Selawik
Akuligaq

Native Village of Selawik:
907-484-2165
City of Selawik:
907-484-2132
AVEC:
907-561-1818

Demographics –
Native Village Status: Federally Recognized Tribal Council
Alaska Native Name: Akuligaq
Population: 845
Avg. Household Size: 4.8
Median Household Income: $35,625

Access –
Barge Access: Seasonal
Runway Ownership: City / State
Runway Surface: Gravel
Runway 1: 3,000 ft x 60 ft
Runway 2: 2,659 ft x 60 ft

Climate –
Average Summer Temperature: 54 °F
Average Winter Temperature: -3 °F
Heating Degree Days: 15,812

Heat & Power Costs (2021) –
Cost of Diesel Fuel: $5.30 per gal
Cost of Gasoline: $6.36 per gal
Cost of Electricity: $0.58 per kWh
Cost of Electricity, after PCE: $0.25 per kWh

Tank Farm -
Ownership: City of Selawik, Native Village of Selawik, AVEC, Native Store, National Guard, Northwest Arctic Borough School District (NWABSD)
Bulk Fuel Capacity:

Owner	Fuel	Capacity (gal)
City of Selawik	-	-
Native Village of Selawik	-	26,000
AVEC	Diesel	138,900
Native Store	-	9,800
National Guard	Gasoline	8,500
Other	-	353,500

Condition: Acceptable

Electric Utility –
Alaska Village Electric Cooperative (AVEC)

Power Demand (2020) –
Average Summer Load: 271 kW
Average Winter Load: 516 kW
Peak Summer Load: 290 kW
Peak Winter Load: 612 kW
Total Power Generated: 2,795,072 kWh

Power System (2020) –
Fuel Efficiency: 13.85 kWh/gal diesel
Line Loss: 4.3%
Number of Community Buildings on PCE:
Community PCE kWh Use of Total Allowed: 69% (489,473 kWh / 709,800 kWh)

Power Generation Infrastructure –
Diesel Engines:

Manufacturer	Model	Capacity
Detroit Diesel	S60K4 1800	363 kW
Cummins	QSX15 G9	499 kW
Cummins	K38G4 1800	900 kW

Wind Turbine(s):

Manuf.	Model	Capacity	Qty.	Condition	Year Built
AOC	15/50	50 kW	4	Non-functional	2006

Solar PV: 9.72 kW installed for water plant, behind the meter
Battery Storage System: None

Heat Recovery –
Facilities Served: Water Treatment Plant, Power Plant
Opportunity to Expand Waste Heat: Yes

Water & Wastewater –
Ownership: City of Selawik
Water System: Circulating Loop(s)
Wastewater System: Vacuum

Selected Projects –

LED Streetlight Retrofit Borough-Wide – *Completed 2015*

- Installed 46 LED streetlights in Selawik
- 25-year community savings: ~$5M & ~1.9 gal diesel
- State of Alaska, Grants to Municipalities
    - Funding awarded 2014
    - $200,000 awarded to Northwest Arctic Borough

Water Plant Solar PV – *Completed 2014*

- 9.72 kW solar PV installed
- Average 12.7 kWh/day; still operational
- Coastal Impact Assistance Program (CIAP)
    - Funding awarded 2009
    - $77,610 awarded

Wind/Diesel Microgrid– *Completed 2006*

- Installed 4 Atlantic Orient Company 50 kW wind turbines
- Integrated turbines with microgrid
- Displaced 18,000+ gallons of diesel fuel annually (projected)
    - Currently non-functional
        - High maintenance costs and siting issues
- Denali Commission; Alaska Village Electric Cooperative (AVEC)
    - $1 million awarded in 2005 by Denali Commission
    - $325,000 contributed in 2005 by AVEC

Future Projects –

Solar PV and Battery Storage

- Conduct feasibility study to ensure project viability
    - HOMER modeling and feasibility study completed, 2020
- Design and permit solar PV and battery storage
    - Application submitted for Alaska Energy Authority Renewable Energy Fund 14
- Construct solar PV and battery storage; establish Independent Power Producer
    - Identify funding
    - Decrease energy costs and enhance power system resiliency

