JOINT UTILITIES
OF NEW YORK

Stakeholder Engagement Session on Long-Term Load and DER Forecasting

July 14, 2017

AGENDA

- **Introduction**
- **Addressing Stakeholder Feedback from prior Engagements**
- **Consolidated Edison Presentation**
- **Orange & Rockland Presentation**
- **Stakeholder Input on Use Cases**
- **Lunch**
- **Deep Dive Discussion**
- **Summary & Next Steps**

Addressing Stakeholder Feedback From Prior Engagements

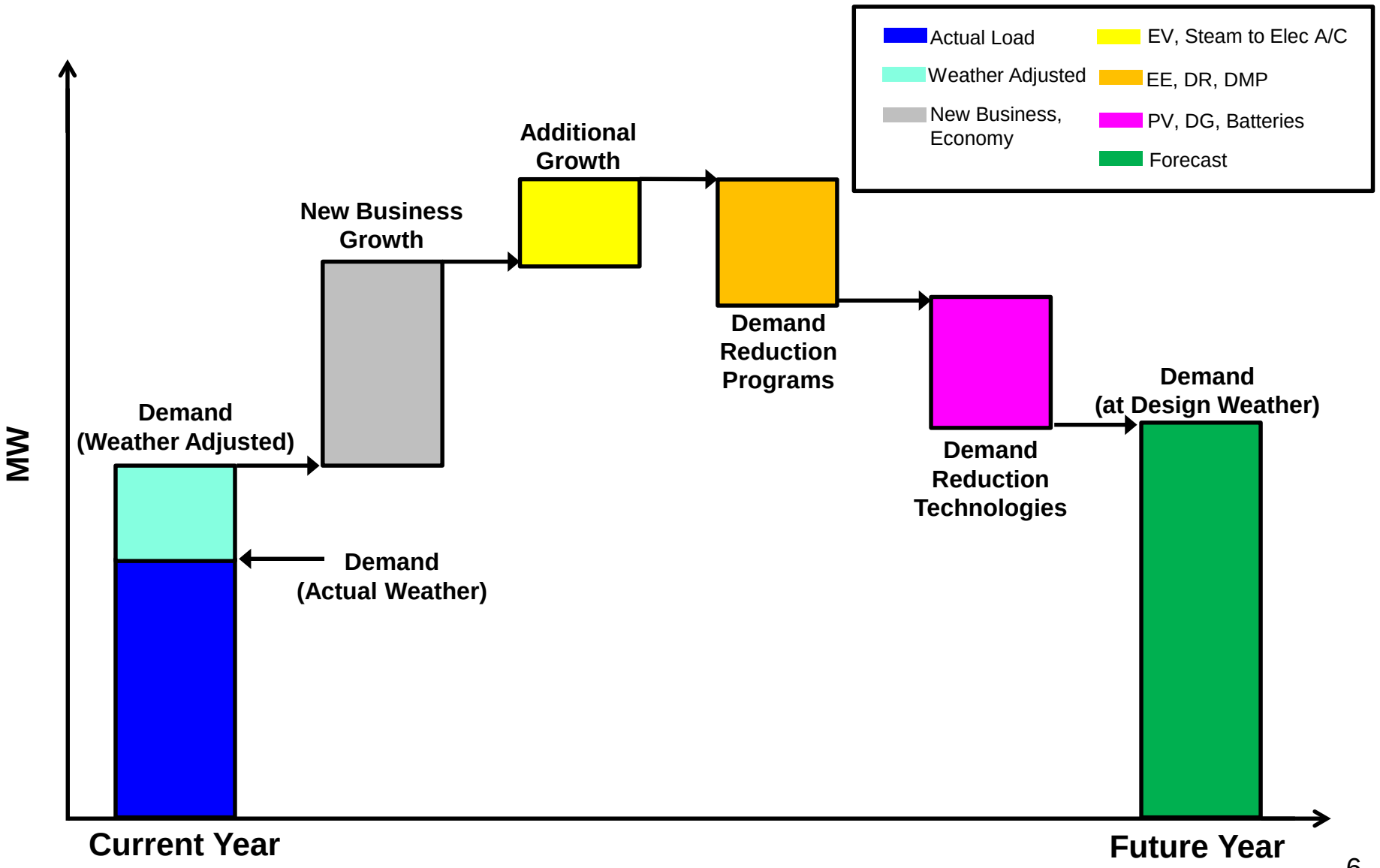
Stakeholder Input	Discussion Points	Next Steps
Use Cases	• The Joint Utilities welcomed the opportunity to engage and discuss use cases with stakeholders • JU mentioned that Con Edison and Orange & Rockland's case studies during the 7/14 EG session would provide details on how aspects that inform forecast planning • JU described elements of their current planning process as illustrated by case studies and data that draw on pertinent issues related to forecasting load and DER on the system • JU Forecasting Working Group is coordinating with the System Data group to incorporate stakeholder input to inform forecast use cases	**CLOSED** – Feedback solicited from stakeholders on use cases and planning process.
Documentation	• The Joint Utilities will continue coordinating to explore opportunities to drive greater consistency in forecasting roadmap as part of ongoing DSIP efforts • Input received is posted to the JU website and will inform the utilities' 2018 DSIP filings	**OPEN** – Utility DSIP filings preparations will continue through the end of the year and into 2018

