Evaluating potential energy projects with the Alaska Affordable Energy Model

AkAES Advisory Group
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Energy Planning Manager

ALASKA ENERGY AUTHORITY

Alaska Affordable Energy Model, what is it?

- Being developed for the Alaska Affordable Energy Strategy to assist in making state energy policy decisions
- Best data available for consumption, generation, and costs
- All communities outside of Railbelt

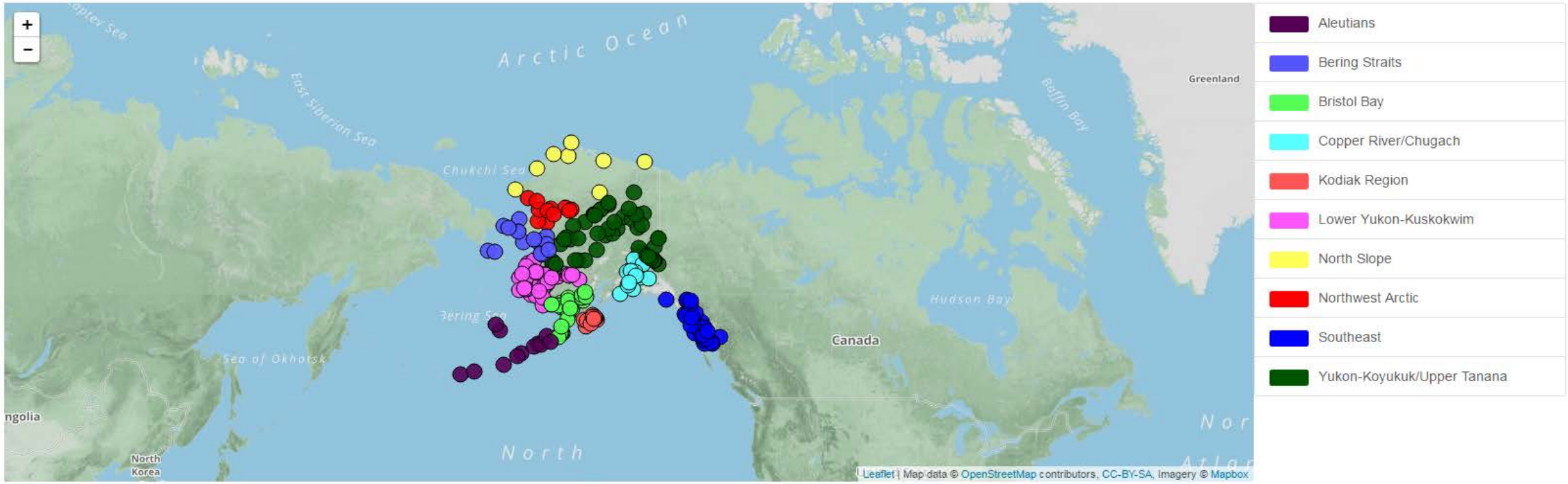
Help communities evaluate energy infrastructure projects that may reduce the cost of energy

Still in beta testing

Alaska Affordable Energy Model

Message about data used for the model

The results presented here a generated from available data on population, consumption, generation, and information on a technologies analyzed. For some communities this information may be incomplete. If you have, or know of a source of data that could help improve the model please contact The Alaska Energy Authority .



Generated from Model Version 0.22.2 and Data Version 0.22.2 on 2016-11-29

Community overview

Demographics	
Population 2010	662
Households 2010	270
Financial	
Diesel fuel cost 2015	$2.85/gallon
Heating fuel cost 2015	$3.29/gallon
Electricity cost 2015	$0.40/kWh
Consumption	
Total electricity consumption 2013	5,555,505 kWh
Estimated residential heating fuel 2017	239,798 gallons
Estimated non-residential heating fuel 2017	320,154 gallons
Estimated utility diesel 2017	453,624 gallons
Generation	
Total generation kWh 2013	6,275,571
Average load kW 2013	unknown
Generation diesel kWh 2013	6,275,571 kWh
Generation hydro kWh 2013	0 kWh
Generation wind kWh 2013	0 kWh
Diesel generator efficiency 2013	14.92 kWh/gallons
Line losses estimated 2013	11.47%

Alaska Affordable Energy Model | Communities | Regions | State Senate Districts | State House Districts

Yakutat Overview

Summary | Efficiency Projects | Electricity Projects | Heating Projects

- Overview
- Financial and Demographic
- Consumption
- Generation
- Potential Projects

