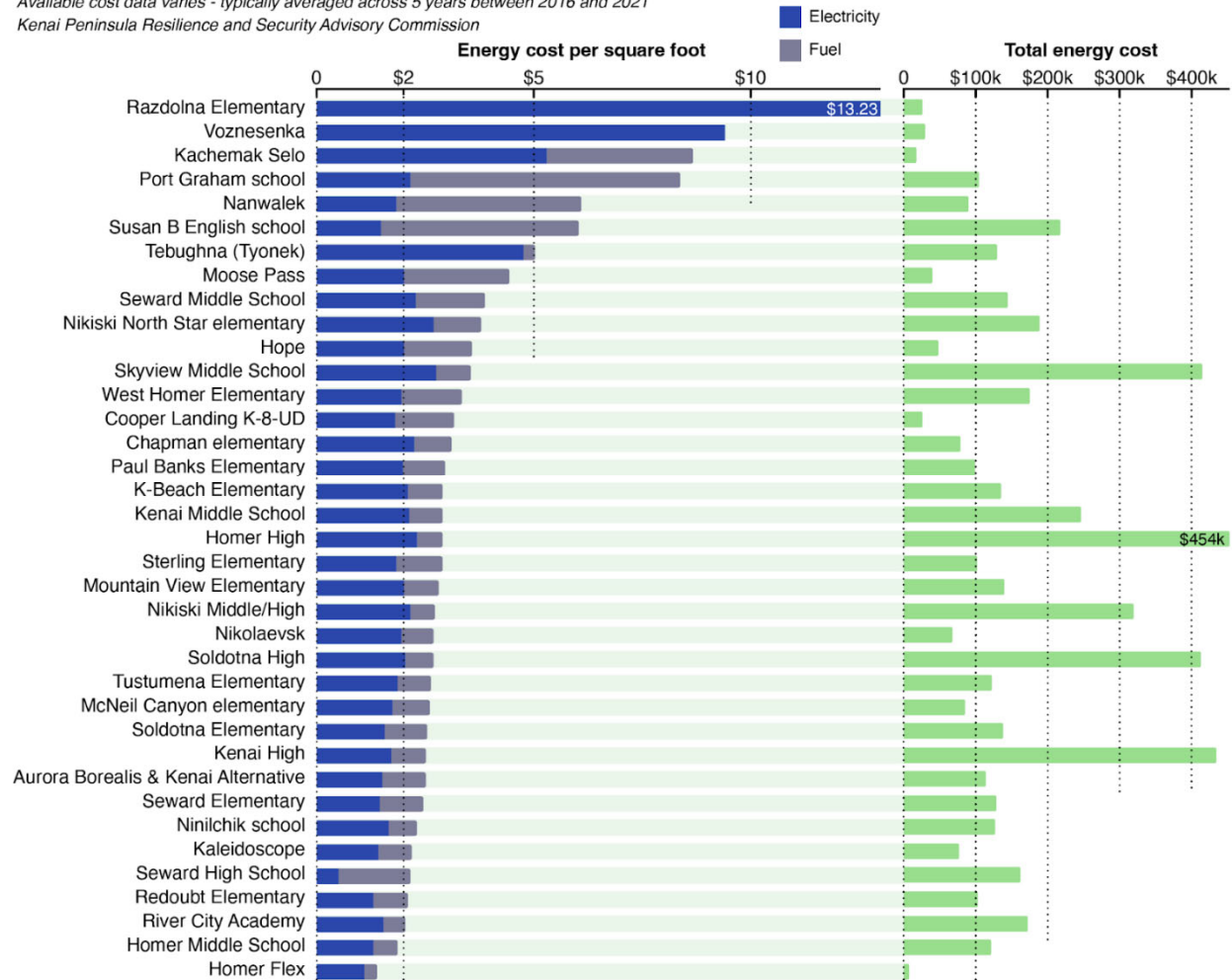
There are near-term grant opportunities that could fund some of these improvements, and the Borough should work quickly to take advantage of them. Funding opportunities for a heat pump pilot program, and energy efficiency measures could be available through the Climate Pollution Reduction Grants administered by the U.S Environmental Protection Agency. The Alaska

Municipal League and the Alaska Dept. of Environmental Conservation are working with local governments on a state-level plan required by the grant. In its meetings with the Alaska Municipal League, the borough should advocate for the inclusion of these projects, which would make it eligible to begin seeking funding for them in spring 2024. Heat pumps and efficiency measures in borough-funded schools would avert both expenses for borough tax payers and carbon emissions. The CPRG program may be a cost-effective way to realize these benefits.

