Alternative Methods for Determining LCRs

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Agenda

- **Transmission Security**
  - N-1-1 Assumptions
  - Stability of Import Limits
  - Timeline of Assumptions
  - Final Results
- **Sensitivity Results**
  - Multiple Changes in Generation
  - Changes in Transmission
  - Net CONE
- **Next Steps**
- **Questions**

Transmission Security Limits (TSL)

Overview of Preliminary Analysis

- Analyzed the N-1-1 thermal transfer limits for the NYCA interfaces associated with the G-J, Zone J, and Zone K Localities
- Used the final Summer 2017 Operating base case
  - Rebuilt case to conduct the N-1-1 analysis

Transmission Security Methodology

- N-1-1 analysis was conducted to determine the transmission security import limits into each Locality
- These import limits were 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 was 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%**

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N-1-1 Analysis Assumptions

N-1-1 Base Case

- Updated Summer 2017 Operating base case
  - Inclusion of transmission and generation facility additions and retirements
- All system elements modeled as in service
- All generation represented

Boundary Assumptions

- **The analysis calculates the N-1-1 transmission security import limits using the NYCA bulk power transmission facilities (BPTF) into each Locality**
  - Zone J: Dunwoodie South interface
  - Zone K: ConEd-LIPA interface
  - G-J: UPNY-SENY interface
- **The external transmission facilities are not incorporated in the analysis since**
  - Facilities without UDRs cannot meet the Locality capacity requirements
  - Facilities with UDRs are treated as supply side resources

Boundary Assumptions

- The import capability from Zone K was included within the Dunwoodie South definition as a result of a contractual agreement
- It was not included in the UPNY-SENY definition since the contractual agreement results in a net zero effect

UPNY-SENY

Name	Line ID	Voltage (kV)
Mohawk (Zone E) – Hudson Valley (Zone G)		
Coopers Corners-Middletown*	CCRT34	345
Coopers Corners-Dolson Ave*	CCDA42	345
West Woodbourne 115/69	T152	115/69
Capital (Zone F) – Hudson Valley (Zone G)		
Athens-Pleasant Valley*	91	345
Leeds-Pleasant Valley*	92	345
*Leeds-Hurley Ave.	301	345
Hudson-Pleasant Valley*	12	115
Blue Stores E-Pleasant Valley*	13-987	115
Blue Stores W-Pleasant Valley*	8	115
*Feura Bush-North Catskill	2	115

* Indicates the metered end of the circuit

Dunwoodie South

Name	Line ID	Voltage (kV)
Dunwoodie (Zone I) – NYC (Zone J)		
*Dunwoodie-Mott Haven	71	345
*Dunwoodie-Mott Haven	72	345
Sprain Brook-Tremont*	X28	345
*Sprain Brook-West 49th Street	M51	345
*Sprain Brook-West 49th Street	M52	345
*Sprain Brook-Academy	M29	345
*Dunwoodie-Sherman Creek	99031	138
*Dunwoodie-Sherman Creek	99032	138
*Dunwoodie-East 179th Street	99153	138
Long Island (Zone K) – NYC (Zone J)		
*Lake Success-Jamaica	903	138
*Valley Stream-Jamaica	901L_M	138

