

# Alternative Methods for Determining LCRs: Final Market Design

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**Management Committee**

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# Agenda

- **2017 Project**
- **Final Market Design**
  - Design Objective
  - Methodology
  - Timeline
- **Tariff**
- **Questions**
- **Propose for vote**
- **Appendix**

# 2017 & 2018 Project Presentations

# 2017 & 2018 Presentations

Date	Discussion points and links to materials
2-15-17	<a href="#"><u>Recap of 2016 Effort, 2017 Plan, and Current Status</u></a>
4-04-17	<a href="#"><u>2017 Commitment and Base Case</u></a>
5-11-17	<a href="#"><u>Proof of Concept and Refining Methodology</u></a>
6-01-17	<a href="#"><u>Sensitivities and Cost Curves</u></a>
6-29-17	<a href="#"><u>Sensitivity Results and Refining Methodology</u></a>
7-25-17	<a href="#"><u>Refining Methodology</u></a>
8-22-17	<a href="#"><u>Refining Methodology and Transmission Security</u></a>
9-28-17	<a href="#"><u>Transmission Security, Results, and Timeline</u></a>
10-30-17	<a href="#"><u>Transmission Security and Results</u></a>
11-15-17	<a href="#"><u>Final Market Design</u></a>
1-10-18	<a href="#"><u>Uncollared Net CONE Recommendation</u></a>
1-25-18	<a href="#"><u>2018 Results for Collared and Uncollared Net CONE</u></a>
2-06-18	<a href="#"><u>2017 &amp; 2018 Base Case Discussion</u></a>

# Final Market Design

# Design Objective

# Market Design Statement

Develop a robust, transparent, and intuitive (predictive) process for developing proper capacity requirements that maintain reliability while producing a lower cost solution

# Methodology



# Optimization Methodology

- Determine LCRs for the Localities that minimize total cost of capacity at the level of excess (LOE) condition while maintaining the reliability criterion (LOLE  $\leq$  0.1 days/year), the NYSRC approved IRM, and not exceeding transmission security limits (TSL)
- Cost defined by uncollared Unit Net CONE used to develop each ICAP Demand Curve

# MARS Modeling Assumptions

- Utilize the same process as currently used to develop the final LCR base case
  - Update the NYSRC approved final IRM topology to account for the updated load forecast and any material capability changes
- Optimize with the appropriate NYSRC final approved IRM

# NYSRC

- Presented to the NYSRC ICS throughout 2017 to provide information and discuss the methodology and progression of this project
- The proposed methodology will enable the NYISO to meet its compliance obligations under the NYSRC rules

# Cost of Capacity

- Based upon ICAP Demand Curve peaking plant net cost of new entry (“DC unit net CONE”) of capacity within each Locality and the NYCA
- Based upon the FERC accepted Demand Curve parameters
- Elasticity is represented by expressing the DC unit net CONE of each Locality and NYCA as a function of the minimum installed capacity requirement

# Transmission Security Methodology

- N-1-1 analysis is conducted to determine the transmission security import limits into each Locality
- These import limits are used to determine the minimum available capacity required for each Locality
- To translate this minimum available capacity into a market requirement the methodology needs to account for capacity unavailability
- To account for capacity unavailability, the 5-year zonal EFORd is used to calculate minimum locational capacity requirements

# Example Calculation

Transmission Security Requirements	Formula	Zone X
Load Forecast (MW)	[A] = Given	12,000
Transmission Security Import Limit (MW)	[B] = Given	1,500
Transmission Security UCAP Requirement (MW)	[C] = [A]-[B]	10,500
Transmission Security UCAP Requirement (%)	[D] = [C]/[A]	87.5%
5 Year EFORd (%)	[E] = Given	8.0%
Transmission Security ICAP Requirement (MW)	[F] = [C]/(1-[E])	11,413
Transmission Security LCR Floor (%)	[G] = [F]/[A]	95.1%

# Timeline

# LCR Setting Timeline

- No alterations to the current timeline are needed to accommodate the alternative methodology for determining LCRs
- Transmission security analysis used in the alternative methodology will be conducted and the results will be posted to the NYISO's website



# Tariff

# Tariff Revisions

- Revisions to
  - MST 5.11
- Incremental revisions based on stakeholder input at the February 6, 2018 ICAP Working Group/MIWG meeting have been incorporated in the proposed tariff revisions

# Questions?

# The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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# Appendix

# Market Guiding Principles

**Efficient allocation  
of capacity**

- Maintains reliability
- Cost effective
- Proper investment incentives

**Transparent and  
predictable**

- Simple, stable, robust
- Predictable

# Methodology

# Minimize:

*Total Cost of Capacity*

$$\begin{aligned} &= \left[ \sum_X (Q_X + LOE_X) \cdot P_X (Q_X + LOE_X) \right] \\ &+ \left[ \sum_Y (Q_Y + LOE_Y) \cdot P_Y \left( Q_Y + LOE_Y + \sum_Z Q_Z + LOE_Z \right) \right] \\ &+ \left[ \left( Q_{NYCA} + LOE_{NYCA} - \left( \sum_X (Q_X + LOE_X) + \sum_Y (Q_Y + LOE_Y) \right) \right) \right. \\ &\quad \left. \cdot P_{NYCA} (Q_{NYCA} + LOE_{NYCA}) \right] \end{aligned}$$