Residential Heat Trace Design Upgrade

- Survey residential heat trace infrastructure and operation
    - Focus on north end of town where freeze-ups are most common and severe
- Design and implement improved system to maintain water system functionality in winter
    - Reduce energy consumption and enhance reliability

Community-Wide Residential LED Lighting Upgrade

- Upgrade all residential lighting fixtures to energy efficient LED lighting
    - Survey type and quantity of lighting fixtures in all homes

- Apply for Village Improvement Fund support
- Procure and install energy efficient lighting
    - Reduce residential electricity costs

Energy Audits

- Conduct additional energy audits
    - Health clinic, school, sewer building, and City offices
- Complete energy efficiency recommendations to reduce heating and operational costs

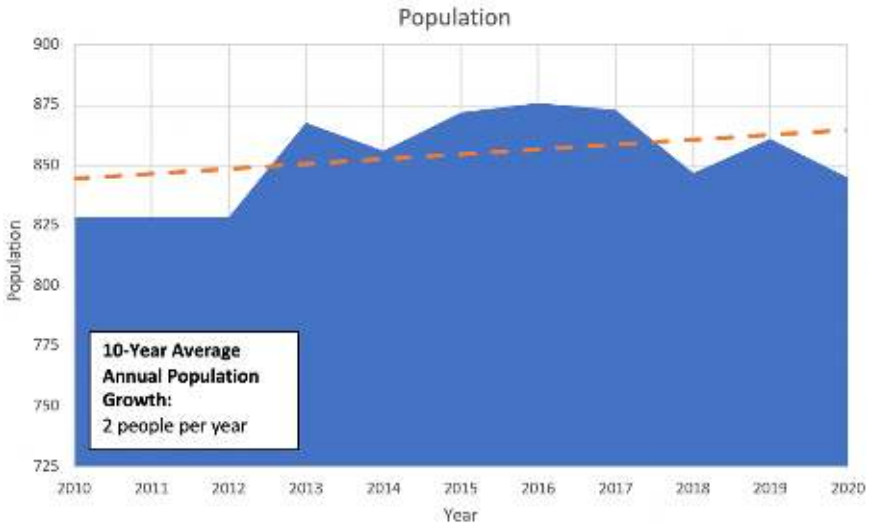
Milestones –

- Installed first solar PV in Selawik, *Completed 2014*
- Installed first wind turbines in Selawik, *Completed 2006*