Community overview

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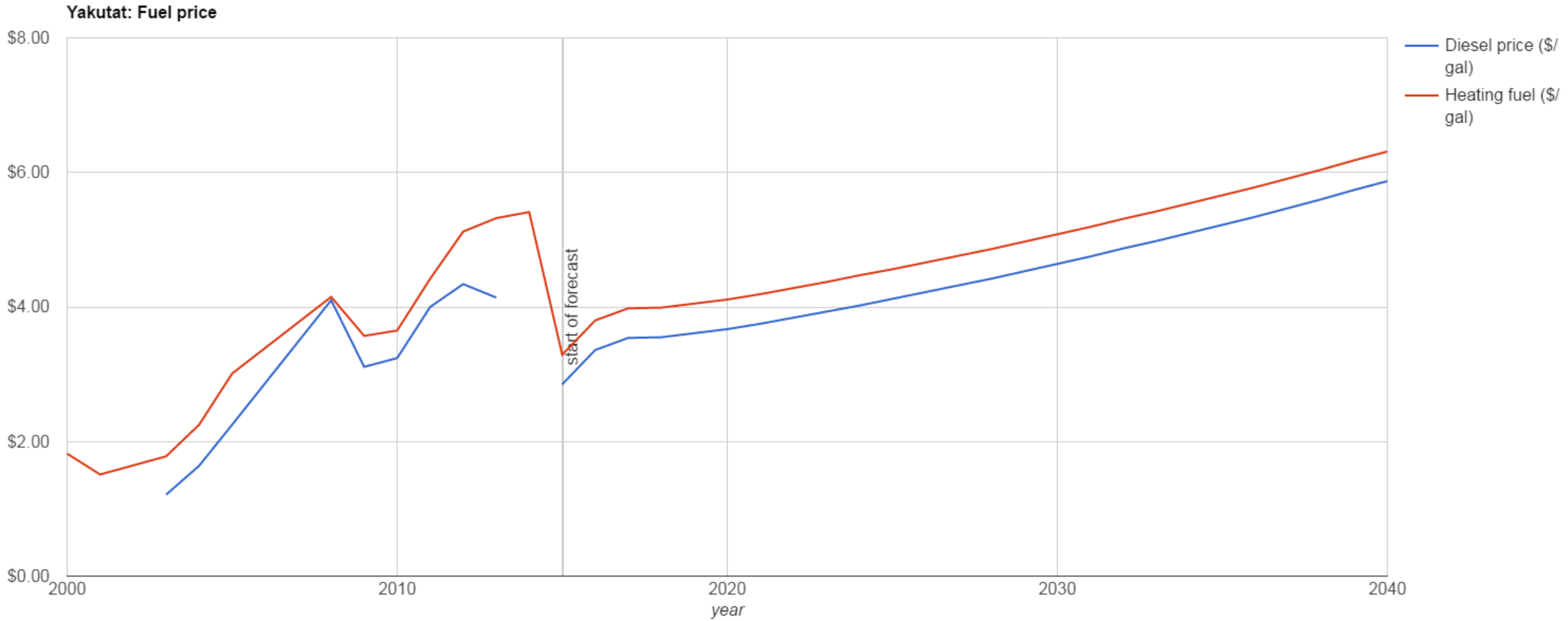