Addressing Previous Stakeholder Feedback

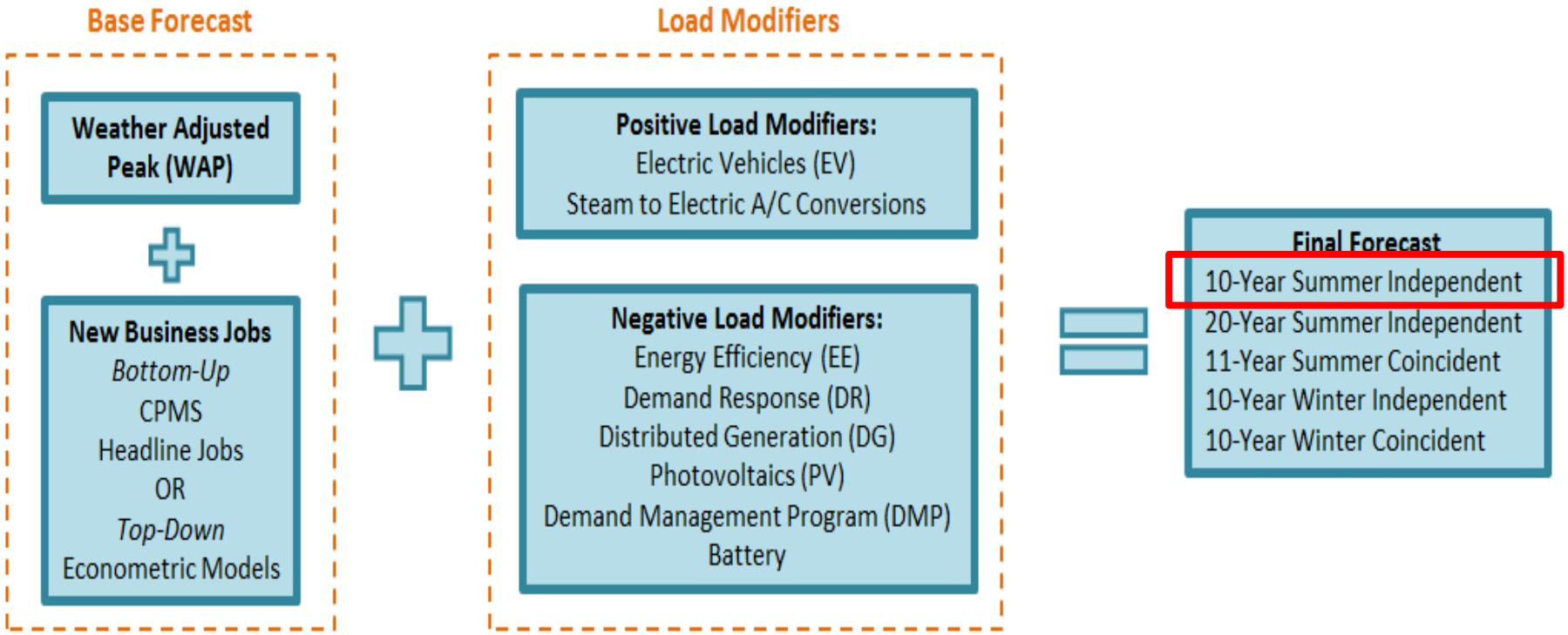
Stakeholder Input	Discussion Points	Next Steps
Lessons from other jurisdictions	• JU acknowledged the importance of leveraging lessons learned and valuable insights from other states, regions and countries • JU is actively engaged with other utilities within US and the European Union, and outside stakeholders to ensure lessons learned at other utilities are leveraged within New York. • JU seek to identify those approaches that can advance the interests of its customers and that will help achieve the objectives of REV.	**OPEN** – Efforts by the utilities to inform their processes through best practices and lessons learned from other jurisdictions is ongoing

Con Edison Case Study

Electric Network Forecast Approach

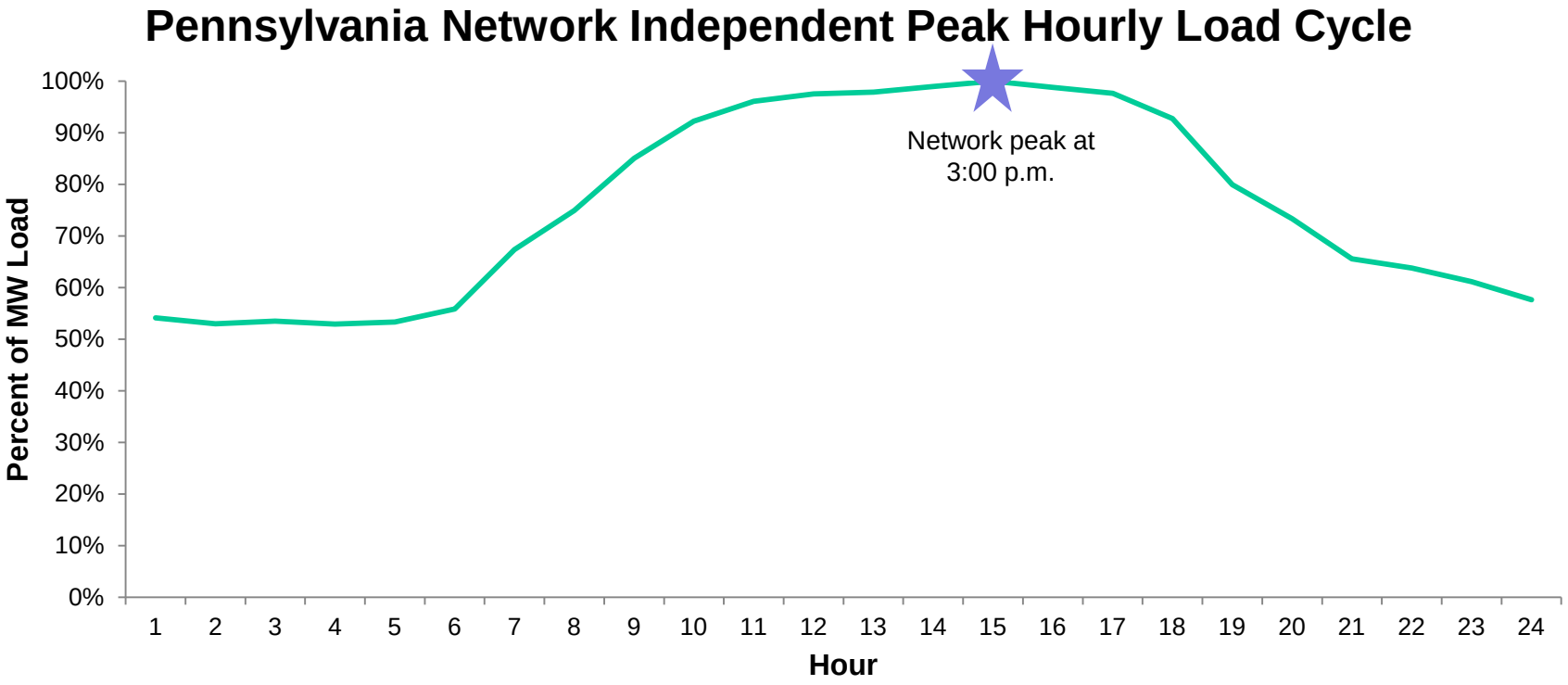


Electric Network Peak Demand Forecast Overview



Pennsylvania Network Boundaries

Pennsylvania Network Load Profile



Base Forecast

- Weather Adjusted Peak (WAP)
  - A regression analysis is completed and evaluated separately for each network
  - The result of this analysis is the starting point of the network forecast