Energy cost for Kenai Peninsula Schools

Available cost data varies - typically averaged across 5 years between 2016 and 2021

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\$8.50 - \$13.50 per square foot. 1% of total district energy costs:

The highest costs per square foot appear to be in Razdolna, Vosnesenska, and K Selo. However, these school buildings are extremely small, and the energy costs may reflect additional satellite buildings not included in the square footage data. The actual budget impact of these schools' energy use is small.

\$5.00 - \$8.50 per square foot. 10% of total district energy costs:

Next are a series of remote off-road-system schools in Port Graham, Nanwalek, Seldovia (Susan B. English), and Tyonek (Tebughna). Costs in these schools are driven largely by expensive heating fuel (propane or oil), and fuel transportation costs. The larger size of these schools make this a more significant piece of the budget. Susan B. English has the 7th highest energy costs in the district, despite its small size. This group, as a whole, makes up around 10% of the district's energy budget (around \$560,000 per year, or \$2900 per student). These schools

are potentially great targets for heat pump heating systems to replace some portion of oil and propane use, as well as for any efficiency improvements that would reduce their heating load.

\$3.00 - \$5.00 per square foot. 20% of total district energy costs:

This group includes road system schools heating with oil or propane, including Hope, Moose Pass, Cooper Landing, and Seward Middle School. These would likely benefit from the same improvements discussed in the previous paragraph. It also includes Nikiski Elementary, Skyview Middle School, West Homer Elementary, and Chapman Elementary. All but Chapman also have high overall energy costs. The reason for their high energy costs is unclear, and these schools may present good opportunities for cost savings.

Pools:

Five of the six schools with swimming pools (Susan B. English, Homer High, Skyview, Nikiski Middle/High, and Soldotna High) are in the top 7 for overall costs. It is unclear how much the pools contribute to the energy costs, but efforts designed to reduce energy use in pools, such as pool covers, may be a cheap way to make large improvements.

Collect Landfill Gas

The Central Peninsula Landfill (CPL) serves the majority of residents on the Kenai Peninsula, and costs Kenai Peninsula Borough taxpayers on average over \$7 million per year to operate. In 2021, the Borough required \$6 million in emergency Covid-relief funds to evaporate increased leachate. Investing in Landfill Gas to Energy (LFGTE) infrastructure at CPL would create significant savings for borough taxpayers by using landfill-sourced methane to evaporate leachate and to generate up to 1.6 megawatts of electricity for HEA members.

HEA and other regional utilities, along with gas distributor ENSTAR, recently commissioned a study of gas supply options, which indicates gas prices are likely to rise significantly in the near future, putting pressure on both electricity and heating costs. By using landfill-produced gas to evaporate leachate, the Borough can avoid exposing tax payers to this rising cost in landfill operations. By using landfill gas for electricity generation, HEA can decrease the exposure of its Ratepayers.

Methane – the byproduct of landfill decomposition and the main component of natural gas – is itself a greenhouse pollutant with roughly 80 times the warming effect of carbon dioxide over a 20 year period. According to the Environmental Protection Agency's Greenhouse Gas Reporting Program, CPL is among the area's major emitters, producing three times as much greenhouse pollution as HEA's nearby natural gas-burning Soldotna Combustion Turbine Plant. About 97 percent of CPL's emissions were methane, which the gas capture project would burn into the less potent carbon dioxide for a net decrease in climate-impacting emissions. Having an inexpensive source of electricity from gas that currently goes to waste and harms air quality would address multiple issues at once.