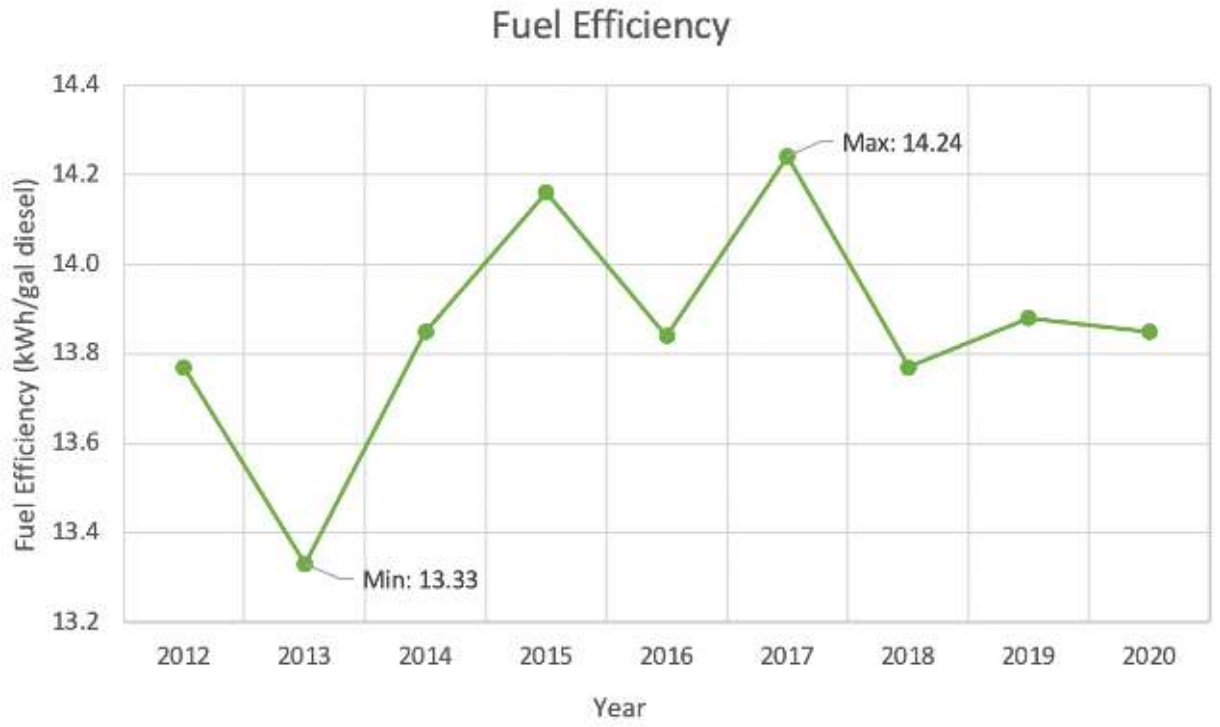
Community Goals –

- Enhance the resiliency of the power system
    - Repair and/or overhaul existing generators to enhance reliability
    - Upgrade generator controllers from EGCP2 to ComAp
- Reduce cost of residential space and water heating
    - Develop renewable energy microgrid
    - Implement energy efficiency measures
    - Maintain and/or replace aging residential heating appliances
- Enhance energy efficiency of water and sewer systems
    - Reduce number of water and sewer freeze-ups
- Develop renewable energy microgrid
    - Solar PV and battery storage
    - Develop Independent Power Producer agreement to sell power to AVEC
- Engage youth in community energy systems
    - Continue to host Environmental Focus Group for youth