Pennsylvania	2016
WAP (MW)	160

- New Business Jobs
  - Three ways to add job growth:
    - Jobs in queue (CPMS): jobs are added to forecast using a ramping matrix
    - Headline jobs: any load information for large projects not yet in CPMS are added to forecast using a ramping matrix
    - Econometric factors: Moody's data provides NYC specific insight (typically used for forecast years 6-10)
  - For the Pennsylvania Network, there was greater insight into job growth for years 6-10 so CPMS and headline jobs were used

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Job Growth (MW)	22	51	82	102	117	128	133	134	143	154

Note: All values incremental in 2017 and then cumulative

Load Modifiers

- (+) Electric Vehicles (EV)
  - Forecast uses registered EVs from DMV data and uses top-down approach based on growth rates required to meet state goals

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
EV (MW)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3

- (+) Steam to Electric A/C Conversions
  - Forecast uses steam customer data to estimate conversion of steam chillers to electric

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Steam A/C (MW)	0.2	0.5	0.7	0.9	1.2	1.4	1.6	1.9	2.1	2.4

- (-) Photovoltaics (PV)
  - Forecast includes PV projects in queue for first few years and then uses top-down approach based on industry growth rates

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
PV (MW)	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1

Note: All values incremental in 2017 and then cumulative

Load Modifiers

- (-) Energy Efficiency (EE)
  - Forecast includes estimates for programmatic EE programs (EEPS, NYPA, NYSERDA)

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
EE (MW)	0.1	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.1

- (-) Demand Management Program (DMP)
  - Forecast includes projects in queue enrolled in DMP

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
DMP (MW)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

- (-) Demand Response (DR)
  - Forecast includes non-Special Case Resource (SCR) DR programs only

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
DR (MW)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Note: All values incremental in 2017 and then cumulative

Load Modifiers

- (-) Battery
  - Forecast includes projects in queue as well as a top-down approach in which the growth rate doubles in 2019 and then remains constant

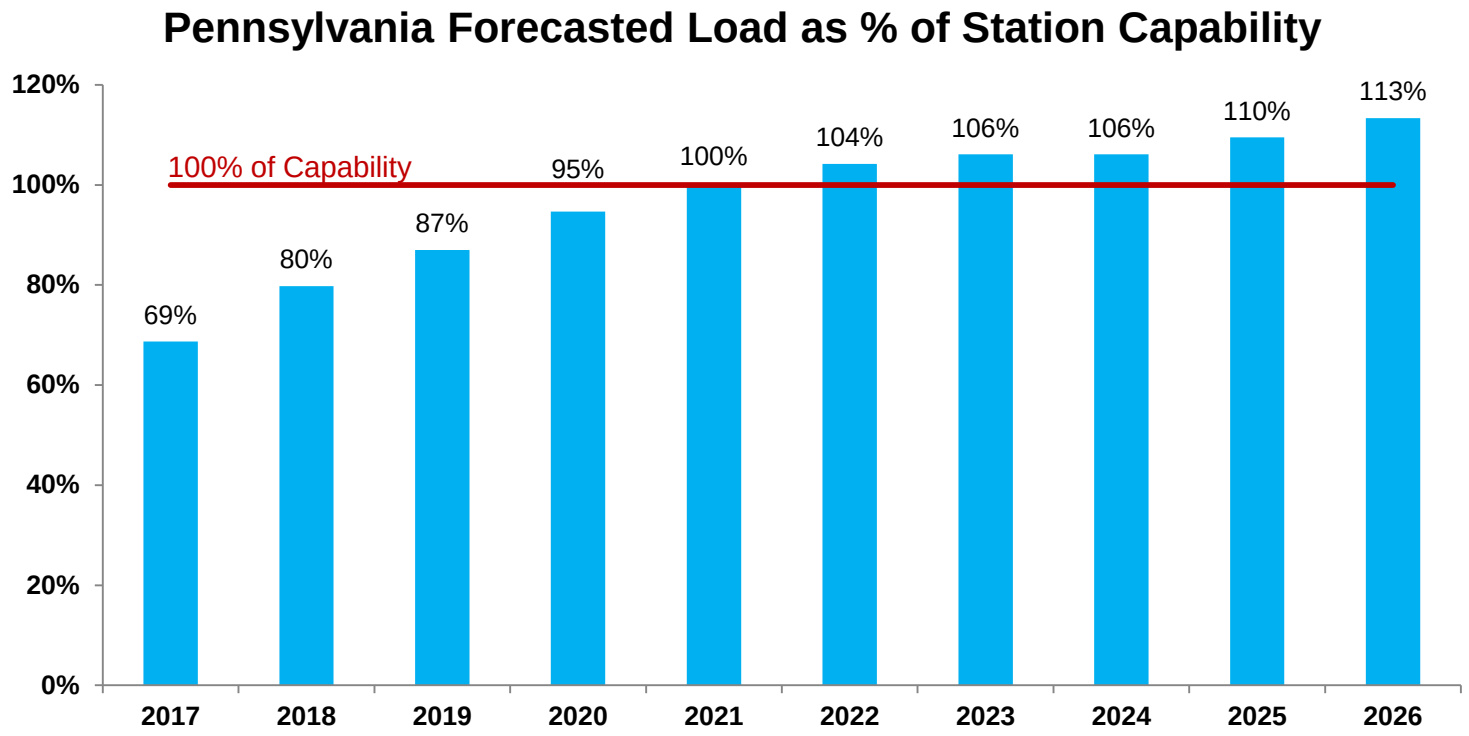
Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Battery (MW)	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4

