ISO-NE Markets Not Structured to Consistently Procure Least Cost Resources

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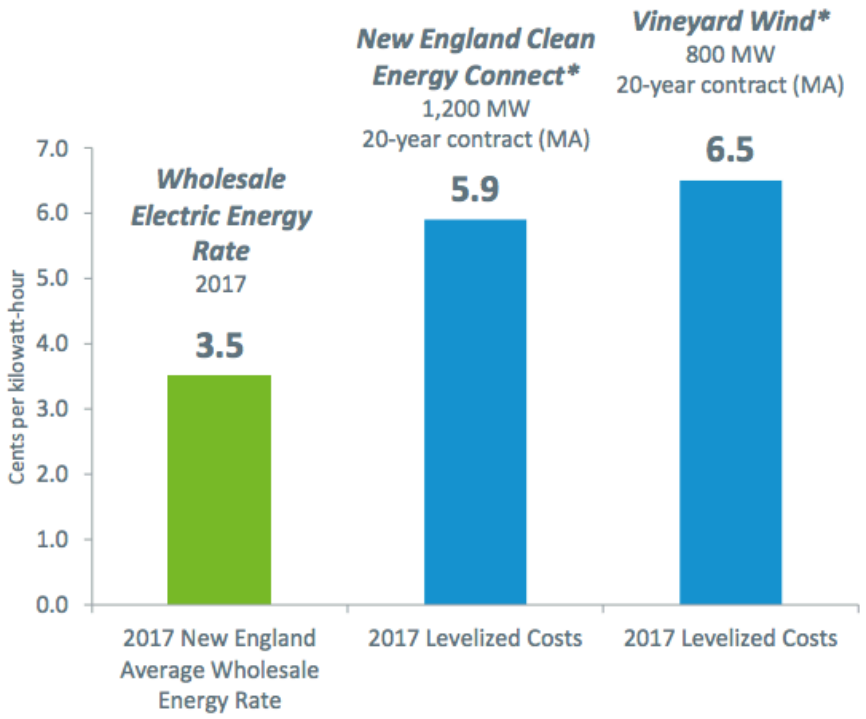
Overview

- ISO portrayal of recent renewables procurements as above market is not apples to apples
  - Many renewables have reached grid parity
- Even when renewables are the least-cost resource, ISO market structure does not provide them comparable certainty for financing as gas plants
  - ISO market is insufficient on its own to procure these least-cost resources
- What should happen?

- ISO portrayal of recent renewables procurements as above market is not apples to apples

ISO Portrayal of Recent State Contracts

State Procurements Are Priced Above Wholesale Energy Market Prices, But Include Different Attributes

