Increasing the Connecticut Renewable Portfolio Standard

Creating Economic and Environmental Benefits for Connecticut

Synapse Energy Economics: Pat Knight, Ariel Horowitz PhD, and Avi Allison
Sustainable Energy Advantage: Po-Yu Yuen and Jason Gifford

Overview

Connecticut has historically demonstrated leadership in creating clean, renewable energy economic development opportunities, enhancing energy security, and reducing emissions of greenhouse gases. The state's Renewable Portfolio Standard (RPS)—which requires electric utilities to provide an increasing percentage of their electricity from renewable sources as part of their basic electric service—is a critical component of Connecticut's leadership. RPS policies around the country are the foundation for clean, renewable energy markets and are a proven tool for supporting cost-effective renewable energy development.

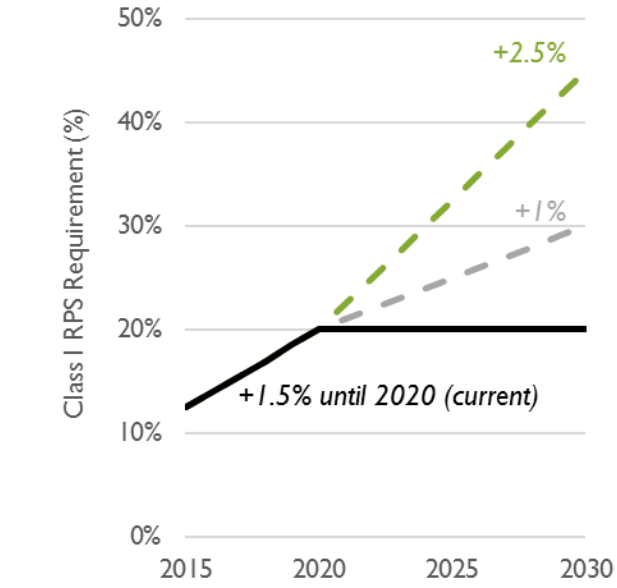
Connecticut's Class I RPS policy currently requires the state's major utilities to provide consumers with 15.5% of their electricity from qualified renewable sources. This increases by 1.5% each year until 20% is reached in 2020. Like many states, Connecticut is updating its RPS . In July 2017, the Connecticut Department of Energy and Environmental Protection (DEEP) released a draft Comprehensive Energy Strategy (CES), which proposed an extension for the Class I RPS through 2030, but with a slowdown in the rate of increase from 1.5% to 1%, reaching a level of 30% renewable energy by 2030.

Other states, including California and Hawaii, have enacted more ambitious RPS programs requiring renewable levels of 40 to 50% by 2030, setting even more ambitious requirements for years after that. In New England, Massachusetts is conducting legislative hearings on an RPS that would boost its annual increase to 2% or 3% per year.

We examined what happens under an RPS that increases by 2.5% per year starting in 2021, reaching a level of 45% by 2030. Our cost-benefit analysis shows that Connecticut will benefit from adopting a more ambitious RPS than DEEP has proposed through the creation of jobs and reducing the negative impacts of climate pollution.

This accelerated approach would put Connecticut solidly on track to reach the pollution reduction requirements of its Global Warming Solutions Act (GWSA). By 2030, this approach would create an additional 1,400 megawatts (MW) of wind and solar power in New England, create 7,100 new jobs, lower emissions by 14%, and decrease reliance on imported natural gas by 43%, with only minor impacts on electricity bills.