- (-) Distributed Generation (DG)
  - Forecast includes projects in queue for the first few years and then uses top-down approach based on industry growth rates
  - Load considered is dependent on equipment size and redundancy in area substation design
  - A large DG project in the Pennsylvania network is accounted for in 2019

Pennsylvania	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
DG (MW)	1.7	1.7	13.7	13.7	14.2	15.1	15.6	16.7	17.2	18.3

Note: All values incremental in 2017 and then cumulative

Final Peak Demand Forecast vs. Capability

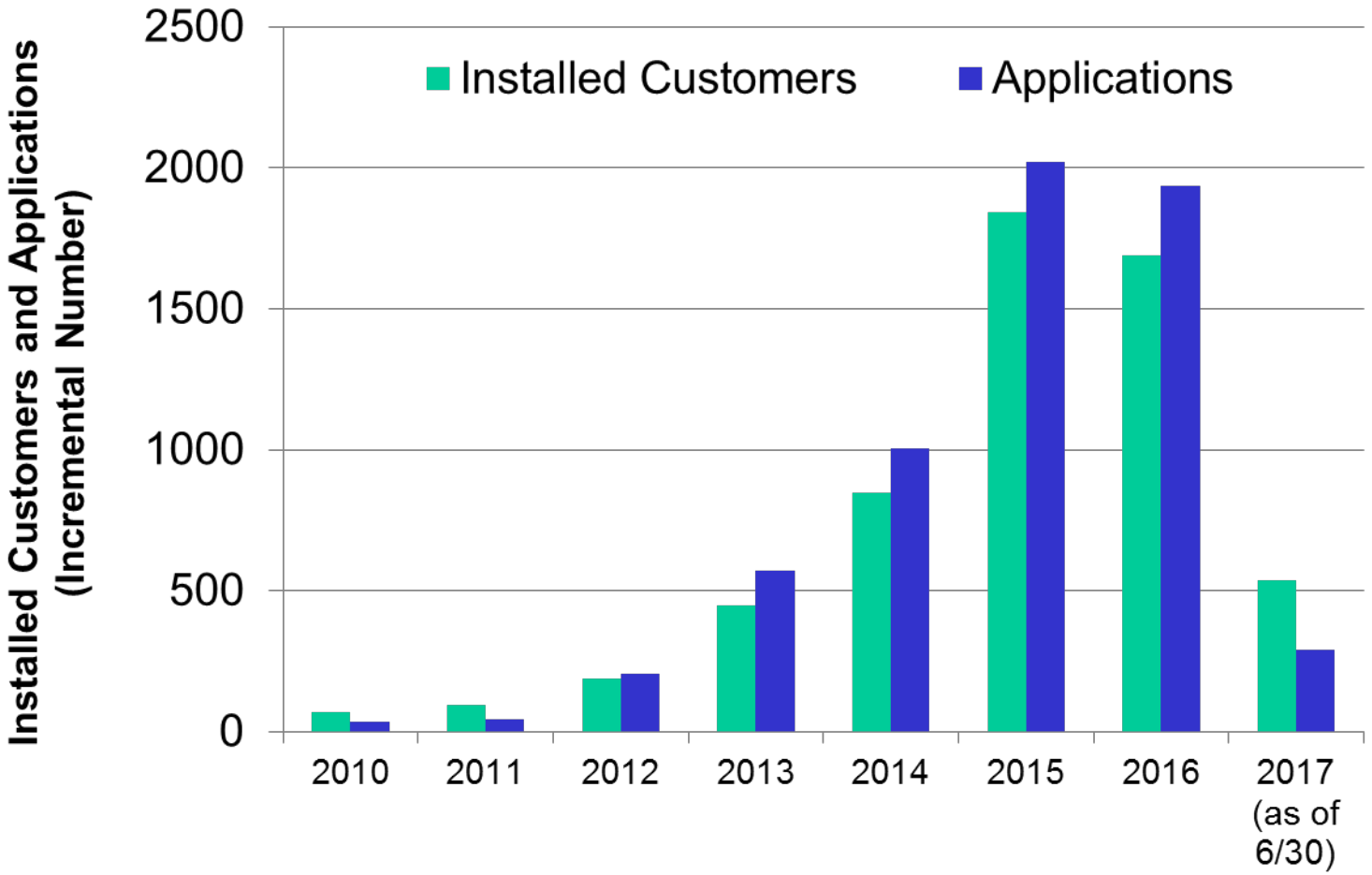


- The 10-Year summer independent electric network and radial forecast is issued in mid-October
- Distribution Planning uses the forecast as an input to the Load Relief Plan
  - Relief needs for each substation are evaluated by comparing the forecast to the station's capability

