Kingston clean electricity

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To help the city of Kingston, New York, achieve its clean energy goal, NREL analyzed its low-income energy affordability, energy efficiency opportunities, and local economic impact.

In 2017, Kingston committed to achieving 100% clean energy by 2050 with a focus on equity and energy efficiency. City officials outlined the following three priorities in achieving the clean energy goal:

The city"s focus on equity led to an exploration of energy burden. To do so, NREL used the Low-Income Energy Affordability Data (LEAD) Tool. The online tool--developed by NREL and funded by the U.S. Department of Energy (DOE)--help stakeholders improve their understanding of household energy characteristics.

The percentage of household income spent on energy expenses (electricity and home fuels). Generally, a household energy burden over 6% is considered unaffordable. Energy burden does not account for the households that are going without essential energy services (by actively choosing to go without or by lack of access).

Kingston has a higher energy burden among low-income households as compared to state or national averages. In the city, 43% of households spend more than 9% of their annual income on utility bills according to the LEAD Tool. Figure 1 illustrates that Kingston has an average higher energy burden across all levels of Area Median Income (AMI) than New York state or the United States. Owner-occupied households earning 0% to 30% of AMI (about 400 households) spent an average of 31% of income on utility bills in Kingston. Approximately 1,470 renter-occupied households in this same income category spent an average of 17% of annual income on utility bills.

Figure 1: Average Energy Burden for Kingston vs. New York vs. the United States by AMI and renter-occupied versus owner-occupied according to the LEAD Tool

NREL provided detailed analysis of a cohort of buildings to determine how energy efficiency measures could be best implemented to meet the city"s clean energy and equity goals. Energy efficiency analyses of residential, commercial, and city buildings demonstrated high energy and cost savings potential in the city"s mostly older building stock.

Analysis indicated that mini-split heat pumps increase efficiency and lower energy bills. For the 15 Land Bank buildings, replacing boilers/furnaces and air conditioning units with mini-split heat pumps for heating and

cooling reduced per building energy consumption by an average of 50%. Ductless mini-split heat pumps avoid energy losses associated with the ductwork of central forced air systems. According to DOE"s Energy Saver website, duct losses can account for more than 30% of energy consumption for space conditioning.

NREL also analyzed 11 city-owned buildings and found that investing $586,000 in energy efficiency measures (e.g. lighting, heat pumps, and control systems) would save the city approximately $85,000 annually in energy costs.

In addition to savings resulting from energy efficiency improvements, the analysis considered job creation. The job creation analysis was informed by the BEoptanalysis, and the employment multiplier approach, which assumes that every million-dollar investment in energy efficiency in 2019 yields approximately 5.5 direct jobs and 10.9 indirect jobs according to the Economic Policy Institute. This analysis is consistent with job development estimates completed using BEoptand a project labor percentages approach. A project labor percentages approach accounts for the local labor market and the percentage of project costs represented by labor expenditures. NREL assumed that 40%-70% of total project costs were spent on labor.

These two approaches determined that approximately 20, one-year, full-time-equivalent jobs could be developed in the community by pursuing the efficiency opportunities for the 24 Land Bank and city buildings. In addition, 120-470, one-year, full-time-equivalent jobs could be developed by implementing rooftop solar and efficiency projects in the Midtown district of Kingston.