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RE-ENERGIZE CONNECTICUT

TOWARD AFFORDABLE ELECTRICITY FOR ALL

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EXECUTIVE SUMMARY

Connecticut's people suffer from some of the highest electricity rates in the nation.

Electricity is a top budget priority for every household, but there is no financial respite in sight for state residents. In the commercial landscape, Connecticut businesses compete with one arm tied behind their backs, confronting competitors in other states and countries with substantially lower electricity costs.

The Renewable Portfolio Standard (RPS) rules, passed by the legislature in 1998 and made more stringent through legislative action every few years, bear significant responsibility for this status quo. The RPS rules severely restrict the ability of utilities to find the cleanest and most efficient means of providing electricity to Connecticut's residents and businesses, creating higher electric bills as a consequence.

Initially, the RPS was passed to create well-paying jobs for Connecticut residents in an emerging energy sector. Yet these jobs have materialized instead in Maine, New York and Quebec, where wood-burning biomass and hydropower facilities meet most of the RPS requirements for our state. This outcome contradicts the original intention and promise of the RPS and requires re-examination.

But have the rules led to any improvement, perhaps even greater confidence in the electrical grid? Not so much. In 2023, residents expressed distrust in the grid's reliability to the Department of Energy and Environmental Protection (DEEP), especially in its ability to handle the complete ban of gasoline vehicles by 2035 for electric alternatives. Many voiced a willingness to consider purchasing an electric vehicle, but only if the grid became more reliable and affordable.[1] Indeed, shortly after realizing he didn't have the votes from the Legislative Regulation Review Committee, Gov. Ned Lamont remarked, "You have to be able to make the investments to make sure the power is there for the charging stations."[2]

Repealing the RPS would go a long way in ensuring that "power is there" when Connecticut needs it most, without requiring an infusion of taxpayer dollars. Reducing the pace of annual RPS benchmarks would help every Connecticut resident and business lower their electricity bills.

The following paper demonstrates that between 2024 and 2030, Connecticut's RPS mandate will cost:

- $1.535 billion statewide from 2024-30 (loss of income, higher prices & lower sales)
- $542 for the average resident
- 1,930 jobs; and
- $337 million in lost real disposable income

By requiring that utility companies buy an increasing percentage of electricity from a short list of renewable energy sources, the RPS unnecessarily limits optimal energy choices, resulting in higher energy prices.

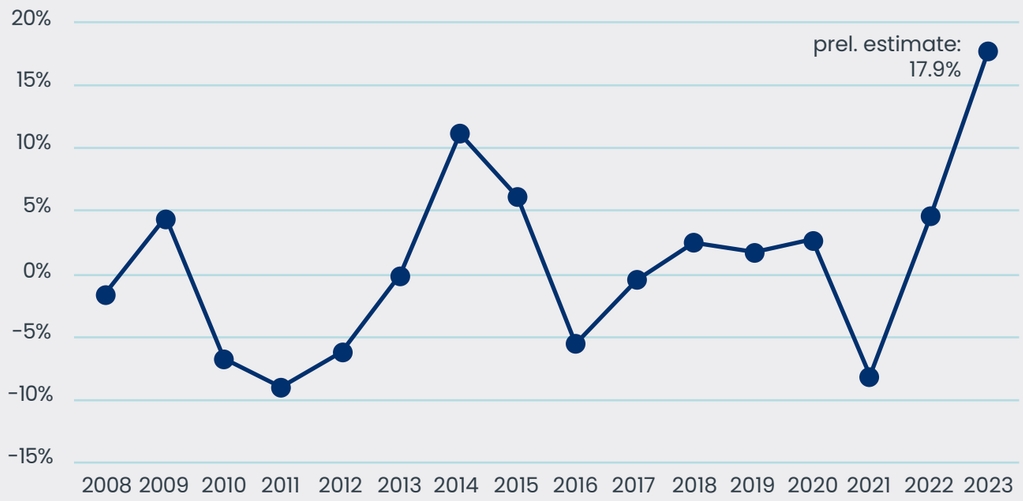
HIGHER PRICES

When Yankee Institute (YI)'s research outlining the costs of the Connecticut RPS was published in 2015, the state's residential electricity rates averaged 20.94 cents per kilowatt hour.[3] [4] Nine years later, residential rates have climbed to 30.59, well above the rate of inflation. Each of the five other New England states still pay less than Connecticut per kilowatt-hour (kWh), the standard household electricity measurement in which 1 kWh powers a 100 watt lightbulb for 10 hours. Since a portion of this increase is legislatively imposed, legislators have an obligation to consider how the RPS mandates are harming our state.

The RPS mandates have pushed electricity rates higher and will continue to do so as the standards become stricter each year. By 2030, 48 percent of the state's electricity must come from an approved renewable power source. As of the latest U.S. Information Administration (EIA) October 2023 data, Connecticut's electricity prices are currently highest in the continental United States, in a virtual tie with California — and 70 percent higher than the national average. This is partly due to Connecticut's RPS mandate, one of the strictest in the country.[5]

FIGURE 1

Residential Electricity Percent Annual Increase, Less Chained Cons. Price Index: 2008-2023



Sources: US Energy Info. Admin., US Bur. Labor & Statistics

The RPS mandates force electricity providers to buy more expensive energy because they cannot look for the least expensive option. Instead, they must purchase energy from a narrow list of approved sources [See Appendix]. This has put a drag on investment in cheaper energy sources, while subsidizing investment in sources that meet the requirements of the mandates.