Orange and Rockland Case Study

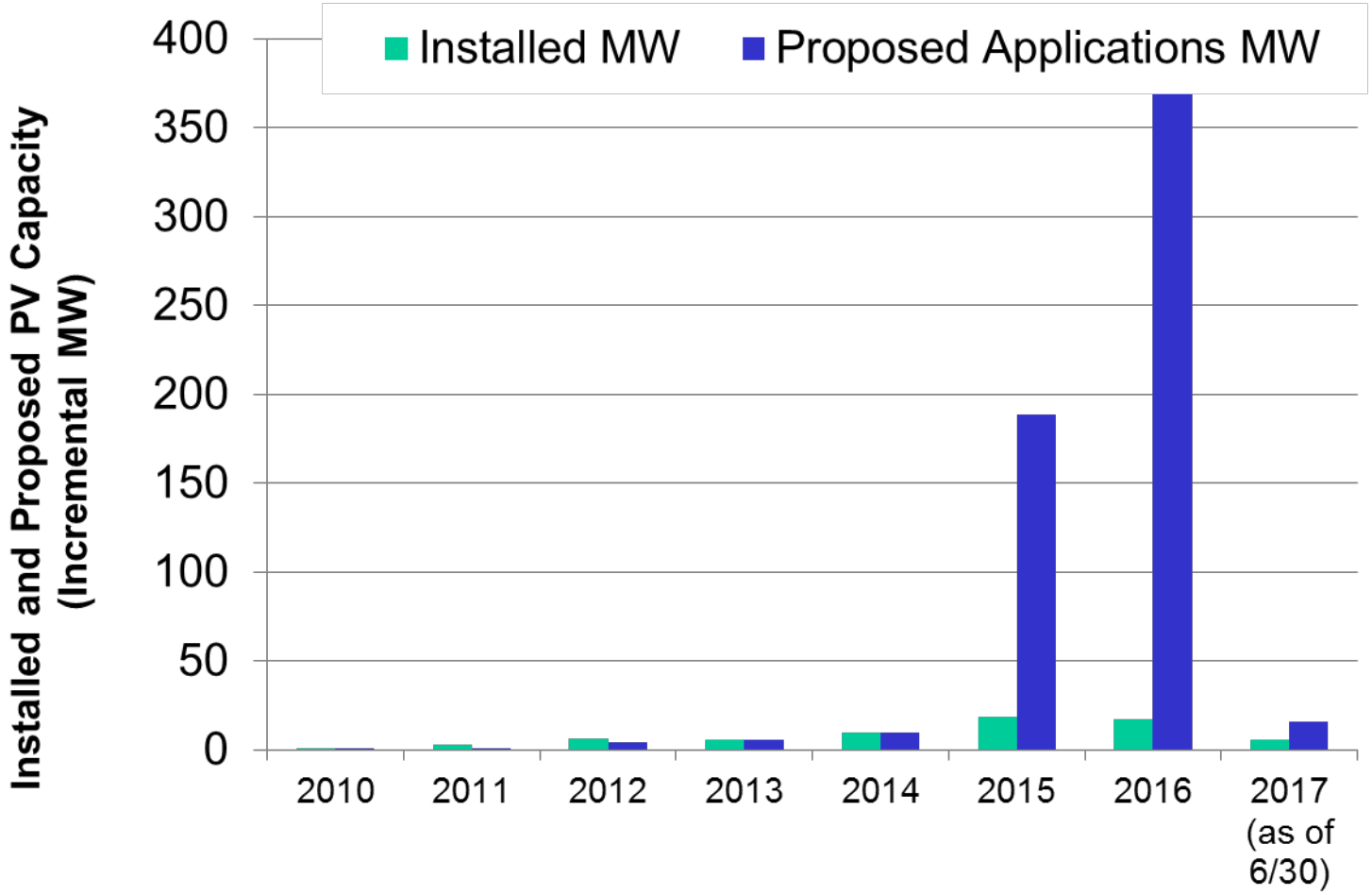
O&R Interconnection History

Installed PV Customers and Applications (Incremental #)



O&R Interconnection History

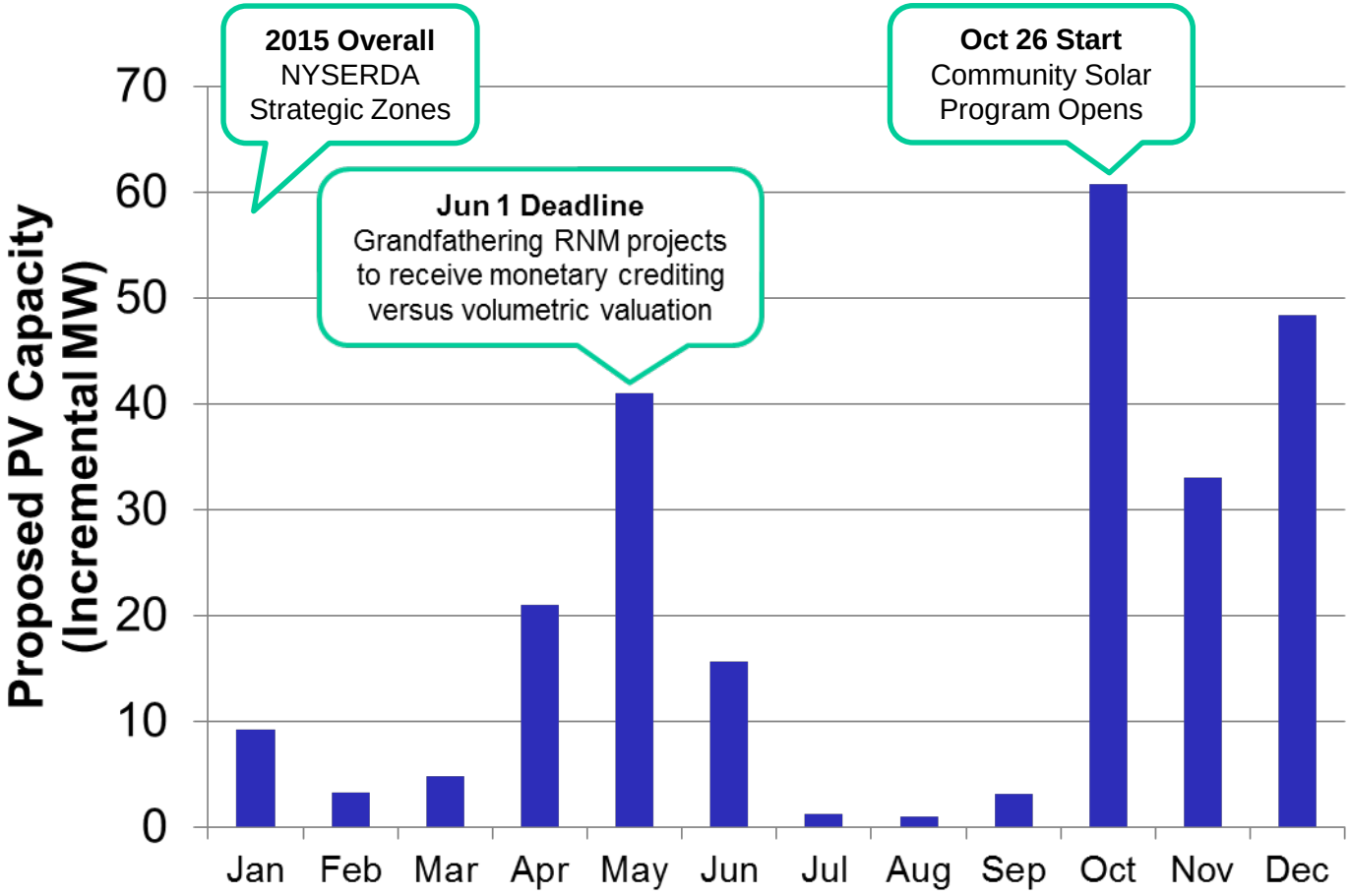
Installed and Proposed PV Capacity (Incremental MW)



