

Noatak

Nautaaq

Native Village of Noatak:

907-485-2173

AVEC:

907-561-1818

Demographics –

Native Village Status: Federally Recognized Tribal Council

Alaska Native Name: Nautaaq

Population: 581

Avg. Household Size: 4.4

Median Household Income: \$52,500

Access –

Barge Access: None (all fuel flown in)

Runway Ownership: State

Runway Surface: Gravel

Runway 1: 3,992 ft x 60 ft

Runway 2: None

Climate –

Average Summer Temperature: 52 °F

Average Winter Temperature: -2 °F

Heating Degree Days: 15,229

Heat & Power Costs (2021) –

Cost of Diesel Fuel: \$9.26 per gal

Cost of Gasoline: \$9.26 per gal

Cost of Electricity: \$0.87 per kWh

Cost of Electricity, after PCE: \$0.26 per kWh

Tank Farm -

Ownership: Northwest Arctic Borough School District (NWABSD), Native Store, AVEC, Noatak IRA Council

Bulk Fuel Capacity:

Owner	Fuel	Capacity (gal)
Noatak IRA Council	Diesel	10,000
NWABSD	Diesel	101,500
Native Store	Gasoline	23,000
Native Store	Diesel	23,000
AVEC	Diesel	95,300

Condition: Deteriorating, near shoreline erosion

Electric Utility –

Alaska Village Electric Cooperative (AVEC)

Power Demand (2020) –

Average Summer Load: 219 kW

Average Winter Load: 315 kW

Peak Summer Load: 224 kW

Peak Winter Load: 395 kW

Total Power Generated: 1,859,085 kWh

Power System (2020) –

Fuel Efficiency: 14.30 kWh/gal diesel

Line Loss: 6.5%

Number of Community Buildings on PCE: 7

Community PCE kWh Use of Total Allowed: 34%
(166,966 kWh / 488,040 kWh)

Power Generation Infrastructure –

Diesel Engines:

Manufacturer	Model	Capacity
Detroit Diesel	S60D3 1800	314 kW
Cummins	QSX 15 G9	499 kW
Caterpillar	3456	455 kW

Wind Turbine(s): None

Solar PV: 11.27 kW installed for water plant, behind the meter

Battery Storage System: None

Heat Recovery –

Facilities Served: Water Treatment Plant

Opportunity to Expand Waste Heat: Yes

Water & Wastewater –

Ownership: Native Village of Noatak

Water System: Circulating Loop(s)

Wastewater System: Gravity

*No City of Noatak phone number is provided because the community does not have a City government.

Selected Projects –

Solar PV Array and Battery – *Expected 2023*

- Install 275 kW solar PV and inverters
- Install 500 kW/460 kWh battery storage system
- Upgrade switchgear, *Completed 2021*
- Estimated annual savings: \$178,000 & 18,840 gal of diesel
- Awards: DOE Office of Indian Energy; Village Improvement Fund
 - \$2 million awarded in 2021 by DOE OIE
 - \$310,000 awarded in 2021 by Village Improvement Fund
- Requests: Teck; Denali Commission
 - \$382,500 requested in 2022 from Denali Commission
 - \$250,000 requested in 2022 from Teck



Bulk Fuel Concept Design Report – *Completed 2018*

- Recommended to construct new tank farm at new airport
- Recommended to construct new AVEC tank farm
- Recommended to upgrade Native Store and WTP tank farms
- Alaska Village Electric Cooperative (AVEC)



LED Streetlight Retrofit Borough-Wide – *Completed 2015*

- Installed 22 LED streetlights in Noatak
- 25-year community savings: ~\$2.4M & ~925,000 gal diesel
- State of Alaska, Grants to Municipalities
 - Funding awarded 2014
 - \$200,000 awarded to Northwest Arctic Borough



Water Plant Solar PV – *Completed 2013*

- 11.27 kW solar PV installed
- Average 19.1 kWh/day; still operational
- Coastal Impact Assistance Program (CIAP)
 - Funding awarded 2009
 - \$87,925 awarded



Bulk Fuel Storage Assessment – *Completed 2015*

- 6 tanks evaluated
- Condition ranges from deteriorating – acceptable
- Alaska Energy Authority (AEA)