EXPORTING DOLLARS AND JOBS OUTSIDE CONNECTICUT

In 1998, state legislators assured the public that tax credits and mandatory consumption in the renewable energy sector would not only boost the economy but also generate more job opportunities in our state. These promises proved hollow. The anticipated jobs, which were expected to compensate for the economic losses resulting from higher electricity costs, never materialized.

Instead, the state's electricity rates continue to go up — even as consumption decreases — and only 4.7 percent of the electricity generated in Connecticut was from RPS-eligible sources in 2021.[6] Most of the money (and those promised jobs) ended up out of state. A full 25% of the RPS eligible energy was produced in New York and Canada.[7] Connecticut's future hope for RPS-approved electricity is based on hydropower from Quebec.[8]

The RPS mandates also mean the state is involved in picking winners and losers in the energy market, as traditional suppliers are forced offline. In the meantime, taxpayers are supporting the growth of solar and wind businesses that may need government handouts for years to survive.

EXPENSIVE, WEATHER DEPENDENT ENERGY

The RPS mandates have reduced the ability to provide energy around the clock and have made Connecticut reliant on intermittent sources that are weather dependent — such as wind farms and solar panel arrays. The unanswered question is what to do when those sources are not readily available, and there is no longer the capacity to meet consumer needs with more reliable energy sources.

Finally, because wind and solar energy sources tend to be more distant from population centers, the state will likely have to add many miles of new transmission lines to move energy to our market.[9] That will cost billions of dollars, which energy consumers will have to subsidize through higher rates unless the federal government absorbs the costs.

LOOKING AHEAD

To bring costs down for consumers and to make Connecticut a more competitive state for business, it is time to repeal the RPS mandates. Or at the very least, stop prioritizing certain types of clean energy over others.

“The anticipated jobs, which were expected to compensate for the economic losses resulting from higher electricity costs, never materialized.”

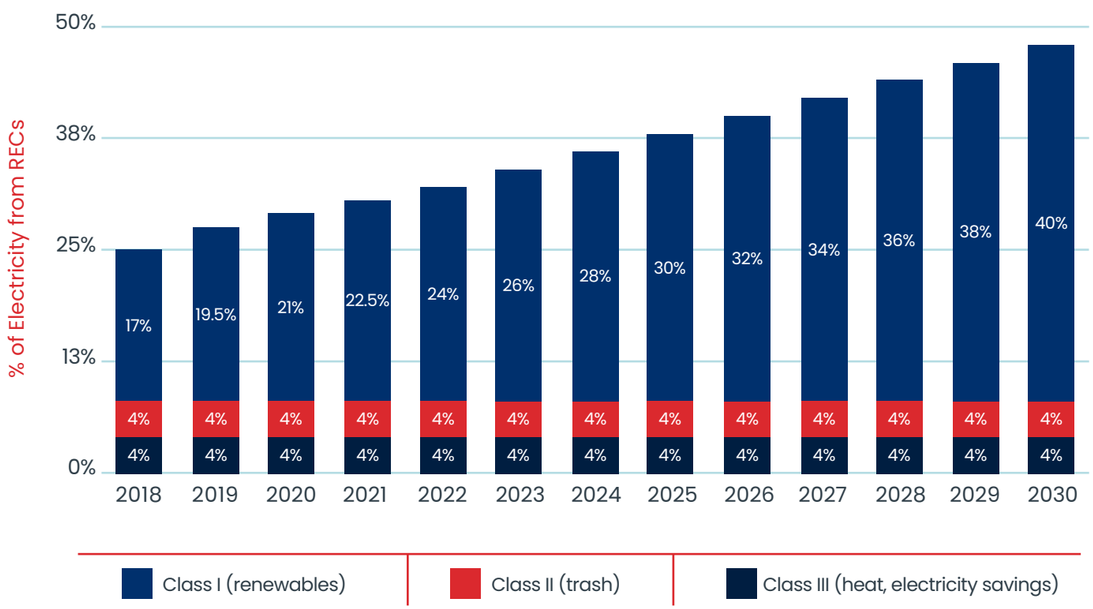
ENERGY IN CONNECTICUT

In 1998, Connecticut passed one of the first RPS mandates in the nation which have since been amended. Then, in 2018, Gov. Dannel P. Malloy signed S.B. 9: An Act Concerning Connecticut's Energy Future into law, which accelerated the RPS mandates from 1.5 percentage per year in new approved energy sources to 2 percentage points per year beginning in 2022.[10]

The Connecticut RPS mandates require that electric providers obtain at least 40 percent of their retail load from renewable energy generation by 2030, called a Class I renewable energy source. The mandate started with an initial requirement of 17 percent in 2018, increasing incrementally by 1.5 percent annually through 2022 and then increasing annually by 2 percent from 2023-30.

The RPS also requires providers to source at least 4 percent of its retail electricity load from permitted trash-to-energy facilities (Class II) and at least 4 percent from combined heat and power (CHP) systems, waste heat recovery systems, conversion and load management systems, and/or demand-side-management projects (Class III). Owners of electricity generation projects that qualify as renewable under one of the three classes of Connecticut's RPS receive one Renewable Energy Credit (REC) for every megawatt-hour (MWh) of electricity they produce. [For more details, see the Appendix.]