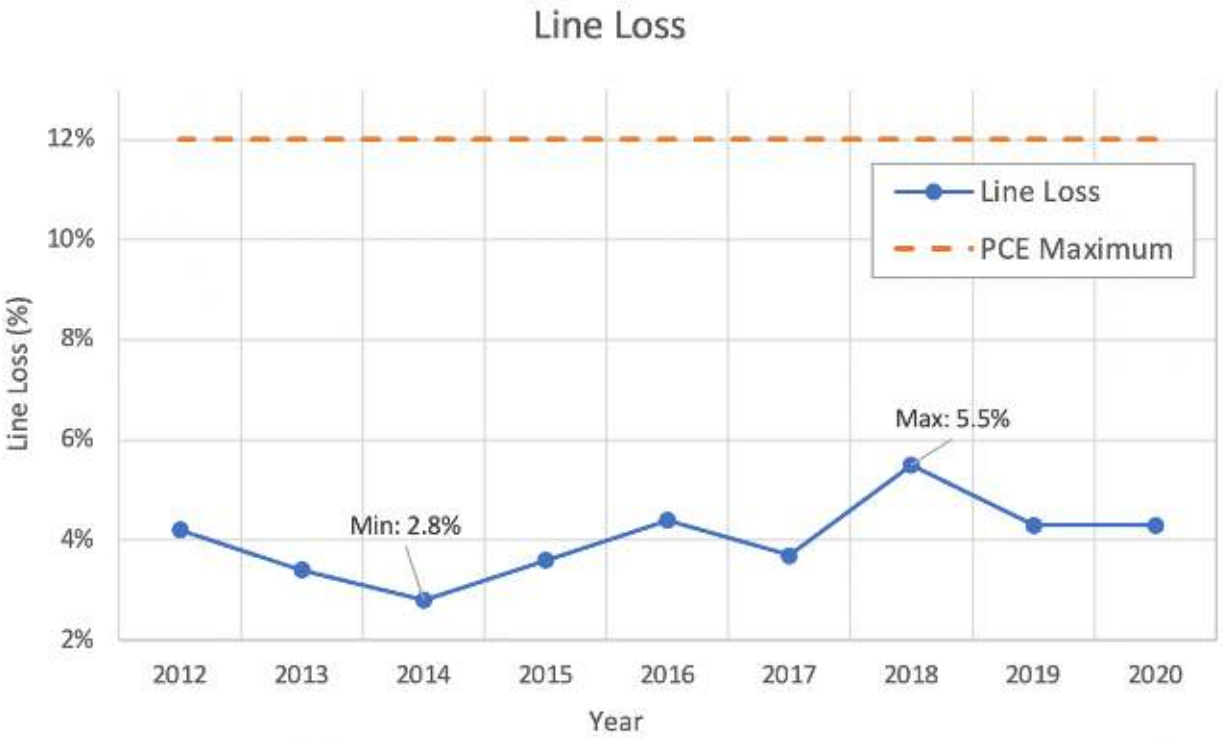
Energy System Trends –



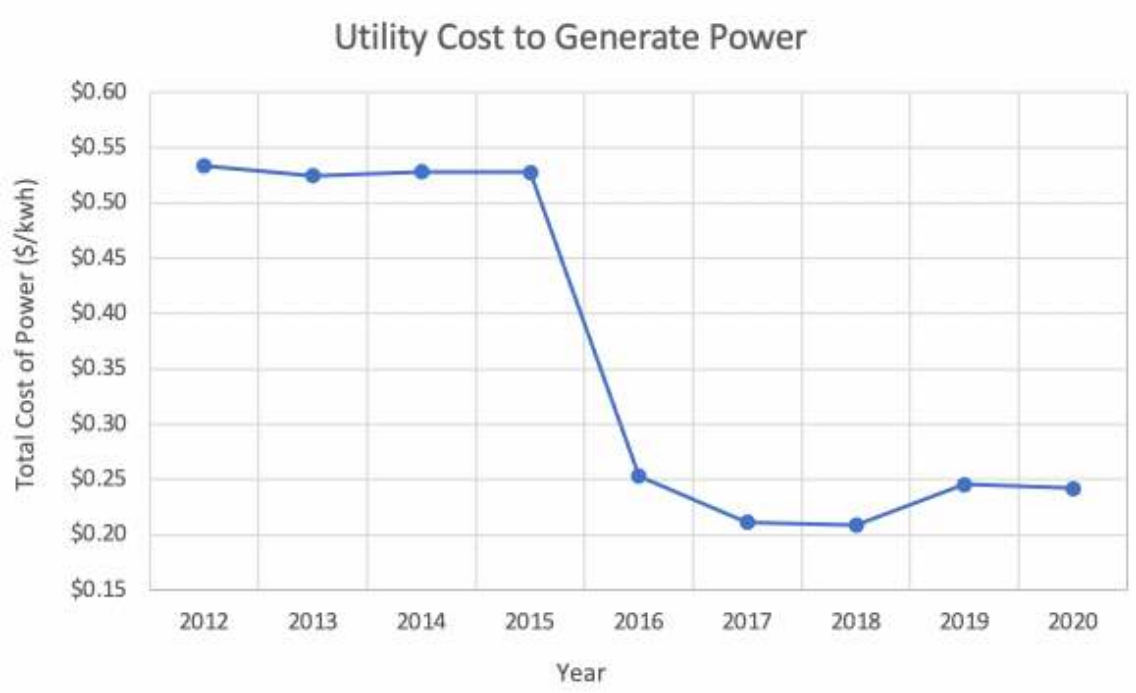
Dramatic changes in population impact the long-term community planning necessary to meet future power demand. The population in Selawik has fluctuated year-to-year, but over the last ten years the population has increased an average of 0.2% each year.



