Wind Energy's Role in the New England Forward Capacity Market

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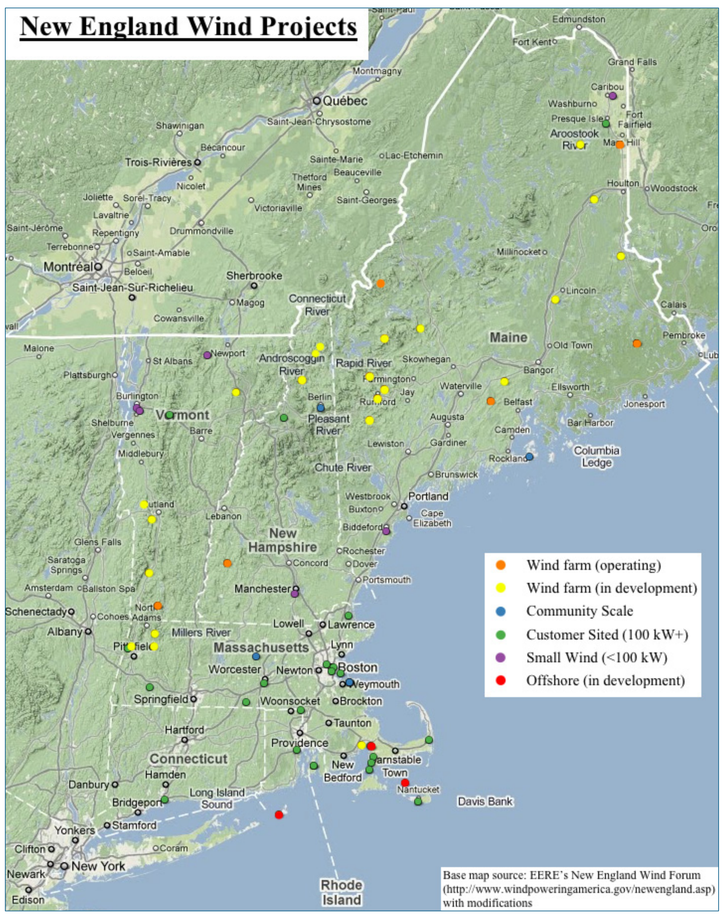
Wind in New England

223 MW installed and 106.5 MW under construction at the end of 2009 (80% in Maine).

Approximately 4,000 MW in the interconnection queue in early 2010.

New England Governors' Renewable Energy Blueprint estimates at least 10 GW of potential, even with siting constraints.



Northern Maine not part of ISO-NE (north of Houlton).

Wind in northern Maine must import into ISO-NE through New Brunswick to participate in FCM.

Forward Capacity Market Overview

- New England has a deregulated energy market overseen by the Independent System Operator of New England (ISO-NE).
- The Forward Capacity Market (FCM)
  - Developed to provide a market mechanism for ensuring sufficient capacity, recognizing locational constraints, for reliable system operation at peak demand.
  - Procures forecasted capacity three years in advance through an auction system using a vertical demand curve.
  - Forward nature of the market intended to incentivize new capacity development and allows new capacity to set the market price.
- Options and Requirements
  - All participants must have real assets greater than 100 kW that have been qualified by ISO-NE. No financial-only transactions are allowed.
  - Existing generation, new generation, and demand resources participate on a level playing field.
  - New capacity must be incrementally useful. It cannot displace existing capacity. This has made qualification difficult for many wind projects in remote parts of the region with transmission constraints between the project and load centers.
  - New resources may elect to have their initial commitment locked in for up to five years.
- The Market rules continue to evolve since first accepted by FERC in April 2007.
- Special rules for intermittent power resources designate how wind participates.
- First annual Forward Capacity Auction (FCA) was held February 2008 for the one-year commitment period beginning June 1, 2010.

