

System & Resource Outlook Update

Economic Planning Department

Electric System Planning Working Group (ESPWG)

Friday February 25th, 2022 – WebEx Teleconference

Agenda

- Outlook Study Status
- Policy Case Assumptions Review
- Next Steps

Outlook Study Status

- September – October 2021: Finalize reference case assumptions*
- November - December 2021: Conduct simulations and analysis*
- January, **February**, March, April 2022 : Conduct Policy case simulations and analysis, issue draft report*
- April-May 2022: Finalize draft report, seek Business Issues Committee and Management Committee review and approval
- June 2022: Seek Board of Directors review and approval

* Collaborate with ESPWG and seek stakeholder input

Requests from last ESPWG

- Review of capacity expansion input assumptions
- Descriptions of scenario modeling
- Addition of requested scenarios

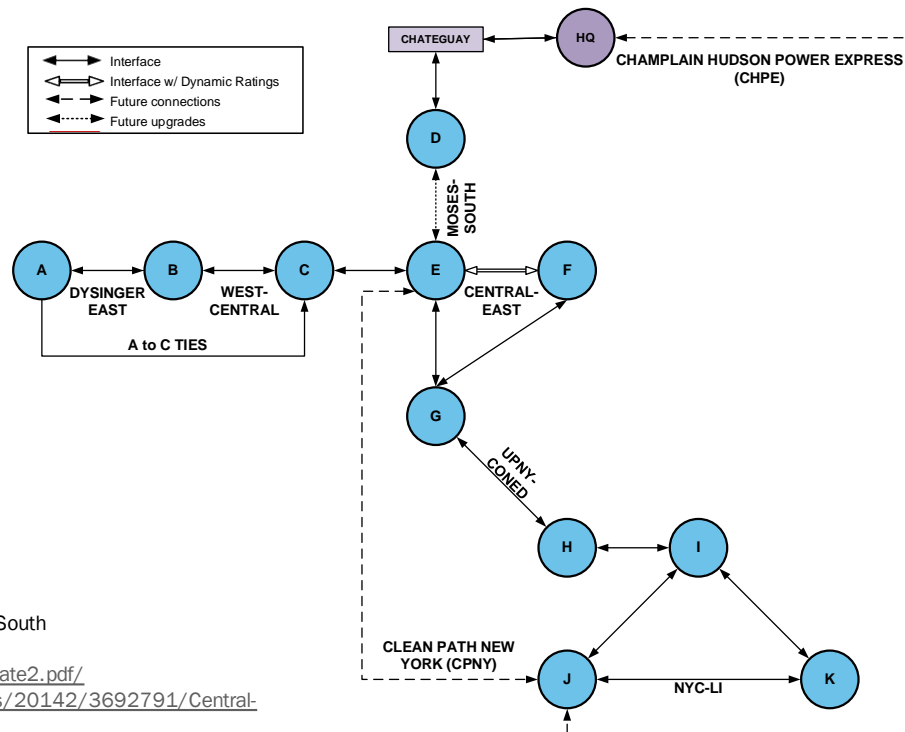
Policy Case Update

Assumptions Matrix

- Updated documents posted [here](#) & [here](#)
- Updates since last ESPWG
 - Topology diagram
 - Maximum capacity limitations
 - Description of declining capacity value assumptions

Pipe & Bubble Representation for Capacity Expansion Model

Years	Interface/Interzonal Pipes	+ Limit (MW)	- Limit (MW)	Source
All	DYSINGER EAST	2,700	*	2020 ATR
All	A to C Ties	550	0	2021 CRP limit
All	WEST-CENTRAL	1,475	*	2020 ATR
2021-2024	MOSES-SOUTH	3,050	-1,500	1/2015 Ops study stability limit ¹
2025-2040	MOSES-SOUTH	4,050	-1,500	Tier 4 contract ²
2021-2023	CENTRAL-EAST (summer)	2,380	-2,380	Operational nomogram ³
2021-2023	CENTRAL-EAST (winter)	2,615	-2,615	Operational nomogram ³
2024-2040	CENTRAL-EAST (summer)	3,255	-3,255	Operational nomogram ³
2024-2040	CENTRAL-EAST (winter)	3,490	-3,490	Operational nomogram ³
2021-2023	UPNY-CONED	6,150	*	2021 CRP limit
2024-2040	UPNY-CONED	6,525	*	2021 CRP limit
All	DUNWOODI-NYC	*	*	
All	DUNWOODI-LI	*	*	
All	NYC-LI	0	-350	Wheel contract
2027-2040	CLEAN PATH NEW YORK	1,300	-1,300	Tier 4 contracts ⁴
2025-2040	CHAMPLAIN HUDSON POWER EXPRESS	1,250	-1,250	Tier 4 contracts ⁴



