Informational Forum on Generators

Connecticut Energy & Technology Committee

Francis Pullaro
Executive Director
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About RENEW

An association of the renewable energy industry and environmental advocates united to promote large-scale renewable energy in the Northeast.

Affordable and Reliable Renewable Energy

Renewables First

Meeting Connecticut's Energy Needs

A "renewables first" strategy couples a strong Renewable Portfolio Standard (RPS) backed by state procurements of cost-effective RPS resources

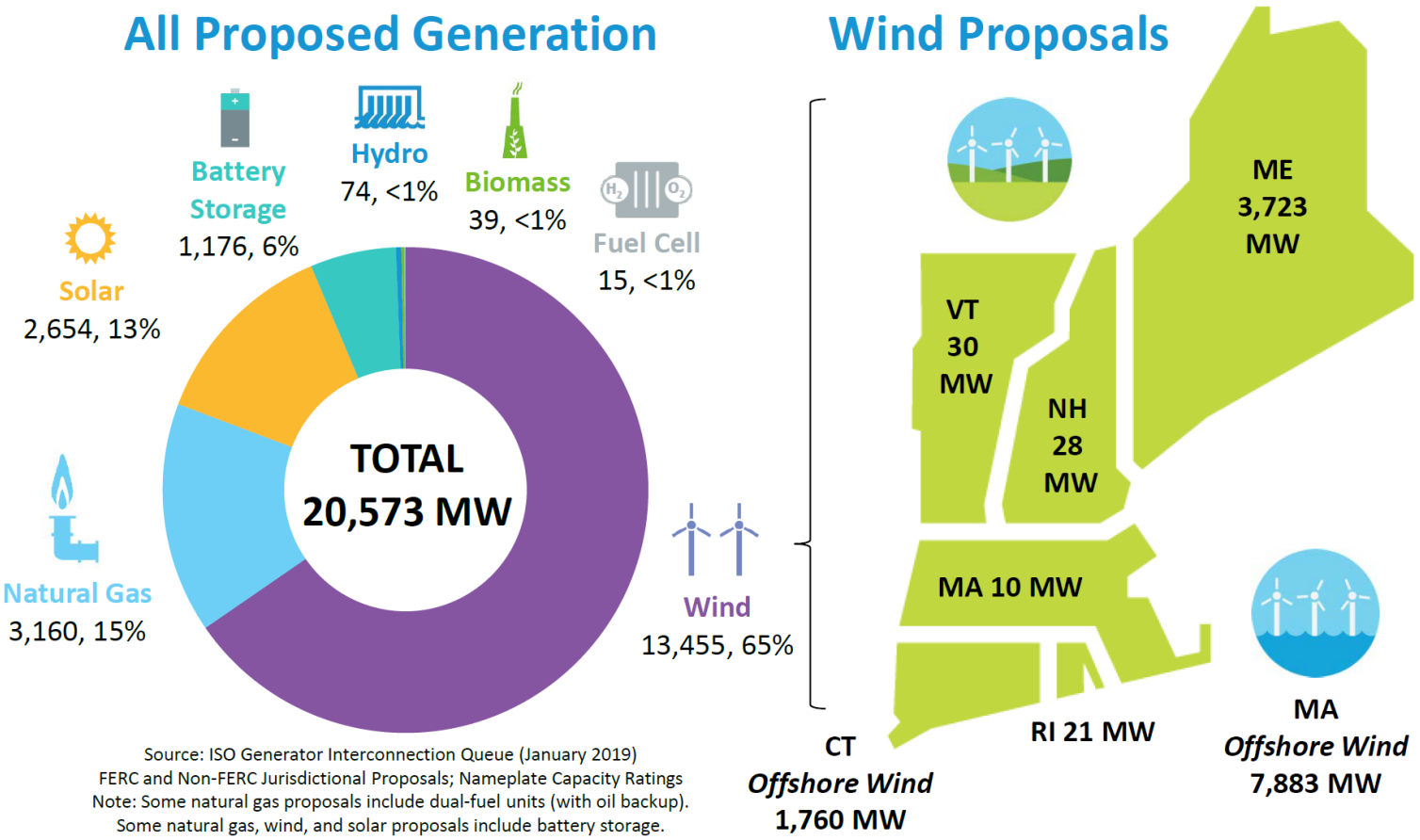
- Provide price stability
- Meet Global Warming Solution Act (GWSA) greenhouse (GHG) reduction requirements
- Propel clean energy job growth
- Secure fuel diversity, increase reliability
- Reduce power plant toxic emissions and waste and water used for cooling
- Substitute renewable and storage peak generation to force out high emitting, high price fossil fueled peaking plants

What is the Renewable Portfolio Standard (RPS)?