Future Projects –

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

Water Treatment Plant Upgrade

- Water treatment plant (WTP) will be reinforced or relocated due to unstable ground
 - Changes in permafrost and erosion threaten stability of WTP
 - The well is not producing enough water
 - Opportunity to prioritize energy efficiency upgrades in facility upgrade
 - Energy efficient construction
 - Optimize recovered heat system

New Fuel Line / Power Plant Relocation

- Construct a new fuel line from the new airport to the AVEC bulk fuel tanks
 - Flown-in fuel necessitates new fuel line from new airport
- Power plant relocation
 - Currently built on land that is eroding into the Noatak River and at risk of flooding
 - AVEC interested in relocating power plant and new bulk fuel tank siting

Residential Energy Efficiency Upgrades

- Residents interested in energy efficiency measures to reduce cost of energy
 - Additional LED lighting retrofits
 - Additional tools to understand energy use
 - In-home power consumption meter

Milestones –

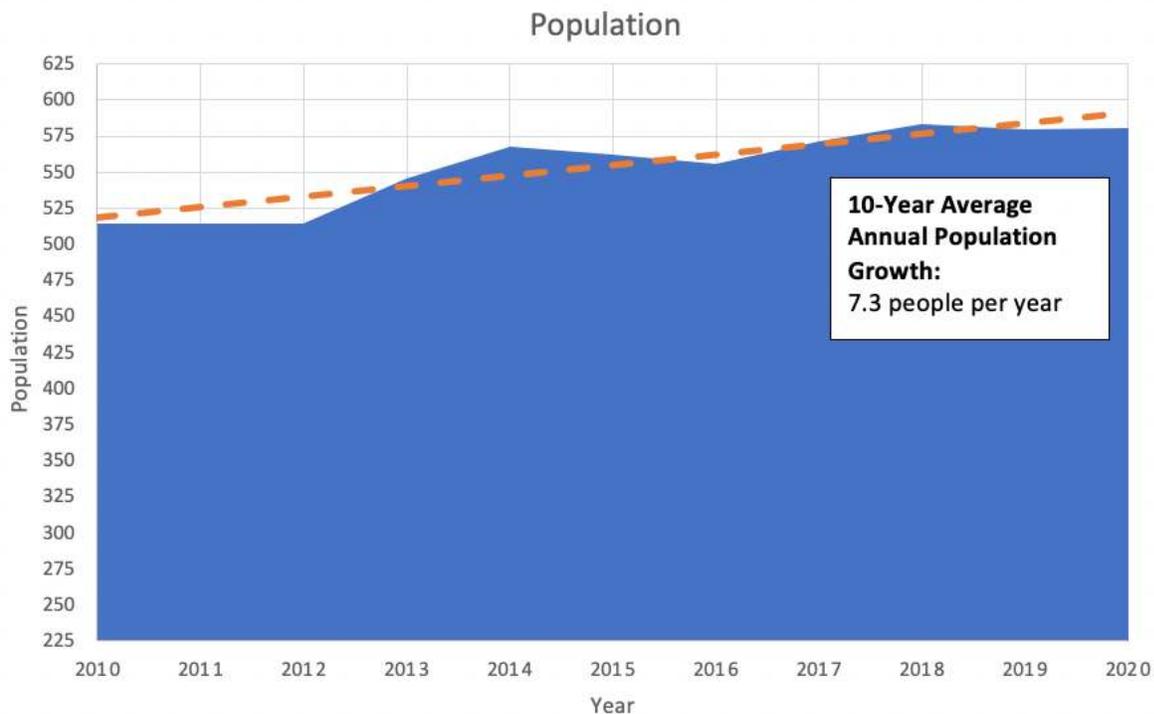
- Installed first solar PV in Noatak – *Completed 2015*

