NYISO Study on Renewable Exempt Technologies

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Background

- **On October 9, 2015 the FERC issues an order, docket No EL15-64:**
  - ***The Commission directed the NYISO to revise the buyer-side capacity market power mitigation measures ("BSM Rules") to exempt certain narrowly defined renewable and self-supply resources from Offer Floor mitigation.***
  - ***[A] renewable resources exemption in NYISO should be limited to renewable resources that are both purely intermittent and that have relatively low capacity factors and high development costs because these resources have limited or no incentive and ability to artificially suppress capacity prices. In addition, the exemption should limit the total amount of such renewable resources—in the form of a megawatt cap—that may receive the exemption, to further limit any risk that these exempted resources will impact NYISO's ICAP market prices. (¶51)***
  - ***The Order established October 9, 2015 (the date the Order was issued) as the effective date for the compliance tariff revisions.***

Background and Overview

- **The FERC granted an extension of time to March 14, 2016 to make the compliance filing**
- **The NYISO reviewed draft tariff revisions with stakeholders on ICAP WG February 24, 2016**
- **The NYISO's proposal includes a provision for Exempt Renewable Technologies (i.e., the technologies types that are eligible for a Renewable Exemption) which will be "reset" each DCR Year**
- **The NYISO's compliance filing will propose including Wind and Solar as Exempt Renewable Technologies.**
- **The NYISO provided details of the preliminary analysis, including an Excel Workbook, to stakeholders with the January 26, 2016 ICAP WG materials.**
- **Today's presentation provides more details on the analysis that is the basis for this recommendation.**
- **The Excel workbook posted with today's ICAPWG meeting materials includes**
  - ***Correction of typographical errors***
  - ***Updated list of data sources (tab "assumptions")***
  - ***Use of the most recent ICAP market data***
- **The NYISO is soliciting Stakeholder input on the analysis**

Candidate technologies:

- Intermittent, renewable, and commercially viable in the wholesale market
- High development costs and low-capacity factors

Such that have limited or no incentive and ability to artificially suppress capacity prices

EXEMPT IF

Projected Cost of New Entry **>** *Estimated value of revenues associated with the production and sale of renewable energy and capacity* **+** *Expected cost savings to Load due to reduction in ICAP prices*

Framework and Assumptions (1)

- **Exempt Renewable Technologies would be either:**
  - ***Intermittent Power Resource (MST 2.9):*** *A device for the production of electricity that is characterized by an energy source that: (1) is renewable; (2) cannot be stored by the facility owner or operator; and (3) has variability that is beyond the control of the facility owner or operator. In New York, resources that depend upon wind, solar energy or landfill gas for their fuel have been classified as Intermittent Power Resources. Each Intermittent Power Resource that depends on wind as its fuel shall include all turbines metered at a single scheduling point identifier (PTID).*
  - ***Limited Control Run-of-River Hydro Resource (MST 2.12):*** *A Generator above 1 MW in size that has demonstrated to the satisfaction of the ISO that its Energy production depends directly on river flows over which it has limited control and that such dependence precludes accurate prediction of the facility's real-time output*
- **The NYISO performed the analysis of which technologies should be Exempt Renewable Technologies upon the effectiveness of the compliance tariff revisions**
- **NYISO conclusion: wind and solar technologies**
  - ***Other commercially feasible renewable and intermittent technologies may request project specific exemption evaluation***
  - ***The NYISO will evaluate wind and solar, and other eligible renewable technology candidates in the next DCR Year (including but not limited run-of-river hydro, and landfill gas)***

Framework and Assumptions (2)

- **The NYISO performed analysis in order to explore whether a new on-shore wind, off-shore wind or solar resource project has limited or no incentives and ability to exercise buyer-side market power to artificially suppress capacity prices.**
- **The analysis was based on:**
  - ***The estimated Net Present Value ("NPV") of a new hypothetical project in current market conditions, the cost savings of cost savings load would experience as a result of reduced ICAP market clearing prices***
  - ***NPV of a single capital expenditure is determined by calculating the discounted uneven cash flows for each year, over period of 20 to 25 years (expected lifetime)***
    - ***Costs (negative cash flows) and revenues and benefits (positive cash flows)***
  - ***Analysis is performed for a hypothetical new project in each of the Mitigated Capacity Zones***

Framework and Assumptions (3)