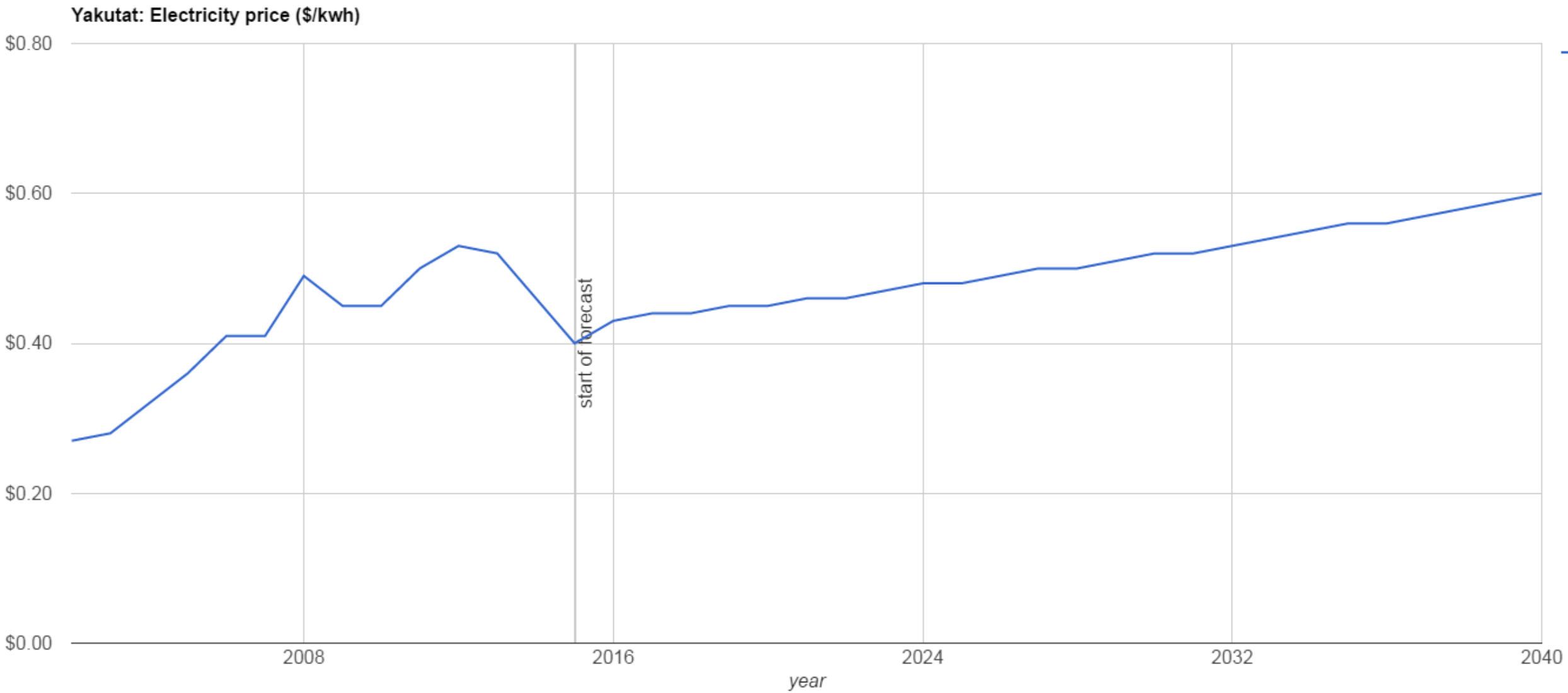
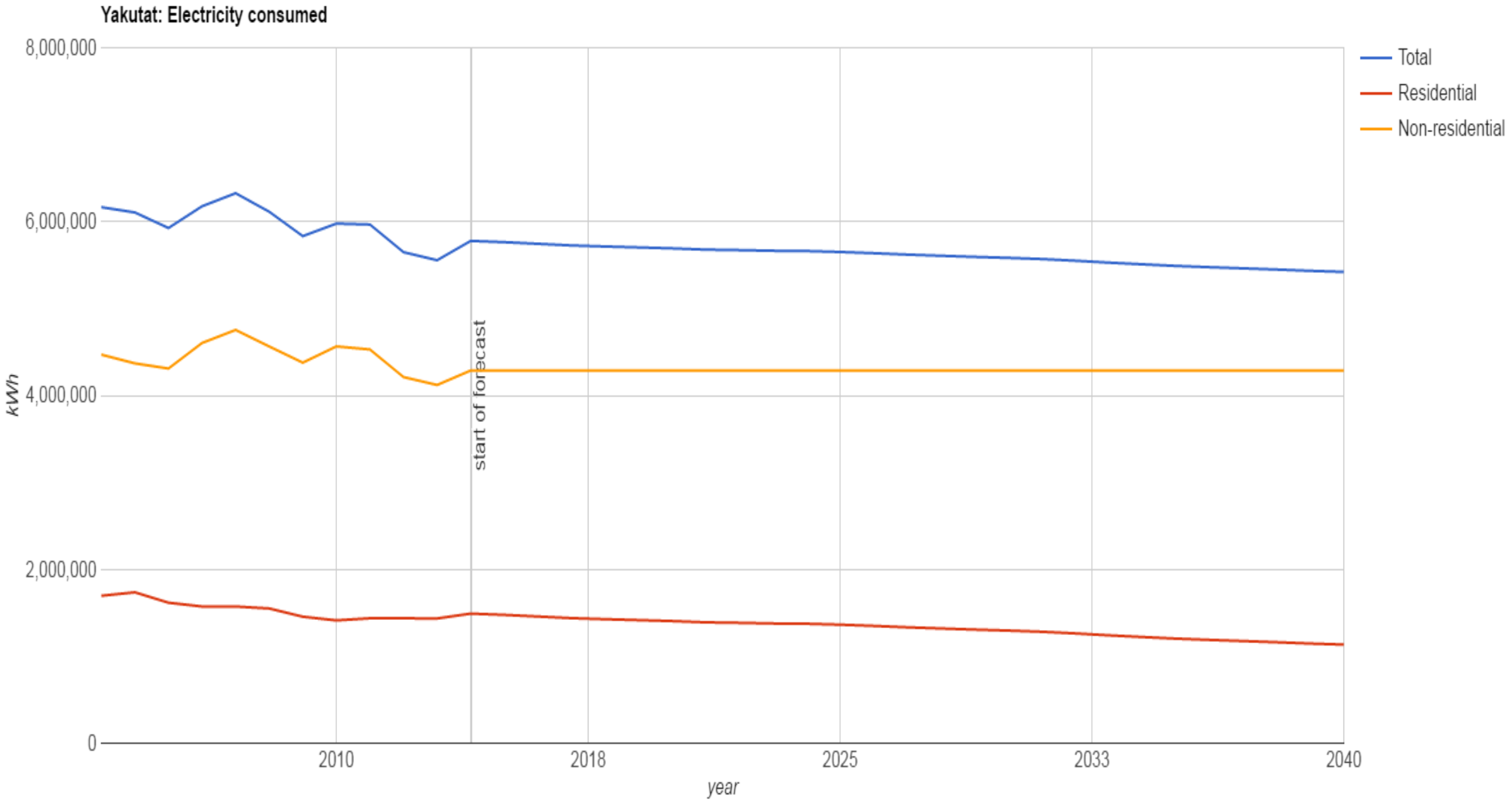
Financial & Demographic

