



New Generation Curtailment Analysis – Pilot Study Approach, Inputs and Assumptions

Planning Advisory Committee

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SYSTEM PLANNING



Summary

- The ISO is proposing to perform a pilot study to analyze the potential curtailments that could be experienced by proposed new generation
 - Where large amounts of new intermittent generation are proposed in the same part of the system
- The pilot study will focus on the addition of offshore wind on Cape Cod

Purpose of the Study

- The purpose of the study is to provide information
 - To allow Market Participants to assess the impacts of the operating characteristics and availability criteria of proposed incremental resources
- No resulting changes to the interconnection standards or criteria are proposed at this time
 - Whether, or not, changes to the interconnection standards or criteria are warranted, can be discussed with the Planning Advisory Committee and with NEPOOL after a review of the results of the pilot study

Background

- The Network Capability Interconnection Standard identifies the upgrades needed for a new project to operate at the full output
 - However, the standard allows for other generation to be dispatched-down in the analysis
- The Capacity Capability Interconnection Standard identifies the upgrades needed for all capacity resources to operate at their capacity capabilities
 - The capacity capability of intermittent resources is based on the median output over certain reliability hours
 - In summer, approximately 30-35% of the full nameplate capacity for offshore wind
- However, there may be many instances where the wind farms are producing more than 35% of their combined output
 - Neither standard analyzes all of the new intermittent resources operating at up-to full output

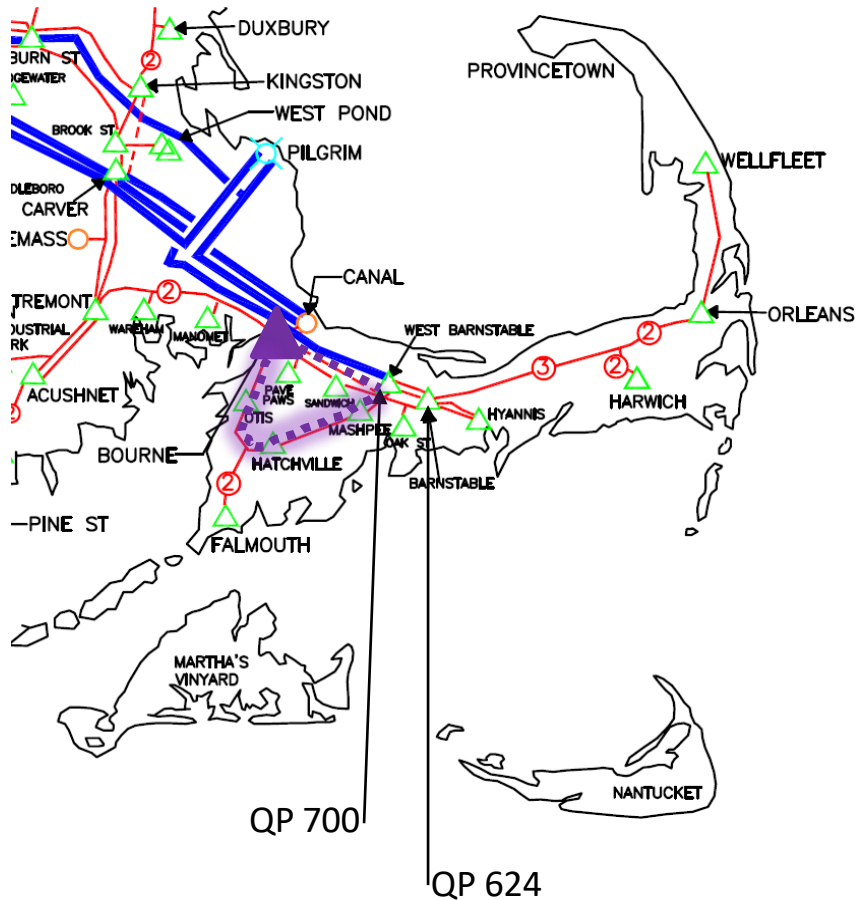
Curtailment Analysis Scope of Work: Topics