- A requirement on retail electric suppliers…
- to supply a minimum amount (20% in 2020 rising to 40% in 2030) of their retail load…
- with eligible sources of renewable energy.

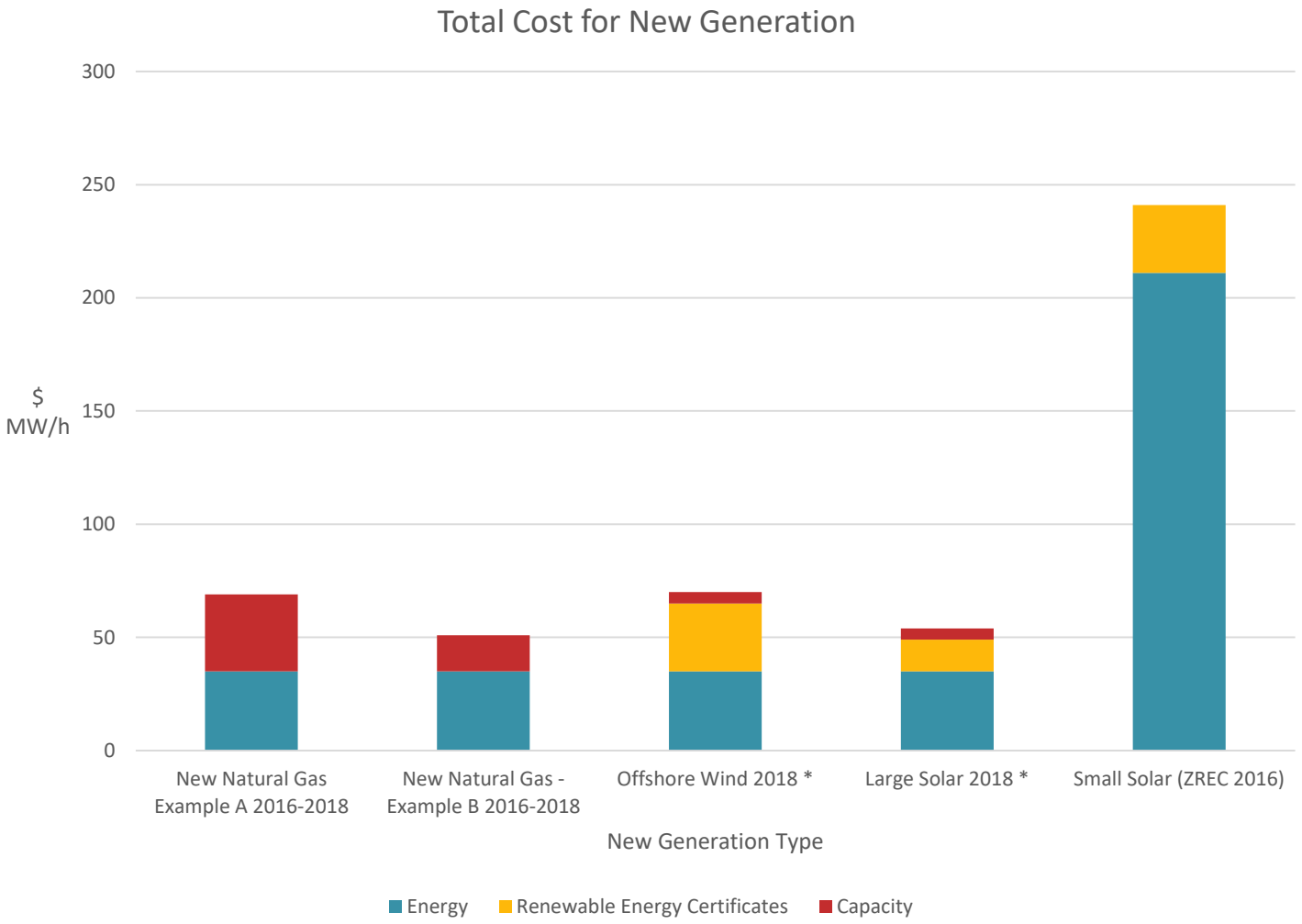
It typically has penalties for non-compliance and is often accompanied by a tradable Renewable Energy Certificate (REC) program to facilitate compliance. No two states programs are designed the same way.