*Limit is defined by sum of normal limits of the lines making up the interface

1: See "Interface Limits & Ops Studies" here: <https://www.nyiso.com/reports-information/>

2: Northern New York Smart Path Transmission Project will increase transfer capability to Moses-South by ~1000 MW and is reflected in the limit noted above:

https://www.nyiso.com/documents/20142/27019028/ESWPG_System_Resource_Outlook_Update2.pdf/

3: Max Limit Applied Proportionally to Operational Nomogram: <https://www.nyiso.com/documents/20142/3692791/Central-East%20Voltage-Collapse-Limit-Evaluation-FINAL.pdf/>

4: See Case Number Case Number 15-E-0302 for additional information on Tier 4 contracts:

<https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=15-e-0302&CaseSearch=Search>



Load Forecasts

■ Gold Book CLCPA Forecast

- 2021 Gold Book CLCPA Case Forecast of Annual Energy with:
 - 10 GW BTM-PV by 2030 CLCPA target
 - Removal of impact from energy storage resources, which are modeled as Generators
 - Smoothed annual electrification forecasts through 2040
- Hourly load profiles from Climate Change Impact Study [here](#)

■ Draft Scoping Plan Analysis Forecast

- Scenario 2 Integration Analysis “No end use flexibility w/o electrolysis load”
- Data can be found [here](#)

Maximum Capacity Limitations

- The preliminary assumptions for the maximum allowable capacity by technology-zone were based on the Climate Change Impact Phase II study
- These assumptions have since been updated to align with the maximum allowable capacity for year 2040 as outlined in Appendix G: Annex 1 of the Climate Action Council Draft Scoping Plan

Unforced Capacity Reserve Margin (URM)

- The Capacity Expansion Model enforces the UCAP equivalent (Unforced Capacity Reserve Margin (URM)) of the 2021-2022 Capability Year NYCA IRM and LCRs for all years in the model's horizon
- The URM accounts for the declining capacity value of intermittent resources as compared to IRM and is more suitable under a system with high penetration of renewable resources
- In the Capacity Expansion Model, the URM is modeled as a percentage and sets the lower bound on the amount of UCAP required in the NYCA and Localities, based on annual peak load

Potential Capacity Expansion Scenarios

Legend
Infeasible
Under Consideration
In-Progress

NYISO Suggested Scenarios

- Candidate technologies available
- Nuclear re-licensing/retirement
- High/low renewable technology cost
- High/low/alternative load forecasts
- High/low gas prices
- High/low emission prices
- Enable/disable/accelerate retirements
- Include/exclude max capacity builds
- Relax/accelerate CLCPA targets
- Reduced hydroelectric energy output
- Fixed capacity value curves

Stakeholder Suggested Scenarios

- Zone J remove all SCR Emergency Response Capacity
- Zone J retire any generator over 40 years old
- Transmission expansion
- NYSERDA Integration Analysis: Scenario 2 load forecast
- \$0 REC bidding
- Distribution of OSW capacity between Zones J and K
- NYC steam heat converted to electric
- Accelerated winter peaking load profile
- Tier 4 project removal

Proposal for Modeling Capacity Expansion Scenarios

- Scenarios for the Capacity Expansion Model will be modeled by changing one or more input assumption(s), as applicable to the proposed scenario
- For example, the emissions price scenarios would be modeled through a different emissions price forecast/data file
 - For this scenario, the preliminary CO₂ price forecast could be escalated 10x to represent an example of a high CO₂ price forecast
- As another example, the high/low renewable technology cost scenarios would be modeled as changes to the build cost of the applicable technology types to assess the impacts of increasing or decreasing technology costs on new builds

Proposed Scenario Model Adjustments

Scenario	Assumption Adjusted	Value
High/Higher CO ₂	CO ₂ price forecast	2x / 10x
Load Profile	Load forecast	Draft Climate Action Council Scoping Plan Analysis Forecast
Low renewable technology cost	Build cost for applicable technologies	Climate Action Council projections
Candidate technologies available	Max units for applicable technologies	0
Age based generation retirements	Retirement date	Climate Action Council Appendix D
Reliability Margin	URM	Increase 1%
High Natural Gas Price	Natural gas price forecast	2x
Nuclear Retirement	Nuclear Retirement Date	Set nuclear retirement to relicense date
Fixed Capacity Value Curves	Declining Capacity Value Curves	Remove Curves
Unconstrained Build	Max Zonal Capacity by Technology	Remove Limits
Reduced Hydro	Monthly Hydro Energy	- 10%