Community Goals –

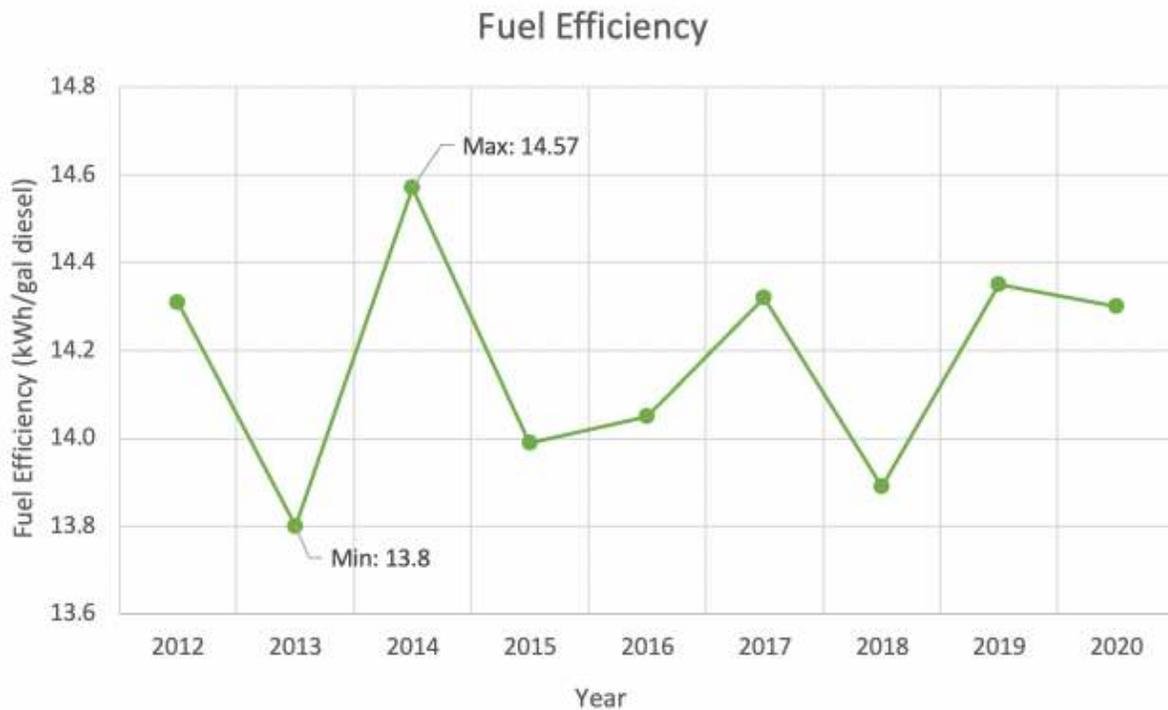
- Reduce cost of residential space and water heating
 - Develop renewable energy microgrid
 - Implement energy efficiency measures
 - Maintain and/or replace aging residential heating appliances
- Enhance resiliency of residential heating by diversifying heating appliances and fuel types
- Develop long-term strategies to mitigate the high costs and delivery frequency of flown-in fuel
 - Construct new fuel line
 - Additional sources of renewable energy
 - Reduce fuel consumption through energy efficiency upgrades
- Develop renewable energy microgrid
 - Solar PV and battery storage
 - Develop Independent Power Producer agreement to sell power to AVEC

- Improve energy efficiency of water and sewer systems
- Enhance funding to support local AVEC operator
 - Expand responsibilities to include operation and maintenance of solar PV and battery systems
 - Create additional training opportunities for operators to enhance skills and understanding of microgrid
- Partner with Northwest Inupiat Housing Authority to implement policy changes to prioritize and invest in energy efficiency in newly constructed home

Energy System Trends –



Dramatic changes in population impact the long-term community planning necessary to meet future power demand. The population in Noatak is not changing dramatically. Over the last ten years the population has increased an average of 1.4% each year.