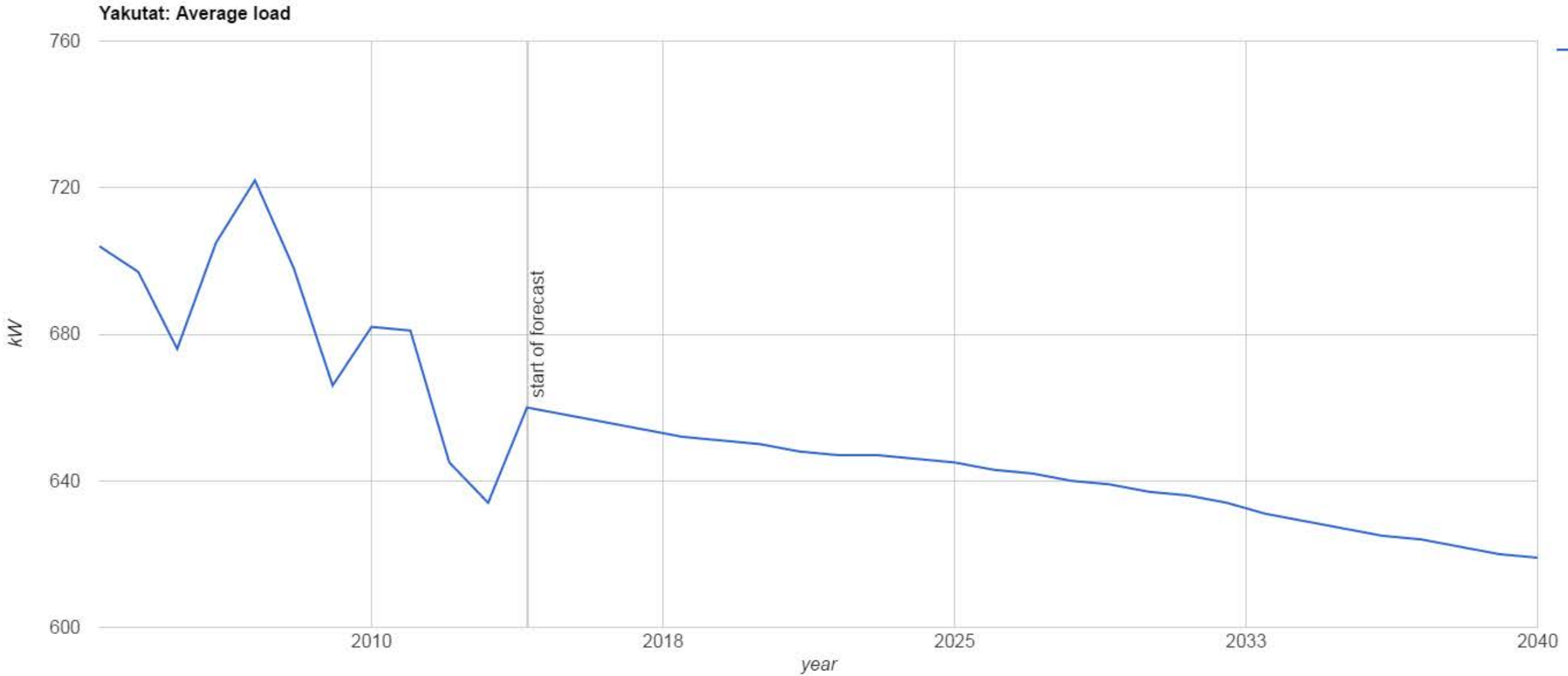
Historical and forecasted prices

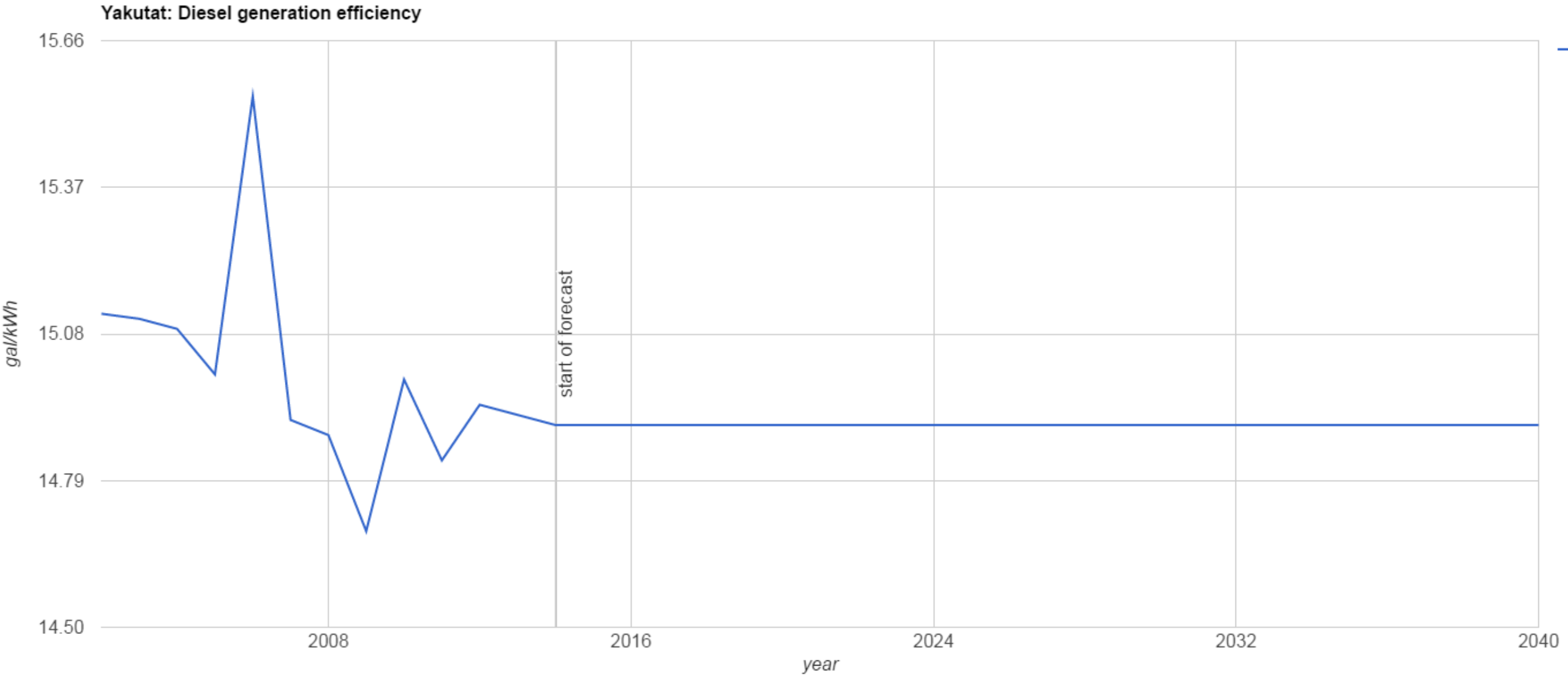

Yakutat: Fuel price
$8.00
$6.00
$4.00
$2.00
$0.00
2000
2010
2020
2030
2040
year
start of forecast
Diesel price ($/gal)
Heating fuel ($/gal)


Yakutat: Electricity price ($/kwh)
$0.80
$0.60
$0.40
$0.20
$0.00
start of forecast
2008
2016
2024
2032
2040
year

Generation and consumption


Yakutat: Electricity consumed
8,000,000
6,000,000
4,000,000
2,000,000
0
kWh
start of forecast
2010
2018
2025
2033
2040
year
Total
Residential
Non-residential


Yakutat: Average load
760
720
680
640
600
kW
start of forecast
2010
2018
2025
2033
2040
year


Yakutat: Diesel generation efficiency
15.66
15.37
15.08
14.79
14.50
gal/kWh
start of forecast
2008
2016
2024
2032
2040
year

Evaluating potential projects

Alaska Affordable Energy Model | Communities | Regions | State Senate Districts | State House Districts

Yakutat Potential Projects | Summary | Efficiency Projects | Electricity Projects | Heating Projects

Technology/Project	NPV benefits	NPV cost	NPV net benefit	Benefit cost atio	Levelized cost of energy: electricity ($/kwh)	Levelized cost of energy: heating Oil ($/gal)	Gallons fuel /saved per year
Residential Energy Efficiency	$3,700,335	$2,137,695	$1,562,640	1.73	$0.00	$2.26	67,556