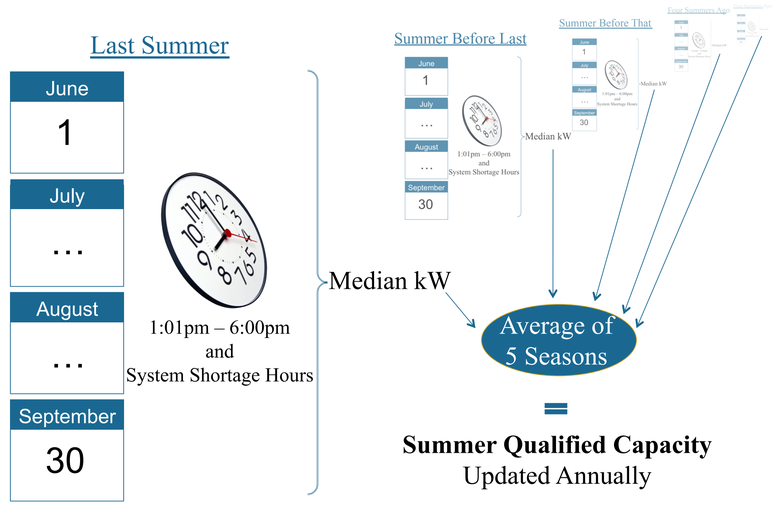
Wind Capacity Ratings

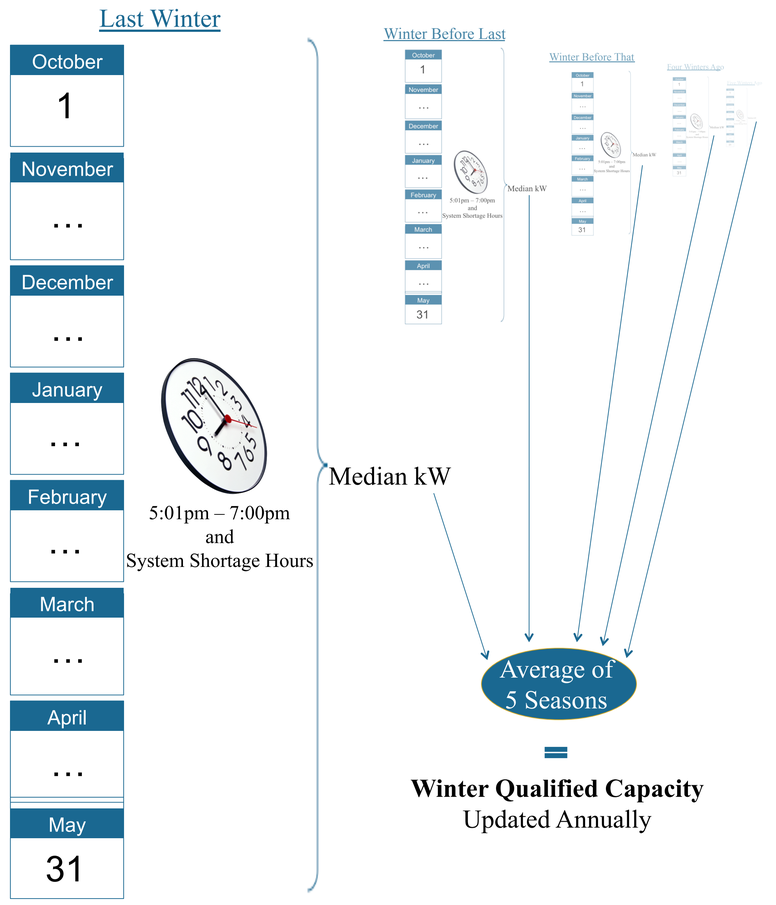
Prior to Commercial Operation

- Project submits claimed capacity rating based on measured and recorded site-specific data.
- ISO-NE reviews for reasonability.
- ISO-NE working to standardize methodology.
- ISO-NE revised suggested methodology early 2010 to better match post-commercial method.

After Commercial Operation

- Separate capacity rating for summer (June-September) and winter (October – May).
- Summer seasonal rating: median of net output from 1:01pm–6pm and system shortage events.
- Winter seasonal rating: median of net output from 5:01pm–7pm and system shortage events.
- Qualified capacity updated each season by averaging five years of seasonal medians or project lifetime if less than five years.





Payments and Performance

All resources are paid the auction clearing price times the summer kW cleared in the auction.

Wind is also paid for any additional qualified winter kW without additional action required.

Capacity payments are made monthly during the commitment period.

Wind is subject to Peak Energy Rent (PER), a reduction in capacity payments to account for energy price spikes. PER has been averaging about $0.20/kW-month.

FCA payment minus PER may never be negative.

Wind is not subject to availability penalties.