FIGURE 2
CT Renewable Energy Credit Requirements: Class I, II, and III (2018-2030)



Source: "Connecticut Renewable Portfolio Standard," CT Public Utilities Regulatory Authority

To estimate the economic effects of the Connecticut RPS mandates, Beacon Hill Institute (BHI) applied its STAMP® (State Tax Analysis Modeling Program) model to data from Independent System Operator (ISO) New England (an independent, not-for-profit corporation responsible for keeping electricity flowing across the six New England states), S&P Global, and Connecticut's Public Utilities Regulatory Authority compliance reports. Using these sources, BHI estimated the costs attributable to the policy. The significant findings show:

- The current RPS mandates will raise the cost of electricity by $275 million for the state's electricity consumers by 2030.
- Connecticut's electricity prices are expected to rise by 5.1 percent by 2030 due to the RPS mandates. These increased energy prices will likely hurt Connecticut's residents and businesses and, in turn, harm the state economy.

In 2030, the RPS is expected to:

- Lower employment by an expected 1,930 jobs;
- Reduce real disposable income by $337 million; and
- Decrease private capital investment (which generates future income).

Additional reliance on expensive peak-demand electricity generation sources and the need for a vast network of power lines will significantly drive these cost increases.

Unlike wind and solar, natural gas generators produce electricity on demand (or are "dispatchable") and provide the bulk of electricity generation under normal conditions — called "baseload" for the electricity grid. Displacing gas with solar and wind will lower the dispatchable electricity generation under baseload conditions, forcing utilities to use peak electricity generation sources when wind and solar are unavailable. In other words, the grid operator will depend on resources that are usually utilized to help supply electricity on hot summer days (when demand is at its highest) to supply electricity during normal electricity demand when wind and solar sources are unavailable.

The peak demand electricity generation sources tend to be more expensive and sometimes burn emission-intensive oils such as fuel oil.

WAYWARD WIND

The New England states have leaned into offshore wind to realize their renewable energy and decarbonization goals. As of 2022, wind projects represented 46 percent of the ISO New England's interconnection queue to be connected to the transmission system, and 88 percent of these are offshore wind projects.[11, 12]

However, offshore wind developers have canceled several projects off the U.S. northeast coast. Most recently, Danish developer Orsted announced that it is scrapping two large projects off the southern coast of New Jersey due to cascading economic pressures, including skyrocketing interest rates and a supply chain crunch.[13] These projects were expected to generate enough electricity to power more than 500,000 homes and create thousands of jobs.

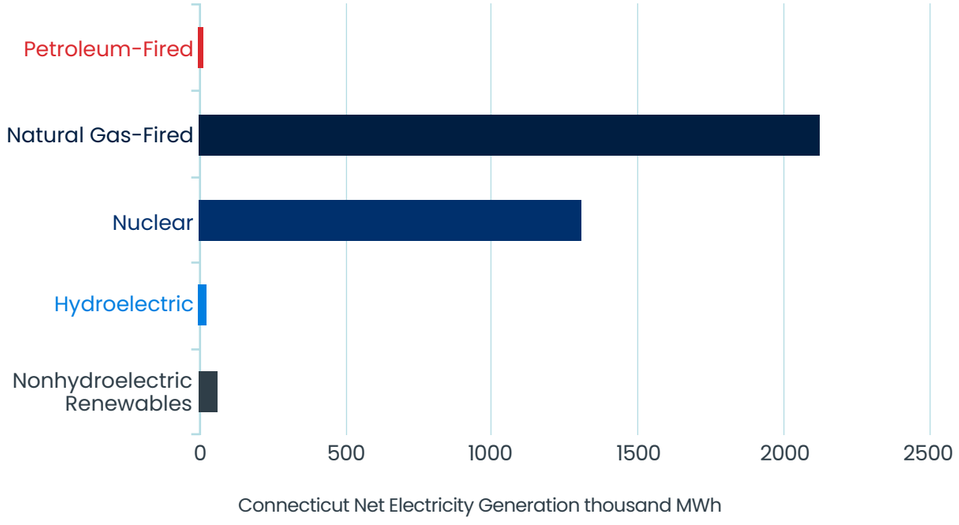
The news comes after developers in New England canceled power contracts for three projects that would have provided another 3.2 gigawatts of wind power to Massachusetts and Connecticut, saying their projects were no longer financially feasible. The cancellations equate to nearly one-fifth of President Joe Biden's goal to build 30 gigawatts of offshore wind power by 2030.[14]

The cancellation could be the first of many, as higher production expenses and import tariffs drive up project costs. This development should be no surprise since the global electric utility industry and its largest customers seek the same paths to reach their decarbonization goals. As a result, the demand for all renewable energy resources may continue to stress supply chains and subsequently push up project prices, making them uneconomical.

THE CURRENT STATE OF CONNECTICUT ENERGY

Only 4.7 percent of the electricity generated in Connecticut during 2021 was from RPS-eligible sources, according to EIA data. Most of the money (and those promised jobs) ended up in New York and Maine.[15]

FIGURE 3
Connecticut Net Electricity Generation by Source Sep. 2023



Source: Energy Information Administration

The New England Power Pool Generation Information System regulates Connecticut's renewable energy sources to ensure compliance with the current standards. A state is compliant if it meets the mandated number of RECs or makes Alternative Compliance Payments (ACP).