Figure 1. Current and alternate RPS requirements in Connecticut



Our Findings

Renew-ables

Increasing the RPS grows New England renewables by 1,400 MW

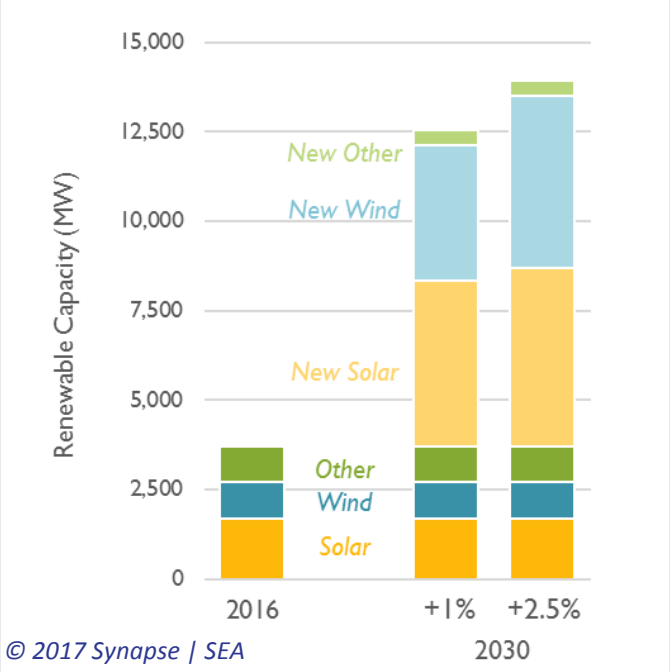
Combined with other regional policies, DEEP's proposal is estimated to contribute to 9,200 megawatts of new renewables in New England by 2030. Of these, an estimated 18% would be located in Connecticut, while the rest would be built in the other New England States. An increase in the Connecticut RPS of 2.5% per year through 2030 would create an additional 1,400 MW of renewable energy in New England.

Jobs

Increasing the RPS adds jobs for Connecticut and New England

Increasing the Connecticut RPS to 2.5% per year would add an estimated 7,100 additional jobs to New England between 2021 and 2030, or about 710 jobs per year. These jobs are driven by a clean energy future of new solar, wind, storage, and transmission. This estimate accounts for changes in jobs related to decreasing the use of natural gas and coal to provide electricity and minor increases in monthly electric bills.

Figure 2. New and incremental renewable additions in the New England electricity system



Natural Gas

Increasing the RPS reduces Connecticut's dependence on natural gas

Under DEEP's proposed 1% annual increase, the electric sector's reliance on natural gas is expected to decrease by 37% by 2030, compared to 2015 levels. Increasing Connecticut's RPS to 2.5% per year will push electricity generation from natural gas to fall 43% by 2030.

Renewables are not the only cause of this reduction; energy efficiency, increased hydroelectric imports, and more stringent carbon pollution reduction programs—put forth under the Regional Greenhouse Gas Initiative (RGGI) program and by the Massachusetts Department of Environmental Protection—are all expected to significantly curtail future need for natural gas in the electric sector. In addition to decreasing emissions, reducing the use of natural gas can help avoid volatile spikes in winter electricity prices.

Emis-sions

More renewables help Connecticut meet its greenhouse gas reduction requirements

Increasing the amount of renewable energy in Connecticut and the rest of New England reduces climate pollution. DEEP's proposal to slow the RPS to 1% per year lowers in-state electric-sector emissions from the 7.0 million metric tons (MMT) that were emitted in 2016 to levels of 5.4 MMT in 2030. Increasing the RPS to 2.5% reduces 2030 in-state emissions to 4.8 MMT.

Under the GWSA, Connecticut is required to reduce carbon pollution by 10% in 2020 (relative to 1990 levels) and by 80% in 2050 (relative to 2001 levels). A line drawn between these targets implies a consumption-based, all-sector carbon pollution cap of 30.2 MMT by 2030.

We estimate that DEEP's proposal falls short of meeting this straight line GWSA reduction path, with carbon pollution exceeding the implied GWSA targets every year from 2026 to 2030. Under DEEP's proposal, Connecticut's consumption-based emissions in 2030 fall to 31.8 MMT, exceeding the target by 5%. With a 2.5%

increase in the RPS, consumption-based emissions in 2030 exceed the target by 3%. While even an annual increase of 2.5% will not guarantee that Connecticut will meet its legally required reductions (as we find the cap is still exceeded in 2028, 2029, and 2030), the accelerated RPS trajectory puts Connecticut closer to its required reductions.