$P$  = Price (*i.e.*, Unit Net CONE curves)

$Q$  = Quantity at 100% requirement (MW)

$LOE$  = Quantity associated with Level of Excess (MW)

$X$  = Single Load Zone that is a Locality (*i.e.*, Zone J and Zone K)

$Y$  = Locality minus any Single Load Zone Locality located within it (*i.e.*, GHI)

$Z$  = Single Locality located within a larger Locality (*i.e.*, Zone J)

$NYCA$  = New York Control Area

# Subject to:

$LOLE \leq 0.1 \text{ days/year}$

$LCR_J \geq TSL_J$

$LCR_K \geq TSL_K$

$LCR_{G-J} \geq TSL_{G-J}$

$IRM = \text{NYSRC Approved IRM (i.e., 18\%)}$

# Computational Method: Linear Approximation

- Iterative process between Linear Program wrapper and MARS that approximates the objective function and constraints to find least cost solution
- Currently uses the Constrained Optimization By Linear Approximation (COBYLA) algorithm available through Python's scientific computing package

# Development of DC unit net CONE Curves

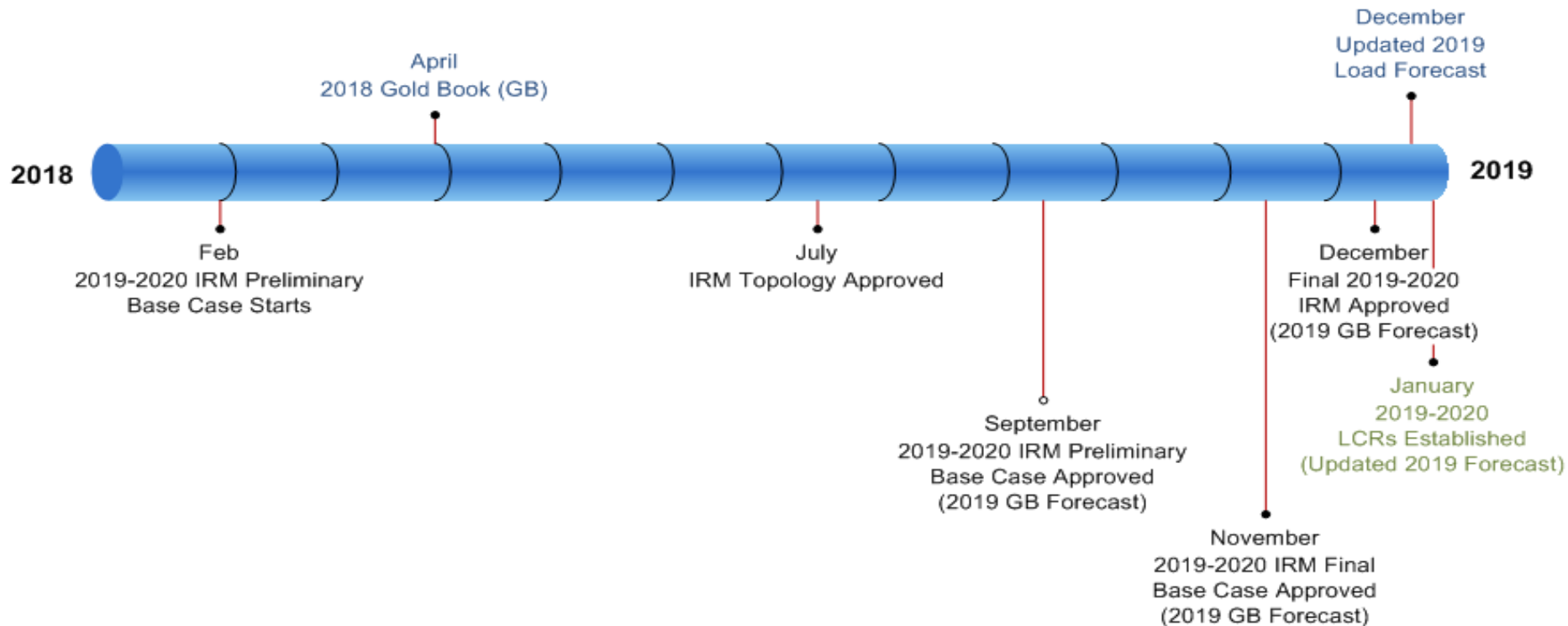
- Evaluate Net EAS at different levels of installed capacity using data from the most recent of either the Capability Year after a quadrennial Demand Curve Reset or the annual update
  - In developing the proposal, Net EAS for each Locality was evaluated at +6%, +3%, 2016 requirement, -3%, and -6% of the installed capacity requirement
- Results are used to develop a Net EAS curve
- The Net EAS at each point on the curve is used to calculate a corresponding uncollared Net CONE
- Net CONE values are used to develop a uncollared DC unit net CONE curve for each Locality and NYCA