If a wind resource over-performs, it cannot supplement under-performing generators to alleviate their availability penalties.

If a wind project performs 20% below its upcoming capacity supply obligation in the previous season, it will be forced to cover that capacity through a bilateral or reconfiguration auction.

Capacity Zones

There can be import-constrained zones and export-constrained zones. Everything else is considered Rest-of-Pool. In the first two auctions there was only the one Rest-of-Pool zone.

In the 2012-2013 auction, Maine separated for the first time as an export-constrained capacity zone with a clearing price lower than the Rest-of-Pool.

For the upcoming 2013-2014 Auction, Maine has a Maximum Capacity limit of 3,187 MW.

The Maine MCL has been steadily decreasing from 3,855 MW in the 2010-2011 FCA to 3,395 MW in the 2011-2012 FCA to 3,257 MW in the 2012-2013 FCA.

Excess Supply

The auction has cleared with excess supply at the floor price in all auctions to date and is expected to continue doing so in the near future.

All resources remaining in the auction when the floor price is reached receive a prorated commitment to account for the excess supply.

Excess Supply in Forward Capacity Auctions

FCA Commitment Period (6/1 - 5/31)	Floor Price ($/kW-month)	Net Installed Capacity Requirement (MW)	Existing Qualified Capacity (MW)	New Qualified Capacity (MW)	Excess Capacity Cleared at Floor (MW)	Maine Proration	Rest-of-Pool Proration
2010-2011	$4.500	32,305	33,053	6,102	2,047	5.5%	5.5%
2011-2012	$3.600	32,528	35,479	7,298	4,755	13.4%	13.4%
2012-2013	$2.951	31,965	37,609	5,806	5,030	14.0%	16.5%
2013-2014	$2.951*	33,127	TBA by May 2010		Auction to be held Aug 2010		
2014-2015	$2.951*	TBD			Auction to be held Jun 2011		
2015-2016	$2.951*	TBD			Auction to be held Apr 2012		
2016-2017	none**	TBD			Auction to be held Feb 2013		

* Pending FERC approval
** Floor is likely to be extended in some form until new capacity can set clearing price

Other Capacity Markets

PJM Reliability Pricing Model (RPM) Three year forward resource adequacy requirement, downward sloping demand curve determines required reserve margins as a function of capacity prices, centralized, locational market, demand and transmission compete with generation. (Initial market implementation in 2007)

MISO Fixed resource adequacy requirement, voluntary centralized monthly market (not a forward market), extremely volatile. (2009)

NYISO Unforced Capacity Market (UCAP) Resource adequacy standard (not forward), downward sloping demand curve, locational, centralized market, uniform clearing price. (2001)

CAISO Locational Resource Adequacy Requirement (LRAR) One year forward resource adequacy requirement, locational, no centralized market. (2006)

SPP Reserve adequacy standard (not forward), no centralized market or specific enforcement provisions. Typical style of market design in regulated U.S. power markets.

ERCOT The only U.S. energy-only market. High energy price caps (around $3,000/MWh) and an annual Peaker Net Margin cap.