- **Estimated Cost of New Entry based on:**
  - ***National Renewable Energy Laboratory Reports****
  - ***Lawrence Berkeley National Laboratory Reports****
  - ***Department of Energy Reports ****
  - ***Inputs from NYISO engineering consultant***
  - ***These estimates do not include interconnection costs or costs of system facilities upgrades, which would vary by project to project and are location specific.***
    - **Including these costs would increase the estimated costs of new entry and, therefore, decrease expected NPV of a project**
    - **so a project that that has limited or no incentive and ability to artificially suppress capacity prices without these costs would also have even less incentive and ability to artificially suppress capacity prices with the costs.**

		NYC Off Shore Wind	NYC Wind	G-J Wind	NYC Solar	G-J Solar
Installed Project Capital Costs	$/kW	$ 5,500	$ 2,700	$ 2,250	$ 4,500	$ 3,750

*** See the appendix for references to the reports.**

Framework and Assumptions (4)

- **Potential Costs of Capital and Financing Structure**
  - ***based on that of the average of the rate regulated entities in Load Zones G, H, I, and J***
    - ***New offshore/onshore wind and solar projects could be expected to have a PPA and a financing structure that is well represented by the financing structure of a typical regulated entity***
  - ***50% Debt and 50% Equity shares***
  - ***5.37% interest rate, and 8.93% Return on Equity***

	NYC	NYC	G-J	NYC	G-J
Financing Parameters	**Off Shore Wind**	**Wind**	**Wind**	**Solar**	**Solar**
Debt	50%	50%	50%	50%	50%
Equity	50%	50%	50%	50%	50%
Interest Rate (Nominal)	5.37%	5.37%	5.37%	5.37%	5.37%
ROE Rate (Nominal)	8.93%	8.93%	8.93%	8.93%	8.93%
Inflation	2.30%	2.30%	2.30%	2.30%	2.30%
Composite Tax Rate	45.37%	45.37%	39.62%	45.37%	39.62%
Investment Horizon	25	20	20	20	20
Depreciation Type	MACRS	MACRS	MACRS	MACRS	MACRS
Tax Depreciation Schedule	10	5	5	5	5

Framework and Assumptions (5)

- **Estimated Fixed O&M**
  - *1% to 2% of initial investment annually*
- **Costs not included**
  - *property taxes, insurance, site development and site leasing costs, since would be case-specific and would be calculated separately.*
  - *Including these would likely increase costs of building and operating a unit and therefore decrease NPV. This makes the analysis more conservative.*
- **Assumed Energy and Capacity markets derating factors**
  - *Feasibility studies and reports (aka NYSERDA, DOE, NREL, LBNL)*
  - *NYISO ICAP manual, for new units*

	NYC	NYC	G-J	NYC	G-J
	Off Shore Wind	Wind	Wind	Solar	Solar
Capacity Market Factor	40%	20%	20%	25%	25%
Energy Market Factor	40%	30%	30%	20%	20%

Framework and Assumptions (6)

- **Estimated Market Revenues**
  - ***ICAP market revenues based on recent ICAP market clearing prices (e.g., the current ICAP Demand Curves and resource mix)***
  - ***Energy markets revenue based on recent average annual LBMP prices***
- **Generally Available Revenues**
  - ***Production Tax Credit (wind)***
    - **$0.023/kWh and may be carried forward for up to 20 years following the year they were generated**
    - **Assumed to be fully captured**
  - ***Investment Tax Credit (solar)***
    - **30% federal tax credit for solar systems on commercial (under section 48) properties that, under current law, remains in effect through December 31, 2019**
    - **Assumed to be fully captured**
  - ***Renewable Energy Credits (wind and solar)***
    - **Rights to environmental attributes associated with the actual generation of electricity by renewable resources**
    - **Allow buyers to apply the renewable attributes (aka carbon offset) to their electricity usage**
    - **Captured based on values reflected in sources listed on Slide 16**

Framework and Assumptions (7)

- **Total costs that Load could be expected to save due to ICAP Spot Market Auction price suppression**
- **Based on NPV of estimated net costs savings**
  - ***Annual ICAP Price and Annual Impact/100MW calculated using auction results from Summer 2015 and Winter 2015/16 and the current Demand Curve slope***
  - ***The most recent Monthly Auction results were used to estimate the UCAP MW and clearing prices for March 2016 and April 2016***
  - ***Capacity price suppression longevity was assumed to gradually decreasing over 5 year period***
    - ***Assuming accelerated market response to price suppression will likely decrease NPV cost savings to NYCA capacity buyers (load) associate with the new entry.***

Framework and Assumptions (7 cont'd)