# N-1-1 Transmission Security Limit (TSL) Analysis

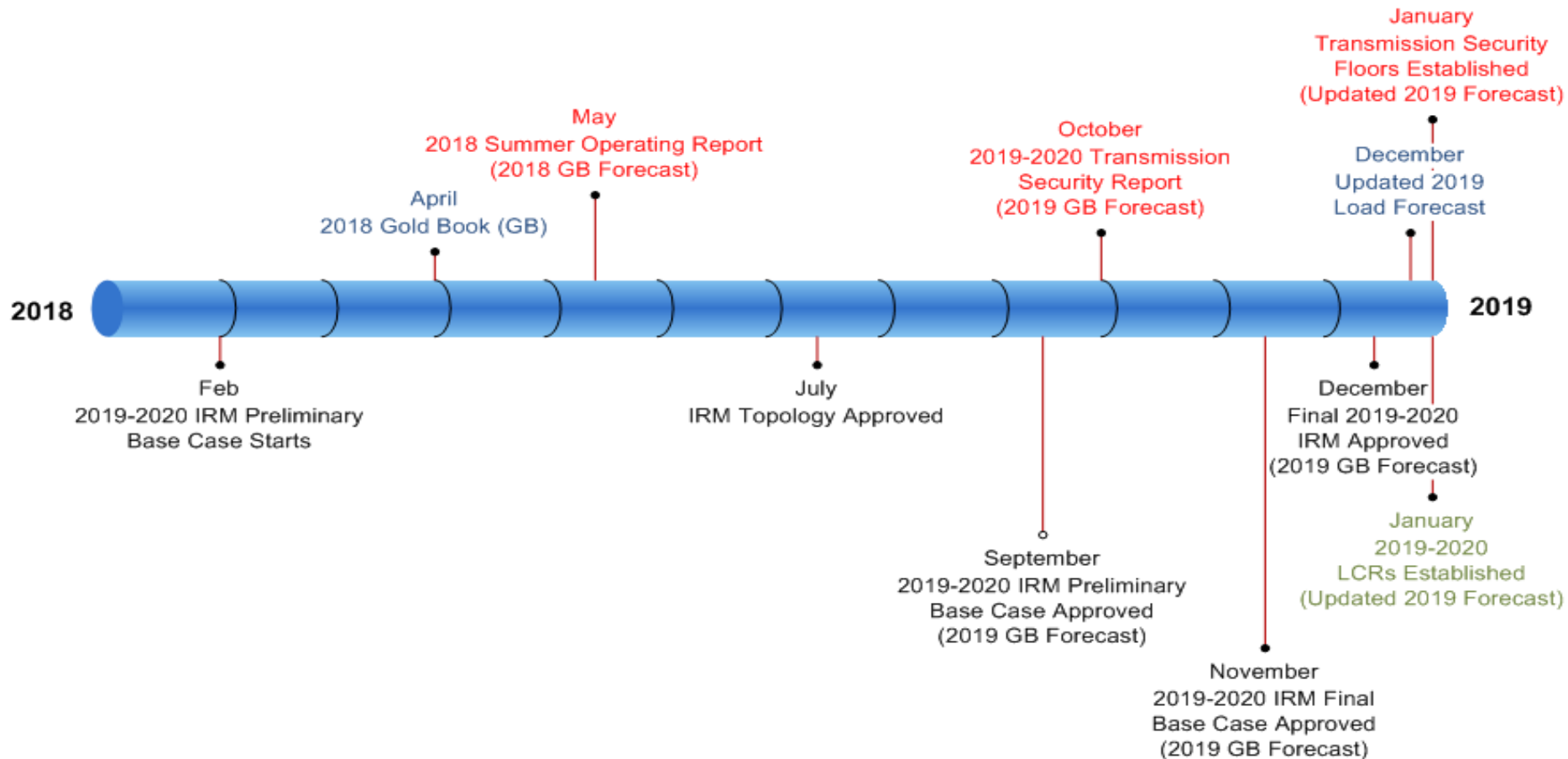
- Analyzes the N-1-1 thermal transfer limits for the NYCA interfaces associated with the G-J, Zone J, and Zone K Localities
- Use an updated Summer Operating base case
  - Inclusion of transmission and generation facility additions and retirements
  - All system elements modeled as in service
  - Appropriate load forecast
- Report with N-1-1 import limits will be posted in October each year
- Final TSLs for the optimization will be established and posted in January each year

# Timeline

# Current Timeline



# Timeline Additions





# Next Steps

# 2018 Project Plan

## ■ Project Plan:

- Seek approval and file tariff revisions with FERC
- Update documentation, procedures, and processes
- Internal training
- Development of production software
- User acceptance testing of production software
- Deployment of production software

# 2018 Required Resources

## ■ Resources:

- GE Energy Consulting
- ICAP Market Design
- Resource Adequacy
- ICAP Market Operations
- Operations Engineering
- Legal

# 2018 Project Milestones

- February 14: Business Issues Committee
- February 28: Management Committee
- March 20: Board of Directors
- March 30: File Section 205 with FERC
- April: Updating documentation, procedures, processes
- June: FERC action
- June 29: Production Version Complete
- July: User Acceptance Testing
- September: Production Deployment