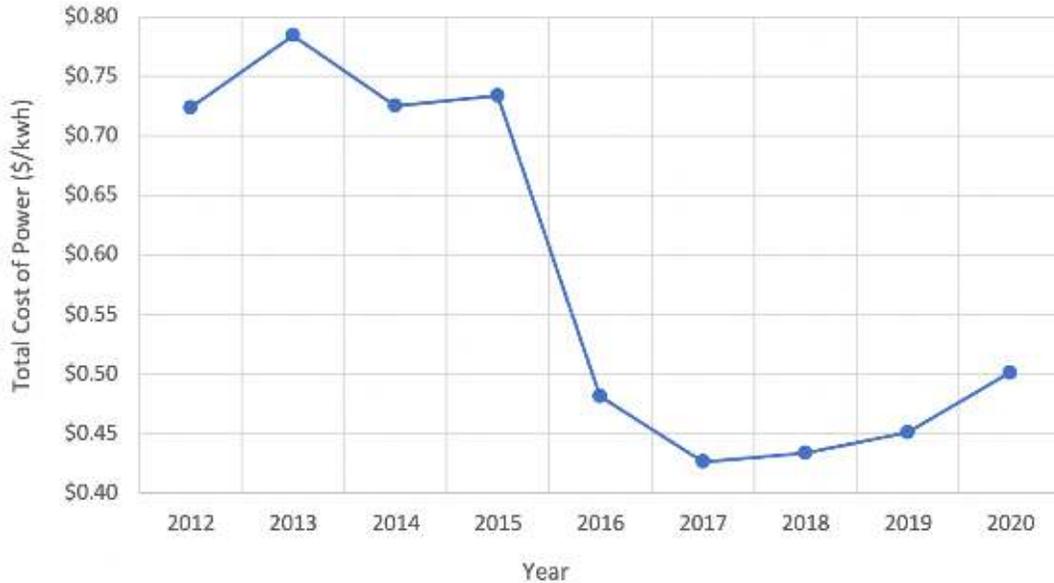


A higher fuel efficiency results in less diesel fuel use and a lower cost to generate power. A fuel efficiency below 12 kWh/gal is poor; a fuel efficiency above 14 kWh/gal is excellent. The fuel efficiency in Noatak is excellent, with values that in most years exceed 14 kWh/gal of diesel.



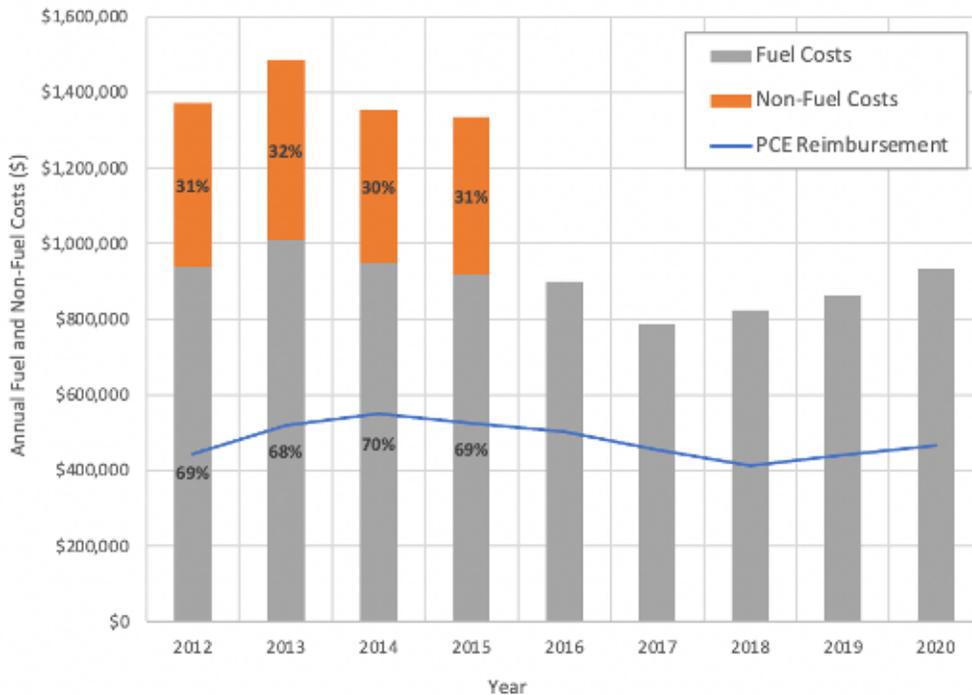
The maximum allowable line loss to maintain eligibility for PCE benefits is 12%. In Noatak, the line loss is very low and has been very low for the past nine years, indicating the distribution system is in good condition and all power use is accounted for.