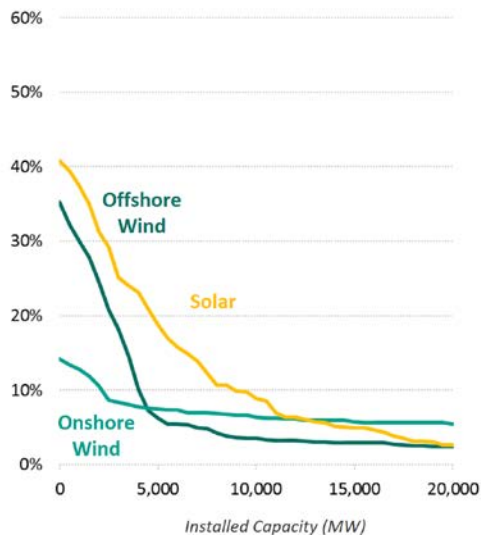
ISO

Capacity Expansion Model: Marginal Capacity Value Curves

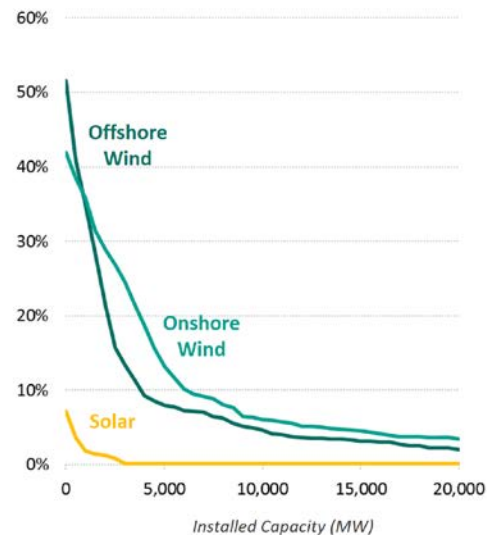
- Implementing marginal capacity value curves from 2020 Grid in Evolution study into capacity expansion model for wind, solar, & energy storage

Marginal Capacity Value of Solar and Wind

Summer Marginal Capacity Value

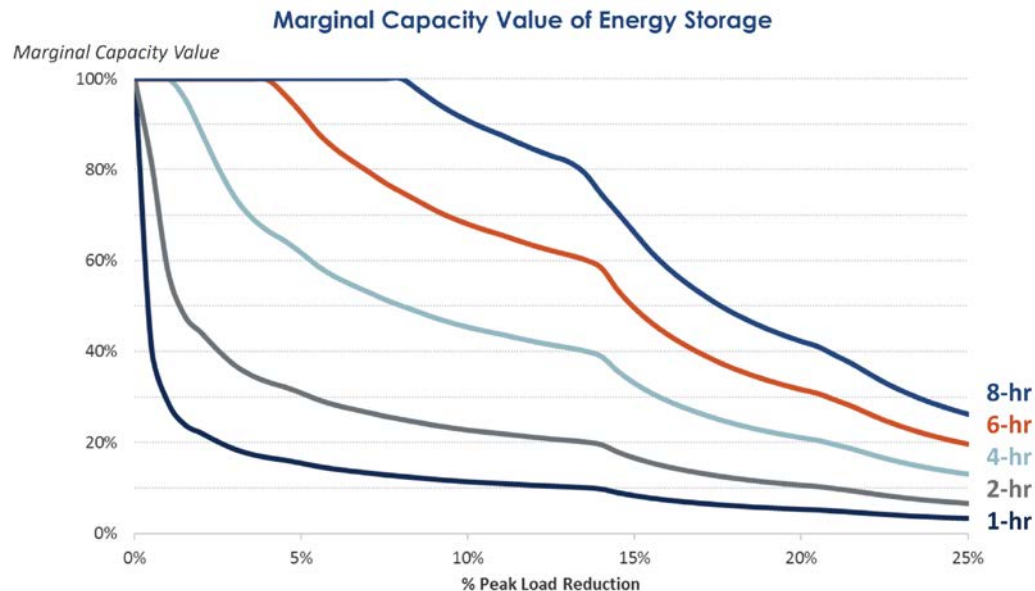


Winter Marginal Capacity Value



Note: Declining capacity value of solar, wind, and energy storage resources is a function of load and operational profiles of the resources, which may not be consistent across studies but provides a reasonable approximation for this study

