

### **Buyer-Side Mitigation (BSM) Renewables Exemption Study**

**Draft Study Results** 

Ethan D. Avallone

Technical Specialist, Capacity Market Design

#### ICAPWG/MIWG

May 5, 2021

## Purpose

### We are here today to review draft BSM Renewables Exemption Study results.

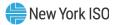


## Background

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

Date	Working Group	Discussion Points and Links to Materials
June 2, 2020	ICAPWG/MIWG	Preliminary Identification of Candidate Intermittent Renewable Technologies https://www.nyiso.com/documents/20142/6474763/5_9_2019_Reserves_for_Resource_Flexibility_FINAL.pdf/f5b74852-2b18-9233-a8fa- bfc488ed1238
December 7, 2020	ICAPWG/MIWG	Review Total Cost Estimates <a href="https://www.nyiso.com/documents/20142/17450815/December_7_2020_BSM_Renewable_Study_ICAPWG_FINAL%20(002).pdf/5c9d4577-9133-0a36-1f57-0d5b1a57bac0">https://www.nyiso.com/documents/20142/17450815/December_7_2020_BSM_Renewable_Study_ICAPWG_FINAL%20(002).pdf/5c9d4577-9133-0a36-1f57-0d5b1a57bac0</a>
January 28, 2021	ICAPWG/MIWG	Review Draft Study Methodology https://www.nyiso.com/documents/20142/18803752/BSM_Renewables_Exemption_Study_Methodology_1.28.2021_FINAL.pdf/519285e1- 35ef-93c9-5fb5-7390c52f0a02



### **Candidate Study Technologies**

Technology			NYISO Zones			
	G	Н	1	J		
Ground Mounted Solar PV	1	$\checkmark$	1	$\checkmark$		
Project Size: 1 - 10 MW	V	V	V	V		
Ground Mounted Solar PV	1	1	1	1		
Project Size: 10-50 MW	V	$\checkmark$	V	$\checkmark$		
Ground Mounted Solar PV	1		274			
Project Size: Greater 50 MW	$\checkmark$	-	-	-		
Wind Onshore 2 - 4 MW WTG* Size	$\checkmark$					
Project Size: 2 - 50 MW	V	-	-	-		
Wind Onshore 2 - 4 MW WTG* Size	1		0.00			
Project Size: 50 - 200 MW	$\checkmark$	-	-	-		
Wind Offshore 6 - 12.5 MW WTG* Size				1		
Project Size: up to 400 MW	-	-	-	$\checkmark$		
Wind Offshore 6 - 12.5 MW WTG* Size				1		
Project Size: 400 - 800 MW	-	-		V		
Run of River Hydro	1					
Project Size: 1 - 10 MW	$\checkmark$	-	-	-		
Landfill Gas (LFG)	$\checkmark$	1	1	1		
Project Size: 2 - 10 MW	V	V	V	V		
: WTG = Wind Turbine Generator						

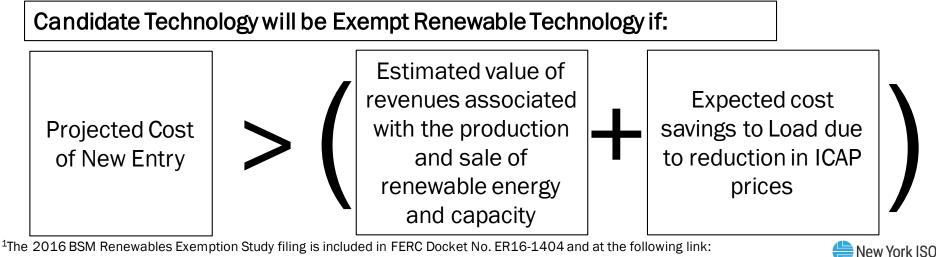
#### \*Note: WTG = Wind Turbine Generator