The RPS mandates force the state utilities to add renewable electricity capacity to a market that has seen electricity sales fall by 7.1 percent since 2011.[16] Although grid operator ISO New England forecasts that the electricity load will grow by 1.5 percent annually through 2032, by forcing additional electricity generation capacity onto the market with legally guaranteed sales, existing generation resources will be squeezed out of the market and forced to close. A large portion of the renewable generation sources are intermittent — wind and solar require significant conventional backup power sources that are cycled up and down to accommodate the variability production or expensive storage options.

Renewables often squeeze out baseload sources, such as gas (that can produce electricity on demand or are "dispatchable") and provide electricity during times of normal (or baseload) electricity demand. As previously noted, demand typically peaks on the hottest days of the year when wind and solar sources are not available. In these instances, the grid will be forced to rely on peak demand generation sources that only run when the price of electricity is high enough to cover their marginal costs of fuel.

Peak demand sources tend to be the most expensive generation sources because they can only justify production when the marginal price of electricity is high enough to cover their considerable marginal costs.

Meanwhile, peak demand fuels such as natural gas and oil are bought on the spot market where gas is purchased for immediate delivery as opposed to the futures market, where fuels are purchased for delivery on a future date. As a result, the spot market buyer must accept the market price, whatever it is. This can result in higher fuel costs and electricity prices, for example, when there is a heat wave and electricity demand rises (along with the resulting demand for gas generation). In short, the switch from baseload demand sources to peak load demand sources drives electricity prices higher.

TRANSMISSION COSTS INTENSIFY

The cost of transmitting new wind generation will also soar as the RPS mandate requires an ever-increasing percentage of electricity generation from renewable sources. Out of the "green" energy sources, wind power will likely supply a high percentage of renewable resources to meet the mandates. By nature, wind farms are placed in windy and often remote locations, such as hilltops or the ocean. These plants will be spread widely around New England and beyond — but they require an enormous investment in new transmission lines.

The grid operator ISO New England reports that utilities in its territory have invested $12 billion in new transmission projects since 2002 "to maintain transmission reliability."[17] Furthermore, "since 2016, 389 asset condition projects have been undertaken in the region, for a total investment of $7.7 billion expected through 2023." The report sums up the problem succinctly: "Increases in renewable generation, along with unprecedented load and weather conditions, are creating power system conditions outside the range of traditional studies. This may prompt the ISO to limit resources' operations."[18]

The Department of Energy and Environmental Protection (DEEP) Connecticut 2020 Integrated Resource Plan considers scenarios to meet the state's 100% Zero Carbon Target for electric supply by 2040. The report assumes that all current policies, such as the RPS, are implemented, and thus, the report looks to achieve the 100% Zero Carbon Target above and beyond the mandate. It also estimates that achieving the target would cost Connecticut ratepayers between $3.8 billion and $4.6 billion from 2027 through 2040 using renewable energy and storage.

Despite millions in lobbying and taxpayer dollars to promote wind and solar in the past decade, 91.4% of carbon-free electricity generated in Connecticut in 2021 came from nuclear.[19] (See "Connecticut Electricity Generation by Source").

POLICY RECOMMENDATIONS

According to the Resource Plan, if renewables were abandoned entirely, extending Millstone Nuclear Power Station's operation license through 2040 would save ratepayers $603 million and $1.5 billion. It would also achieve the 100% zero carbon goal.[20]

As the RPS has been in place for years — making some renewable firms entirely dependent on government assistance to be profitable — its repeal will require enormous political courage. If policymakers are unable to take the recommended step of repealing the state's RPS, even scaling back the annual increase from 2 percentage points to 1 percentage point would make electricity more affordable on the margins, by giving electricity producers more time to find lower emission and efficient solutions.

Additionally, legislators could consider adding a "safety valve" feature into the RPS, so that if residential, industrial or commercial electricity rates increased by a certain percentage over the past year (less inflation), the RPS requirement would "stall" at the previous year's mandate (See Figure 1). For example, if Connecticut's residential electricity rate increases by more than 10% from January 2024 to December 2024, the RPS would require utilities to purchase RECs for only 28% of the electricity they generate, in 2025, rather than rising to the 30% mark (See Figure 2). For reference, inflation-adjusted residential electricity prices have exceeded 10% on an annual basis only once in the past 10 years, but preliminary figures suggest 2023 prices will overshoot 2022 prices by nearly 20%.[21] [22]

NUCLEAR OPTIONS

In 2023, the Legislature passed "S.B. 7, An Act Strengthening Protections for Connecticut's Consumers of Energy" which would allow nuclear energy generated at facilities built after October 1, 2023 to be counted under the RPS mandates.[23] Unfortunately, due to crippling federal regulations, new nuclear facilities have become all but impossible to bring

online, with only one U.S. facility built in the past three decades.