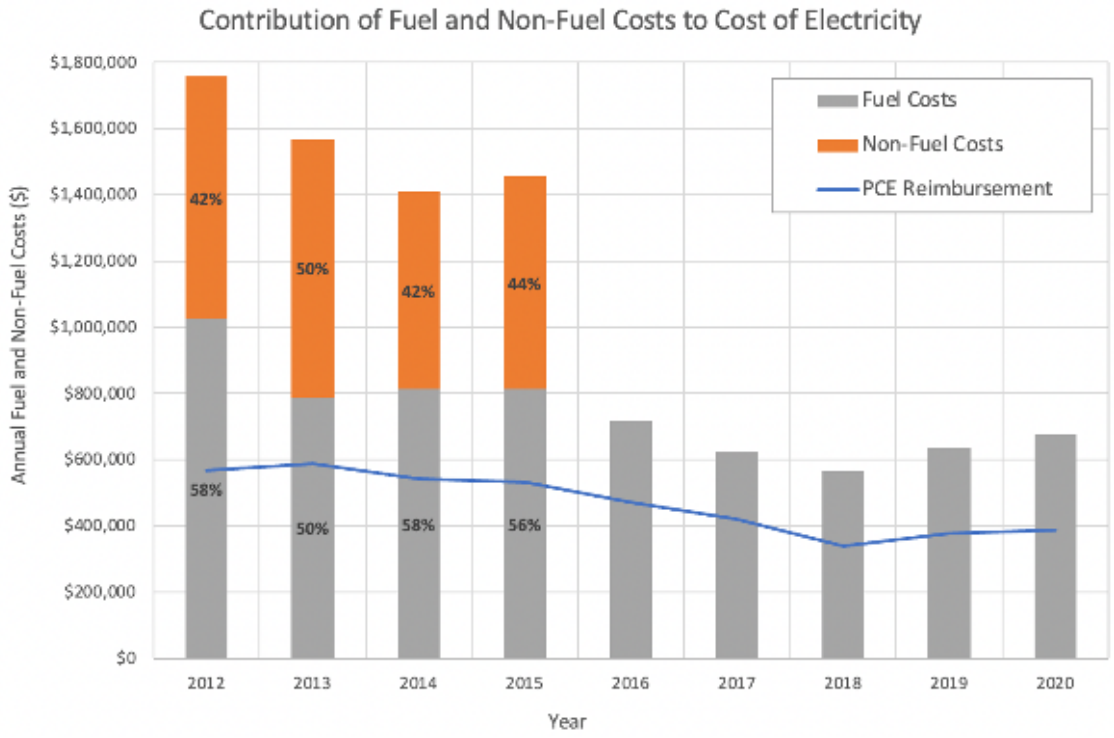
A higher fuel efficiency results in less diesel fuel use and a lower cost to generate power. A fuel efficiency below 12 kWh/gal is poor; a fuel efficiency above 14 kWh/gal is excellent. The fuel efficiency in Selawik is excellent with values that are typically near 14 kWh/gal.



The maximum allowable line loss to maintain eligibility for PCE benefits is 12%. In Selawik, the line loss is very low and has been very low for the past nine years, indicating the distribution system is in good condition and all power use is accounted for.