#### **Tariff Requirements**

- In each ICAP Demand Curve Reset Filing Year, the ISO must conduct a periodic review to determine the technology types that should be Exempt Renewable Technologies (MST 23.4.5.7.13.2.1)
  - The ISO will determine, for each Mitigated Capacity Zone, which candidate intermittent renewable technologies have (a) high development costs and (b) a low capacity factor, such that considering (a) and (b) there is limited or no incentive and ability to develop the candidate intermittent renewable technology in order to artificially suppress capacity prices (MST 23.4.5.7.13.2.2)
  - The ISO's periodic review shall provide for: (a) the ISO's preliminary identification of candidate intermittent renewable technologies for stakeholder review and comment (MST 23.4.5.7.13.2.3), which was accomplished with the June 2, 2020 presentation to stakeholders.
  - The ISO will then issue a draft list of recommended Exempt Renewable Technologies, and the basis for the recommendation, for stakeholder and Market Monitoring Unit review (MST 23.4.5.7.13.2.3).
    - This presentation will occur after FERC acceptance of the 2021 to 2025 ICAP Demand Curves and annual update methodology.
  - After FERC acceptance of the ICAP Demand Curves and annual update methodology, the NYISO has 60 days to file with FERC the results of its Exempt Renewable Technology periodic review and determination (23.4.5.7.13.2.4).

### **Study Purpose**

- The Net Present Value (NPV) of the revenues and costs associated with each Candidate Technology are analyzed to determine if the projected cost of new entry is greater than the sum of the estimated revenues to the resource and the expected cost savings to a Load Serving Entity (LSE) financing the project.<sup>1</sup>
  - Candidate technologies are intermittent, renewable, and commercially viable in the wholesale market. These technologies may have high development costs and low capacity factors such that they have limited or no incentive and ability to artificially suppress capacity prices.



https://nyisoviewer.etariff.biz/ViewerDocLibrary//Filing/Filing1131/Attachments/Filing\_1131.zip

## Study Results

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

### **Candidate Technology Results**

- Solar, land-based wind, offshore wind, and run-ofriver hydro are identified as Exempt Renewable Technology from BSM.
  - The estimated revenue to the candidate technology and cost savings to load were below zero for each of these candidate technologies.
- Landfill gas is not identified as Exempt Renewable Technology.
  - The estimated revenue to the candidate technology and cost savings to load were above zero for this candidate technology in NYC.
- Intermittent technologies that are not identified as Exempt Renewable Technology are able to request an individual exemption evaluation.

Candidate Technology	Result
Solar	Exempt
Land-based Wind	Exempt
Offshore Wind	Exempt
Run-of-River Hydro	Exempt
Landfill Gas	Not Exempt



©COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED

#### NPV of Plant Cash Flow and Cost Savings

 The NPV of plant cash flow and cost savings to load is negative for solar, landbased wind, offshore wind, and run-of-river hydro.

Locality (Load Zone)	Candidate Technology	F	V of Plant Cash lows and Cost avings to Load
G-J (G)	Solar	\$	(49,160,615)
G-J (H)	Solar	\$	(19,135,912)
G-J (I)	Solar	\$	(19,092,292)
NYC (J)	Solar	\$	(9,399,212)
G-J (G)	Land-based Wind (PTC)	\$	(44,619,252)
G-J (G)	Land-based Wind (ITC)	\$	(33,512,420)
NYC (J)	Offshore Wind	\$	(849,717,597)
G-J (G)	Run-of-River Hydro	\$	(44,453,943)
G-J (G)	Landfill Gas	\$	(3,251,665)
G-J (H)	Landfill Gas	\$	(4,090,710)
G-J (I)	Landfill Gas	\$	(4,015,960)
NYC (J)	Landfill Gas	\$	13,028,678



## Study Feedback

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

#### Feedback

The NYISO has considered stakeholder feedback on the study methodology.\*

Feedback	Result
Offshore wind should include cost estimates for units greater than 800 MW	The study filing will use results for 800 MW offshore wind resources. A sensitivity for 1200 MW is included in the study.
The NYISO should assume at least 10 years for the return to the historical LOE instead of 5 years.	The study filing will use 5 years. A sensitivity has been included for 10 years.
Study assumptions look at history, but should forecast future market conditions, including IRM/ LCRs.	This is a potential future enhancement. As the study results are expected to be closer in the future, this modeling may be appropriate to consider in future iterations of the study.
The wind and solar energy production factors seem low.	Wind and solar shapes that are consistent with those utilized in the NYISO's CARIS studies were scaled up until the energy production factors of these resources were equal to the Sargent & Lundy estimates.