Large-Scale Renewable Energy Potential



Abundance of renewable resources to meet RPS growth. Local small-scale solar growth continues and developers are offering a vast supply of large-scale wind and solar from across the region . . .

Grid-Level Renewables Reach Cost Parity



* Assumes wind and solar qualify for limited exemption being phased-out to earn capacity revenue; otherwise renewables prohibited from earning capacity revenue

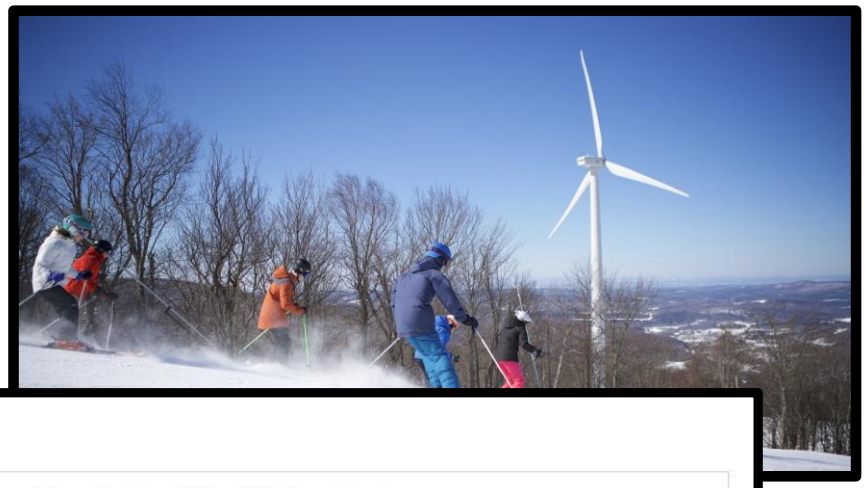
Forward Clean Energy Market

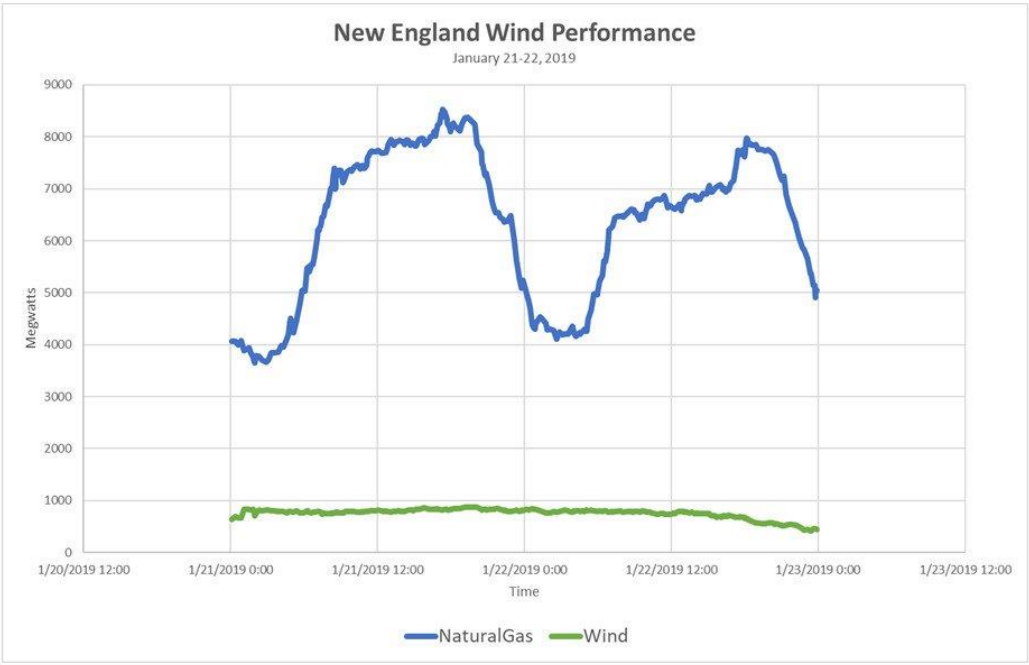
A coalition of like-minded entities in RENEW Northeast (Brookfield Renewables, Conservation Law Foundation and NextEra) and others developed a framework for a Forward Clean Energy Market (FCEM).