- Transmission constraints found in the Cape Cod cluster study
- Offshore wind production
- Area load
- Solar development
- Curtailment analysis approach



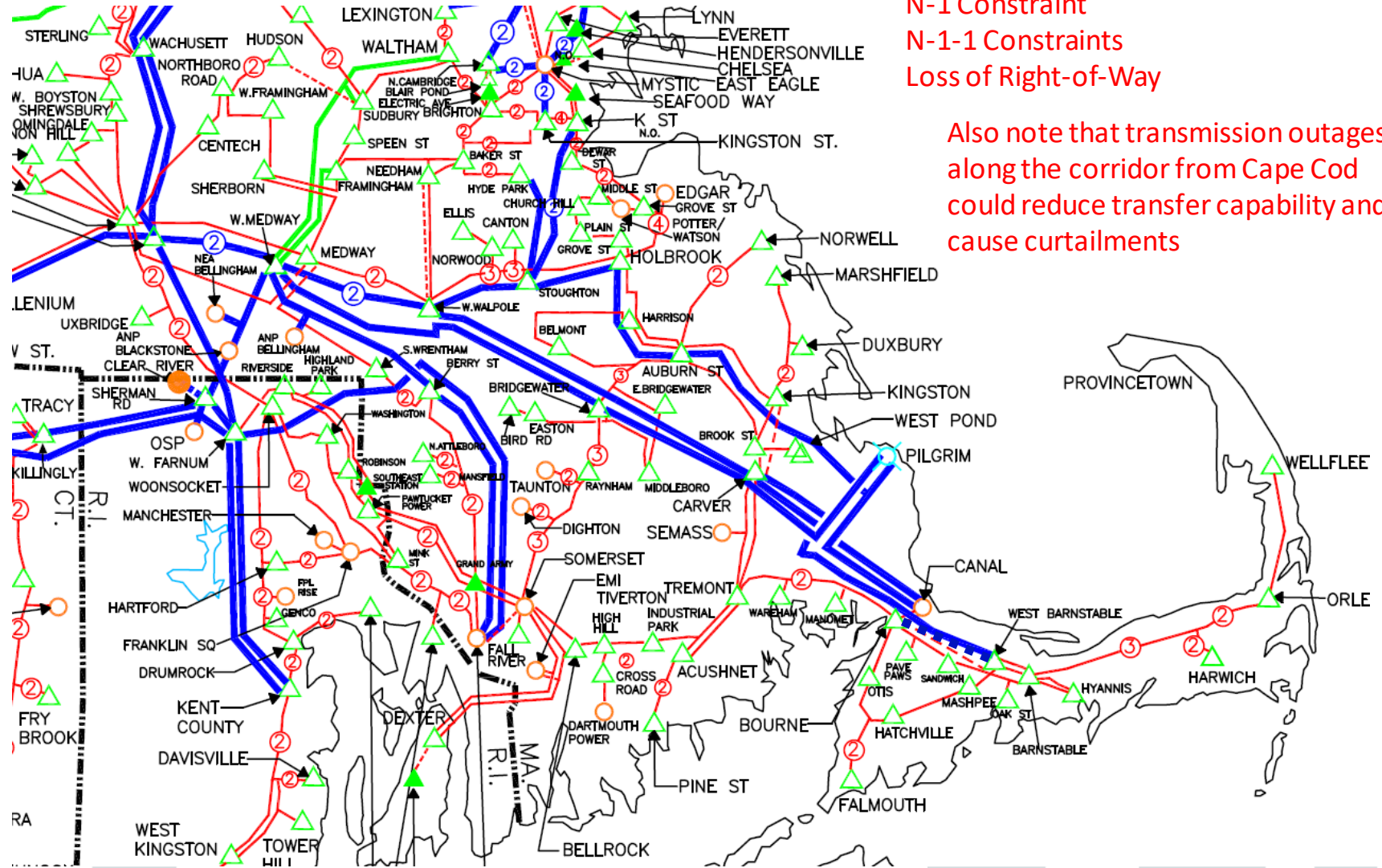
TRANSMISSION CONSTRAINTS

Cluster Enabling Transmission Upgrade



- The first Cape Cod Resource Integration Study (CCRIS) focused on the addition of **new 345 kV transmission infrastructure between West Barnstable and Bourne**
- The CCRIS identified that 1,200 MW of offshore wind, in addition to the 1,600 MW with completed system impact studies, could be interconnected on Cape Cod