* Indicates the metered end of the circuit

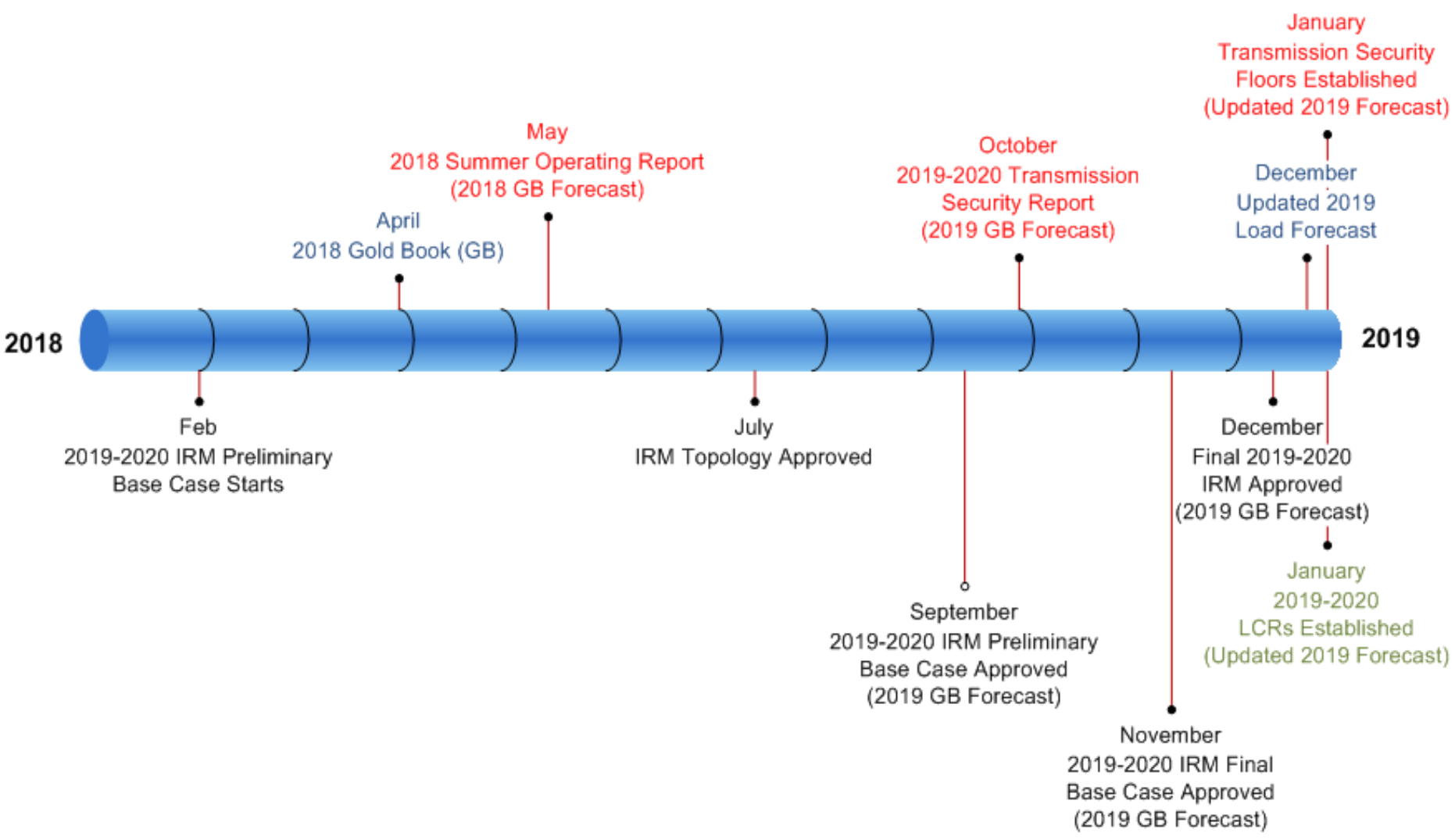
ConEd – LIPA

Name	Line ID	Voltage (kV)
Dunwoodie (Zone I) – Long Island (Zone K)		
*Dunwoodie-Shore Road	Y50	345
*Sprain Brook-East Garden City	Y49	345
NYC (Zone J) – Long Island (Zone K)		
Jamaica-Valley Stream*	901L_M	138
Jamaica-Lake Success*	903	138

* Indicates the metered end of the circuit

Load Forecast

- Summer Operating Report utilizes the Gold Book load forecast for the appropriate year
- The Transmission Security Limit analysis will use an updated load forecast -- the subsequent year's load forecast
  - This will result in a base case that utilizes the same load forecast assumed in the NYSRC IRM study


January
Transmission Security
Floors Established
(Updated 2019 Forecast)
May
2018 Summer Operating Report
(2018 GB Forecast)
October
2019-2020 Transmission
Security Report
(2019 GB Forecast)
December
Updated 2019
Load Forecast
April
2018 Gold Book (GB)
2018
2019
Feb
2019-2020 IRM Preliminary
Base Case Starts
July
IRM Topology Approved
December
Final 2019-2020
IRM Approved
(2019 GB Forecast)
January
2019-2020
LCRs Established
(Updated 2019 Forecast)
September
2019-2020 IRM Preliminary
Base Case Approved
(2019 GB Forecast)
November
2019-2020 IRM Final
Base Case Approved
(2019 GB Forecast)

Example: 2018-2019 TSL Analysis

- **May 2017**
  - 2017 Summer Operating Report base case
    - Utilize the 2017 Gold Book load forecast (produced in April 2017)
- **Sept. 2017**
  - Perform the N-1-1 analysis to determine import capabilities into each Locality
    - Update the load forecast in the base case to be the 2018 Gold Book forecast (this is the same load forecast in NYSRC 2018-2019 IRM study)
    - Update expected generation and transmission changes consistent with NYSRC 2018-2019 IRM study
- **Jan. 2018**
  - Calculate TSLs
    - 2018 load forecast produced in December 2017
    - Import capabilities produced in October 2017
    - 5 year EFORd used in NYSRC 2018-2019 IRM study
  - Establish LCRs using optimization methodology
    - 2018 load forecast produced in December 2017
    - TSLs produced in January 2018

Line Rating Assumptions

- **The G-J Locality and Zone K were calculated assuming Long Term Emergency (LTE) ratings**
  - Consistent with NYISO Normal Operating and planning criteria
- **Zone J was calculated assuming Normal line ratings**
  - Based on NYSRC Local Reliability Rule (G1)

Treatment of UDRs

- UDRs are treated as supply-side resources and at a level consistent with their elections
- UDRs are not considered as part of the import capability when calculating the N-1-1 import limits

Outage and Contingency

- In the N-1-1 analysis
  - 1st
    - Outage of the most limiting single element
  - 2nd
    - Zone K and G-J: NPCC defined contingency
    - Zone J: Outage of the second most limiting single element[1]

[1] Based on NYSRC Local Reliability Rules (*i.e.* G1)

Zone J

Outage Applied		Thermal Transfer
Sprain Brook – W. 49th St. (M51) 345 kV Sprain Brook – W. 49th St. (M52) 345 kV		3200 MW (1)
Limiting Element	**Rating**	**Limiting Contingency**
(1) Dunwoodie – Mott Haven (71) 345 kV	@NORM 785 MVA	Pre-Contingency Loading

Zone K

Outage Applied		Thermal Transfer
Sprain Brook – East Garden City (Y49) 345 kV		350 MW (1)
Limiting Element	**Rating**	**Limiting Contingency**
(1) Dunwoodie – Shore Rd. (Y50) 345 kV	@NORM 687 MVA[2]	Pre-Contingency Loading

[2] LIPA rating for Y50 circuit is based on 70 % loss factor and rapid oil circulation.

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G-J

Outage Applied				Thermal Transfer
Athens – Pleasant Valley (91) 345 kV				3225 MW (1)
Limiting Element	**Rating**			**Limiting Contingency**
(1) Leeds – Pleasant Valley (92) 345 kV	@LTE	1538 MVA	L/O	Leeds – Hurly Ave. (301) 345 kV