- States "opt-in" to procure all resources needed to meet their policy goals in a market-based forward auction, which is competitive, transparent and cost-effective
- Treats new and existing the same and creates value for existing clean energy resources (small hydro) and resources (like wind and solar) coming off state supported contracts
- Payment based on resource response in time and location based on ability to reduce GHG emissions – a "dynamic REC"
- Procuring in this fashion means that such resources are in-market and treated as supply in ISO New England forward capacity market, i.e., states do not pay twice for clean energy and capacity

Renewables and Winter Reliability

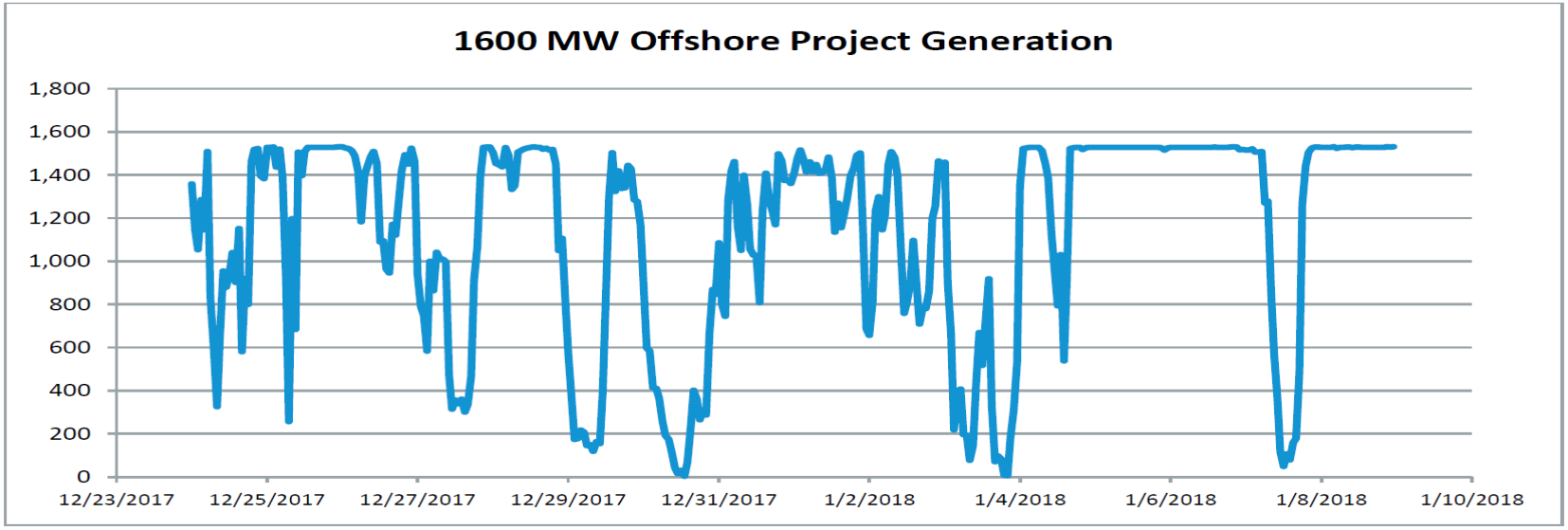
Wind as Winter Baseload Power





Wind as Winter Baseload Power

Offshore Wind Projected Performance 16-Day 2017-2018 Cold Spell	
Capacity factor	70%
Energy savings (millions)	$80-85
Avoided CO2 emissions	11%

