Understanding the Impact of Energy Tariffs in Maine

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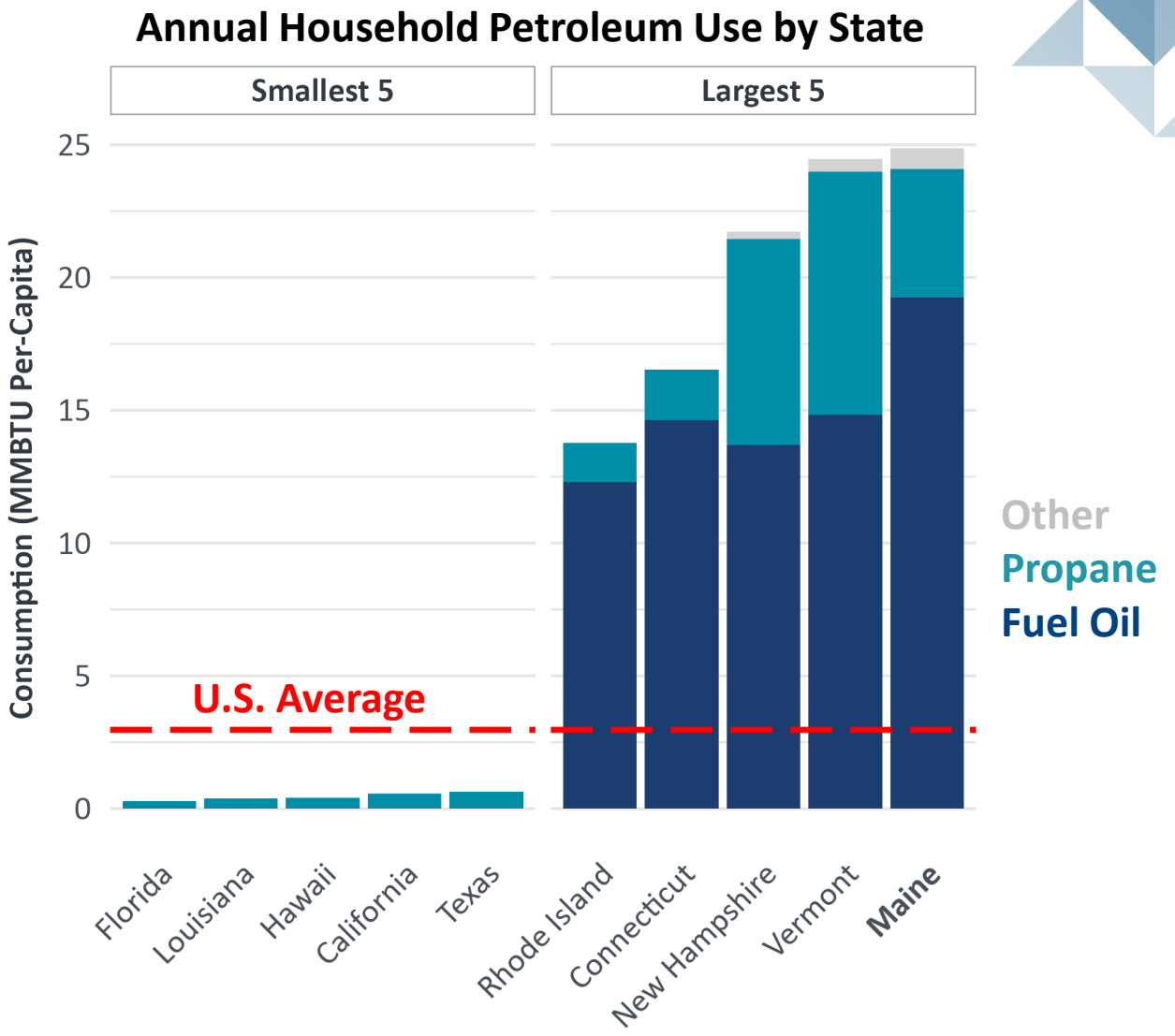
Household Petroleum Use

- Maine has the **highest per-capita household petroleum use in the United States**, consuming about **8 times the U.S. average**[1]
- Burning fuel oil and propane for heating is **considerably more expensive** than heat pumps or other sources[2]
  - Customers in Maine spend an estimated **60% more the U.S. average** on household space and water heating[3]
  - This reliance on fossil fuels also exposes Maine customers to volatility in global fuel prices, compounding energy insecurity

