Attachment #4.2
Return to Agenda

Guidelines to ICS from the High Renewables Study

Dr. Mayer Sasson

Howard Kosel

May 8, 2020

conEdison

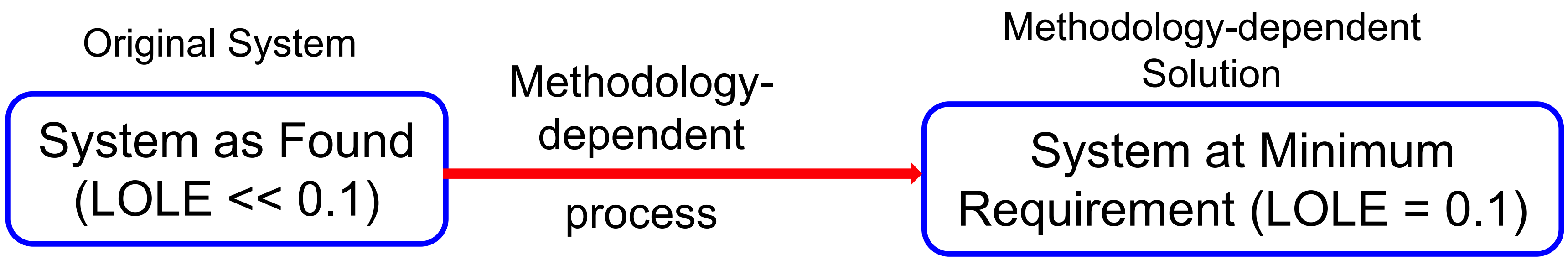
Why was a Study Performed

- Given the Climate Leadership and Community Protection Act (CLCPA) 70x30 renewable goals, the NYSRC set out to study
  - Impact on the IRM in terms of ICAP and UCAP
  - Need for new modeling in MARS
- Expected to be one of several studies necessary to fully understand impact on reliability
  - Challenge arises from the variability and intermittency of wind and FTM PV generation
- Renewables were added to the latest 2020-21 IRM study base case

Unexpected Difference in Total NYCA UCAP for Base Case and HR Case at LOLE Criteria

- Theoretically, there should not be a difference
  - The Base Case determined the amount of UCAP needed for the system to be at an LOLE of 0.1
  - In the HR Case, additional resources reduce (improve) the LOLE to < 0.1 and equivalent capacity must be removed to return to an LOLE of 0.1
  - The IRM is higher in the HR Case but so is the average NYCA EFORd
- NYCA UCAP@0.1 LOLE in Base Case is theoretically expected to be equal to NYCA UCAP@0.1 LOLE in HR Case
  - In both cases, no additional resources are required beyond those needed for system to be at LOLE of 0.1
  - Practically, the study shows there is a difference
  - Results are highly dependent on resource location and existing transmission topology

Methodology Matters



- "As Found" system is a physical system with all of its resources; therefore, few loss-of-load events
- To move towards an LOLE = 0.1, resources must be removed and possibly shifted to increase loss of load events
- The process used to decide which resources to remove and/or shift affects results
  - For example , since Zone J is the zone with most loss of load events, resources could just be removed from J until NYCA LOLE = 0.1
  - In current IRM/LCR analysis, for a given IRM value, UCAP resources are removed from surplus Zones A, C & D to reach a desired IRM value, followed by shifting from Zones J and K to the same upstate zones until active transmission constraints result in NYCA LOLE = 0.1.
  - Process repeated for different IRM values to create a curve; Tan 45 is selected as the desired value
  - The NYISO further shifts resources across zones, keeping unchanged the IRM-identified total amount of resources, with the objective of minimizing the purchased cost of capacity

Derate for Renewable Resources

Figure 4- Offshore Wind Capacity Factor from 2PM to 6PM

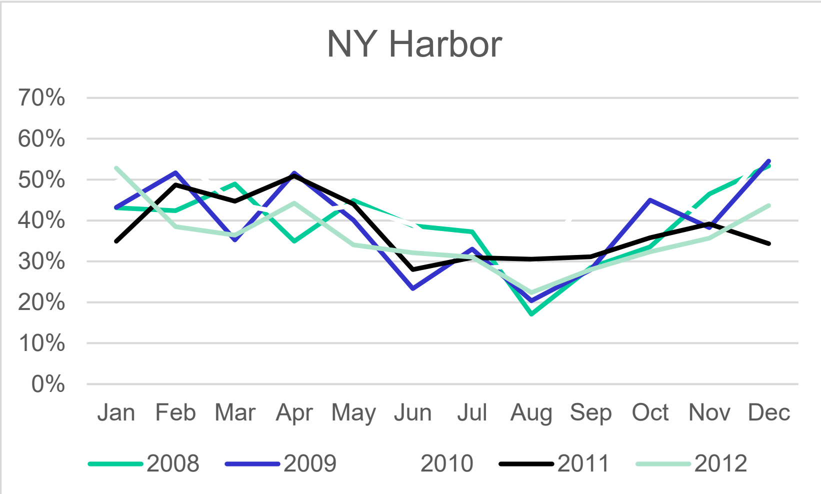


Table 3- Zonal Production Factors by Resource Type

Zone	FTM PV	On-Shore Wind	Off-Shore Wind
A-C	31%	15%	
D		14%	
E		17%	
F	28%		
G	28%		
J			29%
K	30%		34%
NYCA	29%	16%	32%

- The white paper utilized 8,760 hourly curves for the availability of renewable resources
- Table 3 shows availability factors or production factors determined as averages for each resource type over the three summer months (greater loss of load period)
  - Availability factors are used as a proxy to convert ICAP to UCAP or vice versa
  - Derate Factor = 1 – Availability Factor
- These factors were used to determine:
  - The initial UCAP for each renewable resource location
  - The IRM, after MARS solves for the URM at criteria
  - Approximate derate factors of renewables
- California and PJM (proposal) calculate the derate factors in terms of the reliability value they contribute to prevent loss of load

Reliability Value of Renewables

- PJM Approach (taken from a 10/17/19 PJM presentation by Patricio Rocha Garrido)
  - Develop a Resource Adequacy case that meets the 1 day in 10 years Loss of Load Expectation (LOLE) criteria (this is the **Base Case**)
  - Add historical or representative hourly system-wide wind/solar output shapes to the Base Case. The LOLE in this **HR Case** will now be less than 0.1 days/year.
  - Increase the peak load in the **HR Case** (retaining the hourly load shape) until the LOLE is back at 0.1 days/year.
  - The difference between the final peak loads in the **HR Case** and the **Base Case** represents the reliability value or UCAP of the renewables
  - These studies are known as Effective Load Carrying Capability (ELCC) or Capacity Value studies
  - Experience in other areas show that the derate factors of renewables increase as the level of renewables increase, while the derate factor of conventional resources remains largely unchanged

Observations

- Location of added renewable resources affects transmission constraints and thereby results
- Taken together with not accounting more precisely for the reliability value of renewables, leads to a difference in the UCAP resources between the two cases studied
  - In the studies performed, the HR case had 775 MW more than the Base Case
  - This may be overstated by not accounting for the reliability value of renewables

EC Guidance to ICS

- The high renewable case studied is prompting the NYSRC / NYISO to review the removal / shifting process for determining the IRM to see if changes are warranted
- The derate factor of renewable resources may need to be revisited to more accurately reflect their contribution to reliability
  - The availability of renewables is fundamentally different than that of conventional resources
- The introduction of storage resources will bring their own set of issues and must be studied