Heat Pumps in Multifamily Housing
ETIPP Application Narrative

Energy resilience challenges facing Juneau and barriers to address them (such as staff capacity, funding, public policy, stakeholder support): 500 words max

Juneau, Alaska is home to approximately 32,000 residents. Access to Juneau is via plane or ferry – there are no roads connecting Alaska's capital city to other towns. Having to import fuels by air or barge, along with other goods and services, contributes to the high cost of living. Fortunately, one of Juneau's greatest assets is its abundant supply of rain and snow that has been harnessed to produce hydroelectricity. Alaska Electric Light and Power Company (AEL&P), the local electric utility, produces 100 percent of its base-load generation through clean, renewable, and low-cost hydropower. This is accomplished through the operation of five hydropower plants: Snettisham, Lake Dorothy, Annex Creek, Salmon Creek, and Gold Creek. These plants, along with backup diesel plants, feed into the islanded electric grid operated by AEL&P to serve all of Juneau.

In 2018, the City and Borough of Juneau (CBJ) set a goal to obtain 80% of its energy from renewable sources by 2045. The most recent greenhouse gas emissions study conducted on behalf of the CBJ estimates that in 2021, 27% of the energy consumed in Juneau is from electricity and 1% is from wood. The remaining 72% of the energy consumed is from non-renewable, fossil fuel-based sources.

As the community works to achieve the goal of transitioning energy use to 80% renewable, many of the efforts are focused on electrification in the transportation and space heating sectors to take advantage of our clean hydropower. Juneau is a leader in electric vehicle adoption, and many residents are installing heat pumps to compliment or replace their existing space heating systems.

Increasing energy efficiency is a vital component of the successful transition to renewable energy and is often the most cost-effective strategy. While the overall increase in community electricity use has been modest over the past several years (growing by 0.5% on average), peak loads are increasing on the coldest days of the year. By promoting energy efficiency strategies that aim to not only reduce fossil-fuel use, but to also reduce inefficient use of electricity, we can reduce costs for residents while also freeing up that existing electricity supply to support additional fuel-switching.

One sector of the community that is particularly difficult to reach with energy efficiency and electrification efforts is residents of multifamily housing (MFH). Renters are often those with the highest energy burdens, and yet they do not have the ability to make improvements to their properties. Existing programs supporting heat pump adoption serve homeowners, and landlords have little incentive to install heat pumps or perform other energy efficiency measures in a market where affordable housing is scarce. It will take dedicated effort and innovative programs to reach MFH residents.

Define the goals of your project: 250 words max

AEL&P is currently researching the benefits and challenges of adding heat pumps to rental units that are heated by electric resistance. Air source heat pumps provide 2-3 times the heat per

kilowatt-hour compared to the commonly installed electric resistance baseboard heaters, and heat pumps work excellently in our temperate climate in Southeast Alaska. This is a mixed methods study, looking at quantitative data (electricity use) in nineteen rental units both pre- and post-heat pump install and qualitative data (how does this work for renters and landlords?) through surveys and focus groups. Currently, we have 12 units with a full year of pre-heat pump data collected and recently installed heat pumps. We have 7 additional units currently collecting pre-heat pump data, with those heat pump installations set to occur in September. We will continue monitoring whole-home and heating appliance electricity use for a full year after the heat pumps are installed.

Specific activities you envision ETIPP supporting: 250 words max

With an ETIPP project, we would like technical assistance in the following areas:

1. Continued and expanded data analysis on whole unit, baseboard, and heat pump heating circuits for the rental units in our study. This data analysis will focus on energy consumption patterns, weather impacts – particularly during cold snaps – and changes in electricity consumption before and after heat pump installation
2. Outreach and information gathering for other, existing multifamily housing with heat pumps that have been installed (such as the legislative housing building in Juneau's downtown).
3. Development of a best practices guide for installation of heat pumps in MFH for both new construction and retrofit. This guide will into account both design and installation practices as well as operation and maintenance support for renters and landlords.
4. Assessment of the effect of installing EV charging stations of a MFH parking lots in conjunction with heat pump retrofits.

How will results support energy resilience: 250 words max

Access to clean, low-cost hydroelectricity is key to achieving the 80% renewable energy goal. Making the most efficient use of our existing hydroelectric generation resources, transmission and distribution systems, and extending the benefits of energy efficiency and electrification to the entire community are vital components of an equitable and affordable energy transition.

The results of this study will provide quantitative data to support the potential energy and cost savings associated with adding heat pumps and EV charging to existing MFH, and it will provide qualitative data to inform how to incentivize and implement such a program. While this project specifically looks at resistance to heat pump conversions, the results will have application to new construction as well as other types of retrofits, including oil to heat pump conversions.

Who in the community will benefit from the project? How will they benefit? 250 words max

With continued and expanded technical assistance through an ETIPP project, we see the following benefits for the community:

1. This project will focus on spreading the benefits of energy efficient heat pumps to residents of multi-family housing, a difficult segment of the population to reach with current programs and often those with the highest energy burdens.

2. Making the most efficient use of our current hydro resources benefits the entire community by helping to keep costs as low as possible. This case study will document what potential energy savings could come from widespread application of heat pumps in existing MFH.

Who will be negatively impacted by the project? 250 words max

We don't anticipate that anyone will be negatively impacted by the project.

How does your project plan to engage w diverse segments of the community? 250 words max

Through project development and implementation, the project has already engaged the following segments of the community:

1. Landlords, through recruitment efforts and interviews with participants
2. Renters, through pre- and post- install interviews with participants
3. Contractors – heat pump installers and electricians
4. Municipality (CBJ)
5. Community groups (Alaska Heat Smart, Southeast Conference, Renewable Juneau)

As part of an ETIPP project, AEL&P will continue and expand engagement with each of these community groups through public meetings and focused outreach.

Do you have or plan to seek other sources of funding or support to complement the TA provided by ETIPP? 250 words max

We are already working with NREL data analysts on the pre-heat pump data that has been collected and Information Insights on the surveys. The project is currently funded internally. The results of the study will provide the basis for future grant applications. AEL&P is also preparing a grant application under DOE's Communities Taking Charge funding opportunity to pursue planning and implementation of direct-to-customer EV charging to serve MFH.