Non-residential Energy Efficiency	$5,843,107	$3,198,597	$2,644,510	1.83	$0.10	$15.17	81,445
Water and Wastewater Efficiency	$212,928	$253,339	$-40,412	0.84	$0.63	$34.81	2,417
Wind Power	$2,691,076	$5,824,643	$-3,133,568	0.46	$0.45	$0.00	62,937
Solar Power	$255,966	$659,654	$-403,688	0.39	$0.78	$0.00	6,383
Hydropower	$0	$0	$0	0.00	$0.00	$0.00	0
Transmission and Interties	$0	$0	$0	0.00	$0.00	$0.00	0
Diesel Efficiency	$2,256,142	$4,654,230	$-2,398,088	0.48	$64.43	$0.00	39,119
Biomass for Heat (Cordwood)	$2,297,325	$2,070,321	$227,004	1.11	$0.00	$4.47	81,628
Biomass for Heat (Pellet)	$0	$0	$0	0.00	$0.00	$0.00	0
Residential ASHP	$2,320,841	$4,447,668	$-2,126,826	0.52	$0.00	$7.37	239,798
Non-Residential ASHP	$604,909	$1,455,710	$-850,801	0.42	$0.00	$7.01	93,975
Heat Recovery	$1,109,900	$451,350	$658,550	2.46	$0.00	$2.02	17,180

Generated from Model Version 0.22.2 and Data Version 0.22.2 on 2016-11-29

Alaska Affordable Energy Model | Communities | Regions | State Senate Districts | State House Districts

Yakutat Potential Projects

Summary | Efficiency Projects | Electricity Projects | Heating Projects

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- Biomass for Heat (Pellet)
- Residential ASHP
- Non-Residential ASHP
- Heat Recovery