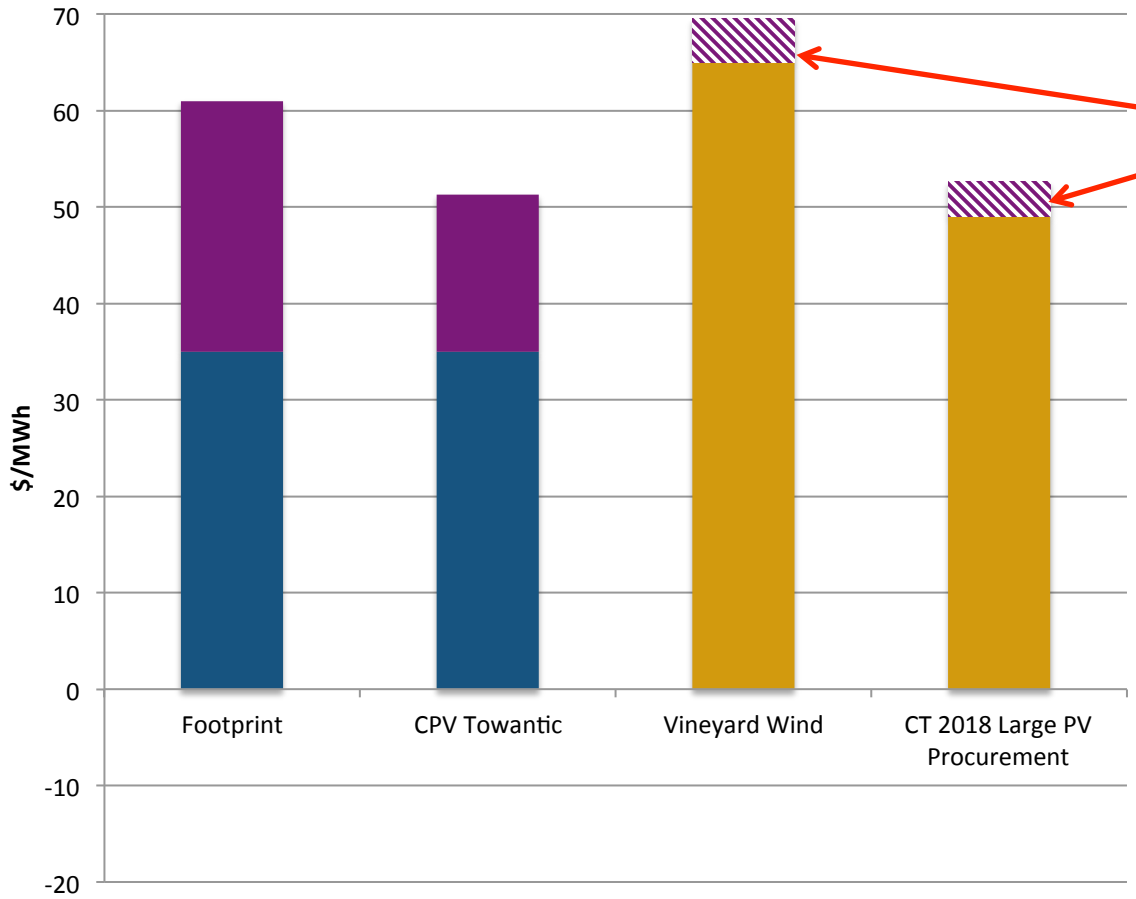


*Sample of state procurements; contracts are pending final approval by state public utility commissions

- States are directing their utilities to sign long-term contracts for clean and renewable energy; these contracts include an implied price on carbon
- Retail rates are likely to rise as states continue on a path to decarbonize the economy

All-In RE Costs Including Capacity Not Dissimilar to New Gas Builds

Recent Gas Plant New Builds vs State Renewables Procurements



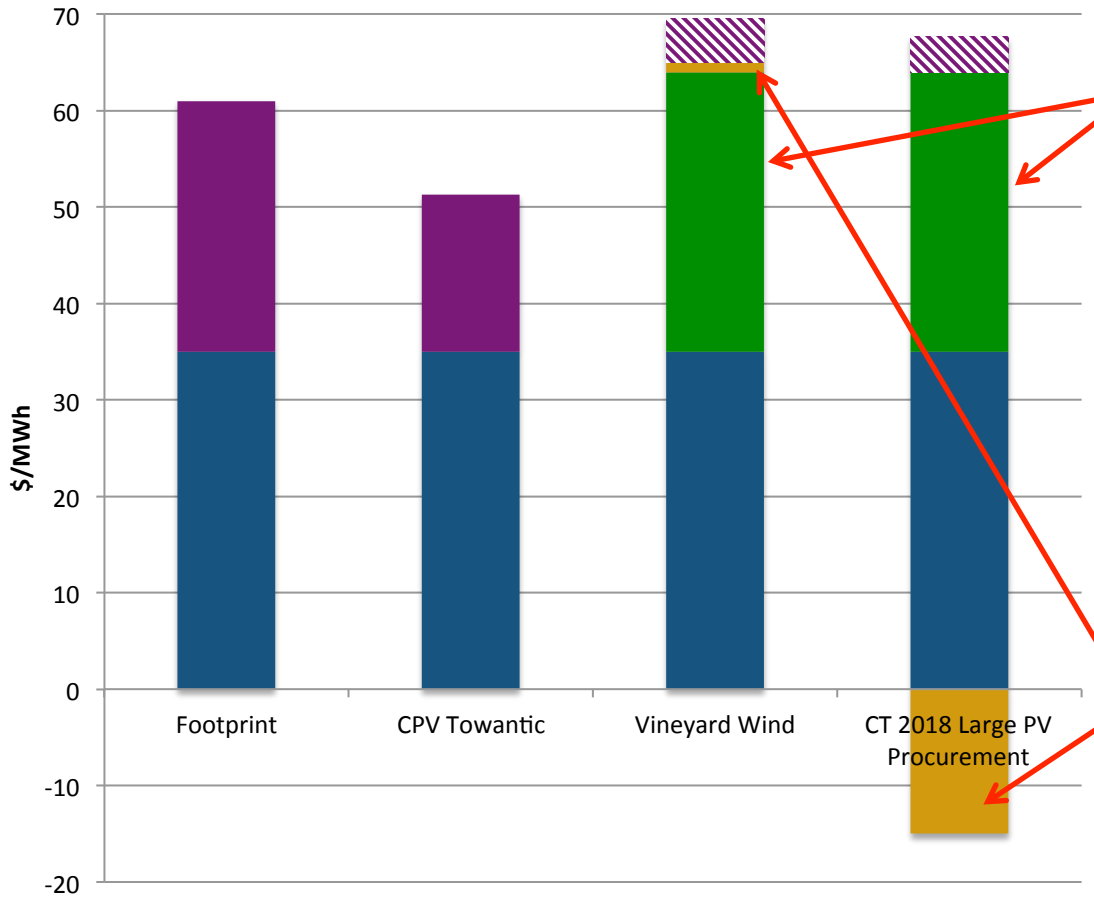
This is potential FCM revenue (assumes $3.80/kW-mo), but they could receive less FCM revenue than this due to MOPR