Utility Cost to Generate Power



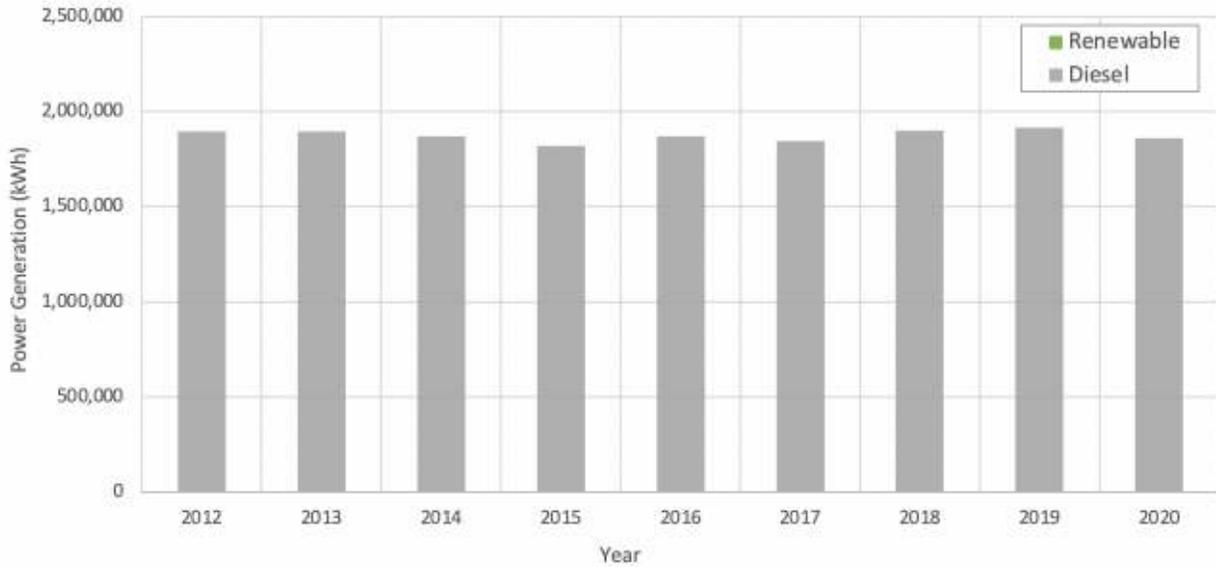
Over the long-term, a lower utility cost to generate power typically correlates with a lower cost of electricity for residents. The major factors that affect the cost to generate power are the cost of fuel, generator fuel efficiency, maintenance, and operations. Major system breakdowns may cause the cost to generate power to spike on a particular year, as will high fuel prices. In Noatak 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.

Contribution of Fuel and Non-Fuel Costs to Cost of Electricity



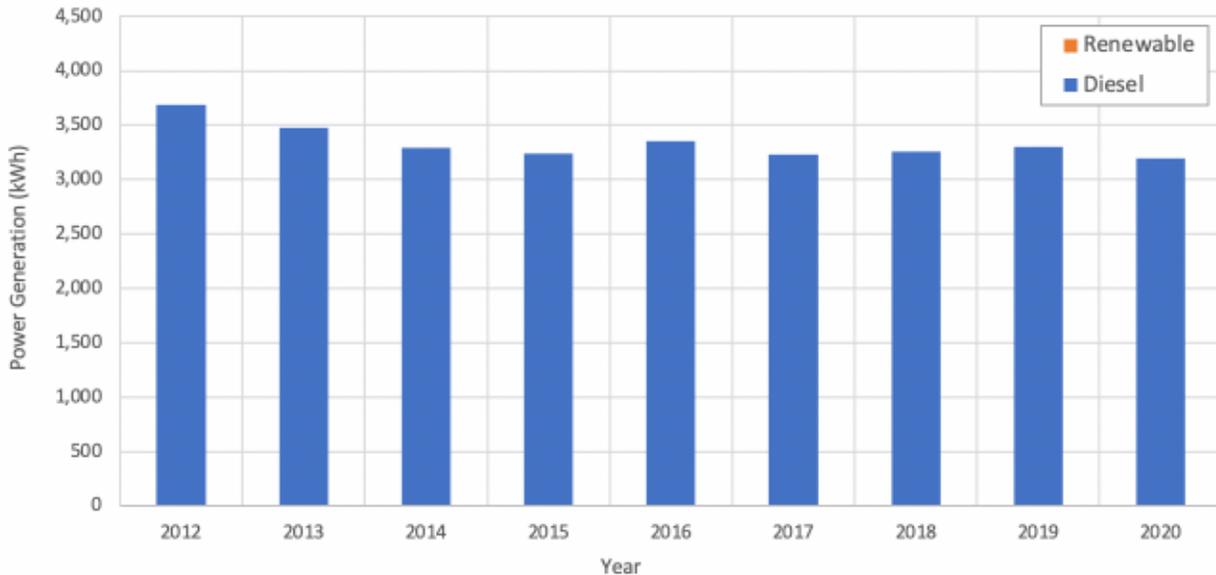
For many utilities, the non-fuel costs associated with generating power do not change dramatically each year. Fuel costs, on the other hand, are highly susceptible to annual fluctuations based on the global price of fuel, transportation costs, and the amount of power generated. PCE reimbursement is meant 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 Noatak, 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.