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Modeled biomass project

Capital Cost ($): $2,070,321

Lifetime Savings ($): $2,297,325

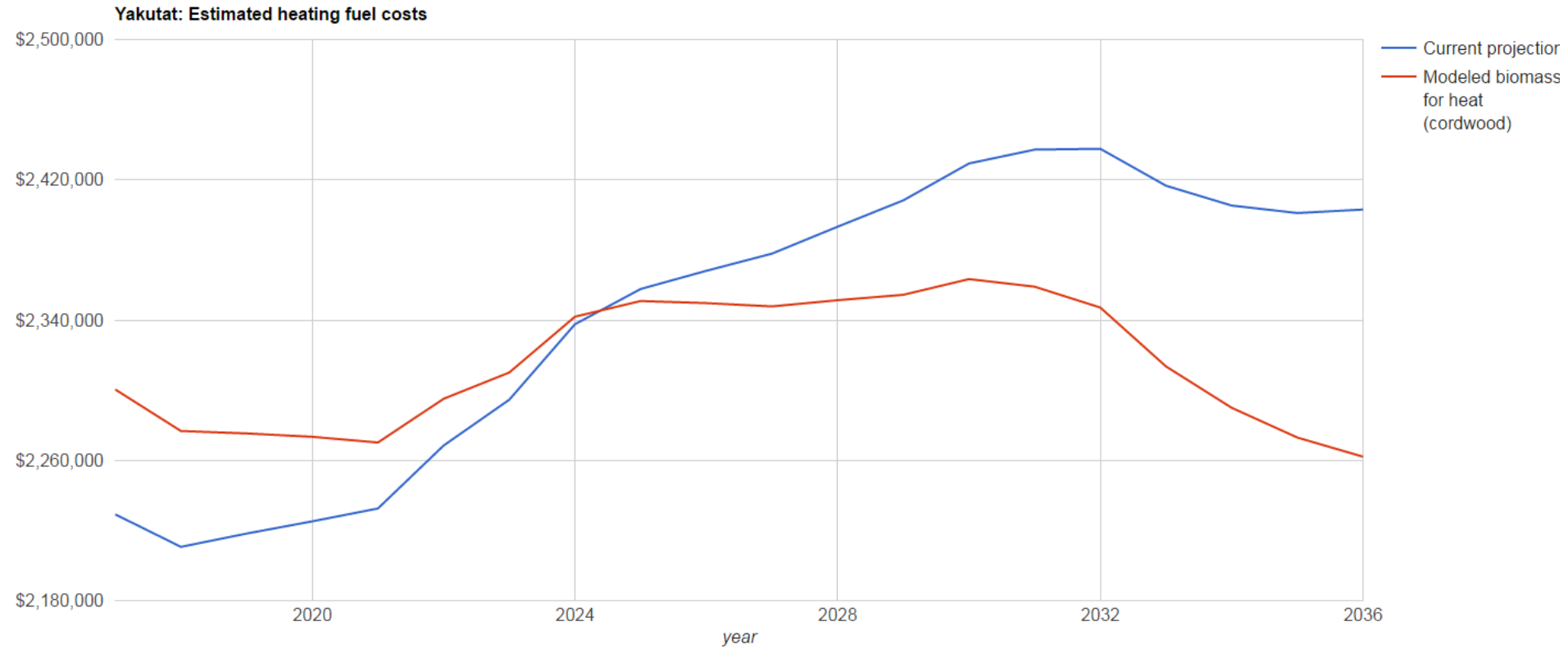
Net Lifetime Savings ($): $227,004

Benefit Cost Ratio: 1.11

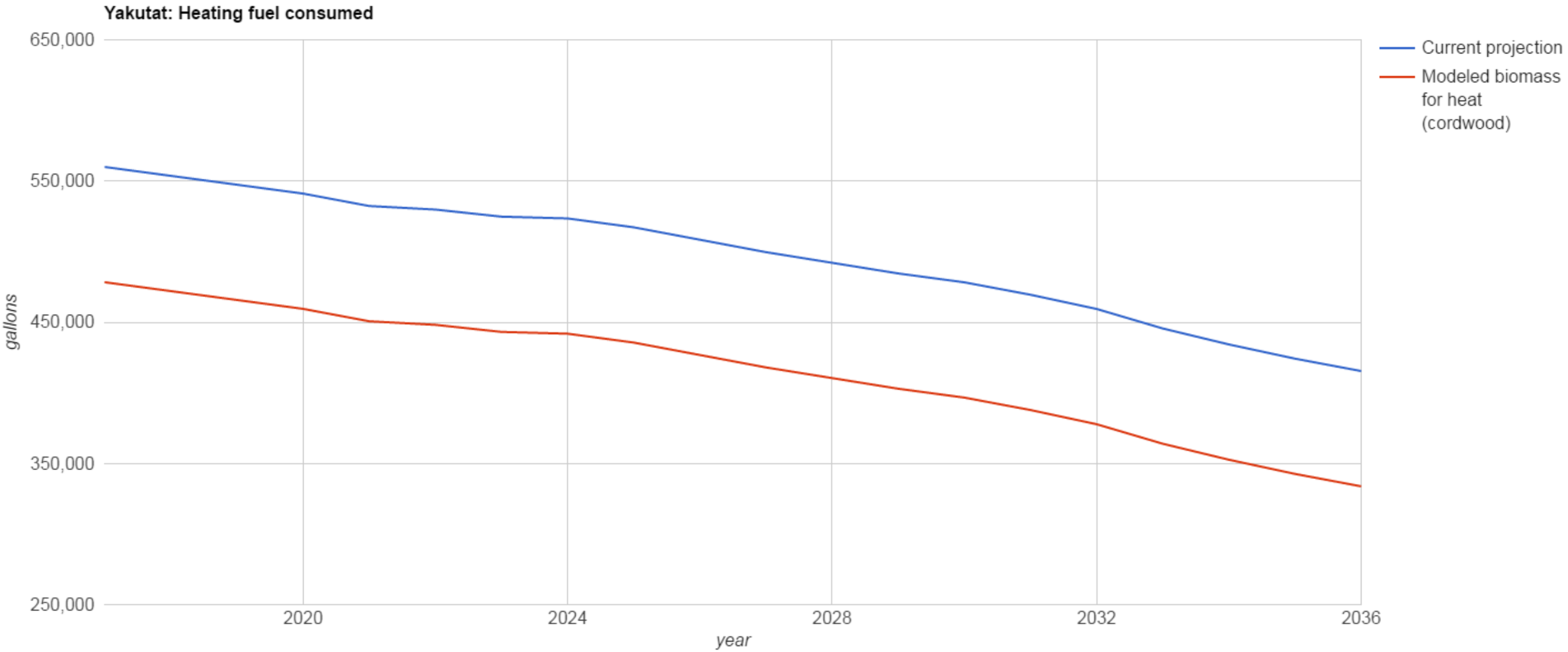
Energy Density [Btu/cords]: 16000000

Capacity Factor: 0.650815609

This component calculates the potential Heating Oil that could be offset by installing new Wood Boiler.



Plot/Table | Printable Plot | Table as csv


Yakutat: Heating fuel consumed
650,000
550,000
450,000
350,000
250,000
gallons
2020
2024
2028
2032
2036
year
Current projection
Modeled biomass for heat (cordwood)

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Yakutat Wind Power | Summary | Efficiency Projects | Electricity Projects | Heating Projects