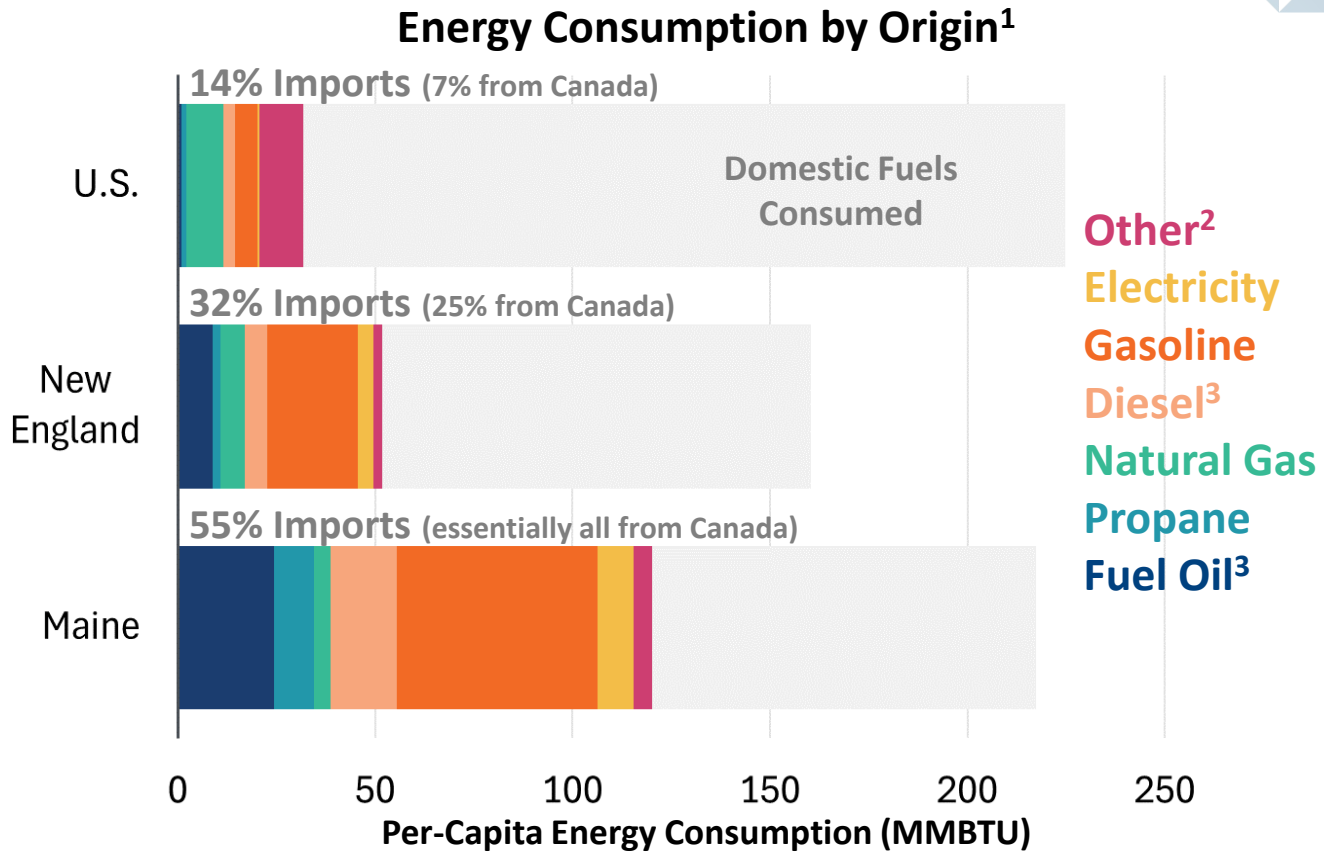


1. EIA SEDS. Latest available data from 2022.
2. EIA SEDS. Customers in Maine spend $30-35/MMBTU for fuel and propane. Across the U.S., the average retail price for natural gas is just $15/MMBTU. Electricity is more expensive, but the efficiency benefits of a heat pump mean customers need to buy far less of it to receive the same amount of heat delivered.
3. EIA RECS

International Energy Imports in Maine

Maine imports *4 times* the energy per-capita as the U.S. on average

- Energy imports represent **55%** of Maine's energy consumption
  - **90% of Maine's total petroleum products are imported from Canada**
- Essentially all of these imports come from Canada, via port and rail
- Due to constraints on domestic shipping, trucking, and rail capacity, it would be **very difficult for Maine to replace these imports with fuels from domestic sources**



Imports data for petroleum products from Maine GEO.
Natural gas and electricity imports, as well as total consumption, estimated based on data from EIA SEDS and Canadian Energy Regulator.