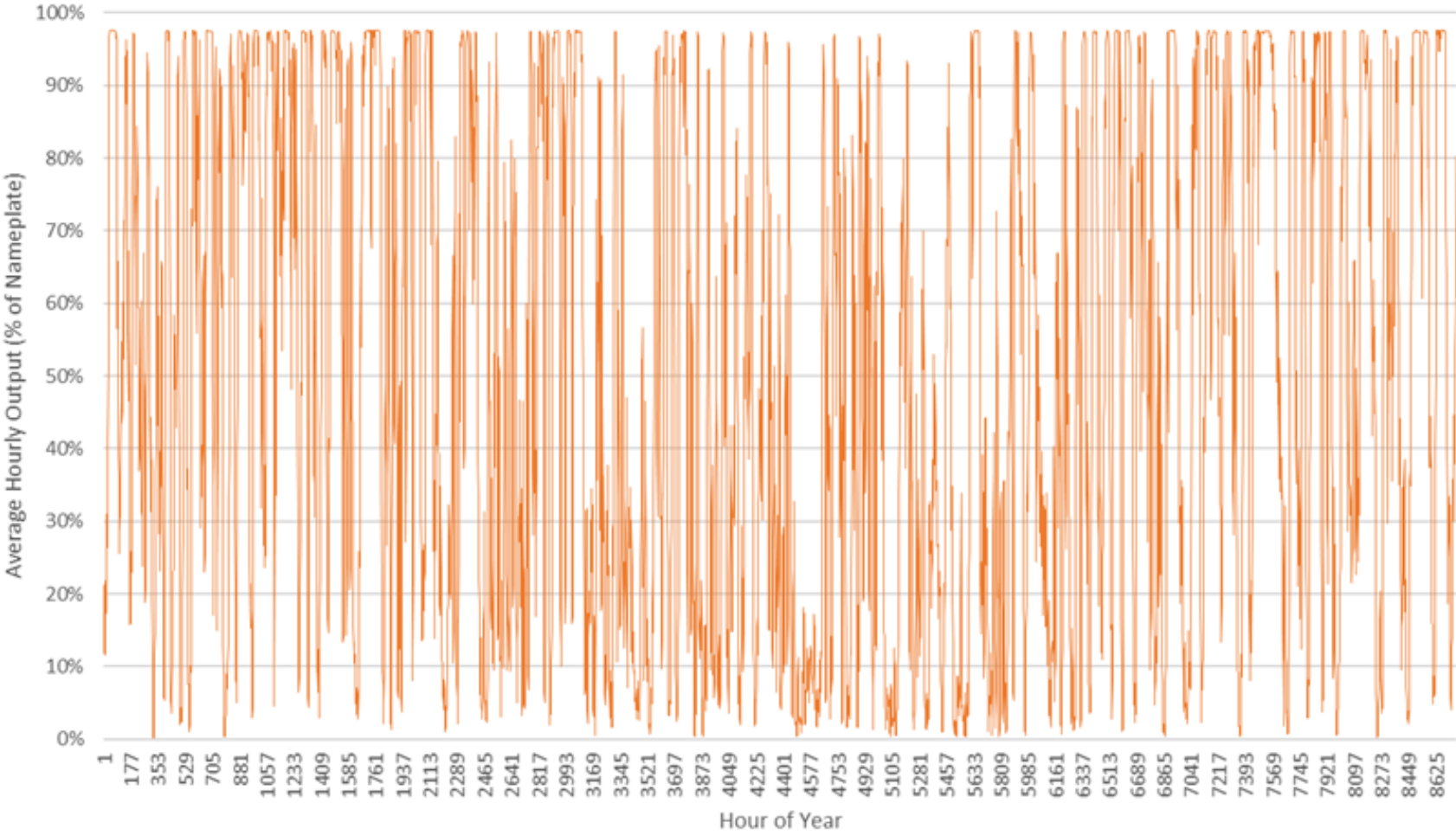
Constraints were observed when more than 2,800 MW was added to the Cape