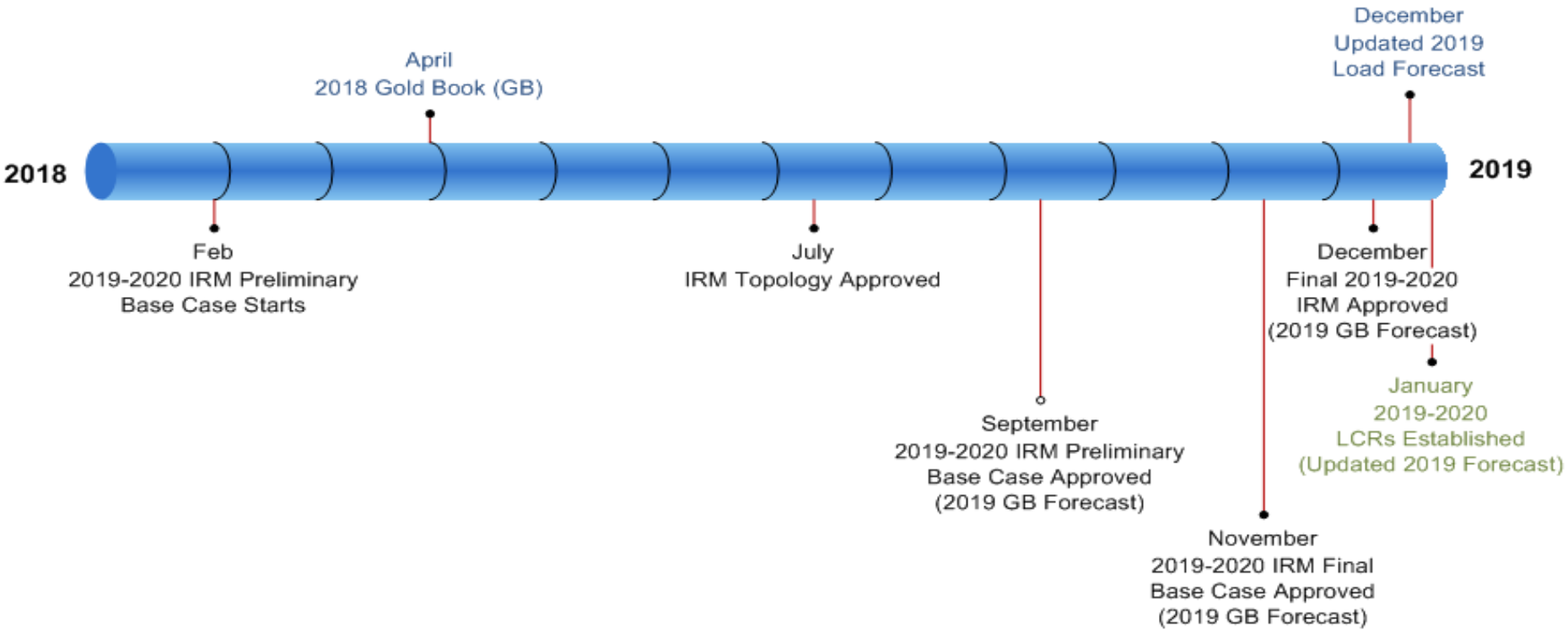
Stability of Transmission Security Limits

Stability with Changes in Generation

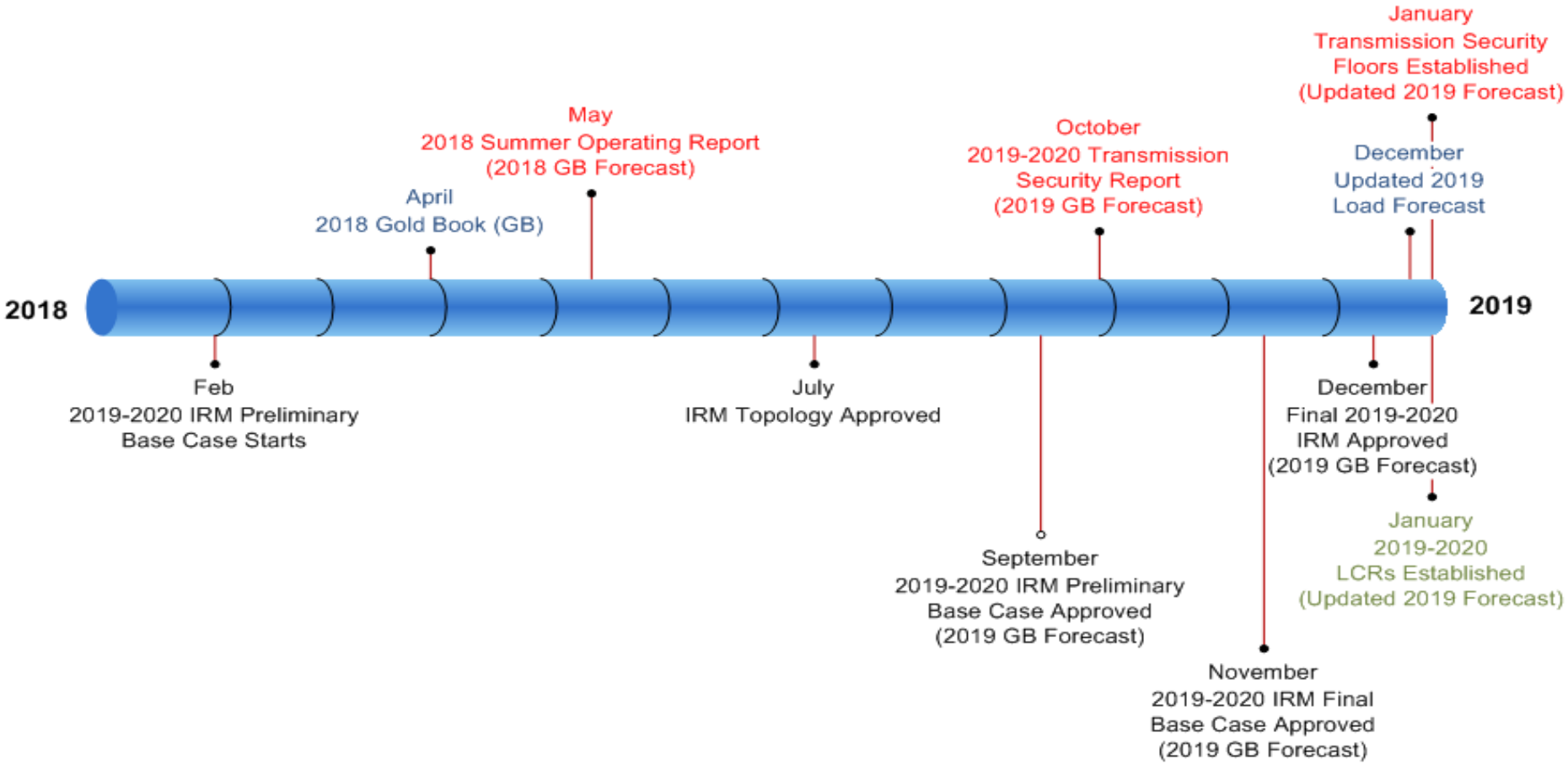
- The N-1-1 import limits used in the Transmission Security Limit (TSL) calculation are primarily impacted by changes in transmission
- Generation does not typically have an impact on the N-1-1 import limits
- Generation that impacts the distribution of flows on the interface facilities can have a impact on the N-1-1 import limits