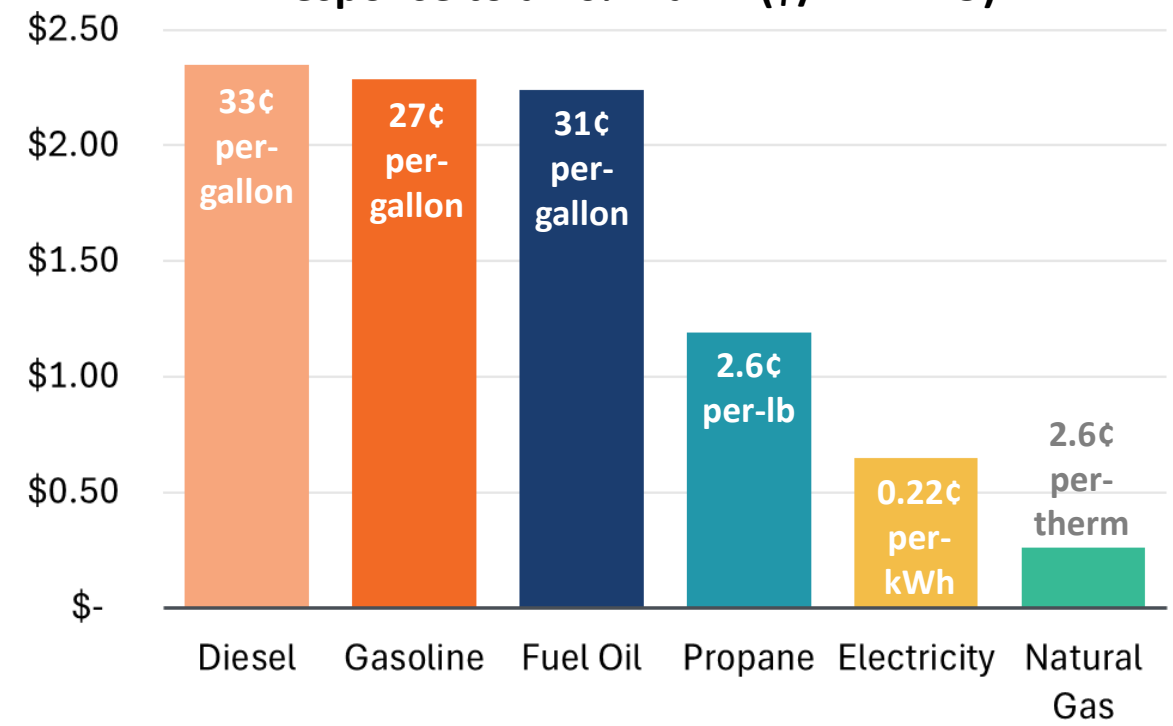
Notes:
1. Using exports data from Maine GEO, 6% of Maine's propane, fuel oil, and "other" imports and 12% of Maine's gasoline imports are estimated to be pass-through to other states in New England.
2. The "Other" fuels category predominantly includes asphalt and road oil, jet fuel, propylene, isobutane, crude oil, and lubricants.
3. Import data for diesel and fuel oil is combined as "distillate fuel oils" (DFO). We assume that the fractions of DFO going to diesel and fuel oil respectively are proportional to the volumetric consumption of each in Maine.

Price Impacts

Brattle analyzed energy prices, import quantities, and the composition of retail rates to estimate the impact a tariff would have on prices

- A 10% tariff on energy imports would increase the price of **fuel oil, diesel, and gasoline** to households by **$2 to $2.50 per-MMBTU (27¢ to 33¢ per-gallon)**
  - It is very difficult to substitute domestic fuels due to the magnitude of imports and constraints on domestic shipping, so a tariff will have a direct and largely unmitigated impact on petroleum prices in Maine
- **Electricity and natural gas** would experience smaller price impacts of **$0.10 to $0.30 per-MMBTU**[1]
  - These energy sources are less reliant on imports than petroleum
  - The tariff only applies to the energy commodity, which accounts for a smaller share of retail electricity and natural gas prices; transmission and distribution expenses (which are not affected in the short-run by a tariff) make up the remainder

Estimated Change in Residential Retail Price in Response to a 10% Tariff ($/MMBTU)[3,4]



1. Due to limitations on data availability on price setting fuels for electricity and natural gas, there is less confidence on the estimated changes in price for these energy carriers. However, because they represent a relatively small share of overall energy expenses, this uncertainty does not materially change the results.
2. In the long run, tariffs on products used to build generation, transmission, and distribution infrastructure will impact retail rates. This is discussed later in the deck.
3. Propane has a smaller ratio of wholesale to retail prices than other delivered fuels, indicating greater overhead and distribution costs.
4. We do not estimate a change in price for wood products, which are largely domestically produced.

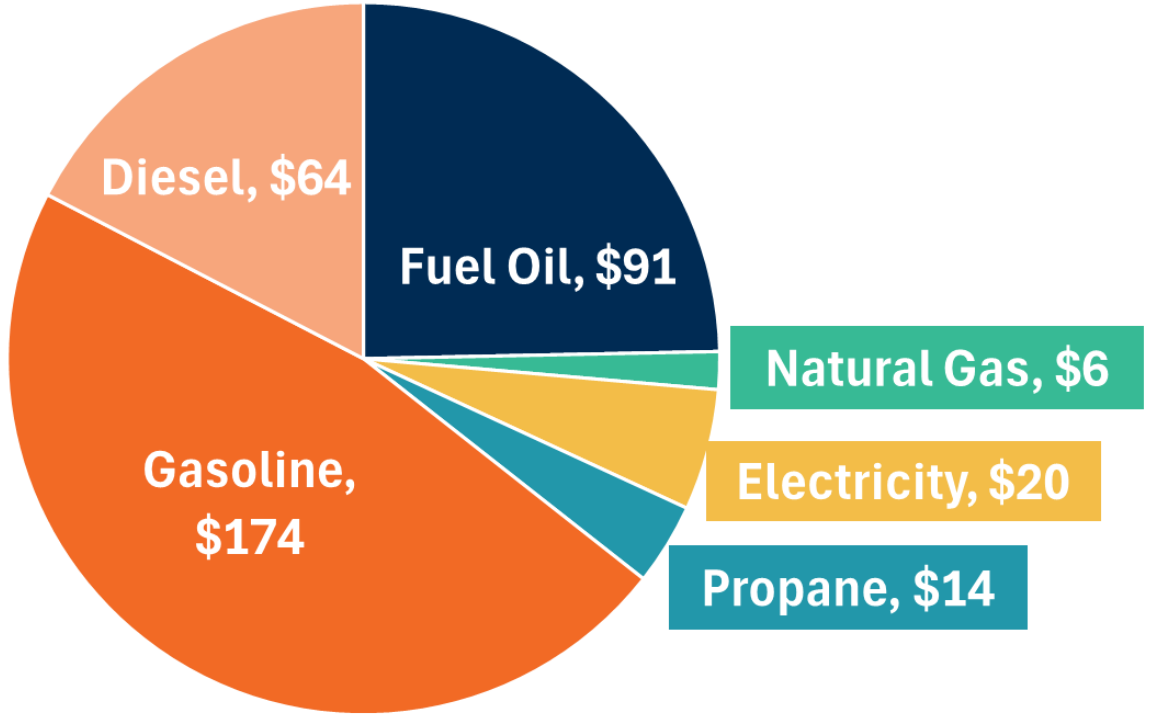
See table in appendix for detailed assumptions.