O&R Interconnection History

Proposed PV Capacity (Incremental MW)

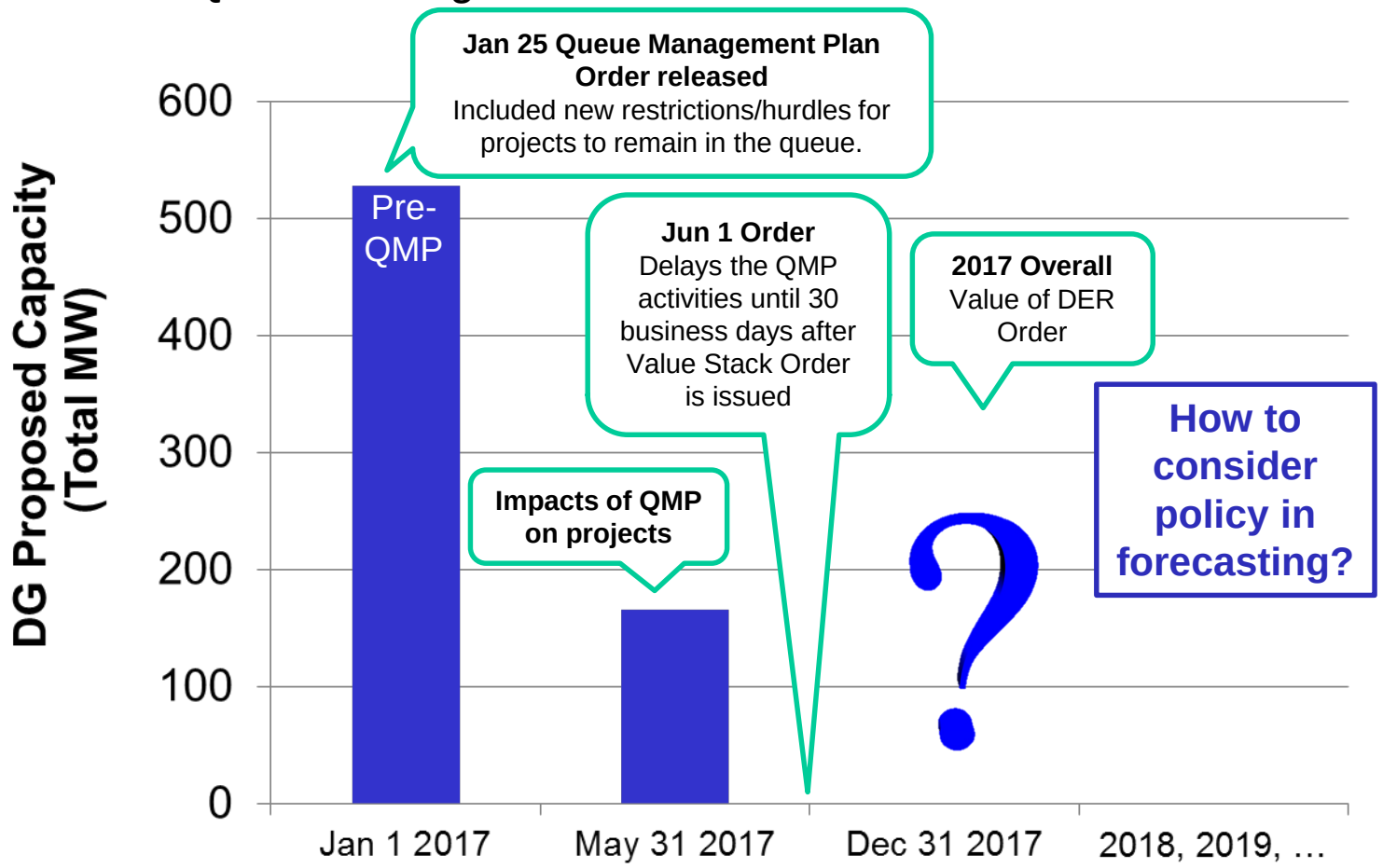
Effect of 2015 RNM and CDG Policies



O&R Interconnection History

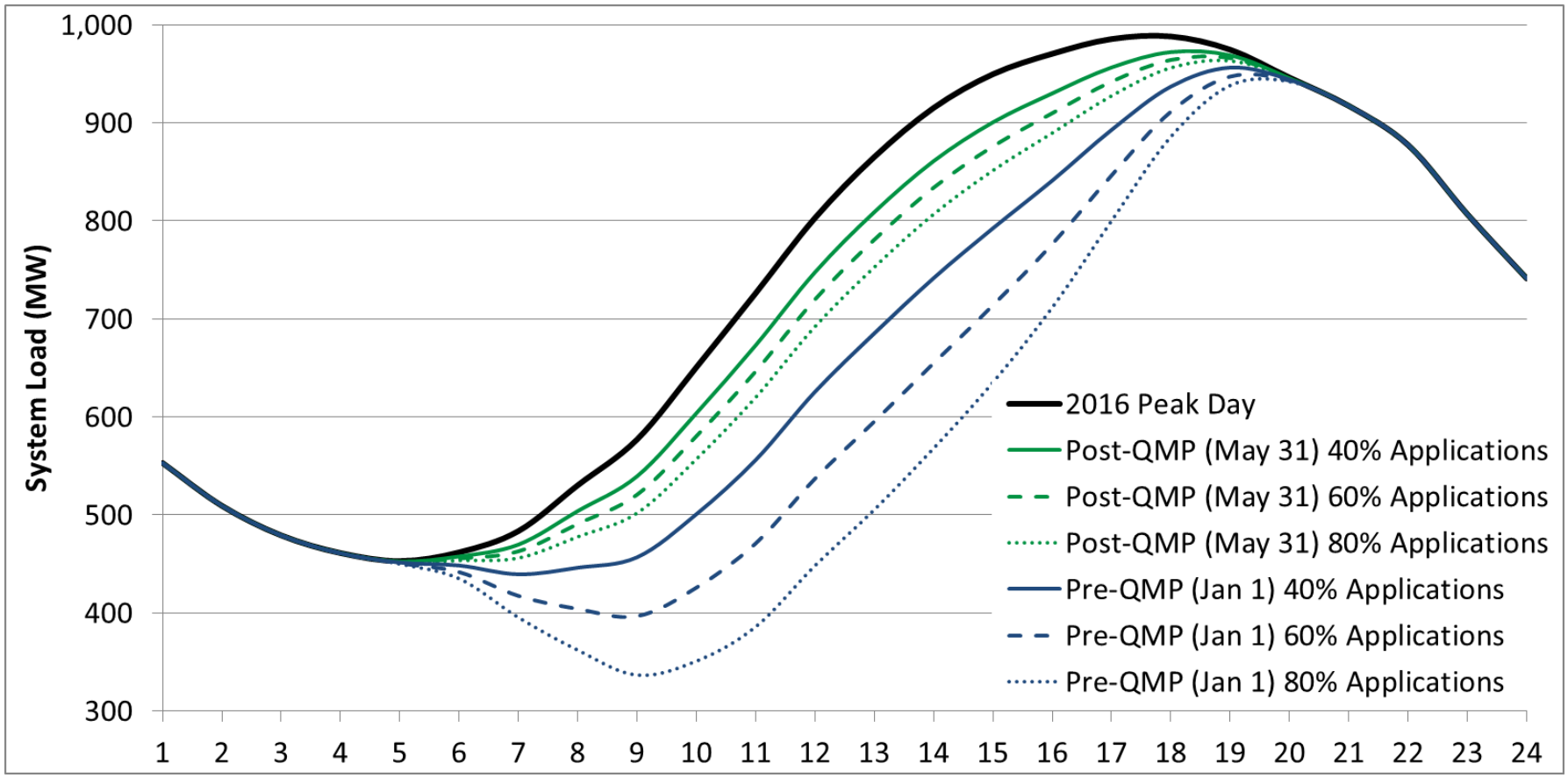
2017 DG Proposed Capacity (Total MW)

Effect of 2017 Queue Management Plan and Value of DER



DER Uncertainty in Forecasting

Proposed PV Effect on a Summer Peak Day