- Initial capacity market payment rate
- Long Term Contract Rate
- $35/MWh Wholesale Electric Energy Rate

One way to compare recent renewables contracts with recent gas new builds is to compare all-in revenues which include capacity: contract price + capacity vs. energy market + capacity.
Renewables are slightly higher cost but pretty close when you look at it this way.

Considering REC Value, RE Contracts are Not Above Market

Recent Gas Plant New Builds vs State Renewables Procurements

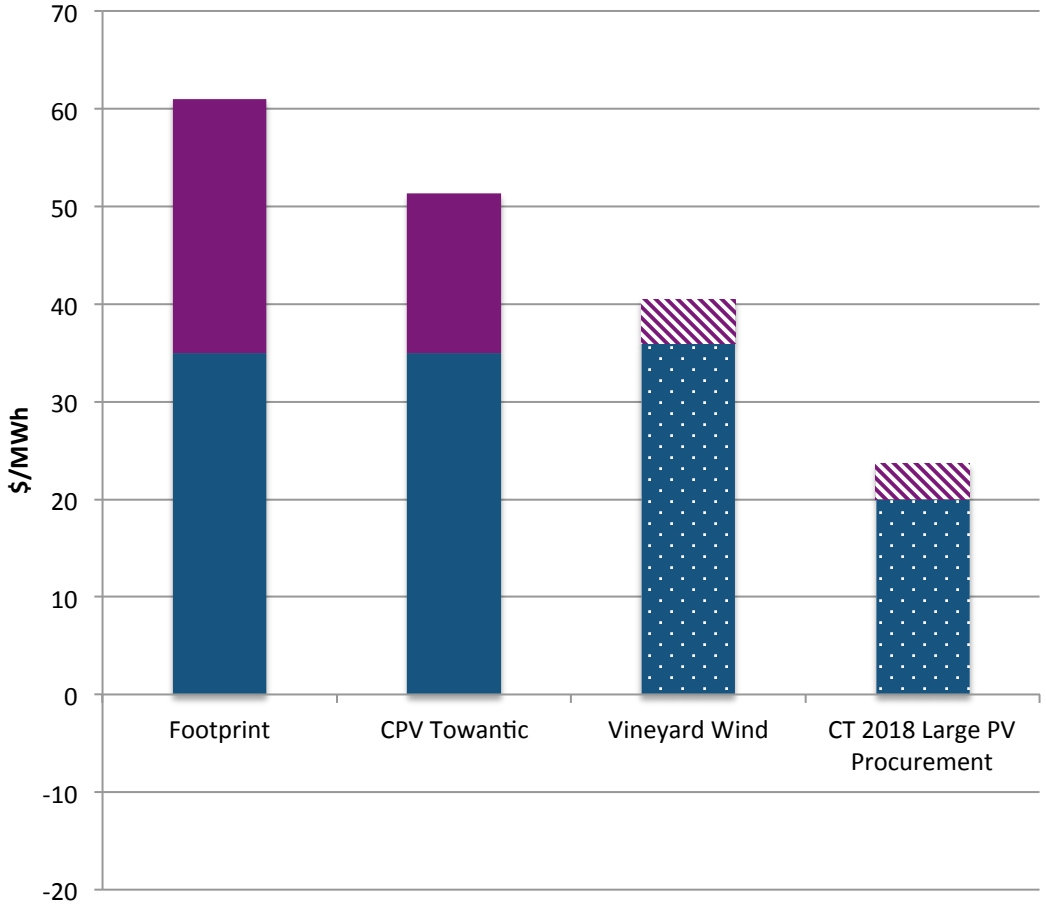


Prior view is not comparing apples to apples. Renewables produce a third market-based product, Renewable Energy Credits (RECs), not just an "implied" price on carbon. Gas plants do not produce this market product. Class I RECs are considered "in market" by ISO, even though it's not ISO's market.

