Alaska Affordable Energy Strategy and Alaska Affordable Energy Model:

Tools for improving energy planning in Alaska communities

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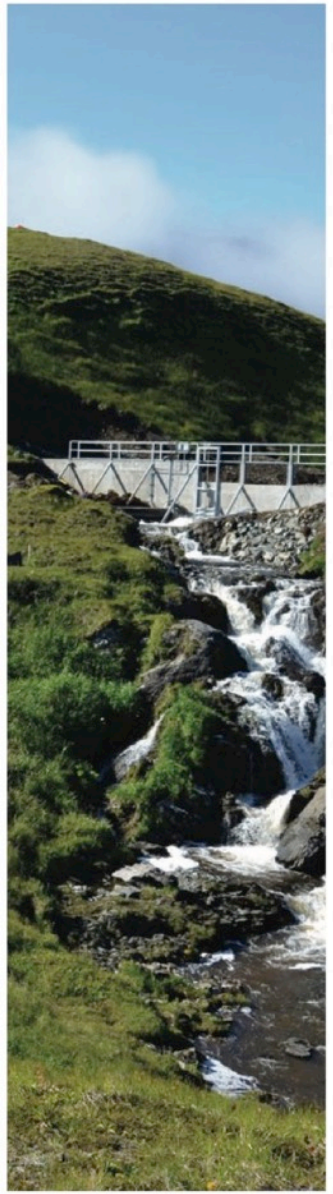
Energy Planning Manager

Calista Energy Management Assistance Initiative Energy Workshop

April 19, 2017






ALASKA ENERGY AUTHORITY
www.akenergyauthority.org

Alaska Affordable Energy Model

Help communities evaluate energy infrastructure projects

- Uses and provides access to the best available data
- Best available forecasts for energy prices
- Best available project costs—capital and operating
- Economic analyses for 13 project types
  - Assumes debt financing, not grants
  - Results, data, and forecasts available online: http://www.akenergyinventory.org/energymodel

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

Adak
Akhiok
Akiachak
Akiak
Akutan
Alakanuk
Alakanuk intertie
Alatna
Alcan Border
Aleknagik
Aleneva
Allakaket
Allakaket intertie
Ambler
Anaktuvuk Pass
Angoon
Aniak
Anvik
Arctic Village