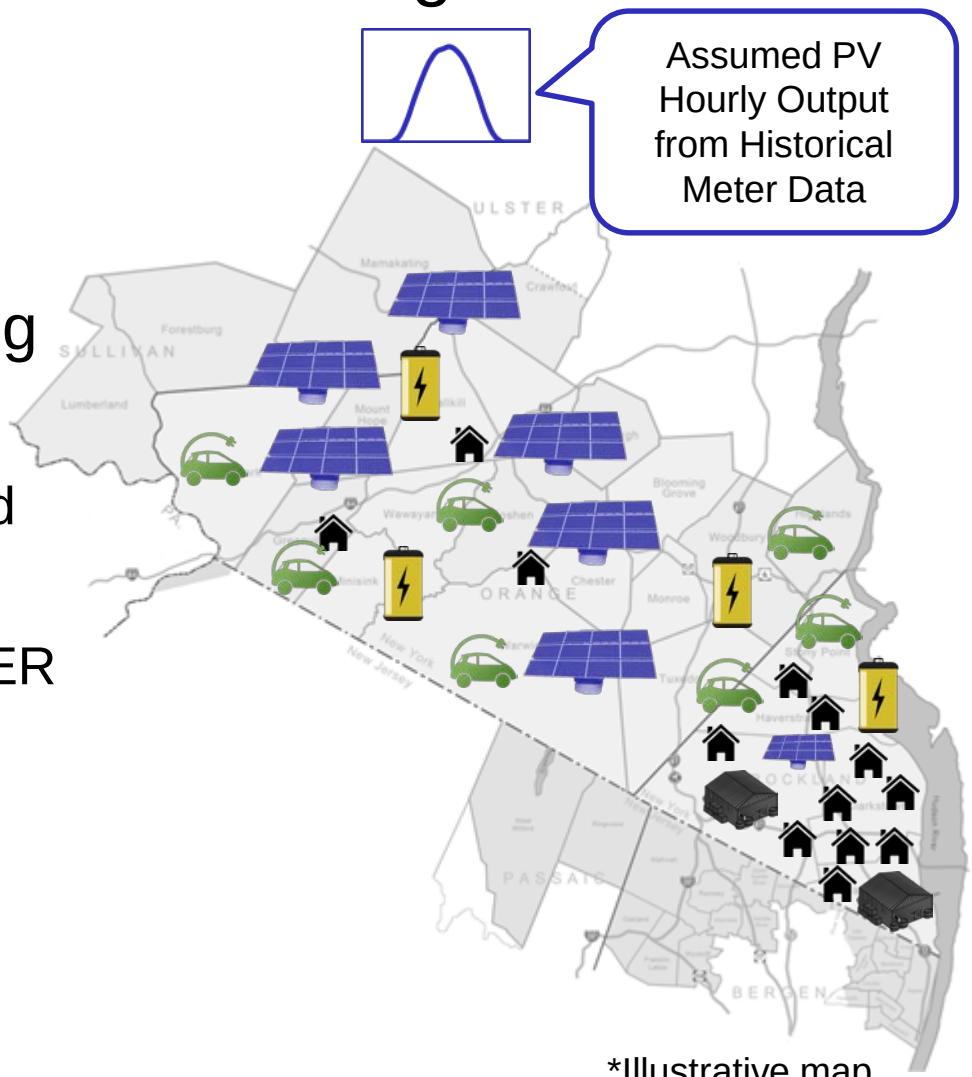


Note: Illustrative example of proposed application MW from Slide 6

DER Uncertainty in Forecasting
Local Area Needs

Forecasting drives all planning analysis

- Requires local levels of study and coordination
- Integration of high penetration DER adds substantial complexity
  - Technology Type
  - Timing
  - State Policies