		NYC Impcat			CHI Impact			ROS Impact	
Before Addtion	2015/2016	NYC UCAP MW	Average MCP $/kW-mon	2015/2016	GHI UCAP MW	Average MCP $/kW-mon	2015/2016	ROS UCAP MW	Average MCP $/kW-mon
	Summer	9,679.6	$15.38	Summer	4,901.0	$9.10	Summer	18,355.2	$3.83
	Winter	10,061.3	$6.07	Winter	5,014.5	$3.26	Winter	18,539.2	$0.92
	Addition	***100***	*MW*	*Addition*	***100***	*MW*	*Addition*	***100***	*MW*
	Slope	*($0.013191)*	*$/kW-month/MW*	*Slope*	*($0.006677)*	*$/kW-month/MW*	*Slope*	*($0.002317)*	*$/kW-month/MW*
After 100 MW addition		NYC UCAP MW	Average MCP $/kW-mon		GHI UCAP MW	Average MCP $/kW-mon		ROS UCAP MW	Average MCP $/kW-mon
	Summer	9,779.6	$14.06	Summer	5,001.0	$8.43	Summer	18,455.2	$3.59
	Winter	10,161.3	$4.75	Winter	5,114.5	$2.59	Winter	18,639.2	$0.69
		Price Impact, $/year	($144,955,390)		*Price Impact, $/year*	($33,112,649)		*Price Impact, $/year*	($48,721,551)

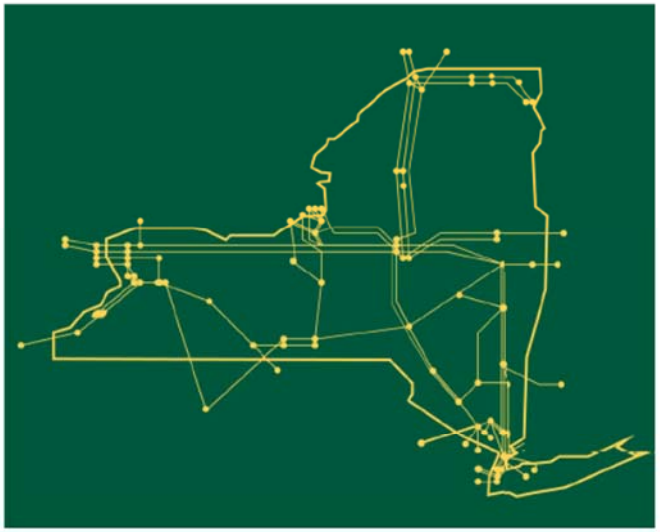
Renewable Exemption- Wind and Solar Analysis Results

		NYC	NYC	G-J	NYC	G-J
		Off Shore Wind	Wind	Wind	Solar	Solar
NPV of Plant Cash Flow	$/kW	$ (2,458)	$ (737)	$ (456)	$ (1,302)	$ (960)
Net Present Value of Plant Cash Flows and Cost Savings to Load	$/kW	$ (1,180)	$ (98)	$ (202)	$ (503)	$ (642)
		limited or no incentive	*limited or no incentive*	*limited or no incentive*	*limited or no incentive*	*limited or no incentive*

Next steps

- **The NYISO will consider input received during today's ICAPWG meeting**
- **Stakeholders can also provide additional comments in writing to deckels@nyiso.com no later than March 7**
- **Filing March 14, 2016**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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Appendix: Studies and Reports

- **Studies on wind and solar technologies**
  - *https://emp.lbl.gov/sites/all/files/lbnl-1000917.pdf*
  - *https://emp.lbl.gov/sites/all/files/lbnl-188167.pdf*
  - *http://energy.gov/sites/prod/files/2015/11/f27/Revolution-Now-11132015.pdf*
  - *http://apps2.eere.energy.gov/wind/windexchange/wind_resource_maps.asp?stateab=ny*
  - *http://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/offshore-wind-energy-development.pdf*
  - *http://www.windmeasurementinternational.com/wind-turbines/om-turbines.php*
- **Production Tax Credit**
  - *http://www.irs.gov/pub/irs-pdf/f8835.pdf*
  - *https://www.gpo.gov/fdsys/pkg/BILLS-114hr2029enr/pdf/BILLS-114hr2029enr.pdf*
  - *http://programs.dsireusa.org/system/program/detail/734*
- **Renewable Energy Credits**
  - *http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=5*
  - *http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=1*
  - *http://www.nyserda.ny.gov/All-Programs/Programs/Main-Tier/Documents*
  - *http://www.wspp.org/filestorage/rec_markets_trading_wspp_oc_mtg_032211.pdf*
- **Investment Tax Credit**
  - *http://www.seia.org/policy/finance-tax/solar-investment-tax-credit*
  - *http://docs.house.gov/billsthisweek/20151214/CPRT-114-HPRT-RU00-SAHR2029-AMNT1final.pdf*