\*Study assumptions are detailed in the study spreadsheet posted with today's meeting materials.

### Feedback (continued)

• The NYISO has considered stakeholder feedback on the study methodology.\*

Feedback	Result
Some resources may have a non-zero impact to the Unforced Capacity Reserve Margin (URM), and therefore it is appropriate to discount capacity market savings using a URM impact.	This is a potential future enhancement. As the study results are expected to be closer in the future, this modeling may be appropriate to consider in future iterations of the study.
Financial parameters should be tied to merchant companies, not utilities.	The study filing will use utility financial parameters. REC payments are relatively consistent and predictable, meaning that financing should be closer to a utility than a private developer.
REC should be included as a cost for Load.	The REC cost is included as a cost for Load in the study.
Offshore wind should not be assumed to be subject to NYC property tax.	Federal lease cost, instead of a property tax expense assumption, was applied to offshore wind.
In general, property tax values seem high.	The study uses property tax estimates from Sargent & Lundy. A sensitivity has been included assuming zero property tax, except for offshore wind, as the property tax was already removed for this technology as noted above.

\*Study assumptions are detailed in the study spreadsheet posted with today's meeting materials.

#### **Offshore Wind Lease Cost**

- A 2.0% of capital costs value was used by Sargent & Lundy in setting the Property Tax Expense for offshore wind.
  - Federal lease expenses were not included in this value.
- It is likely only the interconnection for offshore wind would be subject to NYC property tax, and it is certain that these units have a Federal lease expense.
  - Thus, the property tax expense was removed for offshore wind, and substituted for an estimate of the federal lease cost



#### **Excluded Costs**

#### Excluded Costs:

- Site leasing costs (except for offshore wind), since these are case specific.
- Costs of system facilities upgrades, which vary by project to project, and are location specific.

#### • Excluding these costs makes the analysis more conservative

- Including these costs would increase the estimated costs of new entry and, therefore, decrease expected NPV of a project.
  - A project that that has limited or no incentive and ability to artificially suppress capacity prices without these costs would have even less incentive and ability to artificially suppress capacity prices with the costs.



## Study Inputs

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

#### **Study Inputs - Overview**

- Study assumptions are discussed in the following slides.
  - A more detailed look at the study inputs is available in Appendix I of this presentation.
  - Links to various data sources are provided on the "assumptions" sheet in the study file posted with today's meeting materials.



#### **ICAP Market Slope Inputs**

#### The most up to date ICAP inputs are included in the study, including:

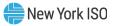
- ICAP prices May 2018 to April 2021
- Updated DCR slope values, based on the FERC's April 9, 2021 Order (shown at right)

		NYCA	G-J	NYC	Long Island
' Pa	rameter - Summer 2021	(Zone C)	(Rockland)	(Zone J)	(Zone K)
Loa	ad Forecast	32,333.1	15,411.3	11,199.0	5,248.6
Loc	cational Capacity Requirement	120.7%	87.6%	80.3%	102.9%
ICA	AP Reference Point	\$7.81	\$ 13.28	\$ 21.28	\$ 17.60
ICA	AP/UCAP Derating Factor	8.77%	3.61%	2.69%	4.91%
Zei	ro Crossing Point	112%	115%	118%	118%
Slo	ppe	-0.002004	-0.007059	-0.013884	-0.020024
		NYCA	G-J	NYC	Long Island
Pa	rameter - Winter 2021/2022	NYCA (Zone C)	G-J (Rockland)	NYC (Zone J)	Long Island (Zone K)
·	rameter - Winter 2021/2022 ad Forecast				-
Loa	•	(Zone C)	(Rockland)	(Zone J)	(Zone K)
Loa Loa	ad Forecast	(Zone C) 32,333.1	(Rockland) 15,411.3	<b>(Zone J)</b> 11,199.0	(Zone K) 5,248.6
Loa Loa ICA	ad Forecast cational Capacity Requirement	(Zone C) 32,333.1 120.7%	(Rockland) 15,411.3 87.6%	(Zone J) 11,199.0 80.3%	(Zone K) 5,248.6 102.9%
Loa Loa ICA	ad Forecast cational Capacity Requirement AP Reference Point	(Zone C) 32,333.1 120.7% \$7.81	(Rockland) 15,411.3 87.6% \$ 13.28	(Zone J) 11,199.0 80.3% \$ 21.28	(Zone K) 5,248.6 102.9% \$ 17.60
Loa Loa ICA ICA Zei	ad Forecast cational Capacity Requirement AP Reference Point AP/UCAP Derating Factor*	(Zone C) 32,333.1 120.7% \$7.81 6.61%	(Rockland) 15,411.3 87.6% \$ 13.28 2.85%	(Zone J) 11,199.0 80.3% \$ 21.28 2.70%	(Zone K) 5,248.6 102.9% \$ 17.60 5.91%