Annual Power Generation - Diesel & Renewable

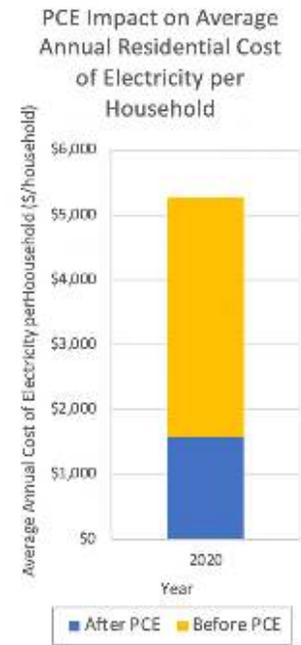
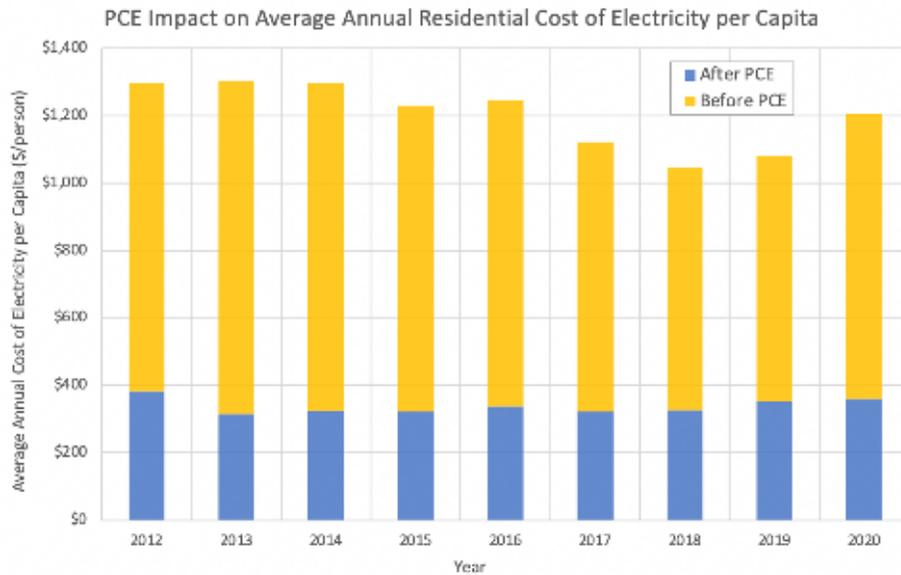


Renewable sources of power generation reduce diesel fuel use and can increase resiliency, in addition to offering many other benefits. The portion of power that is generated by renewable energy sources depends both on the capacity of the installed infrastructure as well as the performance of that infrastructure. In this way, the renewable energy generated may vary annually depending on the availability of the resource and availability of the equipment. There is no renewable power generation at the utility scale in Noatak. All of the power is generated by diesel generators. The total power generated has fluctuated minimally year-to-year since 2012. The amount of renewable energy generation is expected to significantly increase in 2022 or 2023 with the installation of a large solar PV and battery system.

Annual Power Generation per Capita - Diesel & Renewable



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 Noatak has been nearly unchanged since 2014.



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 Noatak, where the residential cost of electricity per capita after PCE has remained steady for the last nine years between \$300 and \$400 per year.