To make progress toward the 100% zero-carbon goal, Connecticut could consider following the lead of New York and establish the country's second Zero-Emission Credit program, thus requiring Load Serving Entities to purchase a certain percentage of electricity load from nuclear facilities.[24] If this is done in conjunction with the scaling back of the RPS to 1% of renewable electricity, electricity savings are likely. Better still, Connecticut could reach 100% clean, pollution-free-electricity faster than under a renewable-exclusive arrangement.

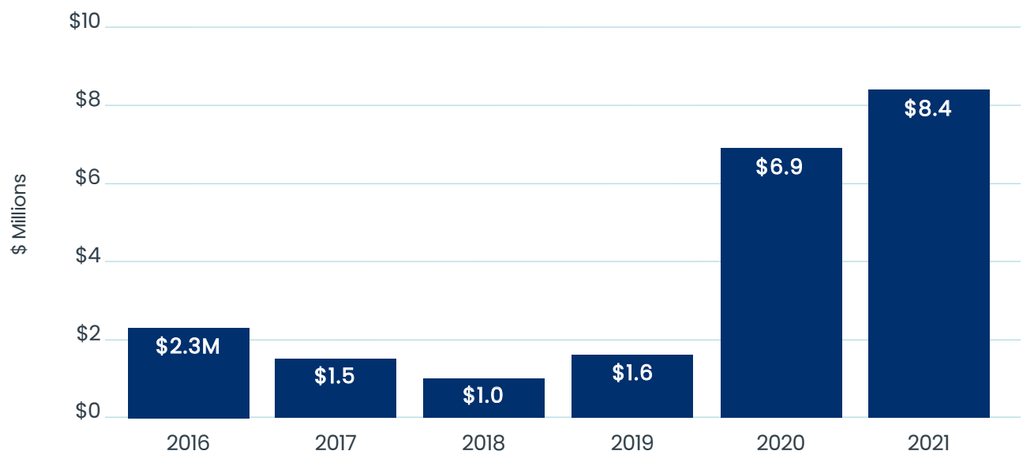
However, the Resource Plan generated these $3.8-4.6 billion estimates before supply chain issues and inflation drove up the cost of renewable energy sources, contributing to the cancellation of wind projects off the East Coast, suggesting the final bill to Connecticut will be even higher. The plan also illustrates the cost of shifting to renewable energy sources and batteries, and the importance of a baseload generation source, such as the Millstone power station. In order to keep the lights on at all times of day, the plan stated that there is no immediate alternative to keeping Millstone.

Compliance costs could surge even higher as the demand for RECs in the Northeast outstrips utilities' ability to secure enough electricity production from eligible sources. Moreover, each new renewable energy project would be placed in a successively less efficient location as the best locations become occupied. Compared to previous projects, these changes will increase costs even further — without any transparency, as ratepayers will never see them itemized on their electric bills. Most of the costs will be folded into the electricity supply cost and transmission categories.

THE COMPLIANCE PAYMENT CEILING

Normally, the ACP prices would effectively act as a ceiling on the cost of the RPS mandates. These prices are determined by the Public Utilities Regulatory Authority, which verifies that the electricity provider obtained enough RECs in the correct time frame to comply. If not, they bill the provider with the ACP. If REC prices rise to the level of the ACP, then energy producers become indifferent between these two options, all else being equal. However, under the RPS policy, the ACP payments cannot pass on the costs of the ACP payments to customers (unlike RECs, which can be passed on to customers through electric rates). For this analysis, we use the ACP as a ceiling for the cost of the RPS. [25] (See Figure 4)

FIGURE 4
Total Alternative Compliance Payments (ACP) by Year (in $ millions)



Source: PURA Compliance Docket

How will these higher costs affect electricity ratepayers and the state economy over the coming years? In the following section, we estimated the costs of the Connecticut RPS law and its impact on the state's economy. To that end, we applied STAMP® to estimate the economic effects of the state RPS mandates.[26]

STAMP® is a five-year dynamic computable general equilibrium (CGE) model programmed to simulate changes in taxes, costs (general and sector-specific) and other economic inputs. As such, it provides a mathematical description of the economic relationships among producers, households, governments and the rest of the world. It is "general" in that it considers all the important markets, such as the capital and labor markets. It is also an equilibrium model because it assumes demand equals supply in every market (goods and services, labor and capital). This equilibrium is achieved by allowing prices to adjust within the model, which is computable because it can generate numeric solutions to concrete policy and tax changes.[27]

ESTIMATES AND RESULTS

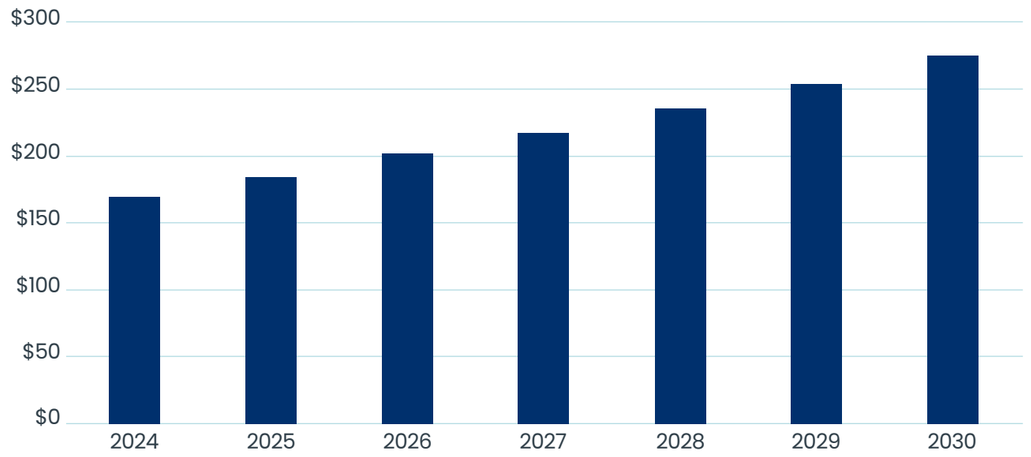
Considering the uncertainty associated with future costs, we provide three estimates — mean, high and low — of the cost of Connecticut's RPS mandate compared to a world where the RPS was not implemented. The Appendix explains the methodology. Figure 5 displays the cost estimates and economic impact of the current 48% RPS mandate in 2030. Figure 6 shows what these costs would be from 2024 to 2030.