#### **Zones Studied and Capacity Factors**

- Construction of candidate technologies was considered for mitigated capacity zones, as these areas are subject to buyer-side mitigation.
- Capacity market factors were set according to default ICAP manual values, publically available documentation, and aggregated actual NYISO data.

Condidata Tashnalagu	Zana(a)	Capacity Factor		
Candidate Technology	Zone(S)	Summer	Winter	
Offshore Wind	J	30.00%	50.00%	
Land-Based Wind	G	16.00%	34.00%	
Solar	GHIJ	46.00%	2.00%	
ROR Hydro	G	48.44%	60.27%	
Landfill Gas	GHIJ	65.13%	60.97%	



### **Energy Market Revenue**

- Energy Market MW production was estimated based on:
  - CARIS production shapes.
    - This was done for the solar, land-based wind, and offshore wind candidate technologies.
    - Note that production shapes for solar, land-based wind, and offshore wind were scaled up to be consistent with S&L estimates, as noted on slide 12.
  - Resource production data
    - This was done for the run-of-river hydro and landfill gas candidate technologies.
- Energy market revenues were estimated using this MW data and the hourly average of the energy market Real-Time time-weighted integrated LBMPs from September 1, 2017 to August 31, 2020 (the study period from the most recent DCR).



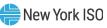
#### **Revenues and Costs**

- Revenue to the candidate technologies in the form of capacity, energy market payments, tax credits, and Renewable Energy Credits (RECs) were included in the analysis.
- Costs to construct the candidate technologies, fixed operations and maintenance (0&M) costs, as well as taxes were considered.

Locality (Load Zone)	Candidate Technology	Size (MW)	Installed Project Capital Costs	Fixed O&M	Net E&AS Revenue - Year 1	REC Revenue - Year 1	Summer ICAP Revenue - Year 1	Winter ICAP Revenue - Year 1
G-J (G)	Solar	100	\$1,361/kW	\$4,746,500/yr	\$4,158,493/yr	\$3,286,261/yr	\$1,534,480/yr	\$8,100/yr
G-J (H)	Solar	20	\$1,885/kW	\$1,227,000/yr	\$848,422/yr	\$657,252/yr	\$321,236/yr	\$1,647/yr
G-J (I)	Solar	20	\$1,885/kW	\$1,227,000/yr	\$852,968/yr	\$657,252/yr	\$321,236/yr	\$1,647/yr
NYC (J)	Solar	20	\$2,204/kW	\$1,406,000/yr	\$934,908/yr	\$657,252/yr	\$771,361/yr	\$11,099/yr
G-J (G)	Land-based Wind (PTC)	100	\$1,577/kW	\$7,140,000/yr	\$11,845,473/yr	\$8,802,486/yr	\$554,063/yr	\$92,340/yr
G-J (G)	Land-based Wind (ITC)	100	\$1,577/kW	\$7,140,000/yr	\$11,845,473/yr	\$8,802,486/yr	\$554,063/yr	\$92,340/yr
NYC (J)	Offshore Wind	800	\$4,277/kW	\$114,630,983/yr	\$102,567,565/yr	\$79,281,504/yr	\$15,508,106/yr	\$120,000/yr
G-J (G)	Run-of-River Hydro	5	\$8,077/kW	\$1,729,000/yr	\$400,433/yr	\$289,358/yr	\$85,264/yr	\$12,077/yr
G-J (G)	Landfill Gas	10	\$2,305/kW	\$1,157,000/yr	\$1,640,797/yr	\$1,267,420/yr	\$35,307/yr	\$4,133/yr
G-J (H)	Landfill Gas	10	\$2,408/kW	\$1,181,000/yr	\$1,667,932/yr	\$1,267,420/yr	\$35,307/yr	\$4,133/yr
G-J (I)	Landfill Gas	10	\$2,408/kW	\$1,181,000/yr	\$1,675,742/yr	\$1,267,420/yr	\$35,307/yr	\$4,133/yr
NYC (J)	Landfill Gas	10	\$2,718/kW	\$1,253,000/yr	\$1,788,783/yr	\$1,267,420/yr	\$84,610/yr	\$27,780/yr
©COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED DRAFT – FOR DISCUSSION PURPOSES ONLY						21		