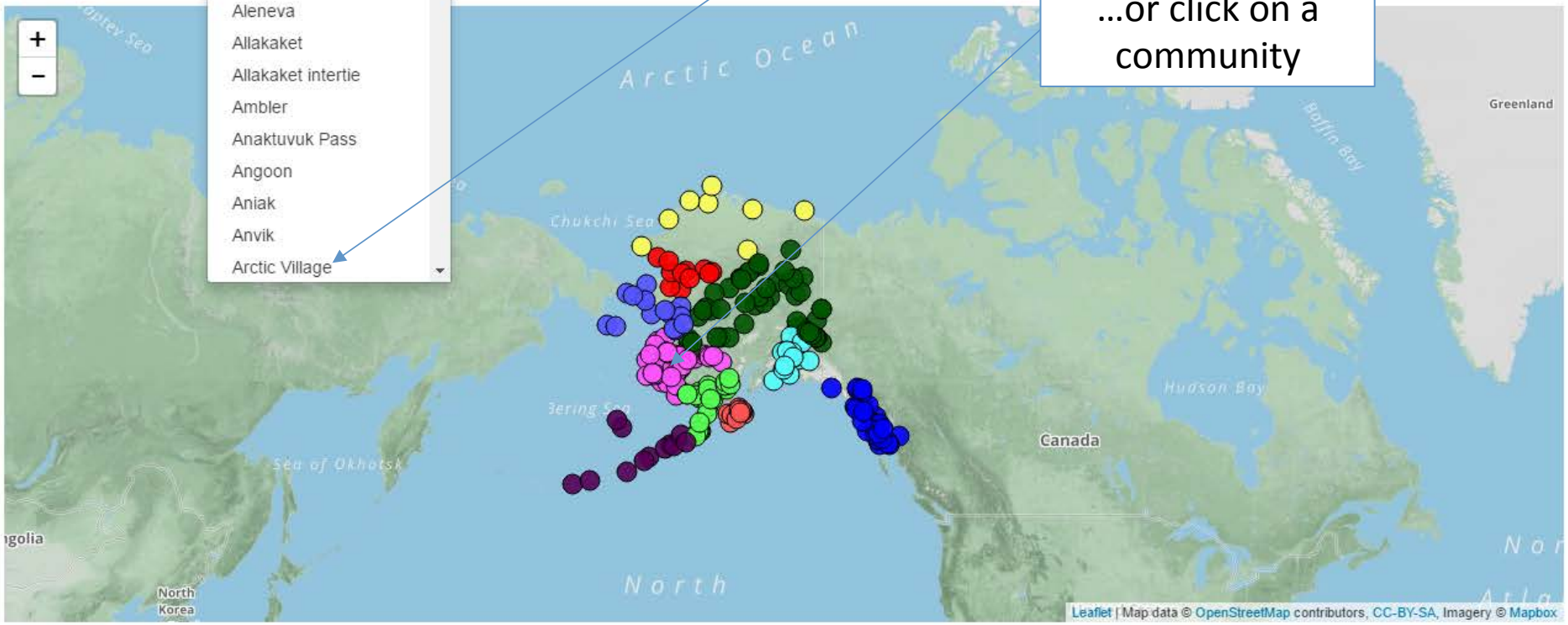
Alaska Af ergy Model

Message about data us

The results presented h 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 imp The Alaska Energy Authority .

Choose from the drop-down list…

…or click on a community



Technology/Project	NPV benefits	NPV cost	NPV net benefit	Benefit cost ratio	Levelized cost of energy: electricity ($/kwh)	Levelized cost of energy: heating oil ($/gal)	Gallons fuel saved per year
Residential Energy Efficiency	$3,076,965	$1,635,957	$1,441,008	1.9	N/A	$2.99	37,836
Non-residential Energy Efficiency	$457,534	$350,824	$106,710	1.3	$0.10	$1.32	13,754
Water and Wastewater Efficiency	$125,664	$60,037	$65,627	2.1	$0.16	$2.78	1,106
Wind Power	$919,971	$2,958,505	$-2,038,534	0.3	$0.54	N/A	29,345
Chefornak Wind Heat System	$883,548	$3,968,157	$-3,084,609	0.2	$0.64	N/A	34,499
Solar Power	$94,013	$187,150	$-93,138	0.5	$0.67	N/A	2,261
Hydropower	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transmission and Interties	$-6,544,150	$6,428,407	$-12,972,558	-1.0	$0.88	N/A	117,572
Diesel Efficiency	$653,677	$2,563,334	$-1,909,657	0.3	$111.65	N/A	11,762
Biomass for Heat (Cordwood)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biomass for Heat (Pellet)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Residential ASHP	$2,593,305	$3,080,400	$-487,094	0.8	N/A	$8.33	97,312
Non-Residential ASHP	$599,300	$690,802	$-91,503	0.9	N/A	$8.08	23,546
Heat Recovery	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Cost effective projects have a benefit cost ratio greater than 1.0.

Chefornak Potential Projects

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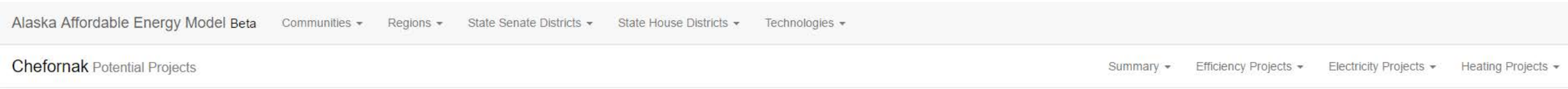
The expected capital and operating cost over the life of the project. Assumes that the project is financed at 5%.

The benefit divided by the cost. A value greater than one means it is expected to save money; a value less than one means it is expected to cost more than doing nothing.

The number of gallons of diesel and/or heating oil that are expected to be saved by the project each year



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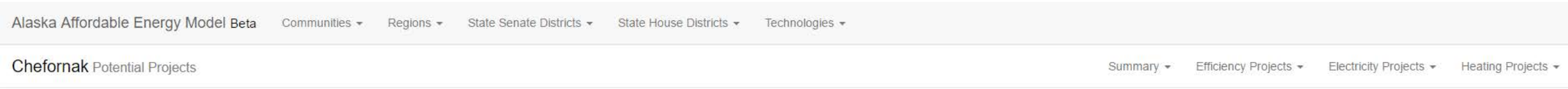
B/C>1: Projects likely cost effective

B/C<1: Projects not likely cost effective

B/C approximately 1: Projects might be cost effective

Cost effectiveness



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Compare costs

Compare yearly fuel savings

Cost & Fuel Savings

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Cost effective projects have a benefit cost ratio greater than 1.0.