Timeline of Assumptions

Current Timeline



Timeline Additions



LCR Setting Timeline

- No alterations to the current timeline are needed to accommodate this proposed alternative methodology for determining LCRs
- Transmission security analysis used in the alternative methodology would be conducted and reported prior to October 1st
  - This analysis would utilize an updated base case used in the Summer Operating Report

Final Results

Transmission Security LCR Floors

Transmission Security Requirements	G-J	Zone J	Zone K
Load Forecast (MW)	16,061	11,670	5,427
Transmission Security Import Limit (MW)	3,225	3200	350
Transmission Security UCAP Requirement (MW)	12,836	8,470	5,077
Transmission Security UCAP Requirement (%)	79.92%	72.58%	93.55%
5 Year EFORd (%)	10.50%	9.99%	10.06%
Transmission Security ICAP Requirement (MW)	14,342	9,410	5,645
Transmission Security LCR Floor (%)	**89.30%**	**80.63%**	**104.01%**

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Transmission Security LCR Floors

	Zone J LCR	G-J LCR	Zone KLCR
Transmission Security LCR Floors	**89.30%**	**80.63%**	**104.01%**

- These values are for the 2016-2017 capability year

Sensitivity Results

Multiple Changes in Generation

- +500 MW in Zone G & -500 MW in Zone J
- -500 MW in Zone G & +500 MW in Zone J
- +500 MW in Zone K & -500 MW in Zone J
- -500 MW in Zone K & +500 MW in Zone J