### **Study Duration Inputs**

- The capacity price effect longevity is used to indicate how long capacity prices would remain depressed by entry of the candidate technologies before rising again in response to resource exit.
  - This concept is also known as the return to the historical level of excess (LOE) conditions. A value of 5 years was used for the study.
- The amortization period is the number of years over which the investment is analyzed, and is tied to the length of the REC contract.
  - This time period is 25 years for offshore wind, and 20 years for all other technologies.



#### **Financial Inputs**

- Two depreciation types are available in the analysis: Straight Line and Modified Accelerated Cost Recovery System (MACRS) Depreciation.
  - MACRS depreciation is assumed for the study, as it is the most advantageous to the resource.
- Inflation and tax rate inputs from the most recent Demand Curve Reset are included as assumptions.
- Utility annual reports informed the Return on Equity, Cost of Debt, and percent of debt/ equity used in the study.



## Tariff Revisions

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

#### **Tariff Revisions**

#### Tariff revisions are posted with today's meeting materials.

- MST Attachment H, section 23.2.1 Definitions
  - Revise the definition of Exempt Renewable Technology to add the newly exempt technology.
- MST 23.4.5.7.13.1.1 (i)
  - Minor revision to include "Hydro" in the reference to "a Limited Control Run-of-River Hydro Resource."



## Timeline

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT - FOR DISCUSSION PURPOSES ONLY

### **Next Steps**

#### Early May

 Stakeholders should provide any written feedback on the Study to the NYISO by emailing Debbie Eckels (<u>deckels@nyiso.com</u>) by May 14th. The NYISO will post this feedback to the ICAPWG materials page on the NYISO website. Stakeholders submitting feedback should indicate if they do not want their written feedback posted.

#### On or before June 8, 2021

• The NYISO will file with the Commission the results of its Exempt Renewable Technology periodic review and determination.



## Appendix I: Assumptions

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT – FOR DISCUSSION PURPOSES ONLY

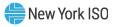
#### **Zones Studied and Capacity Factors**

Input	Input Candidate Technology		Notes
	Land-Based Wind	G	
Zones	Solar	GHIJ	
	ROR Hydro	G	
	Landfill Gas	GHIJ	
	Offshore Wind	30.00%	UCAP production factors at p. 13 (pdf page 70)
	Land-Based Wind	16.00%	Default ICAP Manual Value
Capacity Market Factor - Summer	Solar	46.00%	Default ICAP Manual Value
	ROR Hydro	48.44%	Average summer '18, '19, '20
	Landfill Gas	65.13%	Average summer '18, '19, '20
	Offshore Wind	50.00%	UCAP production factors at p. 13 (pdf page 70)
	Land-Based Wind	34.00%	Default ICAP Manual Value
Capacity Market Factor - Winter	Solar	2.00%	Default ICAP Manual Value
	ROR Hydro	60.27%	Average winter '18/'19, '19/'20, '20/'21
	Landfill Gas	60.97%	Average winter '18/'19, '19/'20, '20/'21