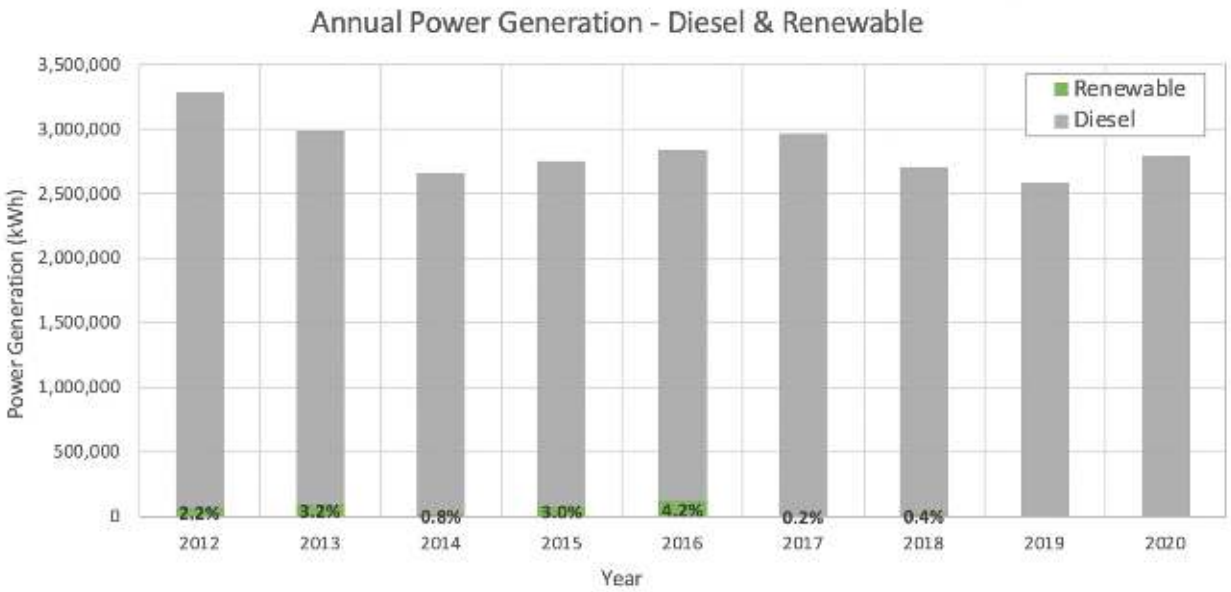


Over the long-term, a lower utility cost to generate power typically correlates with a lower cost of electricity for residents. The major factors that affect the cost to generate power are the cost of fuel, generator fuel efficiency, maintenance, and operations. Major system breakdowns may cause the cost to generate power to spike on a particular year, as will high fuel prices. In Selawik the cost to generate power was consistent from 2012 to 2015. The low costs to generate power from 2016 to 2020 are misleading as they do not include the cost of fuel, whereas the previous years do, as shown below.

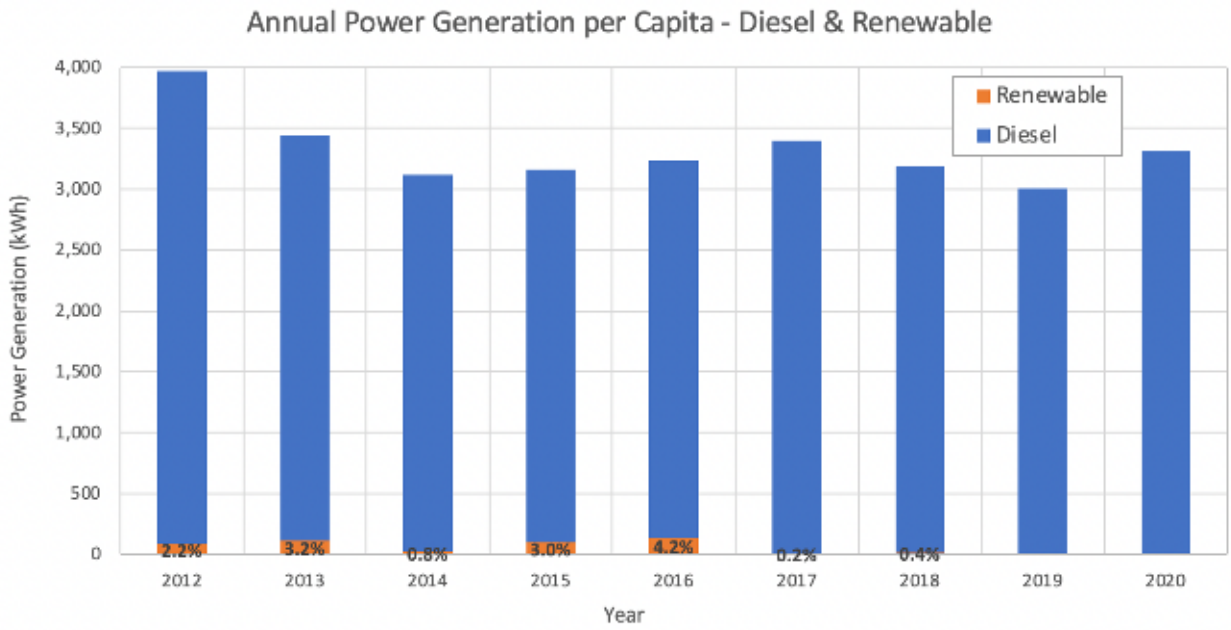


For many utilities, the non-fuel costs associated with generating power do not change dramatically each year. Fuel costs, on the other hand, are highly susceptible to annual fluctuations based on the global price of fuel, transportation costs, and the amount of power generated. PCE reimbursement is meant to offset the high fuel costs in rural Alaska. As the overall efficiency of the system increases, the PCE reimbursement offsets a larger portion of the total fuel costs. In Selawik, no non-fuel costs were reported