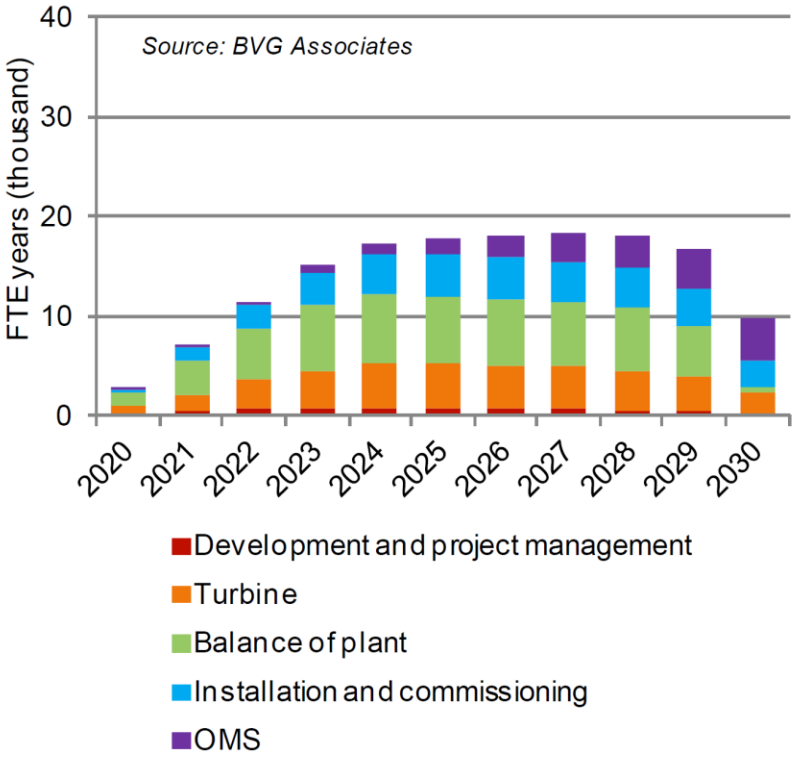


Source: ISO New England System Planning Department December 17, 2018

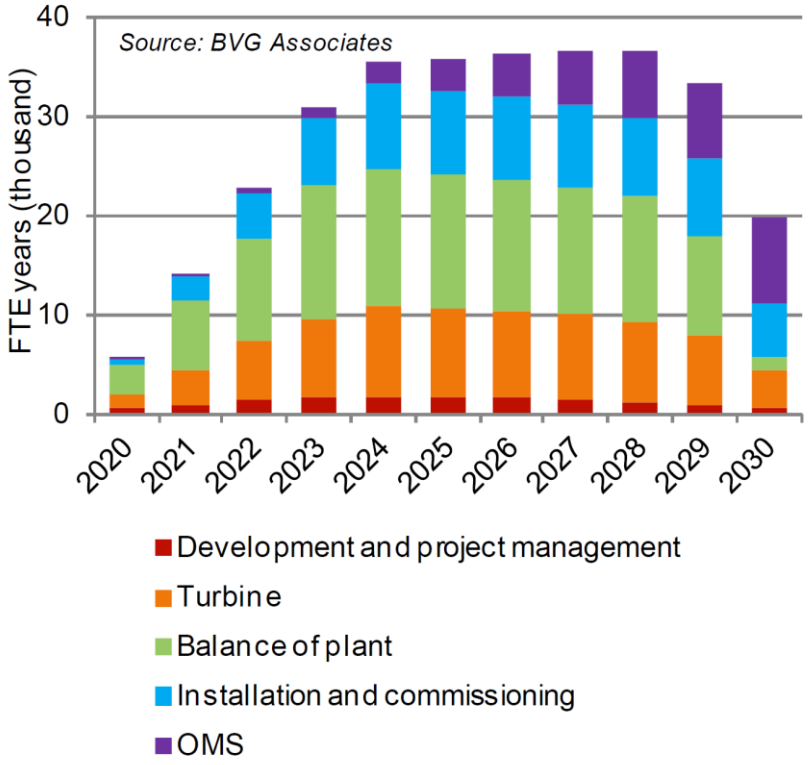
Offshore Wind and Jobs

Offshore Wind Job Predictions