Market Simulations: +/- 500 MW to Zone G and +/-500 MW to Zone J

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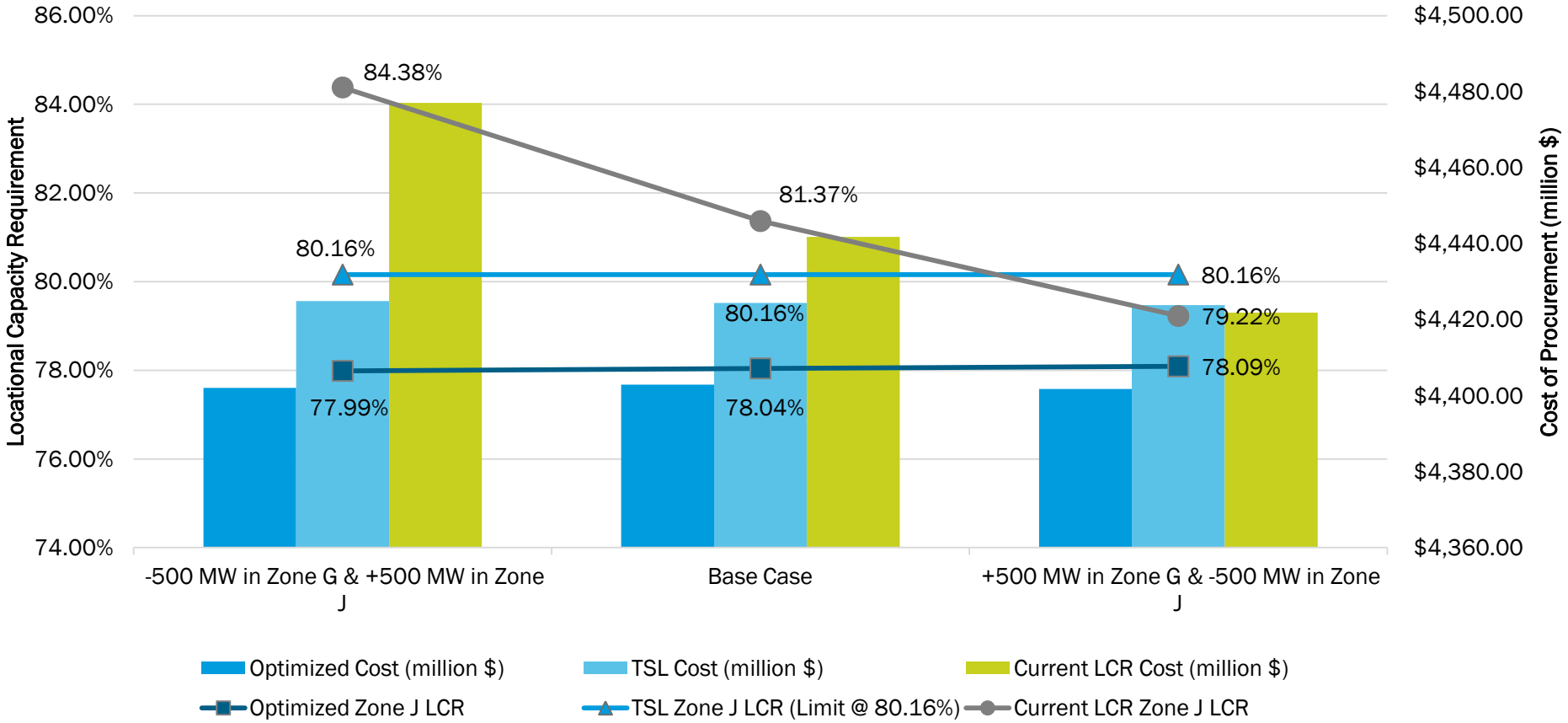
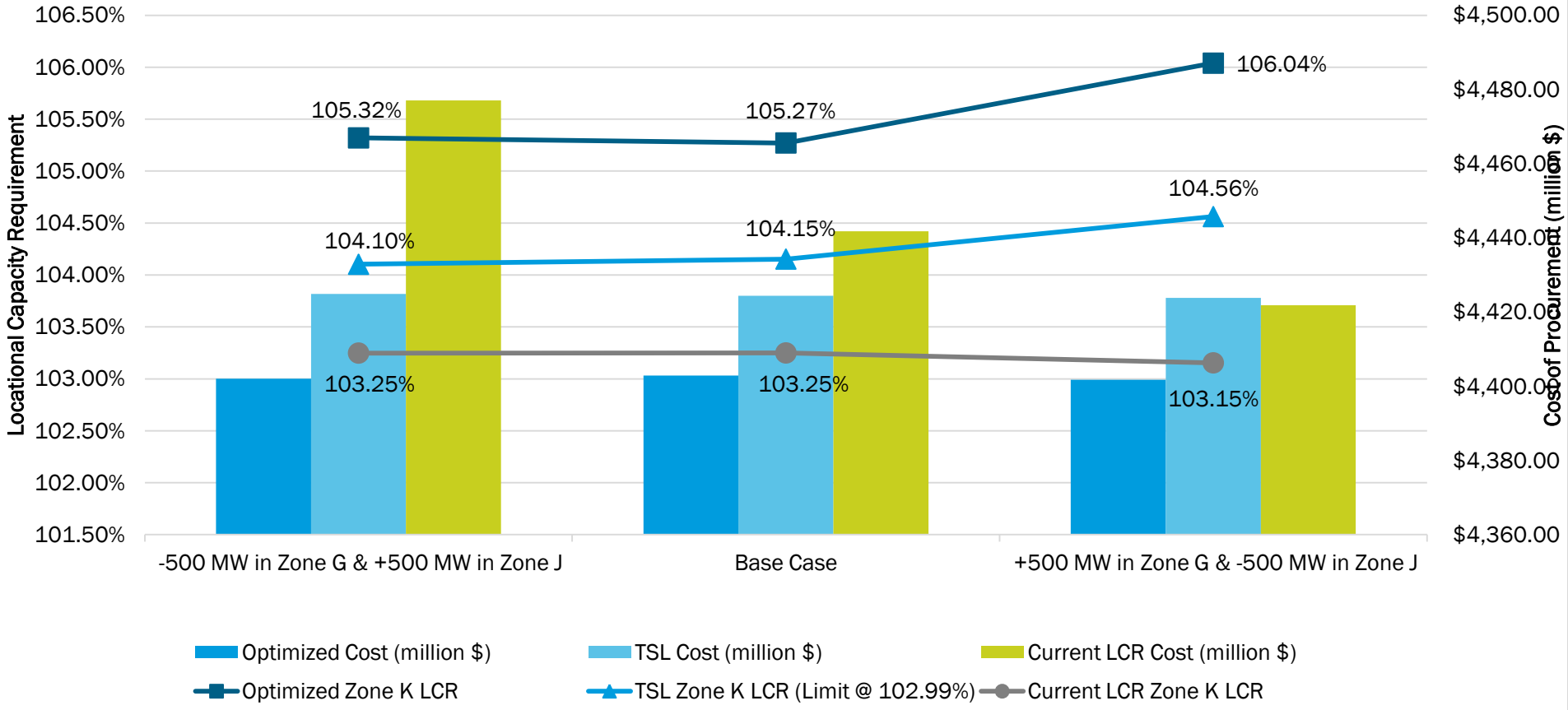
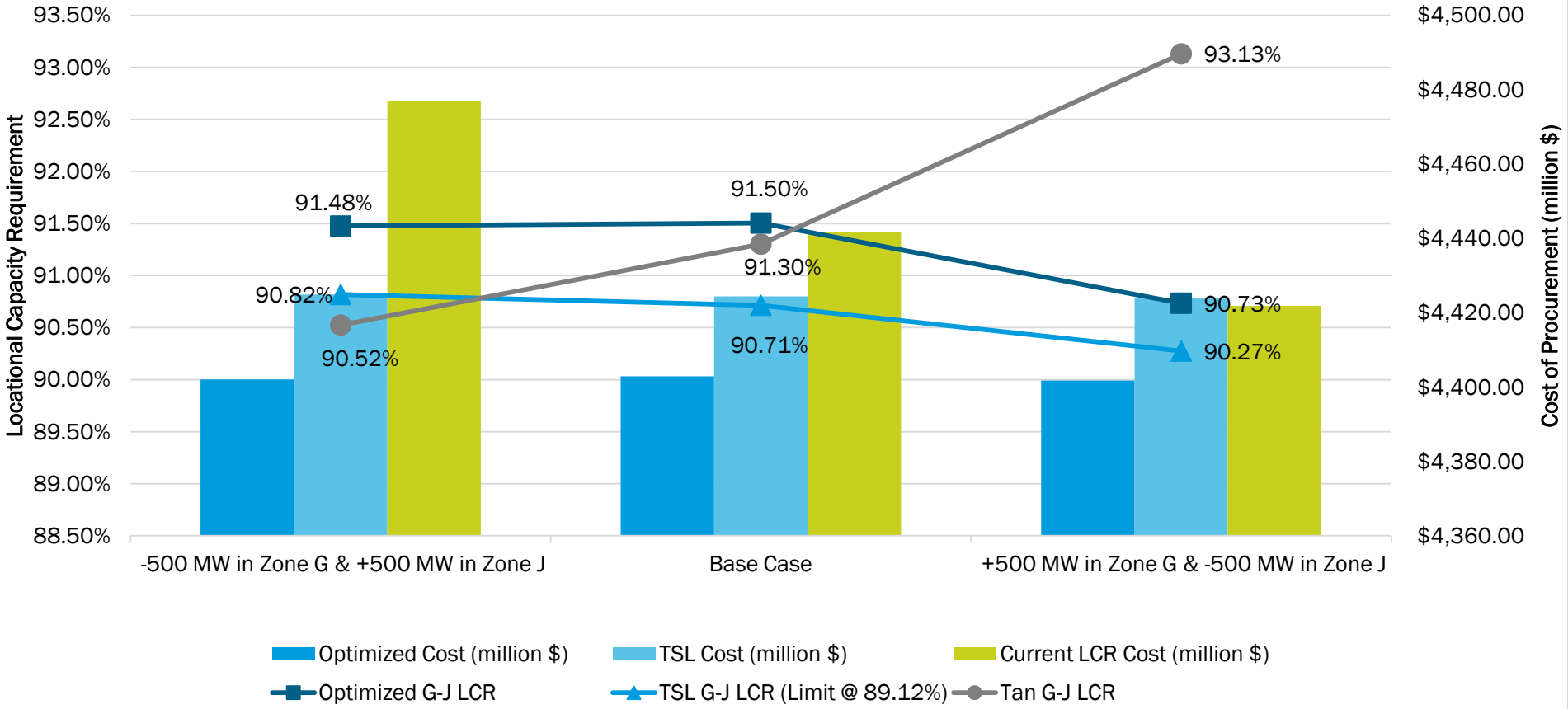
Addition & Removal of Capacity from Zone G & Zone J Zone J LCR