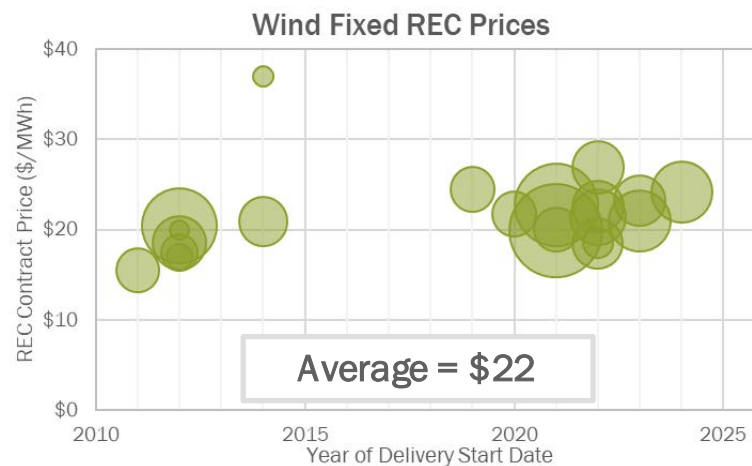
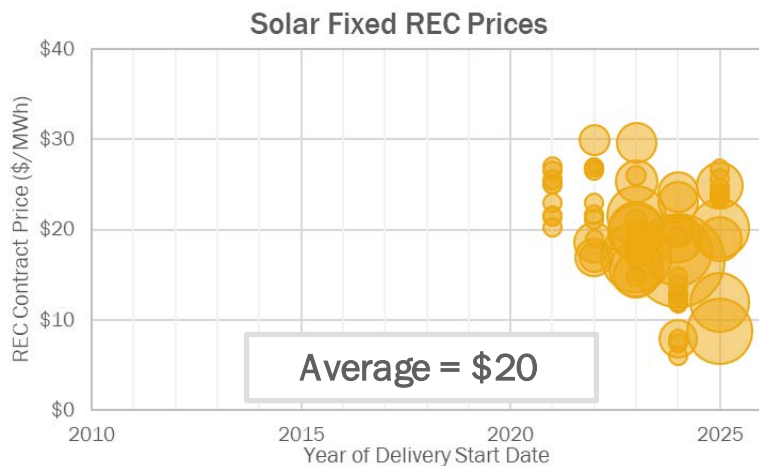
Capacity Expansion Model: Marginal Capacity Value Curves (cont.)



Note: Declining capacity value of solar, wind, and energy storage resources is a function of load and operational profiles of the resources, which may not be consistent across studies but provides a reasonable approximation for this study

Future REC Prices

- Proposal:** in production cost simulation model future renewable generation REC prices as average of fixed REC prices by technology



Offshore Wind REC Price Models

- **Proposal:** in production cost simulation model ORECs as an equivalent fixed REC for existing & future projects:

Fixed OREC*

Empire Wind 1: \$36

Sunrise Wind: \$62

Average: \$49

Index OREC

Empire Wind 1: \$99

Sunrise Wind: \$110

Beacon Wind: \$118

Empire Wind 2: \$108

Average: \$109

**Premium = \$109-\$49
= \$60**

Specific OSW Fixed OREC Model

Empire Wind 1: \$99 - \$60 = **\$39**

Sunrise Wind: \$110 - \$60 = **\$50**

Beacon Wind: \$118 - \$60 = **\$58**

Empire Wind 2: \$108 - \$60 = **\$48**

Future OSW Fixed OREC Model = \$109 - \$60 = **\$49**

**Note: Empire 1 and Sunrise contracts include provisions for index or fixed REC pricing*

Next Steps

Next Steps

■ 3/8 Special ESPWG

- Capacity expansion preliminary results
- Contract Case
 - Congestion & relaxed simulation analysis results

■ 3/24 ESPWG

- Capacity expansion scenario preliminary results
- Contract Case
 - Renewable generation pocket identification
 - Energy deliverability results

Questions, Feedback, Comments?

- Email additional feedback to: JFrasier@nyiso.com

2021-2040 Outlook Data Catalog

May 20, 2021

Model Benchmark Results

September 22, 2021

System & Resource Outlook Update

October 25, 2021

Capacity Expansion Model Primer

System & Resource Outlook Update

November 19, 2021

System & Resource Outlook Update

December 19, 2021

System & Resource Outlook Update

January 25, 2022

System & Resource Outlook Update

February 9, 2022

System & Resource Outlook Update

Base & Contract Case Results

February 25, 2022

System & Resource Outlook Update

Final Reports

Data Posted to ESPWG



2022
Release

Assumptions Matrix v1

Capacity Expansion Assumptions Matrix v1

Contract Case Renewable Projects

Emissions Price Forecast

Fuel Price Forecast

Capacity Expansion Assumptions Matrix v2 (Redline)

Capacity Expansion Assumptions Matrix v3 (Redline)

ESPWG/TPAS Presentations

Our Mission & Vision



Mission

Ensure power system reliability and competitive markets for New York in a clean energy future



Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation