Renewable Energy for Connecticut
Where are we? Where are we going?

Francis Pullaro
Executive Director
February 8, 2018

Connecticut Energy & Technology Committee
About RENEW

An association of the renewable energy industry and environmental advocates united to promote renewable energy in the Northeast.
Connecticut’s Renewable Portfolio Standard (RPS) Today and Beyond 2020
What is the RPS?

• A requirement on retail electric suppliers...
• to supply a minimum percentage (rising each year until it plateaus in 2020) of their retail load...
• with eligible classes of renewable energy (Class I is wind, solar, fuel cells, some small hydro).

• It has penalties for non-compliance; and
• Tradable Renewable Energy Certificates (REC) to facilitate compliance.
Importance of RECs for RPS Compliance

• The REC market price shows whether REC supply and demand are in balance. It sends a signal to developers on whether to invest in renewable energy development and/or sell RECs in the region;

• REC sales are important source of revenue for renewable generators whether in short-term transactions or bundled in long-term contracts; and

• RECs demonstrate compliance by retail electricity providers for RPS obligations and document RPS costs.
The RPS Beyond 2020

• Competitive clean energy procurements authorized by legislation in 2013, 2015 and 2017 are important to meeting RPS requirements:
  o The greater revenue certainty of contracts from reduced investor exposure to commodity market price risk increases chance of projects getting financing and at a lower rate; and
  o Lower financing costs and competitive nature of procurement lowers consumer costs.

• Procurements might oversupply RECs in the long term but . . .
  o It does not result in huge RPS compliance cost savings as utilities sell RECs for large loss and place costs on ratepayers; and
  o Oversupply shuts down some existing renewable resources and will require more natural gas generation to enter service.
Compliance with Global Warming Solutions Act (GWSA)

- To count additional procured supply towards GWSA and RGGI limits, RPS targets must be increased so RECs are retained for Connecticut; and

- If RPS targets are not increased, RECs associated with procured supply could be sold for RPS compliance in other states. When these RECs are sold, the ability to count the associated greenhouse gas characteristics is lost.
GC3’s 2050 Greenhouse Gas Mitigation

Renewable Generation Sensitivity
Even Wind Resource Split (45% Scenario)

Overall renewable generation represents 75% of total generation by 2050
- Utility-scale solar = 40%
- Onshore wind = 17.5%
- Offshore wind = 17.5%

Levelized cost of energy is 23% to 26% higher than reference case
After 2020, annual increases of nearly 2% needed to reach Connecticut Governor's Council on Climate Change scenario of 75% by 2050
Large-Scale Renewable Energy Available to Connecticut
Large Projects Have Lowest Prices

Small PPA project size = 2 to 20 megawatts
Large PPA project size = 20 megawatts and greater
LREC project size = 2 megawatts or less
ZREC project size = 1 megawatt or less
RSIP = Residential Solar Investment Program

Source: 2017 Connecticut Department of Energy and Environment Protection
Massachusetts 2017-2018 Clean Energy RFP
Wind Bids

Quebec 1902
Maine 2961
New Brunswick 768
Nova Scotia 425
Mass. 278
New York 800

Total Wind Bid Exceeds 6,000 Megawatts

Megawatts Nameplate Capacity

Major Transmission Proposals to Serve Wind
Massachusetts 2017-2018 Clean Energy RFP
Solar Bids by Jurisdiction

Total Solar Bid Exceeds 800 Megawatts

Megawatts Nameplate Capacity
• Offshore wind projects totaling **2,054 megawatts** are today seeking connection to the New England grid. More federal ocean areas are to be leased within the year;
• Massachusetts now evaluating bids to award a contract for 400 megawatts of offshore wind. Connecticut RFP for up to 200 megawatts of offshore wind and/or fuel cells and anaerobic digestors has bids due by April 2, 2018.
Present and Future Procurements

• This week, Rhode Island Governor Raimondo directed her state's utilities to issue a procurement for up to 400 megawatts of RPS Class I resources and small hydro by this summer;

• Connecticut DEEP has statutory authority remaining to procure over 1,200 megawatts of Class I RPS resources;

• Massachusetts Clean Energy RFP winner announced on Jan. 25 is a non-RPS resource leaving all RPS Class I projects that were bid available for a new solicitation. The RFP team, though, is reconsidering the winning bid due to the rejection last week of its transmission line siting application; and

• Connecticut joining Rhode Island in a summer RFP will increase competition. The largest proposals- combinations of wind, solar and/or small hydro of 600 to 1,200 megawatts over new transmission- then become eligible.
Overcoming Challenges for Large-Scale Solar in Connecticut
Drivers of Large Solar Costs

Land Categories for Development: Moving Across the Spectrum

From Ag Land to Industrial Zoned Development

Increasing Public Acceptance of Land for Solar Development

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

Lower Land Costs = Lower LCOE to Utility Ratepayers

Increasing Cost of Solar to Ratepayers
### State of Connecticut Ag Land Category Statistics

<table>
<thead>
<tr>
<th>Land Category</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Land Area of CT</td>
<td>3,100,000</td>
</tr>
<tr>
<td>Land in Farm</td>
<td>436,000</td>
</tr>
<tr>
<td>Total Crop Land</td>
<td>151,000</td>
</tr>
<tr>
<td>Harvested Crop Land</td>
<td>127,000</td>
</tr>
<tr>
<td>Crop Land Not Harvested</td>
<td>24,000</td>
</tr>
</tbody>
</table>

Source: USDA, National Agricultural Statistics Service

### Potential Solar Land Use in CT as % of Total Land in Farm

<table>
<thead>
<tr>
<th>Scenario</th>
<th>New MWs</th>
<th>Approx Acres</th>
<th>Cumulative CT Solar Acres</th>
<th>% of Land in Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 PPAs – All States Solar</td>
<td>544</td>
<td>2,720</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2016 PPAs – CT Solar</td>
<td>269</td>
<td>1,345</td>
<td>1,345</td>
<td>0.3%</td>
</tr>
<tr>
<td>Growth of CT RPS to 27% by 2020 – All States</td>
<td>1,000</td>
<td>5,000</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Growth of CT RPS to 27% - (assumes 50% in-state CT)</td>
<td>500</td>
<td>2,500</td>
<td>3,845</td>
<td>0.9%</td>
</tr>
<tr>
<td>If RPS Grows Beyond 2020 Targets¹ – CT Solar</td>
<td>1,000</td>
<td>5,000</td>
<td>8,845</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

¹Estimate assuming growth of CT RPS to 33% post-2020 and 50% of new renewable gen is solar located in CT.
Recent times: U.S. government survey reveals 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.
Example: Converting from stone/grass ground cover to a wildflower mix assists pollinators, enhances biodiversity and has a net positive environmental impact. Opportunities exist for solar projects to take the lead in addressing the pollinator crisis, while supporting the agricultural community. Pollinator habitat combined with solar is considered best practice in Minnesota and is being evaluated throughout the U.S. Pollinators contribute to increased yields and higher quality crops.
In 2016, DEEP competitive solicitations to provide clean energy to local utilities showed large solar was the least-cost form of solar electricity and competitive on price with the cheapest form of renewable energy in the region—large-scale wind.

Solar projects of this size also provide other positive economic benefits to host communities, including much needed new 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.
Problem: If the Department of Agriculture (DOA) does not make any determination (remains silent) as to whether a project will materially affect prime farmland, then the project is ineligible for expedited declaratory ruling process. DOA effectively can “veto” any solar project— even non-farmland— and require it face the “certificate” process designed for large fossil-fuel power plants. CSC cannot override.

Solutions:

• Allow for declaratory ruling process if DOA does not submit to CSC a determination on the petition; and

• Require DOA submit any determination against the project within the CSC process, and require CSC to hear from the petitioner rebuttable evidence (e.g., petition contains a plan for keeping land viable for agriculture use after decommissioning).
A New Market for
Clean Energy Resources

- 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 and resources coming off state supported contracts.
- Payment based on resource response in time and location reflecting ability to reduce GHG emissions – a “dynamic REC”.
- These resources treated not subject to today’s offer price restrictions for subsidized resources in the ISO New England forward capacity market so states will not pay twice for clean energy and capacity.
Dynamic Valuation of Clean Energy

Attribute payments under FCEM vary each hour based on the marginal carbon displacement. Total daily revenue may be the same in both scenarios, but there is higher valuation when power is produced during peak carbon emitting hours.
FCEM Timeline

The coalition is working on the design to ensure financing for new resources despite the varying nature of the payment;

It continues to build regional support among policymakers and stakeholders for the FCEM and a process for its consideration; and

FCEM implementation likely has a long time horizon that will involve changes to state laws, regulations and/or the ISO New England Tariff.

THANK YOU