Addition & Removal of Capacity from Zone G & Zone J Zone K LCR



Addition & Removal of Capacity from Zone G & Zone J G-J LCR



Market Simulations: +/- 500 MW to Zone K and +/-500 MW to Zone J

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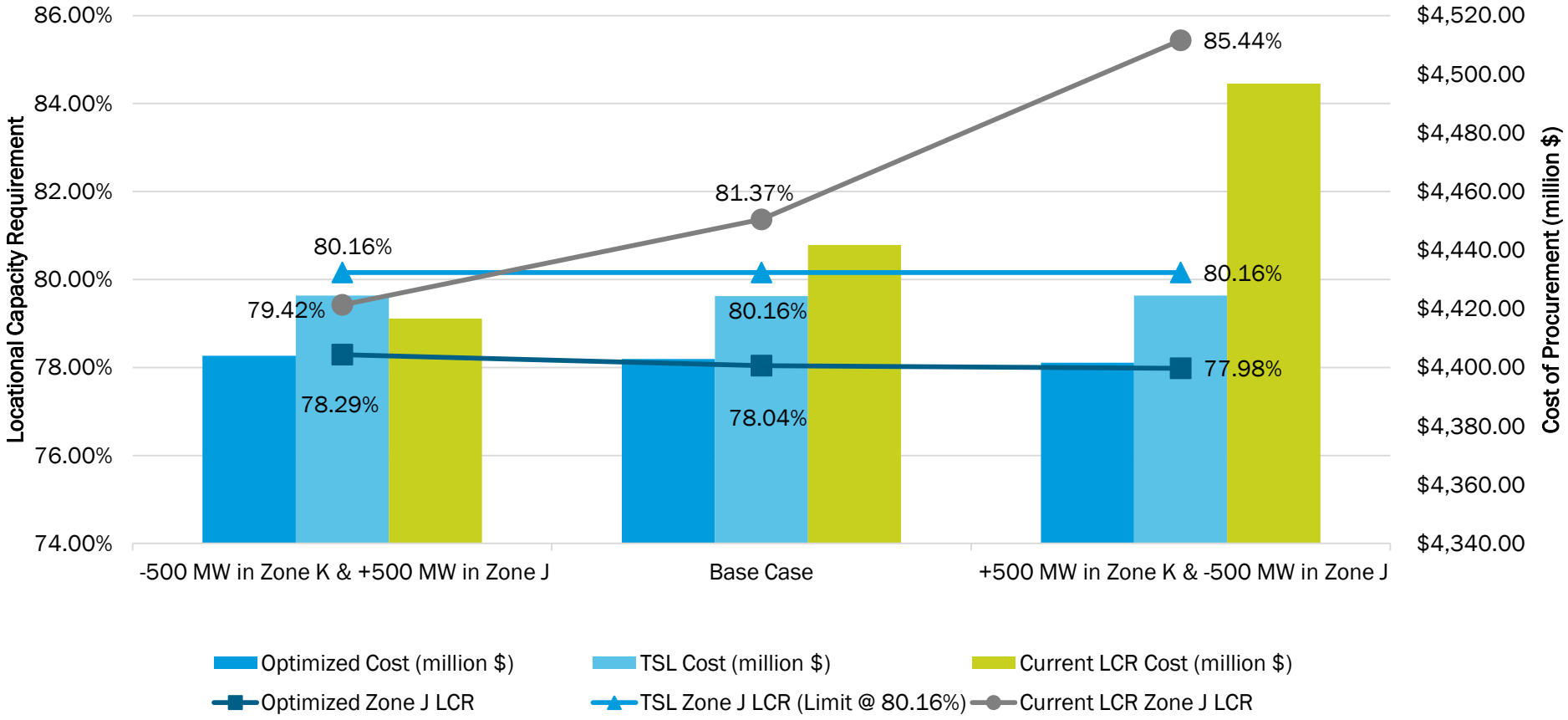
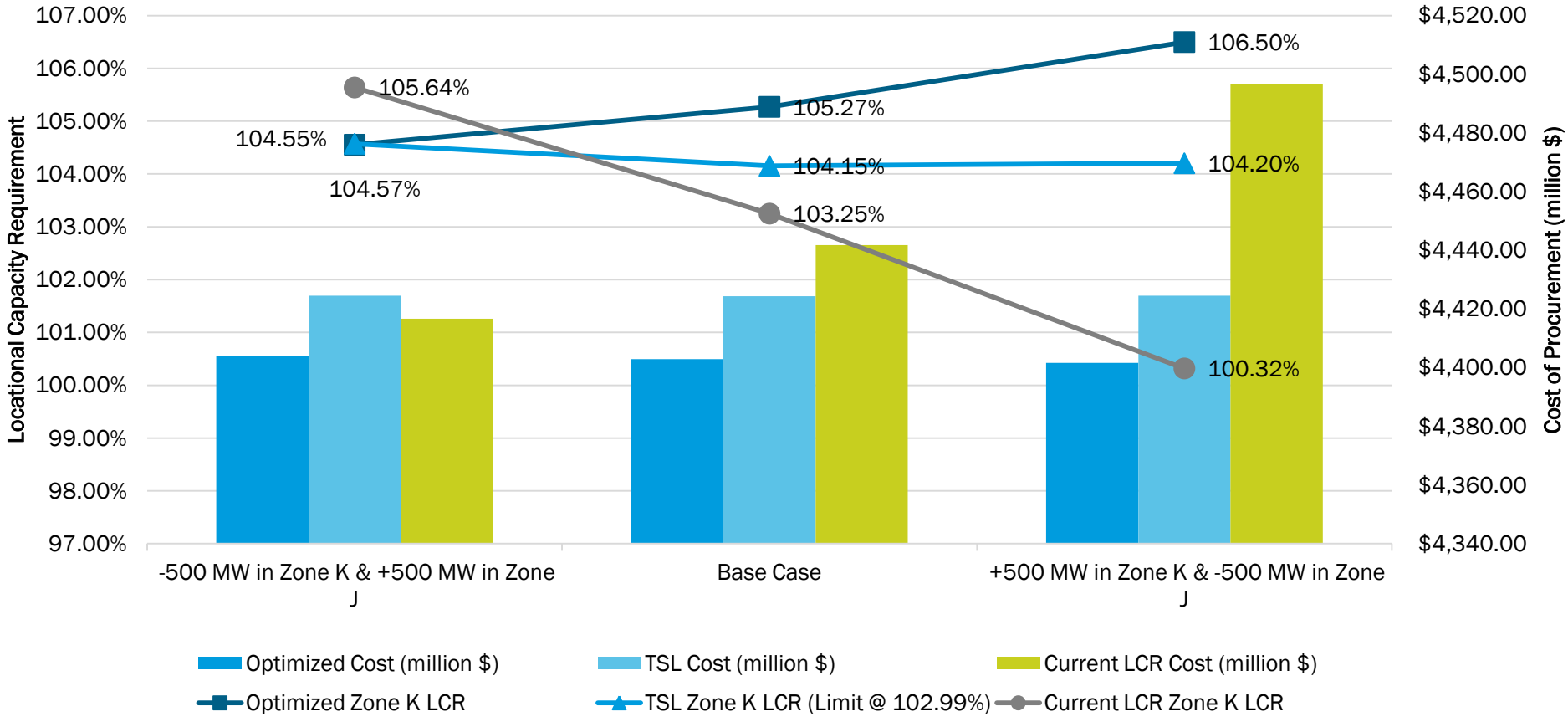
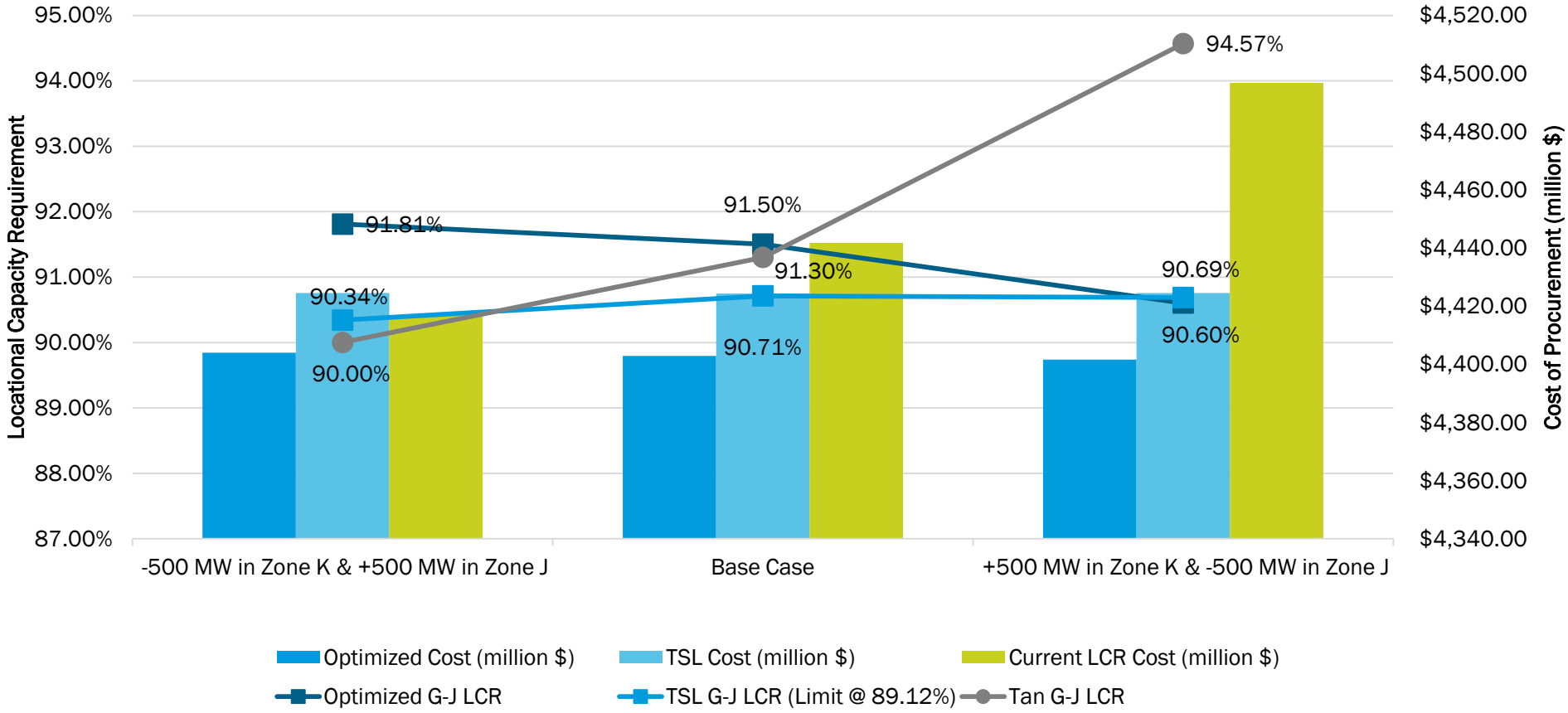
Addition & Removal of Capacity from Zone K & Zone J Zone J LCR