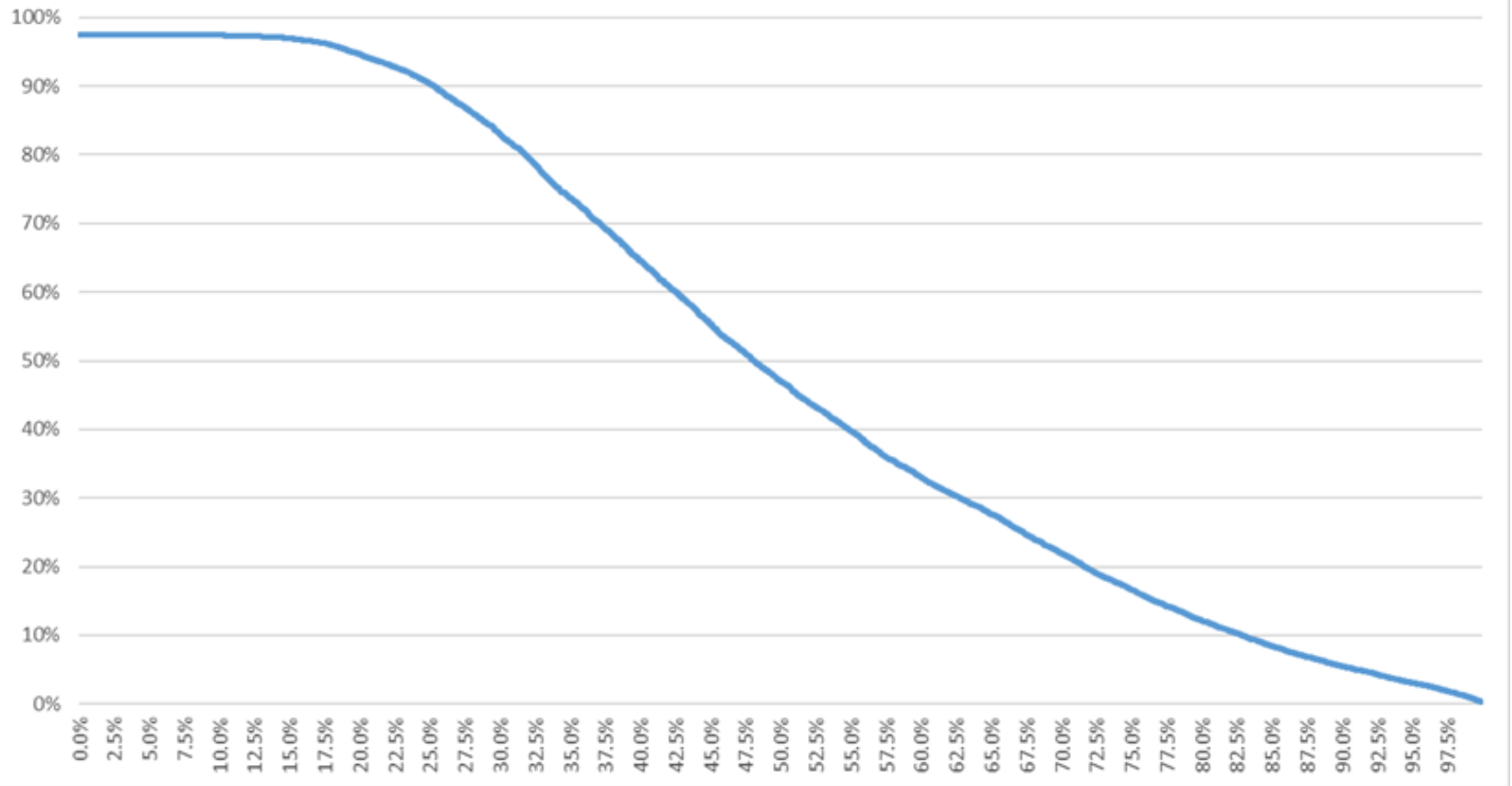
OFFSHORE WIND PRODUCTION

Illustrative

Offshore Wind 2010 Hourly Output 3,137.6 MW Nameplate

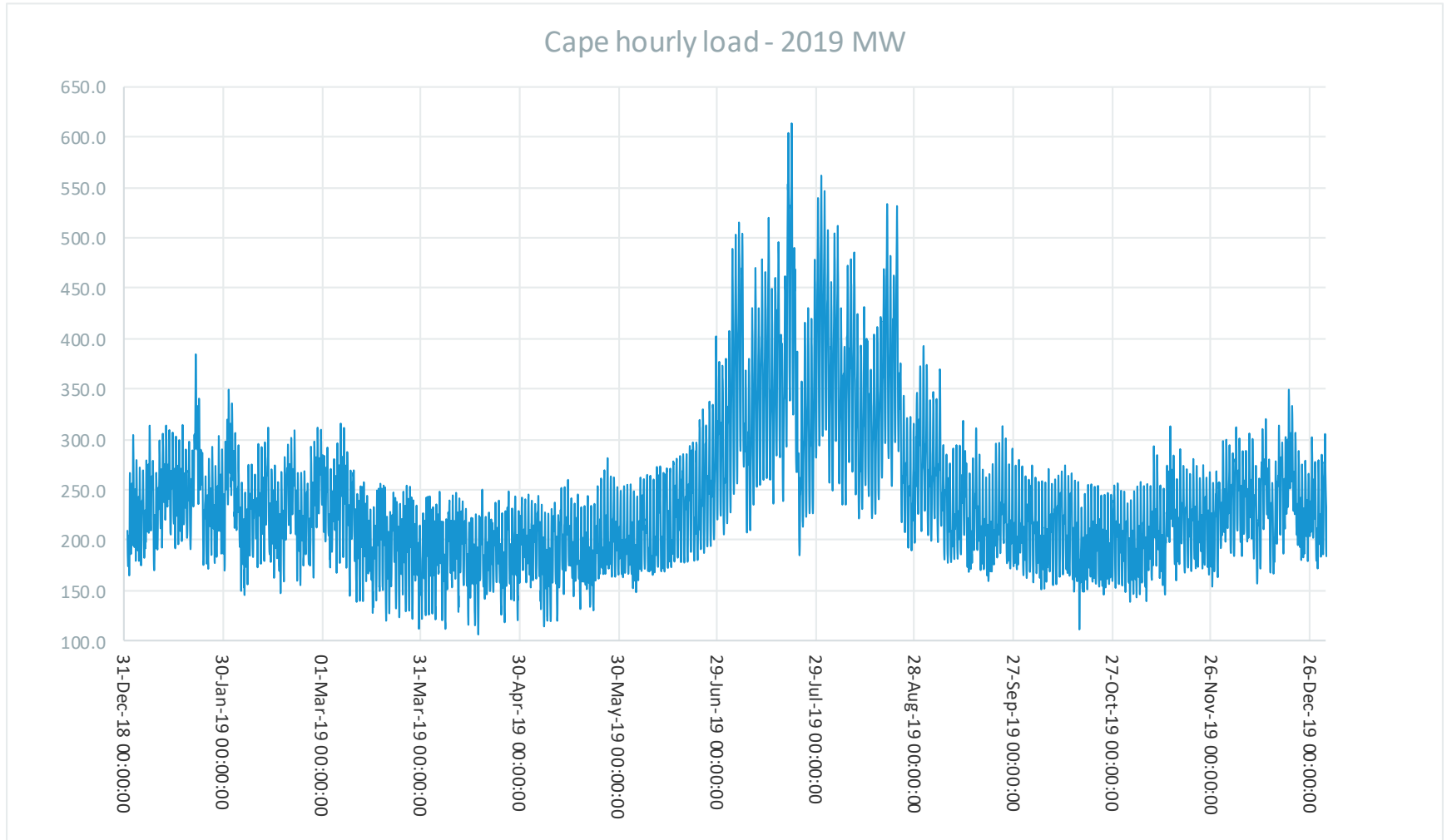


Offshore Wind Hourly Output Duration Curve - 2010



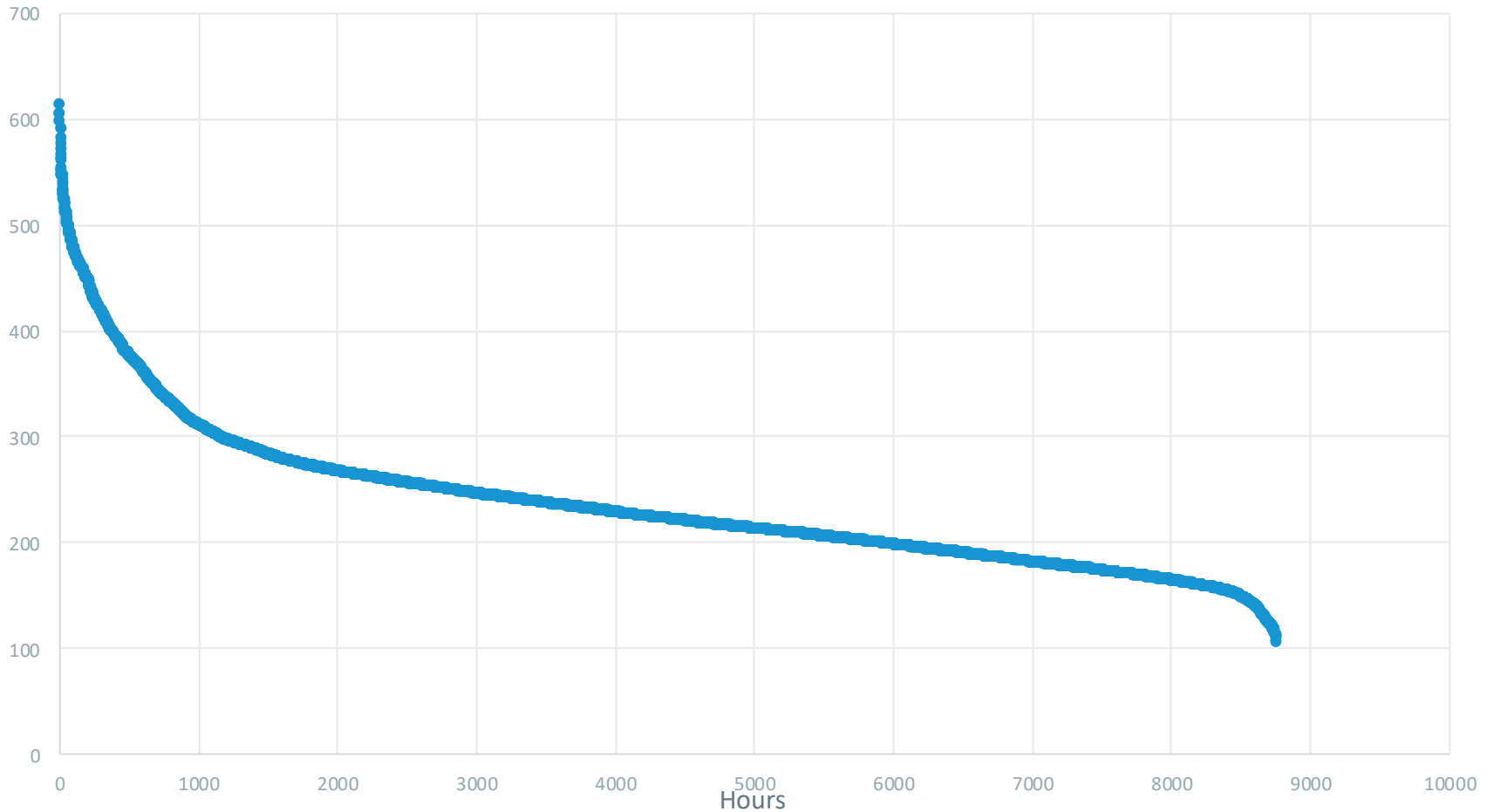
