Effective Load Carrying Capability (ELCC) Review – Part III

Patricio Rocha Garrido
Resource Adequacy Planning
Planning Committee
December 12, 2019

Introduction

- At the October PC meeting, PJM described the current methodology to calculate Capacity Credit for wind/solar resources and pointed out two key issues with such methodology:
  - Too many hours without any reliability risk are included in the calculation
  - Disregard for the potential reliability impact of “shifting the peak load” as the penetration of wind and solar resources increases

Introduction

- At the November PC meeting, PJM described the Effective Load Carrying Capability (ELCC) methodology and
  - Outlined and compared two options in which the actual ELCC runs can be performed (“load approach” vs “generation approach”)
  - Presented how ELCC has been implemented at MISO and CAISO

Data Requirements/Considerations

- Analysis captures the relationship between loss-of-load risk and wind/solar output
  - Therefore, hourly load shapes and coincident wind/solar output shapes are required
  - Since such shapes are highly variable from year to year, the analysis should include as many annual shapes as possible
- In addition, since it is a reliability study, ELCC runs require inputs similar to those used in the Reserve Requirement Study
  - Load uncertainty, capacity availability uncertainty (based on performance metrics such as forced outage rates for resources other than wind/solar), etc.

Data Requirements/Considerations

- Analysis is forward-looking (e.g. what is the capacity credit of wind resources in future year X?) and as such it requires the expected level of penetration of wind/solar resources in a given future year
- The analysis is used to derive capacity credits and therefore it should focus on wind/solar resources that are or are expected to be **capacity** resources

Preliminary Framework - Wind

- For Wind, the system-wide Final ELCC value for Future Delivery Year (DY) X will be calculated as the average of 10 annual system-wide ELCC values (one for each DY in the period DY 2009 – DY 2018)
  - Each of the annual system-wide ELCC values will be based on the total expected nameplate wind penetration for Future DY X and the performance of the wind resources (i.e., the hourly wind shape) that were in service in each of the corresponding historical delivery years
  - The expected nameplate wind penetration will only include wind capacity resources with RPM Resource Ids. (energy-only are excluded)
  - The performance of wind resources (i.e., the hourly wind shape) for a historical year only includes wind capacity resources with RPM Resource Ids. (energy-only are excluded)
  - In summary, the Final Wind ELCC for Future DY X is computed under the assumption that the average performance of the wind fleet during the last 10 DYs is a good indicator of the expected wind fleet's performance in Future DY X

Preliminary Framework - Wind

Delivery Year (DY)	Load (Hourly Shape)	Wind Performance (Hourly Shape)	Penetration Level	ELCC
2009	2009	2009	Expected for DY X	e1
2010	2010	2010	Expected for DY X	e2
2011	2011	2011	Expected for DY X	e3
2012	2012	2012	Expected for DY X	e4
2013	2013	2013	Expected for DY X	e5
2014	2014	2014	Expected for DY X	e6
2015	2015	2015	Expected for DY X	e7
2016	2016	2016	Expected for DY X	e8
2017	2017	2017	Expected for DY X	e9
2018	2018	2018	Expected for DY X	e10

Final Wind ELCC for Future DY X is the average of e1, e2, …., e10.
This value represents the capacity value (in MW) of the expected Wind fleet for Future DY X.

Preliminary Framework - Solar

- For Solar, the system-wide Final ELCC value for Future Delivery Year X will be calculated as the average of 7 annual system-wide ELCC values (one for each DY in the period DY 2012 – DY 2018)
  - Each of the annual system-wide ELCC values will be based on the total expected nameplate solar penetration for Future DY X and the performance of the solar resources (i.e., the hourly solar shape) that were in service in each of the corresponding historical delivery years
  - The expected nameplate solar penetration will only include solar capacity resources with RPM Resource Ids. (energy-only are excluded)
  - The performance of solar resources (i.e., the hourly solar shape) for a historical year only includes solar capacity resources with RPM Resource Ids. (energy-only are excluded)
  - In summary, the Final Solar ELCC for Future DY X is computed under the assumption that the average performance of the solar fleet during the last 7 DYs is a good indicator of the expected solar fleet's performance in Future DY X

Preliminary Framework - Solar

Delivery Year (DY)	Load (Hourly Shape)	Solar Performance (Hourly Shape)	Penetration Level	ELCC
2012	2012	2012	Expected for DY X	e1
2013	2013	2013	Expected for DY X	e2
2014	2014	2014	Expected for DY X	e3
2015	2015	2015	Expected for DY X	e4
2016	2016	2016	Expected for DY X	e5
2017	2017	2017	Expected for DY X	e6
2018	2018	2018	Expected for DY X	e7

Final Solar ELCC for Future DY X is the average of e1, e2, …., e7.
This value represents the capacity value (in MW) of the expected Solar fleet for Future DY X.