Results

- A 10% tariff would result in an **$370 million annual increase in energy costs** for Maine customers[1]
  - Most of the increase in expenditures will be incurred during the winter season
  - A 25% tariff would result in up to a $925 million annual increase in energy costs
- About two-thirds of the cost will be borne directly by households through greater electricity bills and retail fuel prices **($419 per-household)**
- The remaining third will be borne by businesses
  - Much of this will pass through to Maine customers through higher prices for goods and services
  - Will also make Maine manufacturers less competitive due to higher costs

Total Change in Energy Expenses (Million $) [2]

10% Tariff on Energy Imports

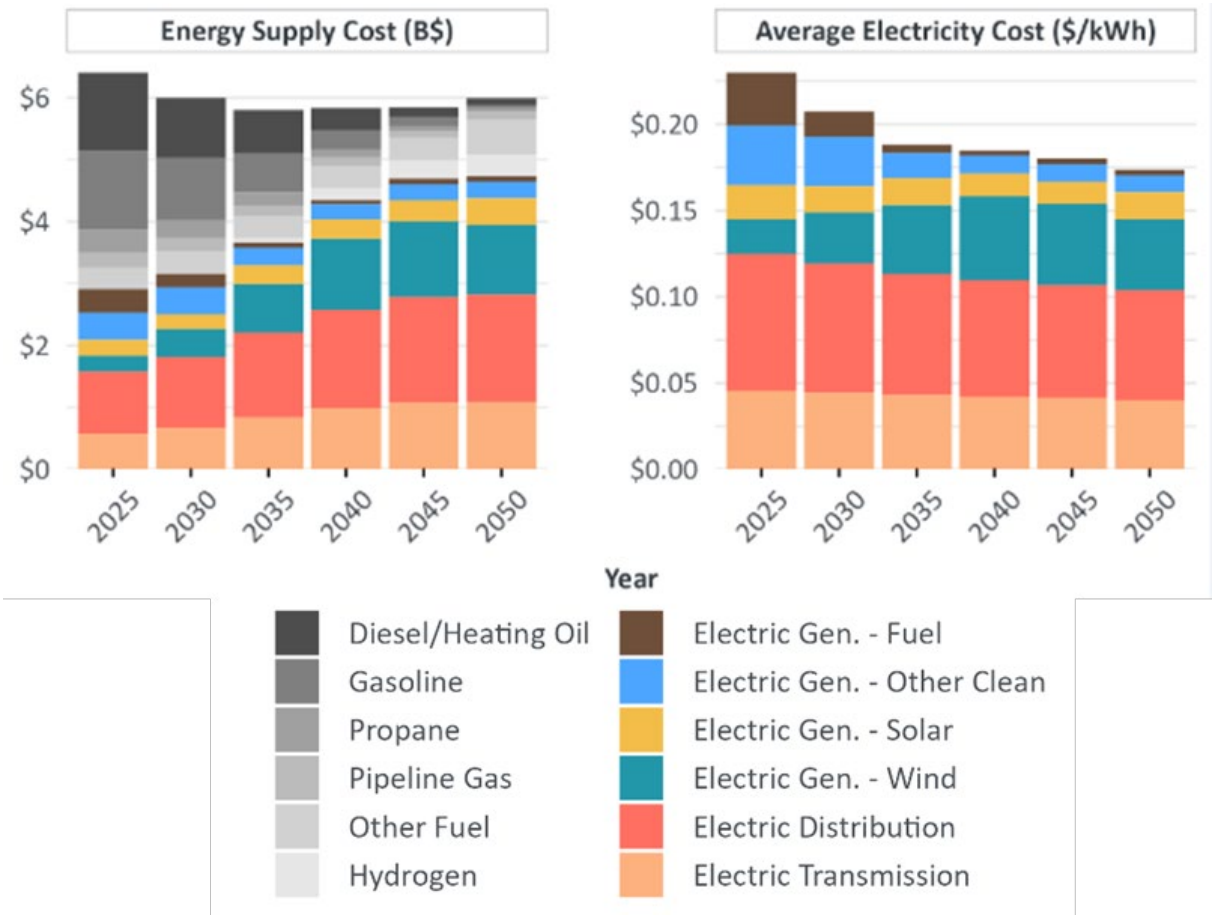


1. We assume the price increase does not cause customers to reduce consumption, which could mitigate cost. This is a reasonable simplifying assumption as own-price elasticities for energy commodities are small, especially in the short-term (see Appendix). Some customers may reduce energy consumption in response to higher prices, thus bearing the cost of tariffs through reduced services and related quality of life impacts.
2. We do not estimate the change in price for "other" energy products outside of these categories. Consequently, these estimates may be conservative.

Implications for Decarbonization

- Recent price volatility for petroleum fuels (driven by global fuel markets and tariffs) underscores the importance of ensuring a firm supply of locally-sourced energy for Maine
- Brattle's recent study, Maine Pathways to 2040: Analysis and Insights, finds that broad adoption of electric vehicles and heat pumps – powered by renewable electricity – could help the state achieve its decarbonization goals while saving customers money