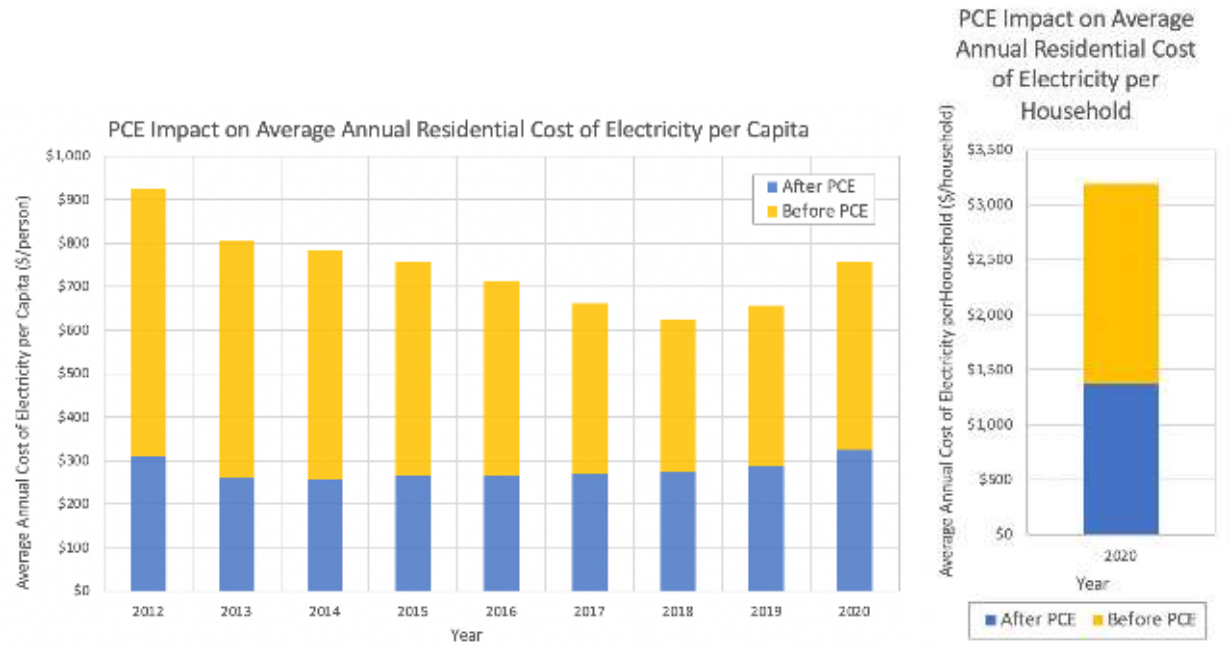
starting in 2016. This is because in 2016 AVEC started reporting fuel costs for all communities in a summarized report rather than individually for PCE reporting.



Renewable sources of power generation reduce diesel fuel use and can increase resiliency, in addition to offering many other benefits. The portion of power that is generated by renewable energy sources depends both on the capacity of the installed infrastructure as well as the performance of that infrastructure. In this way, the renewable energy generated may vary annually depending on the availability of the resource and availability of the equipment. From 2012 to 2018 renewable energy was generated by wind turbines. The wind turbines are no longer functional. No renewable energy has been generated at the utility scale in Selawik since 2019.



In general, people choose to power more electric devices each year, so the power generation per capita is expected to increase over time. When power generation per capita instead decreases over time, it is often correlated with reductions in power consumption as a result of energy efficiency upgrades. Power generation is also affected by the weather and corresponding heating needs each year. Power generation per capita in Selawik has fluctuated over the last nine years, but has been trending downward since 2017, excluding 2020.



The PCE reimbursement reduces the residential cost of electricity by a different amount each year. In communities where the main factor that affects the cost of power is the price of fuel, the PCE reimbursement will tend to levelize the residential cost of electricity from one year to the next. This is the case in Selawik, where the residential cost of electricity per capita after PCE has remained steady for the last nine years between $250 and $350 per year.