*Illustrative map

Summary

Distribution Planning is complex & requires high degree of granular coordination to ensure cost effective solutions are deployed while planning for the future

- DER uncertainty in forecasting
  - % of queue applications that become operational assets
  - Calibrating hourly coincident factor for energy – by service territory and technology
- Utility forecasting use case is reliable electric service
  - Utility responsible for electric service and SAIDI/SAIFI/CAIDI requirements
  - Risk mitigation actions: outage exposure, mobile transformer, reconfiguring electric infrastructure
  - Granular forecasting becomes more important to drive needs/solutions at local level, but also much more difficult and complex
- JU welcome stakeholder input to inform forecasting process for evolving forecasting methodology and assumptions

Summary of Stakeholder Input from EG Session

STAKEHOLDER INPUTS AND ENGAGEMENT GROUP DECISION

Stakeholder Input	Discussion Points	Next Steps
Stakeholders requested JU to explore and consider probabilistic planning methods	• Stakeholders suggested probabilistic planning methods as way to address the uncertainty and to evaluate a broader set of possible outcomes • Stakeholders stated that opportunities to utilize NWA solutions for small and large projects could be better assessed by using probabilistic methods • Stakeholders commented that utilizing probabilistic planning would yield benefits to the forecasting process and capital planning, beyond the assessment of NWA opportunities. • Stakeholders presented frameworks to depict cost-effective decision-making while addressing system changes such as adding PV, weather impacts, etc., in a granular manner using probabilistic approaches • Stakeholders mentioned that probabilistic planning is utilized widely in multiple industries/sectors with considerable success in assessing risks that are comparable to the electric industry.	**Closed** – Feedback solicited from stakeholders on the application of probabilistic methods. Stakeholders are invited to provide further comments in writing

STAKEHOLDER INPUTS AND ENGAGEMENT GROUP DECISION

Stakeholder Input	Discussion Points	Next Steps
Stakeholders requested JU to explore and consider probabilistic planning methods	• Stakeholders acknowledged the complexity in probabilistic planning but stated that increased uncertainty in forecasting arising from growth of DERs, warranted exploring probabilistic planning approaches for forecasting • Stakeholders commented on utilizing use-cases to investigate benefit and costs of utilizing probabilistic planning for assessing load and DER forecasts. • JU requested stakeholders to specify data that utility could provide to help inform use-cases on probabilistic planning	**Closed** – Feedback solicited from stakeholders on the application of probabilistic methods. Stakeholders are invited to provide further comments in writing

STAKEHOLDER INPUTS AND ENGAGEMENT GROUP DECISION

Stakeholder Input	Discussion Points	Next Steps

Stakeholders provided inputs on forecasting use-cases	• Stakeholder suggested multiple use-cases focused on the forecasting process evolution:
	  • Use-case to assess benefits and costs of utilizing probabilistic planning for load and DER forecasting and identifying DER's that can alleviate load
	  • Use-case on the process of identifying grid investments on improving system capabilities to accommodate growth of DERs
	  • Use-case to identify DERs through NWA procurement to defer T&D investments
	  • Use-case to identify regions with large amounts of hosting capacity to accommodate DERs
	  • Assessing forecasts and cost-curves to identify the DER penetration level, which would yield the most benefits under the BCA framework.
		Closed – Feedback solicited from stakeholders on use cases and planning process. Stakeholders are invited to provide further comments in writing

STAKEHOLDER INPUTS AND ENGAGEMENT GROUP DECISION

Stakeholder Input	Discussion Points	Next Steps

Stakeholder Inputs with relevance to other JU working groups	• JU informed stakeholders that aspects discussed during the engagement session, which had touchpoints with other working groups would be conveyed to the respective working groups.
	• Aspects relevant to DER Sourcing:
	  • Non-wire alternatives procurement and screening criteria
	  • NWA performance assessment
	• Aspects relevant to System Data:
	  • Communication on granularity of forecast data for probabilistic planning,
	  • Third-party and market data
	  • Timeline and Periodicity of data availability
	  • 8760 forecast data requirement for stakeholders
	• Aspects relevant to Hosting Capacity:
	  • Use-case related to identifying regions that could accommodate DERs
		Closed – The inputs provided by stakeholders have been communicated to the team leads for in the relevant group and will be used to inform further stakeholder engagement by those groups.

STAKEHOLDER INPUTS AND ENGAGEMENT GROUP DECISION

Stakeholder Input	Discussion Points	Next Steps
Stakeholders requested JU to ensure customer interests are not compromised	• Participants articulated concern about discussions related to the development of forecasting capabilities and suggested use cases that could incentivize DER deployment and impact the utility customer rates • Participants requested JU to explore use-cases, forecasting approaches that accrue DER benefits to customers, commensurate with the costs incurred by them. • JU requested stakeholders to specify necessary data which would aid JU in data management and reduce unnecessary costs to customers	**Closed** – Feedback solicited from stakeholders on the evolution of forecasting tools and methods. Stakeholders are invited to provide further comments in writing.
Stakeholders suggested exploring collaboration with academia	• Explore collaboration with academic institutions to address longer term research questions related to probabilistic approaches and DER supply curves	**Open** – Utilities will consider these study concepts as future R&D opportunities become available

Next Steps

- The Joint Utilities thank participants for joining the stakeholder engagement session on Long Term Load and DER forecasting, today, 7/14
- The Joint Utilities invites all stakeholders to provide written comments on the forecasting process
- The Joint Utilities will coordinate with stakeholders for participation in the Stakeholder Conference on November 30th, 2017.

More Information can be found online: http://jointutilitiesofny.org/

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