#### **Investment Incentives**

Input	Candidate Technology	Study Value	Notes
	Offshore Wind	30.00%	
	Land-Based Wind	18.00%	
ITC (Percent of investment cost)	Solar	22.00%	
	ROR Hydro	O%	
	Landfill Gas	0%	
	Offshore Wind	\$0.00	
	Land-Based Wind	\$15.00	
PTC	Solar	\$0.00	
	ROR Hydro	\$13.00	
	Landfill Gas	\$13.00	
	Offshore Wind	N/A	
	Land-Based Wind	10	
PTC Horizon	Solar	N/A	
	ROR Hydro	10	
	Landfill Gas	10	
	Offshore Wind	\$ 25.14	2018 OREC Cost
	Land-Based Wind	\$ 22.33	2021 Quarter 1 Tier 1 REC Cost
REC	Solar	\$ 22.33	2021 Quarter 1 Tier 1 REC Cost
	ROR Hydro	\$ 22.33	2021 Quarter 1 Tier 1 REC Cost
	Landfill Gas	\$ 22.33	2021 Quarter 1 Tier 1 REC Cost



### **Study Duration Inputs**

Input	Candidate Technology	Study Value	Notes
	Offshore Wind	5	
	Land-Based Wind	5	
Capacity Price Effect Longevity (Return to LOE Conditions)	Solar	5	
	ROR Hydro	5	
	Landfill Gas	5	
	Offshore Wind	25	
	Land-Based Wind	20	
Amortization Period	Solar	20	
	ROR Hydro	20	
	Landfill Gas	20	



#### **Financial Inputs**

Input	- Candidate Technology	Study Value		Notes		
Depreciation Type	Offshore Wind	MACRS				
	Land-Based Wind	MACRS				
	Solar	MACRS				
	ROR Hydro	MACRS				
	Landfill Gas	MACRS				
	Lease Cost		42,469,725	Note that Statoil changed its name to Equinor, as noted in a March 18,		
Offshore Wind Estimated Federal Lease Cost (\$/MW)	MW		2,076	2015 press release by the company.		
	\$/MW	\$	20,457.48	ZOID press release by the company.		
Minimum NYCA Price			\$0.05			
ROE			8.90%	Regulated rates of return for ConEdison, O&R, and CH*		
Inputs to Estimate Cost of Debt	Cost of Debt (ConEdison)		4.63%	Cost of long-term debt, 2020-2022 (page 132)		
			5.17%			
	Cost of Debt Year 1, 2, 3 (Orange & Rockland)	5.14%		Cost of long-term debt, 2019-2021 (page 135)		
			5.14%			
	Interest on long-term debt (Central Hudson)	\$	31,978,000	2020 Interest on long-term debt (page 9)		
	Long-term Debt (Central Hudson)	\$	837,000,000	2020 Long-term Debt (page 88)		
	Estimated Cost of Debt (Central Hudson)		3.82%	Estimated cost of long-term debt		
Estimated Cost of Debt			4.53%			
Percent Debt			52%	One utility had a range of 50% to 52%, the others were 52%		
Percent Equity			48%			
Inflation			2.10%	Utilized most recent DCR assumptions		
Federal Tax Rate			21.00%	Utilized most recent DCR assumptions		
State Tax Rate			6.50%	Utilized most recent DCR assumptions		
City Tax Rate			8.85%	Utilized most recent DCR assumptions		
Composite Tax Rate (NYC)			36.35%	Utilized most recent DCR assumptions		
Composite Tax Rate (non-NYC)			27.50%	Utilized most recent DCR assumptions		

©COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED

#### **Miscellaneous Assumptions**

	CARIS production shape data used for Land-Based Wind, Offshore Wind, and Solar.					
	Actual production shape data used for Run-of-River Hy	Actual production shape data used for Run-of-River Hydro				
	Actual production shape data used for Landfill Gas	Actual production shape data used for Landfill Gas				
	Average of 9/1/2017 to 8/31/2020 RT TWI LBMPs.	Average of 9/1/2017 to 8/31/2020 RT TWI LBMPs.				
		Increases the average production factor from the NREL/ CARIS data to				
	Land-based wind modern efficiency increase	equal the S&L estimate, labeled as "Capacity Factor" on the "Capital Cost &				
Net EAS Revenue Calculation	factor	1.238048752 O&M Assumptions" tab				
		Increases the average production factor from the NREL/ CARIS data to				
		equal the S&L estimate, labeled as "Capacity Factor" on the "Capital Cost &				
	Offshore wind modern efficiency increase factor	1.051821035 O&M Assumptions" tab				
		Increases the average production factor from the NREL/ CARIS data to				
		equal the S&L estimate, labeled as "Capacity Factor" on the "Capital Cost &				
	Solar modern efficiency increase factor	1.114378052 O&M Assumptions" tab				