  - The incremental electricity system costs would be offset by reductions in fossil fuel expenses
  - This approach would insulate Maine customers from future petroleum price shocks, whether driven by tariffs or other geopolitical factors

Maine Energy Supply Costs and Average Societal Electricity Cost (2022$)



Source: Maine Pathways to 2040: Analysis and Insights

Note: Some electrification costs (such as heat pump equipment and batteries) are reliant on global supply chains that are also subject to tariffs. Trends in the cost of electricity system inputs are discussed in the Appendix.

Conclusion

Maine is much more exposed to energy tariffs than other states, mostly via petroleum fuels

- Maine uses much more heating oil than other states, and similar amounts of total fuels
- Maine imports much more of its fuels from other countries (55%, vs. 14% US average), with the majority coming from Canada
- Fuel transportation constraints limit Maine's ability to buy these fuels from other states

Under a 10% tariff, Maine households can expect to pay $419 more per year for energy

- Most of this is for gasoline, diesel, and fuel oil
- Overall impact is largest in the winter when Maine residents use the most heating fuels
- Customers will also face higher costs for goods and services, as businesses pass through (much of) their increased fuel costs
- A 25% tariff could raise household energy expenses by over $1,000 per year

Decarbonization can help

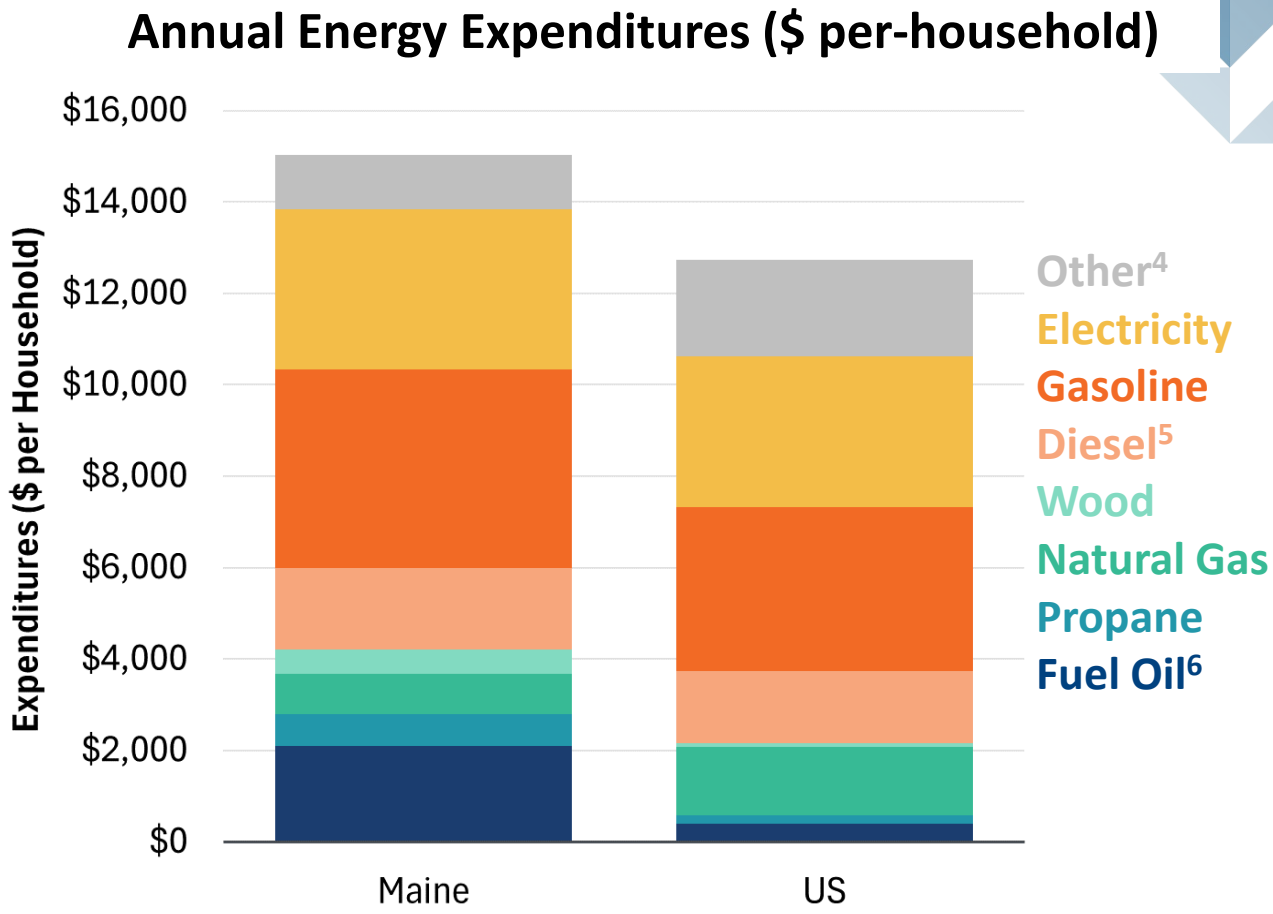
- Replacing aging furnaces and boilers with heat pumps and adopting electric vehicles powered by local, renewable electricity could help reduce energy costs
- This approach would also insulate customers from future petroleum price volatility