Current system

Average Community Load (kW)(2013): 716

Average kWh/year(2013): 6,275,571

Peak Load: Unknown

Existing nameplate wind capacity (kW): 0.0

Existing wind generation (kWh/year)(2013): 0

Existing nameplate solar capacity (kW): 0.0

Existing solar generation (kWh/year)(2013): 0

Existing nameplate hydro capacity (kW): 0.0

Existing hydro generation (kWh/year)(2013): 0

Modeled wind power

Capital Cost ($): $5,824,643

Lifetime Savings ($): $2,691,076

Net Lifetime Savings ($): $-3,133,568

Benefit Cost Ratio: 0.462

Proposed Nameplate Capacity(kW): 1,100

Expected Yearly Generation (kWh/year): 9,636,000

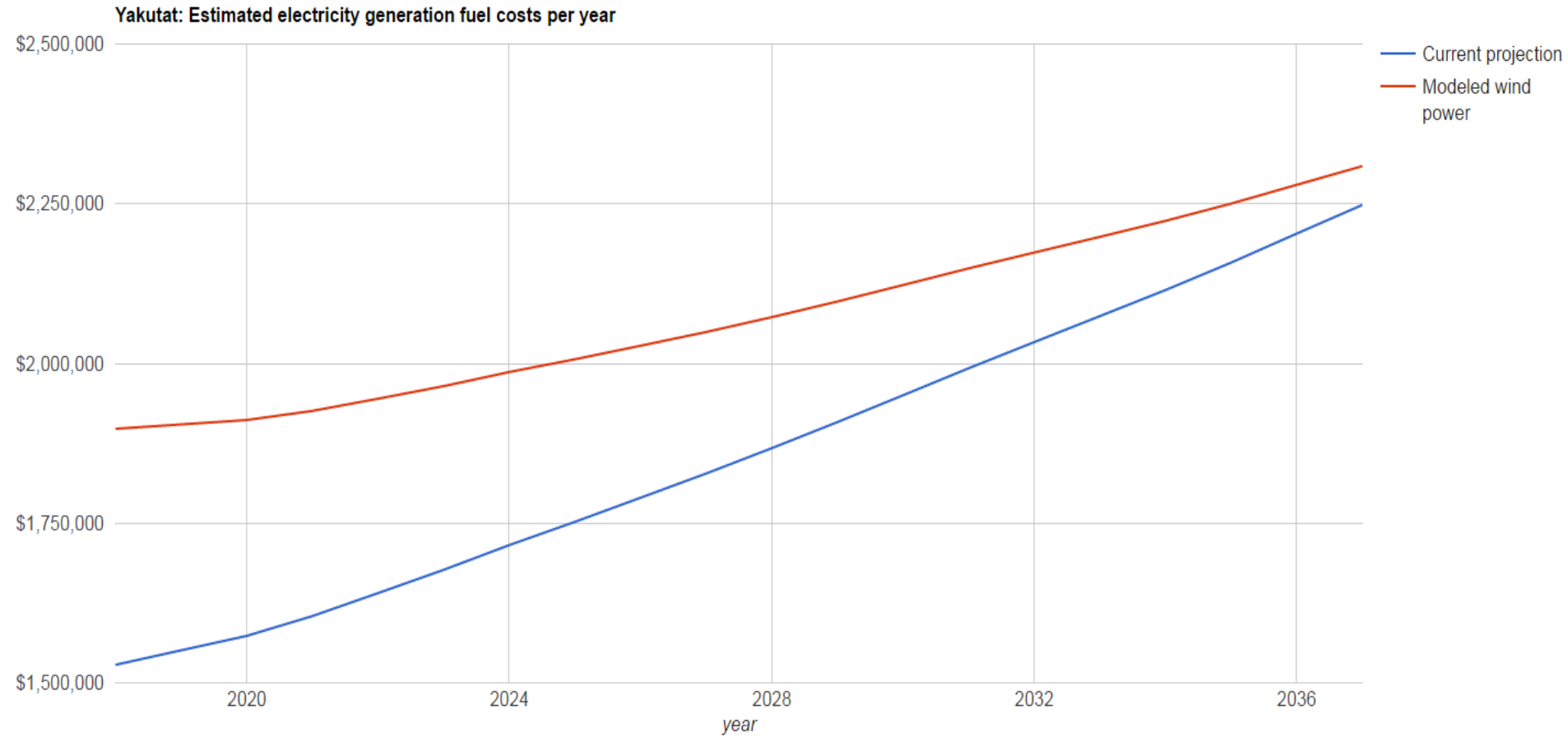
Estimated Wind Class: 2