4 Gigawatts



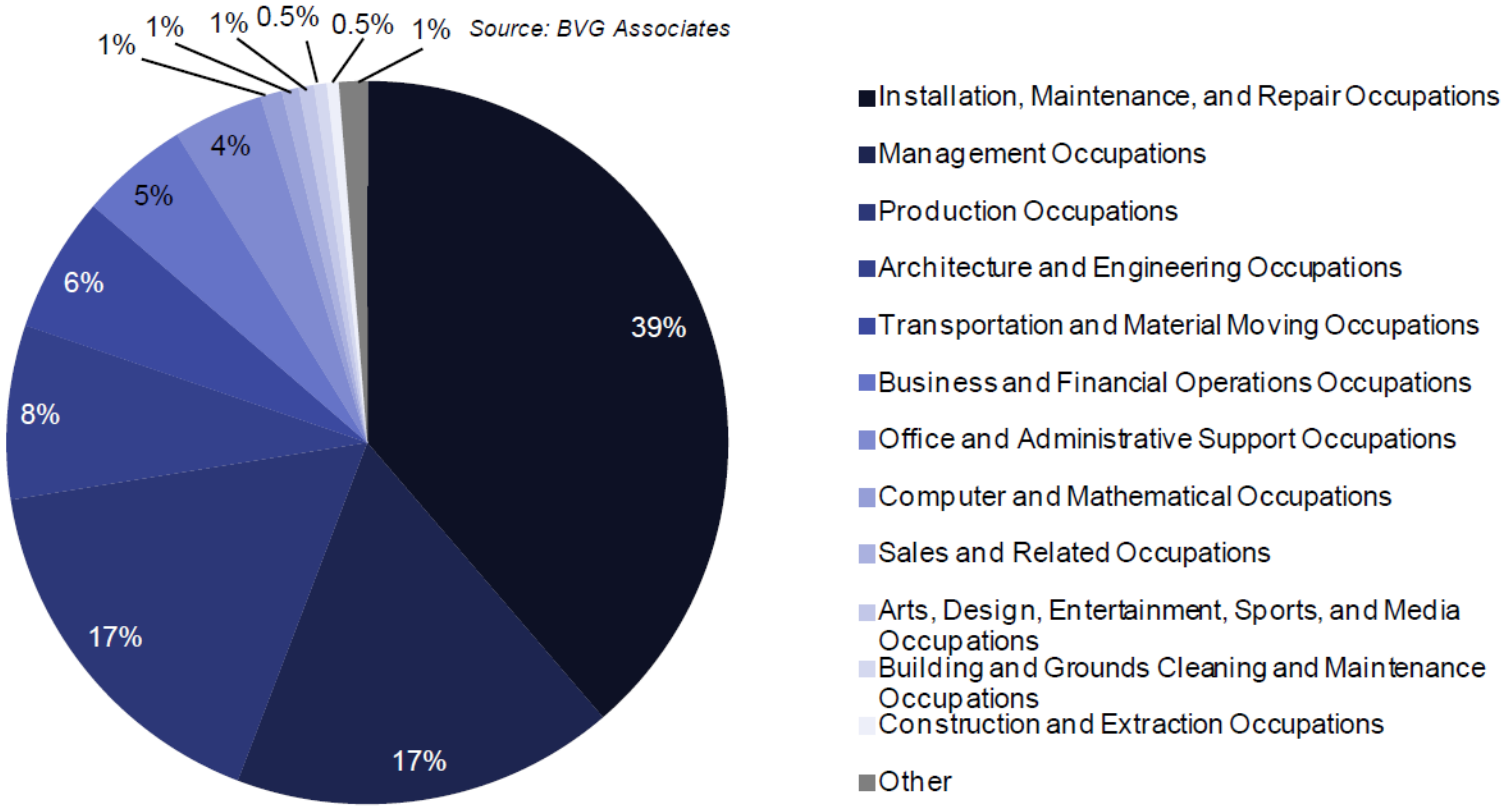
8 Gigawatts



For the high (8 GW) scenario in 2028, there would be 500,000 Full Time Equivilent (FTE) job years, with a peak of 36,300 FTE jobs.