Appendix

APPENDIX

Maine Energy Expenditures

- Maine spends over **$15,000 per-household**[1] on energy, about **18% above the U.S. average**
  - Annual energy expenditures exceed $8.8 billion
- This includes nearly $1,000 per-household on space heating, almost ***twice*** the U.S. average[2]
  - Maine is colder than most of the United States
  - Half of Maine households use expensive petroleum fuels (mostly heating oil, propane, and kerosene) for home heating, the highest share among all U.S. states
- **Canada is the dominant supplier of the petroleum products to Maine**
  - Maine produces only about one-third of the energy it consumes,[3] with no reserves of coal, natural gas, or crude oil



Notes:

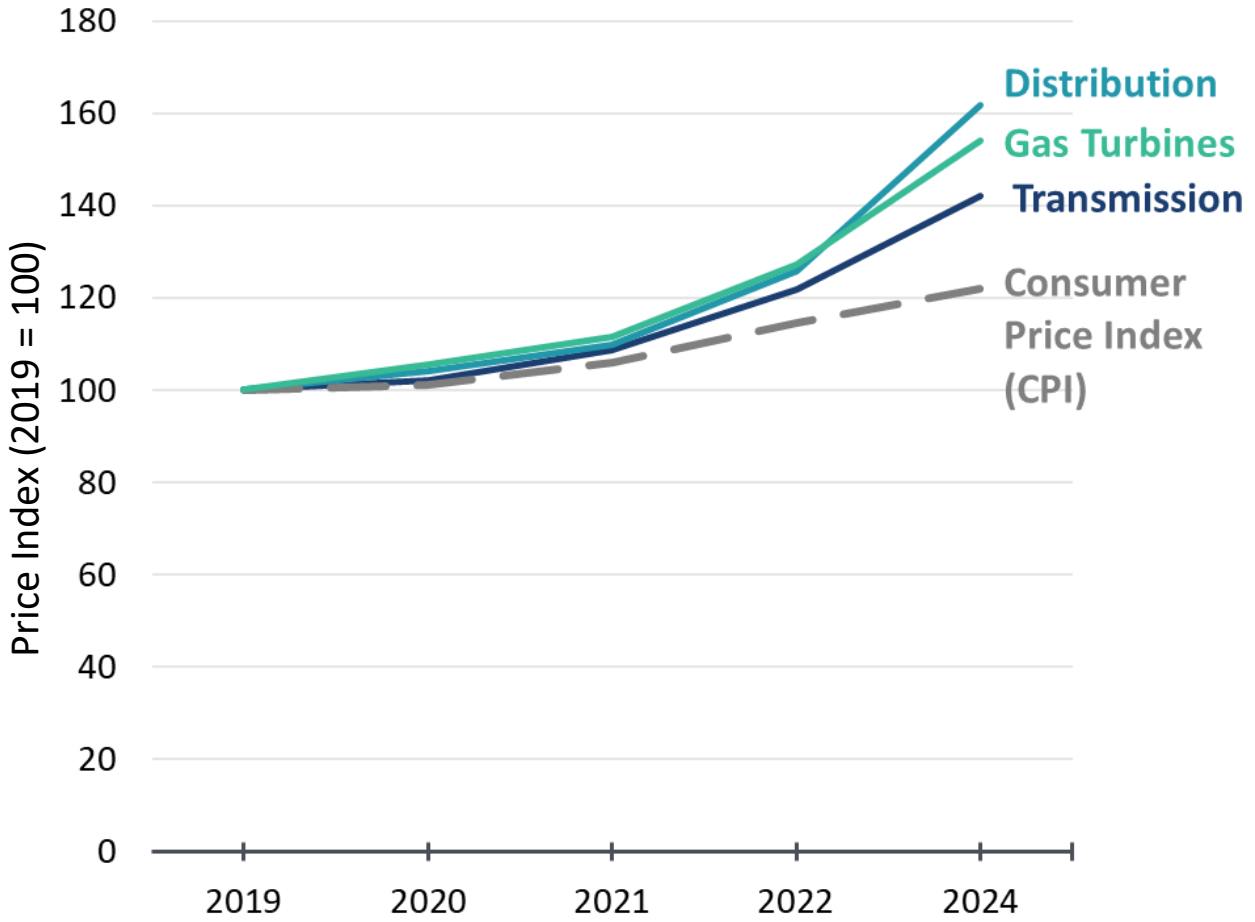
1. About one-third of energy expenditures are borne by businesses. Much of this is passed through to households through higher costs of goods and services.
2. EIA RECS 2020, Table CE3.6
3. About three-quarters of this comes from wood waste combustion, with the remaining coming from other renewables.
4. Other fuels are mainly composed of residual fuel oil, asphalt and road oil, jet fuel, petroleum coke, coal, lubricants.
5. All distillate fuel oil consumed in the transportation sector is labeled "diesel," but also includes small amounts of biodiesel, kerosene, and marine diesel oil.
6. Fuel oil includes distillate fuel oil and kerosene from residential, commercial and industrial sectors.