Navigate to project types either by clicking on the project type name….

…or use the drop-down menus

Current system

Households 2010: 92

Estimated Total Households (2017): 102

Estimated Households to be retofit (2017): 102

Modeled efficiency project

Capital cost: $1,635,957

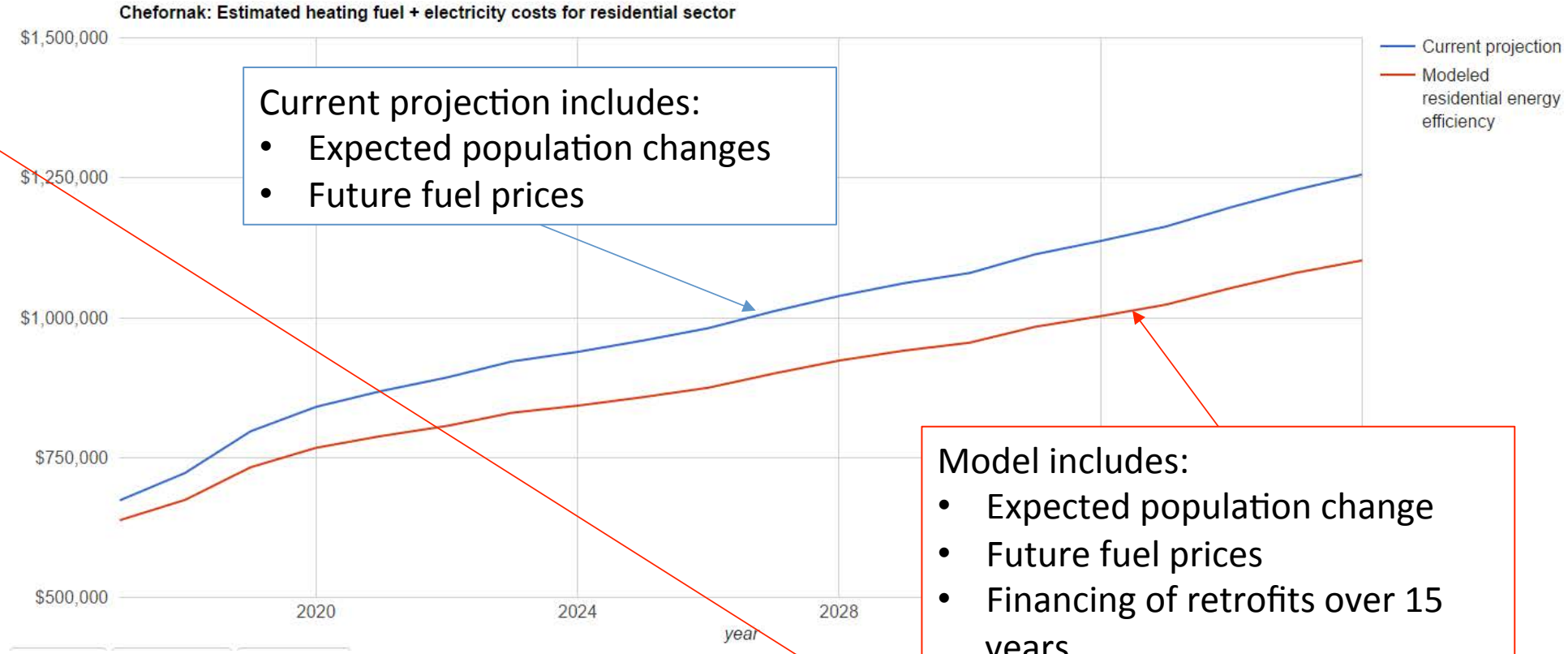
Lifetime savings: $3,076,965

Net lifetime savings: $1,441,008

Benefit-cost ratio: 1.9

Estimated cost to refit household: $17,600.00/home

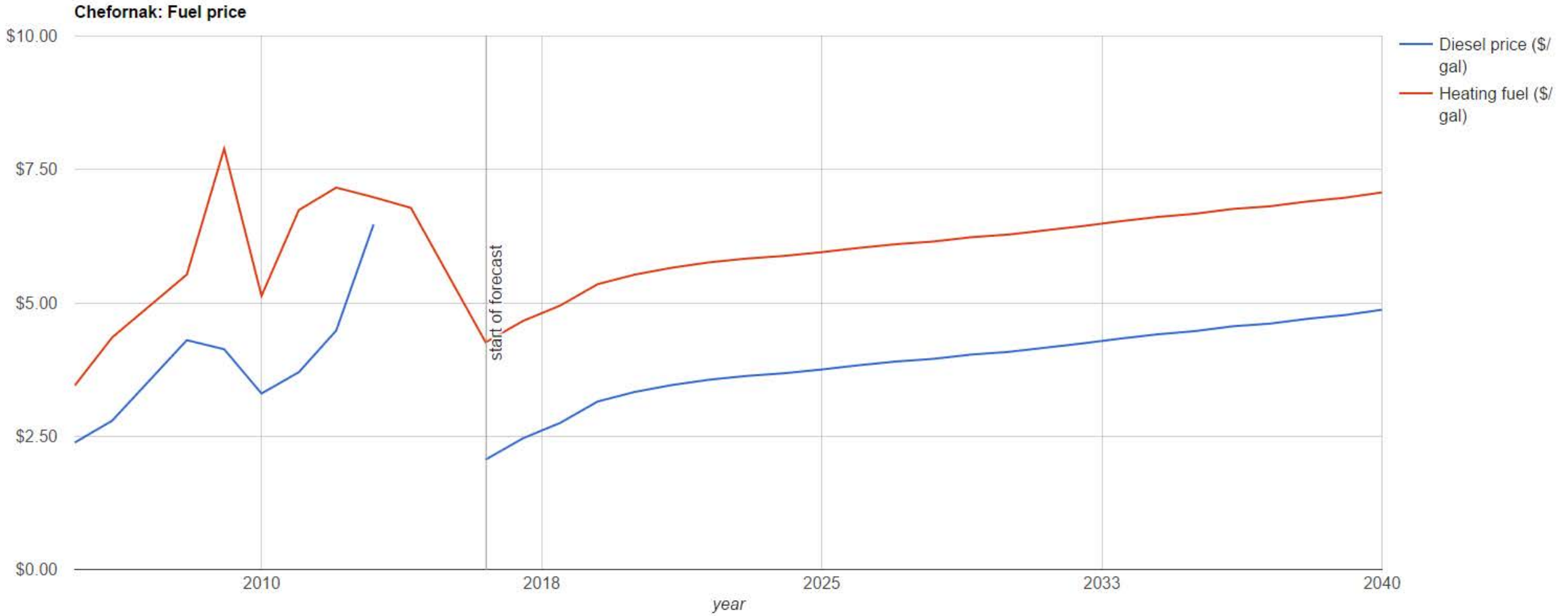
This component calculates the potential reduction heating oil by improving the efficiency of residential buildings



Current projection includes:
- Expected population changes
- Future fuel prices

Model includes:
- Expected population change
- Future fuel prices
- Financing of retrofits over 15 years
- Reduced energy consumption
- Households to be retrofit

Forecasts


Chefornak: Fuel price
$10.00
$7.50
$5.00
$2.50
$0.00
2010
2018
2025
2033
2040
year
start of forecast
Diesel price ($/gal)
Heating fuel ($/gal)

Other Forecasts and Data

Other Data

- Residential building characteristics
- Non-residential buildings
  - Type
  - Consumption (actual and estimate)
- Generation types, capacity, etc.
- Historical generation performance
  - Efficiency
  - Line loss
  - Diesel consumption

Forecasts

- Population
- Electricity prices
- Electricity generation by source
- Electricity consumption
- Average load

Alaska Affordable Energy Model

Results available online for communities not on Railbelt

http://www.akenergyinventory.org/energymodel

Advanced users:

- Model will be publicly available and can be downloaded
- Users will be able to change inputs through data files
- More advanced users can change code to meet needs

ALASKA ENERGY AUTHORITY

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AEA's mission: Reduce the cost of energy in Alaska.