Estimated Capacity Factor: 0.15

Estimated Wind Penetration Level (%): 23.03%

source: unknown

This component calculates the potential electricity generation from diesel that could be offset by installing new wind power infrastructure.



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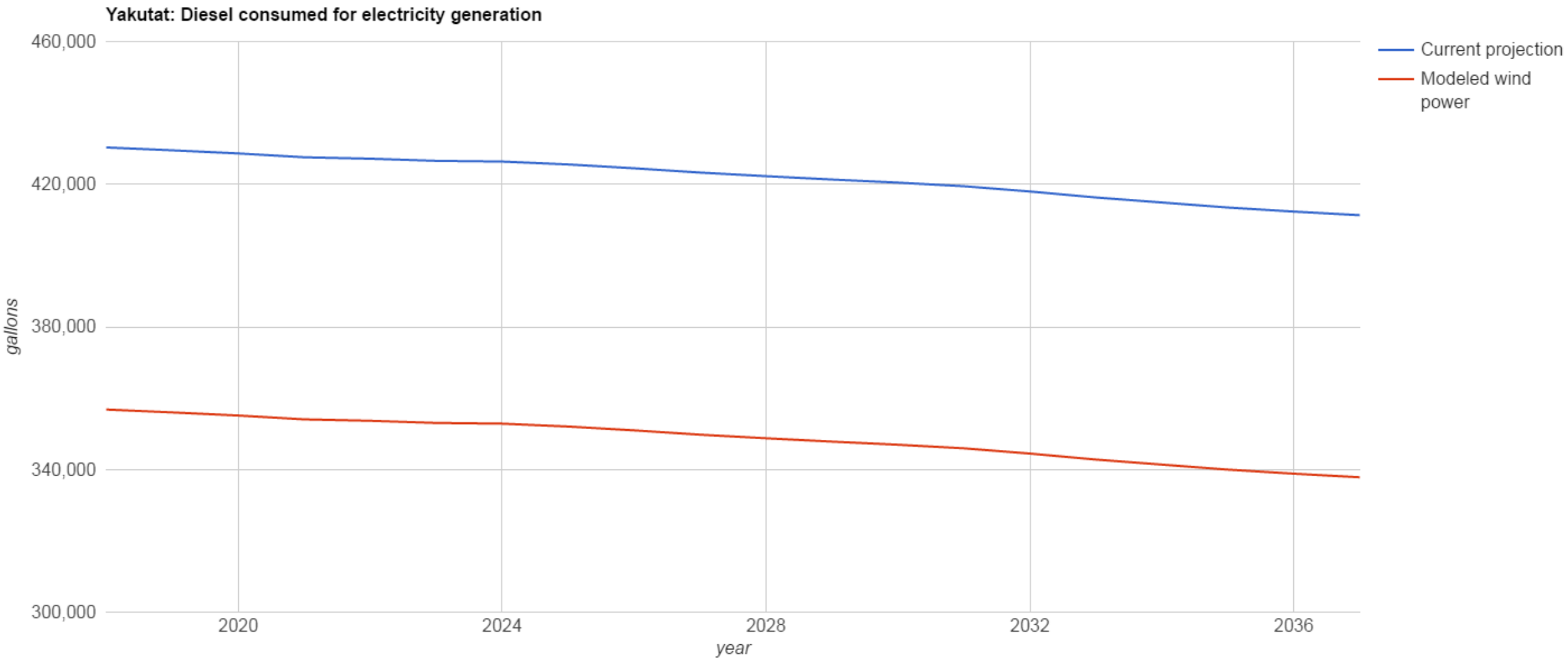
Yakutat: Diesel consumed for electricity generation
460,000
420,000
380,000
340,000
300,000
gallons
2020
2024
2028
2032
2036
year
Current projection
Modeled wind power

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Questions?

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AEA's mission is to reduce the cost of energy in Alaska.