State energy overview statistics are from EIA, Maine State Profile and Energy Estimates.
Data on energy expenditures is from EIA, State Energy Data System (SEDS).

Impact on Cost of New Generation

- The **cost of power system technologies has risen substantially over the last 5 years**, outpacing inflation, due to strained global supply chains and increased electrical demand from data centers and electrification
  - Lead times for new gas generation have grown to 7-8 years due to supply constraints
- Tariffs on generation and power system components could **further exacerbate these strains**
  - Gas turbines manufactured in the US rely on a global supply chain and include components sourced from Mexico, Italy, Japan, Hungary, and Canada[2]
  - Over 90% of large-scale battery storage installations in the U.S. include at least one critical component from China[3]
- The **uncertainty associated with potential energy tariffs creates additional problems**, as developers are unlikely to make large, irreversible investments (e.g. building US factories to produce components domestically) if a trade deal in the future could make these investments uneconomical

Power System Cost Indexes vs. Inflation



Source: Handy Whitman Index January, 2024. CPI data from FRED.

1. Power Engineering
2. World Bank
3. Congressional testimony from Emma Stewart, Idaho National Laboratory

APPENDIX

Price Assumptions

Fuel	% of Tariff Passed Through to Commodity Price	% of Retail Price Paying for Commodity
Natural Gas	Approximated at 20% based on analysis of NG imports and consumption in New England. Consumption data from EIA SEDS; import data from CER.	65%, based on data from Natural Gas Annual, documenting average retail and Citygate prices in New England.
Fuel Oil	1:1, based on dominance of Canadian imports relative to in-state consumption. Consumption data from EIA SEDS; import data from Maine GEO.	74%, based on the three-year average ratio (2022-2024) of East Coast wholesale-to-retail price of heating oil. See EIA – Propane and Heating Oils.
Diesel	1:1, based on dominance of Canadian imports relative to in-state consumption. Consumption data from EIA SEDS; import data from Maine GEO.	61%, based on crude oil and refining portion of costs from EIA's breakdown of diesel retail price. See EIA – Gasoline and Diesel.
Propane	1:1, based on dominance of Canadian imports relative to in-state consumption. Consumption data from EIA SEDS; import data from Maine GEO.	33%, based on the three-year average ratio (2022-2024) of East Coast wholesale-to-retail price of propane. See EIA – Propane and Heating Oils.
Electricity	Approximated at 20% based on analysis of NG imports and consumption in New England. Consumption data from EIA SEDS; import data from CER.	49%, based on three-year average ratio (2022-2024) of wholesale (supply) to retail prices of electricity in Maine (retail price computed based on weighted averages across sectors).
Gasoline	1:1, based on dominance of Canadian imports relative to in-state consumption. Consumption data from EIA SEDS; import data from Maine GEO.	68%, based on crude oil and refining portion of costs from EIA's breakdown of gasoline retail price. See EIA – Gasoline and Diesel.

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Percent of Fuels Consumed in Maine Imported Internationally

Fuel	% of Fuel Consumption Imported[1, 2]	Sources[3]
Natural Gas	10%	Using ratio of New England imports to consumption (see next slide).
Fuel Oil	77%	Data on imports provided by Maine GEO.
Diesel	77%	Data on imports provided by Maine GEO.
Propane	~100%	Data on imports provided by Maine GEO.
Electricity	32%	Data on imports provided by CER.
Gasoline	~100%	Data on imports provided by Maine GEO.

Notes:

1. Using exports data from Maine GEO, 6% of Maine's propane, fuel oil, and "other" imports and 12% of Maine's gasoline imports are estimated to be pass-through to other states in New England. These are subtracted from % of total Canadian imports to consumption.
2. Additional petroleum imports data from Maine GEO shows higher or approximately equal amounts of imports in 2023-2024 for petroleum products.
3. All data on consumption from EIA SEDS.