Offshore Wind Job Predictions

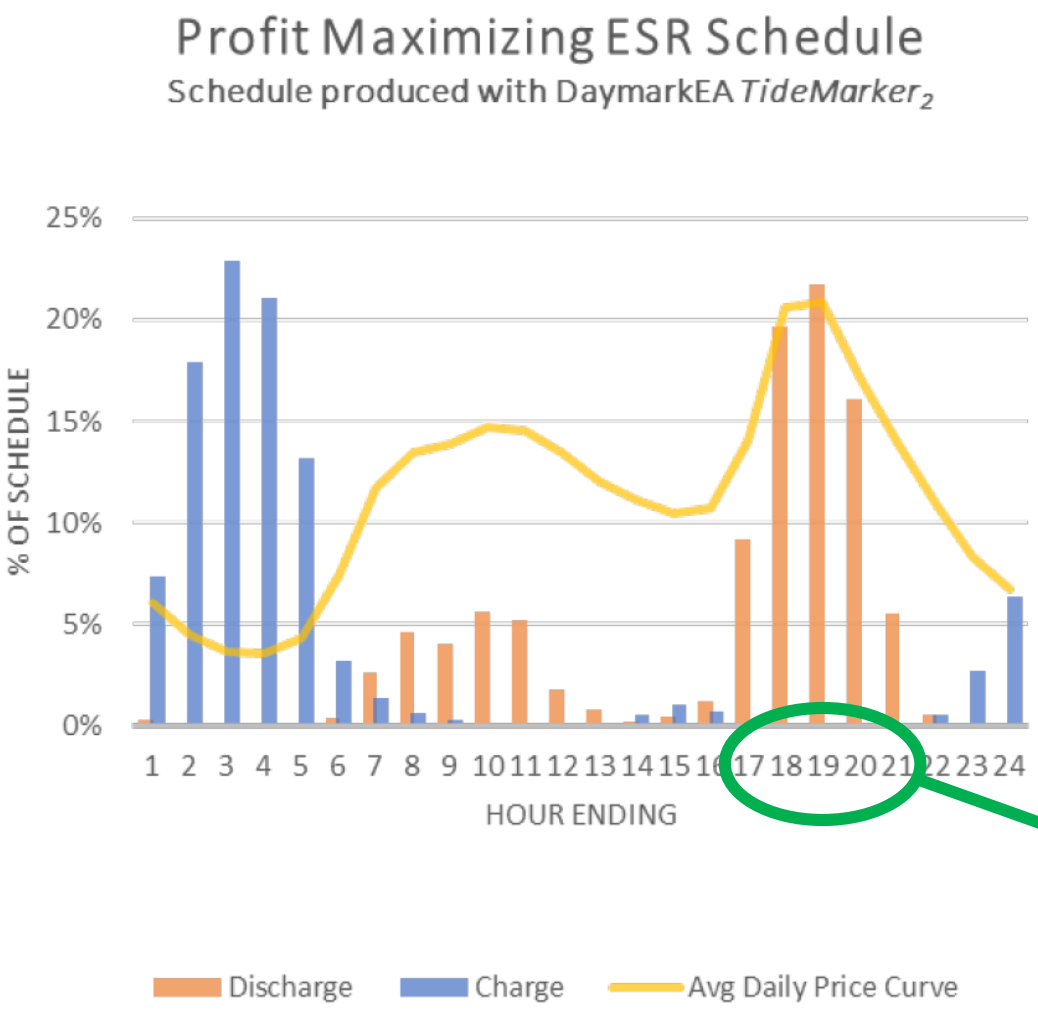
Total offshore wind occupations



Energy Storage and Renewables

Cleaning the Peak with Storage

10 MW / 40 MWh ESR Simulated Winter Deliveries



Massachusetts developing a Clean Peak Energy Standard requiring retail electricity providers to purchase attributes from resources (storage and renewables) for their production at peak times.

RENEW to recommend 4 hour peaks for summer, winter & shoulder seasons

Cleaning the Peak with Storage

Common Feature:
Power Purchase Agreements

Arizona's Tucson Electric Power
A signed a power purchase agreement for a **solar-plus-storage system** was at an all-in cost significantly less than $45/MWh over 20 years.