If we assume an energy value of $35/MWh and REC market value of $29/MWh (ISO's numbers), the "Out of Market" portion of the renewables contracts is $1/MWh for Vineyard Wind and $-15/MWh for CT Large PV. In other words, VY is pretty much at parity and the PV contract is well below market.

Comparing Apples to Apples, RE Are Clearly Least Cost Resources

Recent Gas Plant New Builds vs State Renewables Procurements



A more apples-to-apples way to look at it is to just compare the capacity plus the energy portion of the contract price to the energy and capacity for the recent gas plants. (This is done by subtracting the $29 REC value out of the contract price.)

These renewables are very clearly the least-cost resource when compared apples to apples like this.

- Even when renewables are the least-cost resource, ISO market structure does not provide them comparable certainty for financing as gas plants

Capacity Market Can Make Gas Plants Financeable

- At the FCA 12 ORTPs, new gas plants would lock in revenue equal to roughly two thirds of their capital costs, to be received over their first 7 years of operations.
  - This leaves only one third of capital costs that need to be recovered through other sources subject to market risk (e.g., energy and ancillary services or capacity revenue beyond their first 7 years).

	FCA 12 ORTP ($/kW-mo)	Share of overnight capital costs locked in at ORTP
Combined Cycle	$7.86	63%
Simple Cycle	$6.50	65%

Capacity Market Won't Make Clean Energy Financeable

- At wind and solar ORTPs, would lock in revenue of only 10% to 16% of their capital costs
  - This leaves 84% to 90% of their capital costs to be recovered through sources subject to market price risk
- Many wind/PV resources have and should obtain Resource Specific Minimum Offer Prices at or below the gas plant ORTPs, allowing them to clear in FCA
  - Even though they may clear in FCA as least-cost resource, will lock in even less of their capital costs.
- No wonder these resources need long-term contracts outside of the markets!
  - Not necessarily more expensive, but lack comparable market certainty

	FCA 12 ORTP ($/kW-mo)	Share of overnight capital costs locked in at ORTP
Combined Cycle	$7.86	63%
Simple Cycle	$6.50	65%
Wind	$11.03	10%
PV	$26.32	16%