FIGURE 5:
Cost Estimates And Economic Indicators

COST ESTIMATES (2023 $)	VALUE
Total Net Cost in 2030 ($ million)	275
Total Net Cost 2024 – 2030 ($ million)	1,535
Electricity Price Increase in 2030 (cents per kWh)	1.03
Percentage Increase (%)	5.1

ECONOMIC INDICATORS	VALUE
Total Employment (jobs)	-1,930
Investment (millions $)	-64
Real Disposable Income (millions $)	-337

FIGURE 6
Increasing cost of Connecticut's RPS, in Millions of $2023



The current RPS will increase in cost each year, reaching $275 million by 2030. As a result, the RPS mandate would increase electricity prices by 1.03 cents per kilowatt-hour (kWh), or by 5.1%, on average. The RPS mandate will cost Connecticut electricity customers $1.535 billion from 2024 to 2030.

The STAMP® model simulation indicates that, upon full implementation, RPS will likely hurt Connecticut's economy. The state's ratepayers will face higher electricity prices that will increase their cost of living, putting downward pressure on households' disposable income. By 2030, the Connecticut economy will shed 1,930 jobs compared to the situation with no RPS.

The job losses and price increases will reduce real incomes as firms, households and local and state governments spend more on electricity and less on other items, such as groceries, childcare or other necessities. Therefore, in 2030, real disposable income will fall by $337 million. Furthermore, net investment will decrease by $70 million according to the STAMP® model.

Figure 7 shows how the RPS mandate is expected to affect the annual electricity bills of Connecticut's households and businesses. In 2030, the RPS is expected to cost families an additional $96 per year directly, commercial companies $653 per year and industrial businesses $4,884 per year. Over the entire period from 2024 to 2030, the RPS will cost families an additional $542, commercial businesses $3,682 and industrial businesses $27,518.

FIGURE 7:
Annual Effects of RPS on Electricity Ratepayers ($2023)

	RATEPAYER COST (2030)	RATEPAYER COST (2024 – 2030)
Residential	$96	$542
Commercial	$653	$3,682
Industrial	$4,884	$27,518

CONCLUSION

We recognize that repealing or amending the Renewable Portfolio Standard (RPS) will not, by itself, lower Connecticut electricity prices drastically relative to the rest of the country. It may take years to overcome the stubborn refusal of regional leaders to lower the price of natural gas, which accounts for over half of New England's electricity generation on an annual basis.[28] Ironically, building a regional natural gas pipeline or repealing the federal Jones Act (restricting natural gas shipping between ports) would likely reduce the region's electricity prices substantially long-term, while lowering carbon emissions from oil.[29]

But those options are not in the hands of Connecticut's legislative leaders. The state RPS is their political low-hanging fruit, ripe for picking. Legislators can tackle the RPS directly, while working with New England leaders on regional issues.

The discussion surrounding increased green investment and job creation often overlooks the opportunity costs associated with RPS policies. Mandating pricier electricity production sources inevitably leads to higher electricity costs for state ratepayers. Consequently, this translates to increased operational expenses for businesses and manufacturers, resulting in reduced investments in both capital and labor. Furthermore, households will have less disposable income for essential and leisure expenditures, from groceries to entertainment.

POLICY RECOMMENDATIONS

Legislators should consider:

- Repealing the Renewable Portfolio Standard entirely to achieve the highest cost savings
- Slowing the rate of the RPS mandate from 2 percentage points a year to 1 percentage point
- Researching Zero-Emission Credits for nuclear energy in a parallel program to the RPS (in conjunction with the recommendation above)
- Creating an RPS "safety valve," so that if electricity rates increase by a certain percentage over the past year, the Renewable Energy Credit requirement for electricity generation would "stall" at the previous year's percentage
- Reaching out to Connecticut federal legislators to repeal the 124-year old federal Jones Act
- Working with regional leaders to build support for a natural gas pipeline

APPENDIX

The Connecticut RPS sorts mandated energy sources into Class I, II and III.