A 2.5% annual increase in renewable energy requirements, combined with more action in other sectors (such as the deployment of heat pumps, water heating, and expanded vehicle electrification), will allow Connecticut to meet its GWSA goals. Reducing carbon emissions in the electric sector by expanding the RPS, though, is a necessary first step to ensure that as levels of electrification increase, total emissions go down, not up.

Bills

Increasing the amount of renewables results in minor changes to bills

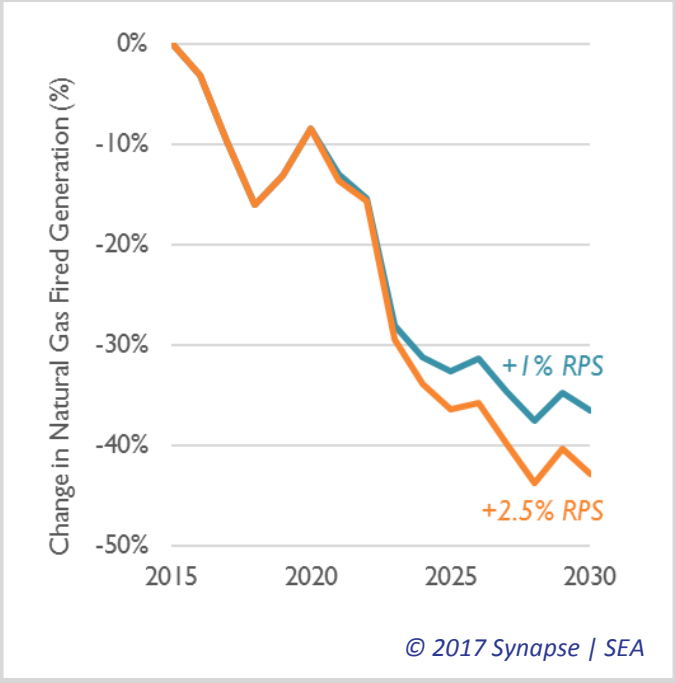
A cleaner, healthier, more efficient and reliable energy future comes at a relatively small up-front cost, with significant long-term benefits. Increasing Connecticut's RPS from 1% to 2.5% will increase monthly electric bills for Connecticut ratepayers by about $2.66 per month through 2030, a relative increase of 2.0% compared to recent average bills. Similar increases will occur in the commercial and industrial sectors. When factoring in the social cost of reducing carbon emissions (e.g., health impacts, costs to agricultural productivity, and property damages), the residential bill impact is reduced to $2.30 per month. Renewable energy sources such as offshore wind and solar have zero fuel costs, which allows for competitive pricing that can save consumers money on their energy bills in the long-term.

What scenarios were modeled?

In this analysis, we evaluated two scenarios:

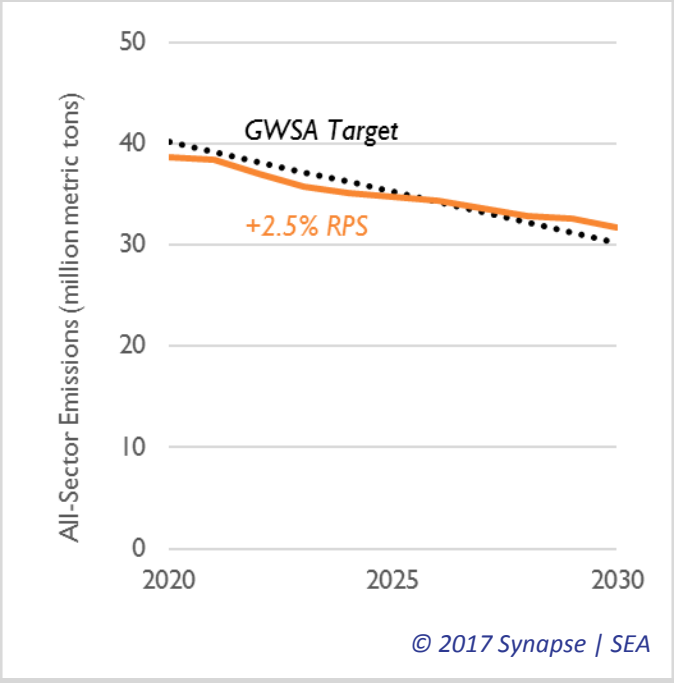
- The **DEEP Proposal**, under which Connecticut implements the RPS proposal in the draft 2017 Comprehensive Energy Strategy (CES). In this case, the Connecticut Class I RPS increases by 1% per year beginning in 2021, reaching a level of 30% renewables by 2030.
- The **Accelerated RPS Proposal**, under which Connecticut accelerates RPS growth to 2.5% in 2021, reaching 45% by 2030.