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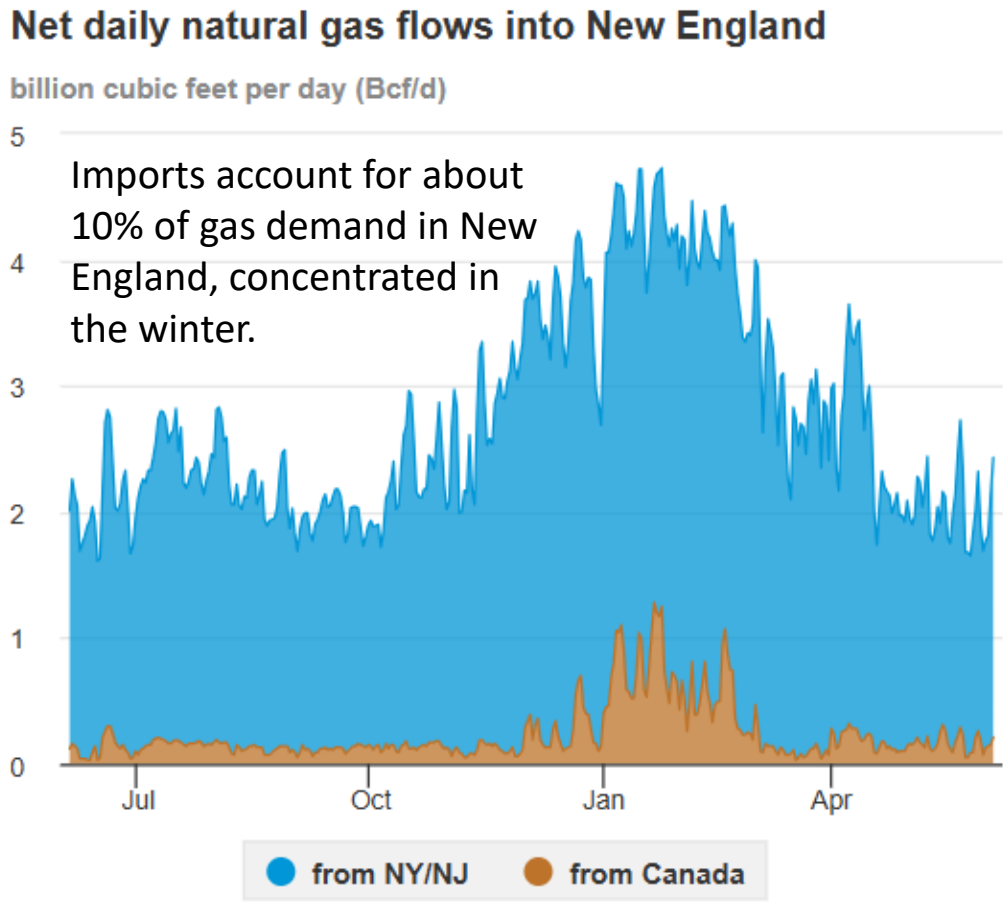
Natural Gas Imports – Impact on NE Gas Price

- Maine does not use much natural gas directly, but is exposed to ISO-NE electricity prices, which are **driven by spot gas prices**
- Imports set **New England gas prices rarely, but often in the tightest, highest-priced conditions.** A tariff would impact prices at these times.
  - High gas demand in cold weather leads to pipeline constraints from domestic sources. In these conditions, Canadian gas can be the marginal, price-setting gas supply for New England
  - LNG also plays a role in setting NE gas prices in the most extreme conditions. LNG is largely imported, either from Canada (including some regasified at Canaport and delivered via the Maritimes & Northeast pipeline) or overseas
  - The frequency and magnitude of the impact is highly weather-dependent and difficult to predict



Source: https://www.eia.gov/dashboard/newengland/naturalgas

https://apps.cer-rec.gc.ca/PPS/en/pipeline-profiles/maritimes-northeast-pipeline

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Electricity Price is Driven by New England Natural Gas Price

- Maine uses relatively little gas directly, but **ISO-NE electricity price is driven by spot gas prices**
  - As noted above, the frequency and magnitude of tariff impact on NE gas prices is weather-dependent and difficult to predict
- For the purpose of this analysis, we assume that imported natural gas (or LNG) sets the electricity price ~20% of the time (i.e. a 10% tariff would raise average wholesale prices by 2% annually)
  - Although this is quite uncertain, sensitivity analysis suggests the overall result is not very sensitive to this assumption
  - Higher or lower tariff impacts on natural gas and electricity don't change the fundamental result that the primary effect of tariffs will be through petroleum products – gasoline, diesel, and heating oil

https://apps.cer-rec.gc.ca/PPS/en/pipeline-profiles/maritimes-northeast-pipeline

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Elasticities

- The short-run elasticities of energy products are quite small in magnitude compared to other household purchases (e.g. food and consumer products)
  - This indicates that customers are unlikely to respond to an increase in energy prices by substantially reducing demand
- This supports the assumption that total energy consumption should be held constant