Colorado's Xcel Energy
Bids for largely PPAs involving **solar with storage** were received at a median price of $36/MWh, and **wind with storage** at $21/MWh, prices so low they have generated a buzz nationally among those who track the utility industry.

Connecticut DEEP
Selects two **solar with storage projects in 2018 competitive RFP**

Large-Scale Solar Development

Drivers of Large Solar on Farmland

Land Categories for Development: Moving Across the Spectrum

From Ag Land to Industrial Zoned Development

Increasing Public Acceptance of Land for Solar Development

Increasing Cost of Solar to Ratepayers

Solar Land Prices are Driven, in Most Cases, by Alternative Use Values

Lower Land Costs = Lower LCOE to Utility Ratepayers

3

Connecticut Farmland Is Increasing

That was then: DOA states that from 1982 to 1997 Connecticut lost a vast amount of agricultural land.

Recent times: The table to the right shows the amount of **agricultural land in Connecticut has actually increased by nearly 80,000 acres since 2002 -** from 357,154 acres in 2002 to 436,539 acres ten years later. Data for 2017 is not yet available.

Connecticut

State and County Data

Volume 1 • Geographic Area Series • Part 7

AC-12-A-7

Table 1. Historical Highlights: 2012 and Earlier Census Years

[For meaning of abbreviations and symbols, see introductory text.]

All farms		2012	2007	2002	1997
Farms	number	5,977	4,916	4,191	4,905
Land in farms	acres	436,539	405,616	357,154	406,222
Average size of farm	acres	73	83	85	83
Estimated market value of land and buildings [1]:					
Average per farm	dollars	809,375	1,045,133	840,302	516,347
Average per acre	dollars	11,082	12,667	9,491	6,270
Estimated market value of all machinery and equipment [1]	$1,000	352,391	315,000	214,739	182,266
Average per farm	dollars	58,958	64,090	51,214	37,167
Farms by size:					
1 to 9 acres		1,768	1,232	984	1,065
10 to 49 acres		2,403	1,894	1,625	1,835
50 to 179 acres		1,317	1,287	1,077	1,447
180 to 499 acres		379	400	387	453
500 to 999 acres		67	63	91	75
1,000 to 1,999 acres		29	30	23	26
2,000 acres or more		14	10	4	4
Total cropland	farms	4,011	3,884	3,395	4,242
	acres	151,144	163,686	170,673	200,586
Harvested cropland	farms	3,781	3,517	3,000	3,848
	acres	126,835	136,833	131,248	153,446
Irrigated land	farms	1,011	789	801	809
	acres	9,272	9,901	10,139	7,689

Large Solar and Farmland Are Compatible

Solar projects of this size also provide much needed new local tax revenue streams, which often exceed hundreds of thousands of dollars annually. Utility-scale solar does not need services or other forms of investment from the municipality. Larger solar projects also create many short-term construction jobs and several full-time positions once the projects are operational.

Land payments for utility-scale solar help farmers diversify their revenue stream and alleviate the pressure to sell off the land, which may be slated for more permanent forms of development.

RENEW Northeast

Recommendations

Recommendations

- **Establish a long-term schedule of renewable energy procurements:** "DEEP should exercise its full discretionary procurement authority for grid-scale renewable and zero-carbon energy. Continued investment in diverse, zero-carbon, renewable energy technologies will be necessary for Connecticut to meet its GHG emissions reduction goals." (CG3 Recommendations December, 2018)

- **Overcome BANANA (Build Absolutely Nothing Anywhere Near Anything)** (or "Anyone") efforts that make it more challenging to site renewable energy projects compared to other forms of development. Large wind is facing recently enacted and proposed anti-wind siting laws (CT, VT, NH, ME, MA). Larger solar projects are facing growing opposition on aesthetic concerns and use of open space (MA, CT and RI).

- **Transmission upgrades needed** to deliver wind energy from remote areas to load centers; six New England states have been unable to work cooperatively to solve this problem; New York, a large state with its own grid operator, has advanced transmission to serve public policy goals.

About RENEW

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Contact

Francis Pullaro

Executive Director

RENEW Northeast

Web: renew-ne.org

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