Figure 3. Generation from natural gas power plants in New England with an Expanded RPS, relative to 2015



© 2017 Synapse | SEA

Figure 4. Projection of Connecticut's CO_2 emissions and compliance with the Connecticut GWSA



© 2017 Synapse | SEA

Methodology

Synapse Energy Economics and Sustainable Energy Advantage employed a suite of models for this analysis:

- Sustainable Energy Advantage's **Renewable Energy Market Outlook (REMO)**, which is used to develop defined forecasts for both near-term and long-term renewable project buildout and renewable energy certificate pricing.
- Anchor Power Solution's **EnCompass** model, a long-term optimization model that integrates data from REMO and other unit-specific inputs to estimate unit-specific scheduling and dispatch, long-term capital project optimization, market price forecasting for energy and capacity, and estimations of greenhouse gas emissions throughout New England.
- IMPLAN LLC's **IMPLAN** model, an industry-standard job impact model. IMPLAN produces net direct, indirect, and induced job impacts for all six New England states.
- Synapse's **Multi-Sector Emissions Model (M-SEM)**, for projecting future energy use and emission changes associated with non-electric energy use, including the impact of electric vehicle deployment.
- Synapse's **Bill Impact Model**, which estimates bill impacts for ratepayers across a variety of customer classes. This model integrates wholesale market price data and spot market REC price data to estimate the annual, relative change in monthly retail bills between two scenarios.

Modeling assumptions: Both scenarios assume that the DEEP's proposal under the draft CES to phase out biomass eligibility from Connecticut's Class I RPS is enacted. In addition, both scenarios assume that Massachusetts updates its RPS to increase by 2% per year and that Connecticut meets a goal of having 161,000 EVs on the road by 2025, as established in a 2013 MOU signed by Governor Malloy. Both scenarios assume that other currently-enacted legislation in the New England states is implemented as written (including requirements in Massachusetts to procure energy from offshore wind and imported hydroelectricity, requirements to procure cost-effective energy efficiency, updates to the RGGI program, updates to distributed generation policies, and the implementation of greenhouse gas regulations by the Massachusetts Department of Environmental Protection). In both scenarios, more intra-regional transmission is required to facilitate movement of high capacity factor, cost-effective renewable energy in northern New England to load regions in the south. In the CES Case, we add a 600 MW HVDC line; in the Expanded RPS Case, we add a 1,200 MW HVDC line.

For more information on the modeling input development and methodology, please see a recent, related report by this analysis' authors, *An Analysis of the Massachusetts Renewable Portfolio Standard*, available at http://bit.ly/2xW1GzZ

This analysis was prepared for Connecticut Fund for the Environment, Consumers for Sensible Energy, RENEW Northeast, and the Sierra Club. For more information, please contact Claire Coleman at ccoleman@ctenvironment.org.

About Synapse

Synapse Energy Economics, Inc. is a research and consulting firm specializing in energy, economic, and environmental topics. Since its inception in 1996, Synapse has grown to become a leader in providing rigorous analysis of the electric power sector for public interest and governmental clients.

For more information, contact:
Pat Knight, Senior Associate
pknight@synapse-energy.com | 617-453-7051

About Sustainable Energy Advantage

Since 1998, Sustainable Energy Advantage, LLC has helped private, public and non-profit organizations develop opportunities for clean, renewable sources of energy, including wind, solar, hydroelectric, biomass and geothermal power, in competitive wholesale and retail electricity markets.

For more information, contact:
Po-Yu Yuen, Principal Analyst
pyuen@seadvantage | 508-665-5861