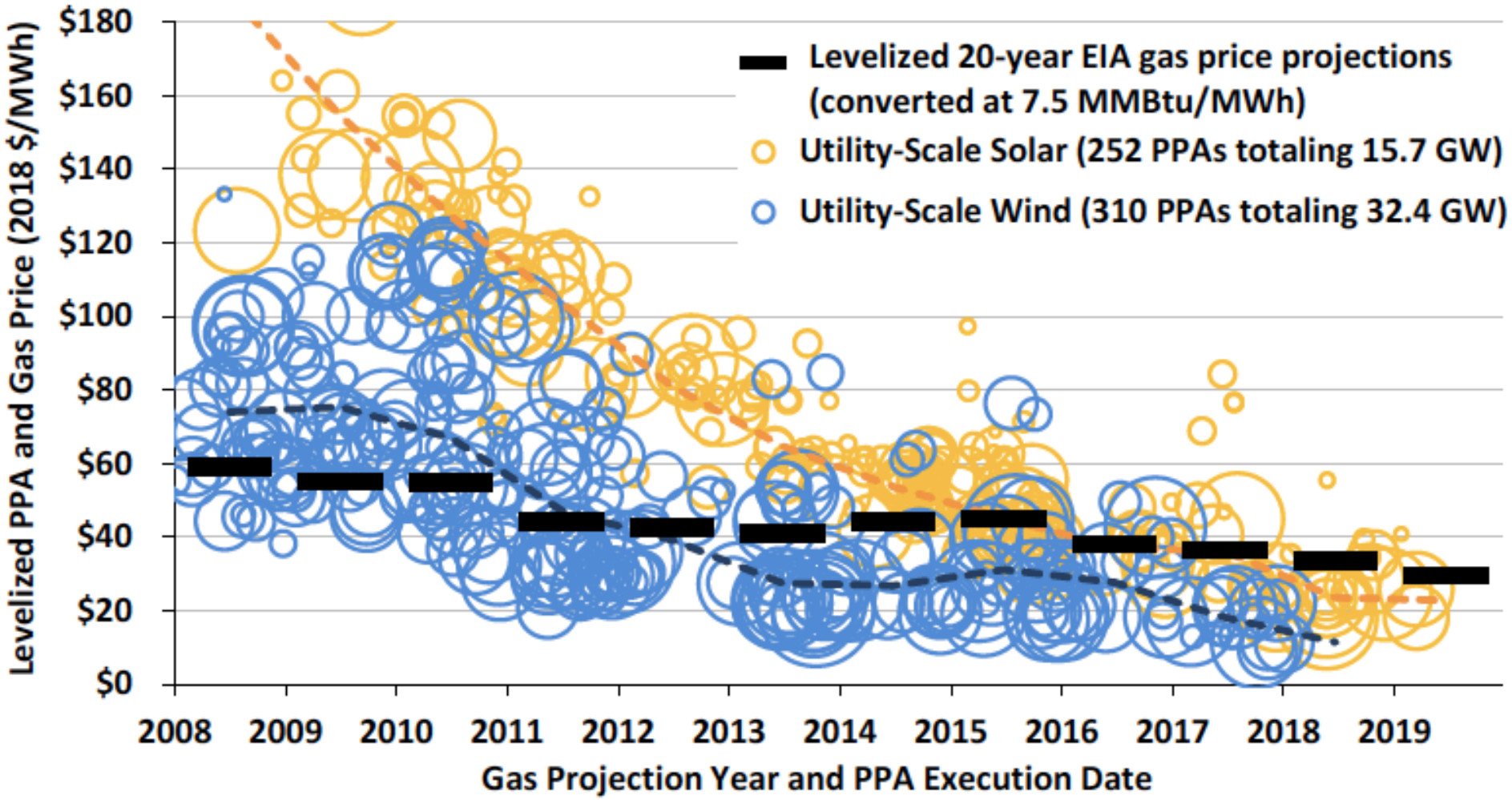
Capacity Market
What Happens If No Energy Profits?

- As zero-fuel-cost resources proliferate, they will set the energy market price at $0/MWh with increasing frequency.
- If we assume energy market prices are $0/MWh in all hours, the ORTP difference between a gas turbine and wind/solar becomes more pronounced.
- The more zero-fuel-cost (clean) resources we have, the more strongly the FCM will drive procurement of low-capital cost resources like gas turbines.
- Current market structure strongly favors low-capital-cost generation, even when that will increase system energy prices.

	FCA 12 ORTP ($/kW-mo)	FCA 12 ORTP If No Energy Revenue ($/kW-mo)
Simple Cycle	$6.50	$6.75
Wind	$11.03	$55.16
PV	$26.32	$68.54

ISO Markets Will Not Procure Renewables Even When They Are Least Cost Resource

- Renewable resource costs have come down dramatically and are expected to continue to decline (see chart on next slide).
- Recent contracts show that they have achieved market parity.
- Yet even when renewables are the least cost resource, the ISO markets structurally do not enable their procurement.
- In these instances, state procurements fill a structural gap in the ISO markets.
- State procurements and other "out of market" actions will continue unless the ISO markets address this structural deficit.
  - Partly to ensure compliance with state environmental regulations
  - Partly to obtain least-cost energy supplies for ratepayers



Sources: Berkeley Lab, Energy Information Administration

Figure 56. Levelized wind and solar PPA prices and levelized gas price projections

- What should happen?

What Should Happen?

- In order to meet the ISO-NE's market mission, market structure and incentives need to be realigned to allow the all-in least cost resources to be procured in a financeable manner. Not just the lowest capital cost resources.
  - How to do that? $64 million dollar question!
  - Renewables/clean constraint in FCM with longer price lock?
  - Long-term energy market?
  - Can and should something be done to avoid collapse of energy spot market prices?
- Without change to ISO markets to address this, as clean energy prices continue to decline, state procurements will increasingly fill role of obtaining least-cost energy supplies.
  - Carbon and environmental regulations are still large driver, but cost is now a major motivation.
  - Solicitations are highly competitive and are able to consider all-in costs in a way ISO markets fail to do.

Questions?

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