## Appendix II: Sensitivities

© COPYRIGHT NYISO 2021. ALL RIGHTS RESERVED.

DRAFT – FOR DISCUSSION PURPOSES ONLY

### **Offshore Wind Sensitivity**

- Offshore wind installations are expected to be higher than 800 MW, and thus may benefit from economies of scale.
  - This sensitivity quantifies the economies of scale that would be needed to make the NPV of plant cash flow and cost savings to load just above zero for a 1200 MW installation.
    - Fixed O&M costs (\$/yr) were scaled up to 1200 MW.
    - The Installed Project Capital Cost (\$) was then adjusted until the NPV of plant cash flow and cost savings to load was just above zero.
  - Results show that the Installed project capital cost would have to decline by roughly 85% as a result of economies of scale to provide a positive NPV in this context.

Unit Size (MW)	Installed Project Capital Cost (\$/KW)	Economies of Scale Cost Reduction
400 MW unit	\$4,600	N/A
800 MW unit	\$4,277	-7%
1200 MW unit	\$659	-85%



### Return to Level of Excess (LOE) Sensitivity

- The study assumes that capacity prices decline for a number of years after the entry of a given candidate technology, and then recover, *i.e.*, return to the LOE.
  - A value of 5 years is currently assumed in the study.
- A sensitivity instead assumed a 10 year return to LOE. The results of this sensitivity are shown at right.

		NPV of Plant Cash	
		Flows and Cost	
Locality (Load Zone)	Candidate Technology	Sa	avings to Load
G-J (G)	Solar	\$	(27,479,005)
G-J (H)	Solar	\$	(14,798,344)
G-J (I)	Solar	\$	(14,754,724)
NYC (J)	Solar	\$	1,559,586
G-J (G)	Land-based Wind (PTC)	\$	(20,935,796)
G-J (G)	Land-based Wind (ITC)	\$	(9,817,079)
NYC (J)	Offshore Wind	\$	(257,428,896)
G-J (G)	Run-of-River Hydro	\$	(41,901,647)
G-J (G)	Landfill Gas	\$	2,638,706
G-J (H)	Landfill Gas	\$	1,799,275
G-J (I)	Landfill Gas	\$	1,874,411
NYC (J)	Landfill Gas	\$	28,263,658



### **Property Tax Expense Sensitivity**

- The NYISO received feedback that the property tax expense for each technology seemed too high.
- A sensitivity was performed whereby the property tax expense for each technology was assumed to be \$0.00.
  - This did not apply to offshore wind because, as described in the presentation, the property tax expense for offshore wind was replaced with the estimated federal lease cost.

		NPV of Plant Cash Flows and Cost	
Locality (Load Zone)	Candidate Technology	Sa	ivings to Load
/ G-J (G)	Solar	\$	(23,530,414)
G-J (H)	Solar	\$	(12,034,164)
G-J (I)	Solar	\$	(11,991,358)
NYC (J)	Solar	\$	(1,578,042)
G-J (G)	Land-based Wind (PTC)	\$	(13,990,348)
G-J (G)	Land-based Wind (ITC)	\$	(4,425,857)
NYC (J)	Offshore Wind	\$	(849,717,597)
G-J (G)	Run-of-River Hydro	\$	(35,468,960)
G-J (G)	Landfill Gas	\$	1,170,761
G-J (H)	Landfill Gas	\$	530,161
G-J (I)	Landfill Gas	\$	602,621
NYC (J)	Landfill Gas	\$	18,082,404



# The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



#### 븢 New York ISO

#### www.nyiso.com