Class I energy resources include solar power, wind power, fuel cells, geothermal, methane gas from landfills (anaerobic digestion or other biogas derived from biological sources), ocean thermal power, tidal power, low-emission advanced renewable energy conversion technologies, hydropower, or energy from a biomass facility. Hydropower plants must not exceed 30 megawatts or cause a change in river flow and are only eligible if the facility began operation after July 1, 2003 or a run-of-the-river hydropower facility that received a new license after January 1, 2018, under the Federal Energy Regulatory Commission rules pursuant to 18 CFR 16, as amended from time to time, and provided the facility is not based on a new dam or a dam identified as a candidate for removal. Utility customer-distributed energy projects using Class I technologies also qualify. Existing renewable energy resources continue to be eligible for Class I renewable energy.[31]

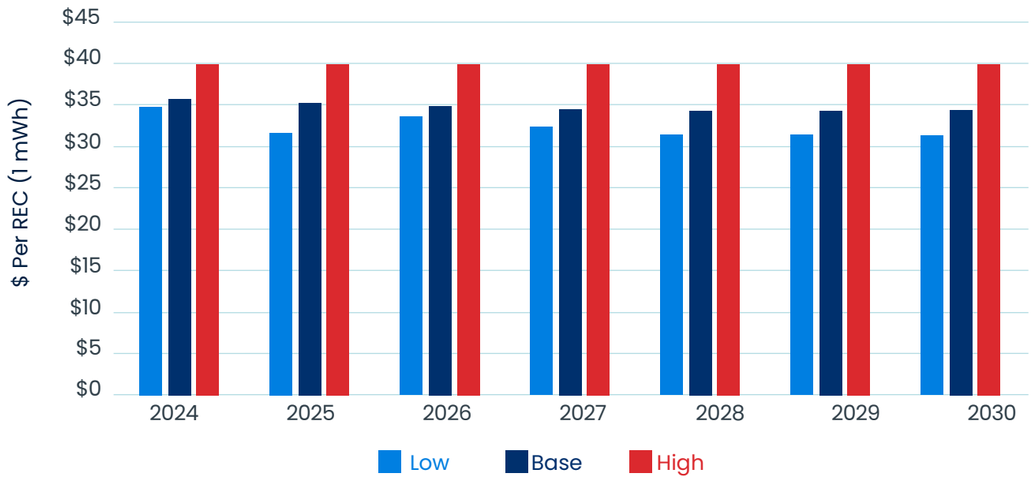
Class II includes trash-to-energy facilities.

Class III resources include customer-sited CHP systems, with a minimum operating efficiency of 50%, installed at commercial facilities in Connecticut on or after January 1, 2006; electricity savings from conservation and demand management programs beginning on or after January 2006; and systems that recover waste heat or pressure from commercial processes installed on or after April 1, 2007.[32, 33]

To meet the RPS, Connecticut utilities must obtain RECs for each megawatt-hour (MWh) of electricity generated by renewable sources. RECs from renewable energy produced in New England and states adjacent to Connecticut are eligible to satisfy the RPS if they were not used to satisfy another state's renewable mandate or goal. Utilities that fail to comply with the RPS mandate must make an Alternative Compliance Payment (ACP) of $40 per MWh of Class I and $25 per MWh of Class II and III.[34, 35]

The RECs represent the extra cost of renewable energy generation over the cost of traditional generation technologies. We forecast the cost of RECS using past prices and the future generation that the RPS applies to make the estimates.

FIGURE 8
Class I REC Price Estimates



DETERMINING THE CONNECTICUT RPS MANDATE COST

Utilities serving electricity load in Connecticut that are subject to the RPS mandate can comply in one of three ways. First, utilities build or enter into contracts for energy resources that meet the Class I, II and III requirements that generate RECs, and retire those RECs in the New England Power Pool Generation Information System (NEPOOL). Second, utilities can purchase RECs within the NEPOOL system, and third, they can make ACPs. The cost of the RECs represents the incremental cost of complying with the RPS mandate for generating the electricity resource. Also, the ACP could act as a ceiling on the cost of the RECs; if the REC price exceeds the ACP, then utilities would pay the ACP instead of purchasing RECs or procuring the mandated energy sources.

However, energy producers cannot pass on ACP costs to customers and must pay the ACP to the electricity distribution company to offset customer costs for Class I and II RECs. Meanwhile, Class III ACP payments are made to the Connecticut Green Bank. Therefore, electricity providers have an incentive to purchase RECs instead of making ACPs. Nevertheless, we treat the ACP amount as a ceiling for REC prices. We assumed that all banked RECs are used by 2024.

To calculate the RPS mandate's cost, we use the ISO New England forecast that Connecticut's electricity load will grow by 1.5% annually between 2023 and 2030. Next, we adjust the total electricity load to the quantity of electricity that the RPS applies. We use the compliance dockets from the Connecticut Public Utilities Regulatory Authority from 2016 through 2021. We compare these amounts with the historical data from the ISO New England report and find that 92% of total electricity sales are subject to the RPS mandate.[36] (See Figure 9)

FIGURE 9:
Portion Of Renewables In CT Annual Energy Sales

	ANNUAL ENERGY SALES (GWH)	ENERGY SALES SUBJECT TO RPS (GWH)	RPS REQUIREMENT (GWH)	PROJECTED RENEWABLE (GWH)	REQUIREMENT - PROJECTED (GWH)
2024	28,852	26,551	9,824	4,250	5,574
2025	29,005	26,692	10,143	4,402	5,741
2026	29,207	26,878	10,751	4,560	6,191
2027	29,547	27,191	11,420	4,723	6,697
2028	30,017	27,623	12,154	4,892	7,262
2029	30,428	28,001	12,881	5,067	7,814
2030	30,964	28,495	13,677	5,248	8,429

Now that we have the amount of electricity subject to the RPS mandate, we forecast the REC prices. We use weekly historical REC price data from S&P Global from 2017 to 2022 to forecast Class I, II and III prices through 2030 and then aggregate the weekly data into annual averages. The forecast includes a lower and upper bound of 95% confidence forecast ranges. The ACP payment acts as our upper bound estimate for REC prices, and we use the lower bound REC price forecast to compute the lower cost estimate of the RPS policy. See Figure 10 below.