CAPE COD AREA LOADS

Cape Cod 2019 Hourly Loads



Cape Cod 2019 Load Duration Curve

Cape Load Duration Curve - 2019 - MW



Load on Cape Cod

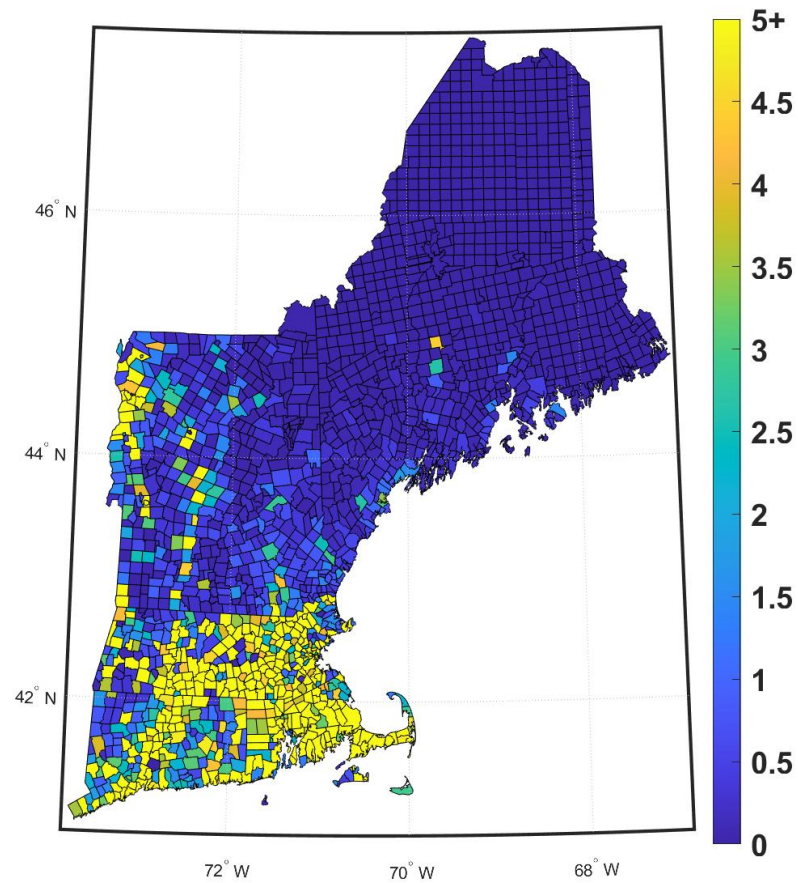
- Load on Cape Cod is seasonal
- For large portions of the year, the load on Cape Cod is less than 300 MW
- Peak load is approximately 600 MW
- This means that, if a large amount of generation is connected to the Cape, the majority of the injected power will flow away from the Cape – to the rest of the system
 - Example:
 - 2,800 MW of generation running on the Cape
 - 300 MW of load on the Cape
 - 2,500 MW will be exporting out of the Cape
- Note that this net export level will only increase as continued additions of distributed solar generation lower net loads on the system