Wind Resource Performance In Previous Forward Capacity Auctions

Project Name	Project Nameplate (MW)	FCA 1 (2010 - 2011 Commitment Period)				FCA2 (2011-2012 Commitment Period)					FCA3 (2012-2013 Commitment Period)			
		Summer Q.C. (% Nameplate)	Winter Q.C. (% Nameplate)	FCA Results	Unadjusted '10-'11 Capacity Revenue	Summer Q.C. (% Nameplate)	Winter Q.C. (% Nameplate)	FCA Results	Unadjusted '11-'12 Capacity Revenue	Multi-Year Election	Summer Q.C. (% Nameplate)	Winter Q.C. (% Nameplate)	FCA Results	Unadjusted '12-'13 Capacity Revenue
Searsburg Wind	6	3.4%	17.7%	Cleared	$39,528	3.4%	17.2%	Cleared	$28,221	-	3.4%	17.0%	Cleared	$22,754
Hull Wind Turbine U5	0.66	6.4%	23.2%	Composite	$3,778	7.3%	24.2%	Cleared	$4,591	-	7.6%	23.5%	Cleared	$3,650
Hull Wind Turbine II	1.8	5.1%	9.0%	Composite	$2,382	5.6%	5.6%	Cleared	$5,926	-	4.8%	11.6%	Cleared	$5,100
Berlin Wind	1.05	0.0%	0.0%	-	-	0.0%	0.0%	-	-	-	0.0%	0.0%	-	-
Portsmouth Abbey Wind QF	0.66	0.0%	0.0%	-	-	0.0%	0.0%	-	-	-	0.0%	0.0%	-	-
Sheffield Wind Farm	40	25.0%	42.5%	Cleared	$748,704	25.0%	42.5%	Cleared	$548,944	-	25.0%	42.5%	Cleared	$446,160
Kibby Wind Power	132	15.5%	35.8%	Delisted	-	15.5%	35.8%	Cleared	$1,434,740	-	15.5%	35.8%	Cleared	$1,133,900
Stetson Wind Farm	57	N.Q. (15.8%)	N.Q.	-	-	N.Q. (4.53%)	N.Q.	-	-	-	N.Q. (22.7%)	N.Q.	-	-
Hoosac Wind	30	25.7%	41.7%	Delisted	-	25.7%	41.7%	Delisted	-	-	25.7%	41.7%	Delisted	-
Cape Breton Wind Farm (Import)	?	N.Q. (150MW)	N.Q. (150MW)	-	-	-	-	-	-	-	-	-	-	-
Longfellow Wind Project	40	-	-	-	-	27.5%	55.0%	Cleared	$686,180	-	27.5%	55.0%	Cleared	$542,300
Granite Reliable Power	99	-	-	-	-	30.2%	43.3%	Cleared	$1,443,473	5	30.2%	43.3%	Cleared	$1,443,473*
Princeton Wind Farm Project	3	-	-	-	-	22.2%	41.9%	Delisted	-	-	22.2%	41.9%	Cleared	$32,255
Templeton Wind Turbine	1.5	-	-	-	-	16.9%	26.7%	Delisted	-	-	16.9%	26.7%	Cleared	$10,698
Berkshire Wind Power Project	15	-	-	-	-	17.2%	46.6%	Cleared	$206,503	-	17.2%	46.6%	Cleared	$167,837
Record Hill Wind	50.6	-	-	-	-	26.9%	33.0%	Cleared	$586,372	5	26.9%	33.0%	Cleared	$586,372*
Lempster Wind	24	-	-	-	-	18.4%	41.8%	Delisted	-	-	18.4%	41.8%	Cleared	$248,156
Stetson Wind 2	25.5	-	-	-	-	N.Q. (47.1%)	N.Q.	-	-	-	N.Q. (18.6%)	N.Q.	-	-
Dundee Wind Farm	34	-	-	-	-	N.Q. (17.6%)	N.Q.	-	-	-	-	-	-	-
Rollins Wind	60	-	-	-	-	N.Q. (11.7%)	N.Q.	-	-	-	N.Q. (20.9%)	N.Q.	-	-
Caribou Wind Park (Import)	99	-	-	-	-	23.3%	23.3%	Delisted	-	-	-	-	-	-
West Cape Wind Farm (Import)	20.8	-	-	-	-	18.3%	18.3%	Delisted	-	-	-	-	-	-
West Cape Wind Farm #2 (Import)	79.2	-	-	-	-	35.0%	35.0%	Delisted	-	-	-	-	-	-
Grandpa's Knob (GPK)	50	-	-	-	-	30.2%	40.6%	Delisted	-	-	-	-	-	-
Highland Wind	129	-	-	-	-	-	-	-	-	-	N.Q. (29.8%)	N.Q.	-	-

All wind participating as generation in the first three FCA's shown in table.

Two small turbines participated as demand response in FCA3.

Many existing community wind facilities not yet participating in FCM.

Revenue from FCA as shown is not adjusted for bilateral and reconfiguration auction transactions, proration elections, self-supply designations, or Peak Energy Rent.

Notes on Table

- Q.C. = Qualified Capacity
- N.Q. = Not Qualified
- Resources listed as Cleared in an FCA cleared in full. No wind resources prorated MW obligation in FCA1. No publicly available proration data for FCA2 or FCA3.
- No multi-year election data made public for FCA3.

* These projects made multi-year elections in FCA2. Actual payment rates may be higher if they also prorated their MW obligation.

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