FIGURE 10:
Cost Estimates And Economic Indicators, Within 95% Confidence Intervals

COST ESTIMATES ($2023)	LOW	HIGH
TOTAL NET COST IN 2030 ($ MILLION)	201	310
TOTAL NET COST 2024 – 2030 ($ MILLION)	1,221	1,722
ELECTRICITY PRICE INCREASE IN 2030 (CENTS PER KWH)	0.75	1.17
PERCENTAGE INCREASE (%)	4	5.7

ECONOMIC INDICATORS	LOW	HIGH
TOTAL EMPLOYMENT (JOBS)	-1,413	-2,190
INVESTMENT (MILLIONS $)	-47	-72
REAL DISPOSABLE INCOME (MILLIONS $)	-247	-282

With the REC prices and electricity consumption defined, we looked at other data points that required estimates — the first of which was a baseline for renewable energy sales: that is, the level of renewable generation that would have come online without considering the policy under review. The difference between this baseline and the policy requirement is the amount of renewable energy that must go online due to the RPS policy. The baseline level of renewables was set equal to the total amount of renewable generation in 2003, as the policy was established in Connecticut in June 2004. To err on the conservative side, we included all renewable energy, even though hydroelectric facilities larger than 30MW were excluded. This amount was then grown annually according to the projected growth of renewables in the region per the AEO 2003 from the Yankee Institute's 2015 RPS study from 2014-2020, or 3.6%.[37]

RATEPAYER EFFECTS

To calculate the policy's effect on electricity ratepayers, we used data from the Energy Information Administration (EIA) on the average monthly electricity consumption by type of customer: residential, commercial and industrial.[38] The monthly figures were multiplied by 12 to compute an annual figure. We then inflated the 2021 figures for each year using the ISO New England forecast of electricity load for Connecticut.[39]

We calculated an annual percentage increase in electricity costs by dividing the total cost increase — estimated in the section above — by the total electricity sales for each year. Then, we multiplied the percentage increase in electricity costs by the ten-year average electricity price (2012–2021) per kWh for each type of ratepayer for each year to obtain the price increase in cents per kWh. Afterwards, we multiplied the price increase per kWh by the annual consumption in kWh for each customer type. For example, we expect the average residential ratepayer to consume 8,719 kWh of electricity in 2024, and the predicted percent rise in electricity is 0.61 cents per kWh in the same year.

Therefore, we expect residential ratepayers to **pay an additional $61.34 in 2024.**

MODELING THE POLICY USING STAMP®

We simulated these changes in the STAMP® model as a percentage price increase in electricity to measure the dynamic effects on the state economy. The model estimates the proposal's impact on employment, wages and income. Each estimate represents the change in the indicated variable against a "baseline" assumption of the variable's value for a specified year without the RPS policy.

Because the policy requires households and firms to use more expensive renewable power than they otherwise would have under a baseline scenario, the cost of goods and services will increase under the policy. These costs would typically be reflected in higher utility bills for all sectors of the economy. For this reason, we selected the sales tax as the most fitting way to assess the impact of the policy. Standard economic theory shows that a price increase of a good or service leads to a decrease in overall consumption and, consequently, a reduction in the production of that good or service. As producer output falls, the decline in production results in a lower demand for capital and labor.

As mentioned previously, BHI utilized its STAMP® model to identify the economic effects and understand how they operate through a state's economy. STAMP® is a five-year dynamic computable general equilibrium (CGE) model programmed to simulate changes in taxes, costs (general and sector-specific) and other economic inputs. To estimate the policy's economic effects, we compiled six STAMP® models to garner the average impact across various state economies: New York, Pennsylvania, North Carolina, Indiana, Kansas and Washington. These models represent different geographic dispersion (Northeast, Southeast, Midwest, the Plains and West), economic structure (industrial, high-tech, service, and agricultural) and electricity sector makeup.

Using three different utility price increases — 1%, 4.5%, and 5.25% — we simulated each of the six STAMP® models to determine what outcome these price increases would have on each of the six states' economies. We then averaged the percent changes to determine the average effect of the three utility increases. Figure 11 displays these elasticities, which were then applied to the calculated percent change in electricity costs for the state as discussed above.

We applied the elasticities to the percentage increase in electricity price and then applied the result to state-level economic variables to determine the effect of the policy. These variables were gathered from the Bureau of Economic Analysis Regional and National Economic Accounts and the Bureau of Labor Statistics Current Employment Statistics.[40]

FIGURE 11:
Elasticities For The Economic Variables

ECONOMIC VARIABLE	ELASTICITY
EMPLOYMENT	-0.022
INVESTMENT	-0.018
DISPOSABLE INCOME	-0.022

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