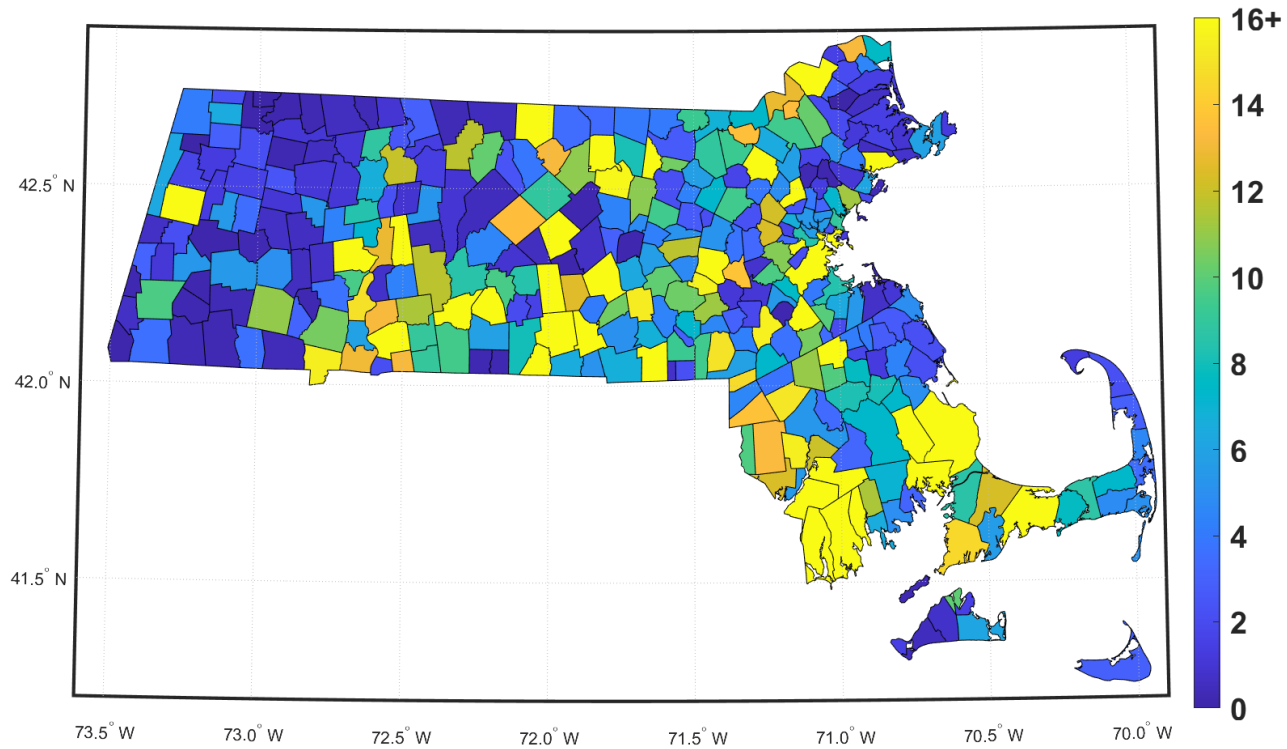
SOLAR DEVELOPMENT

Solar development will continue to reduce net loads

New England Solar Heat Map



Massachusetts Solar Heat Map



CURTAILMENT ANALYSIS

Curtailment Analysis – Pilot Study

- Needs to consider load
 - Net load continues to decline in Southeast MA and is highly seasonal
- Can be very simplistic from a production cost perspective
 - Curtailment will be caused by new offshore wind competing with other new offshore wind and increasing levels of solar
 - The relevant conventional generation (Canal Station and Edgar/Fore River) were already assumed fully off (-2,300 MW) in the CCRIS
- Needs to consider transmission outages
 - Forced and planned outages of transmission (in the corridor connecting the Cape to Boston) will cause potentially significant reductions in the ability of the generation to run
- Future study effort
 - Interaction with large injections at Brayton Point

Next Steps

- The ISO hopes to provide some preliminary results of the curtailment analysis before the end of the year



Questions