Addition & Removal of Capacity from Zone K & Zone J Zone K LCR



Addition & Removal of Capacity from Zone K & Zone J G-J LCR



Changes in Transmission

Changes in Transmission

- **+1000 MW to UPNY-SENY**
  - Transmission Security Limit for G-J was recalculated assuming an additional 1000 MW of import capability

+1000 MW to UPNY-SENY

Scenario	Zone J LCR	Zone K LCR	G-J LCR	Cost ($ million)
Current LCR Methodology	79.38%	101.94%	90.18%	$ 4,398.63
Optimized Methodology without Transmission Security Limits (TSL)	77.71%	107.44%	84.29%	$4,365.16
Optimized Methodology with Transmission Security Limits (TSL)	**80.16%**	**103.80%**	**84.96%**	**$4,388.00**

- **G-J import limit was increased by 1000 MW in the TSL calculation resulting in a reduction in the TSL from 89.12% to 82.17%**

+1000 MW to UPNY-SENY

Scenario	Zone J LCR	Zone K LCR	G-J LCR
Current LCR Methodology	9,263 MW	5,532 MW	14,484 MW
Optimized Methodology without Transmission Security Limits (TSL)	9,069 MW	5,831 MW	13,538 MW
Optimized Methodology with Transmission Security Limits (TSL)	9,355 MW	5,633 MW	13,645 MW

Change from Base Case to +1000 MW UPNY-SENY

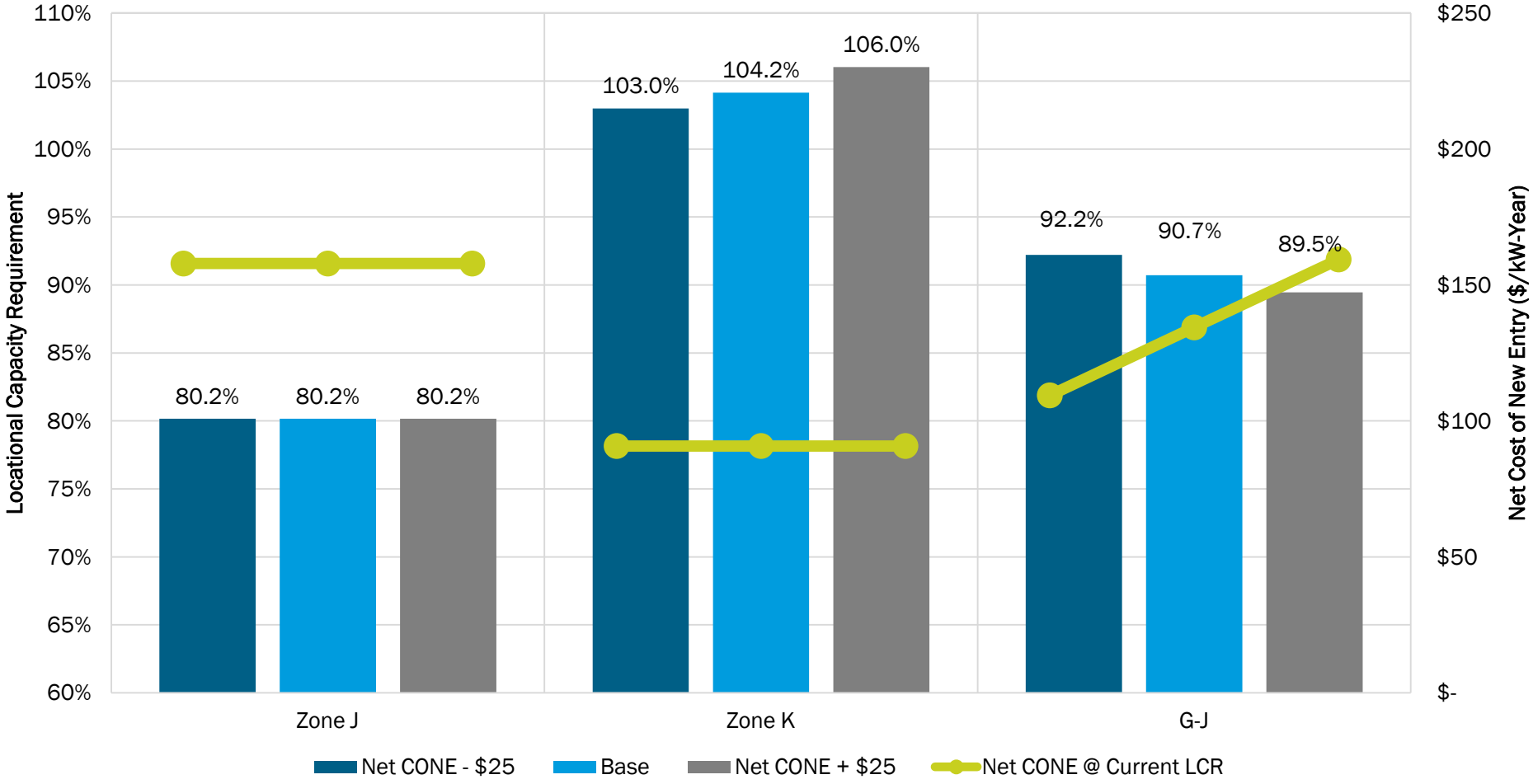
Scenario	Δ Zone J MW	Δ Zone K MW	Δ G-J MW	Δ Total Locality MW
Current LCR Methodology	-232.2	-71.1	-180.5	-483.8
Optimized Methodology without Transmission Security Limits (TSL)	-38.5	117.7	-1159.1	-1079.9
Optimized Methodology with Transmission Security Limits (TSL)	0.0	-19.2	-924.8	-944.1

Changes in Net CONE

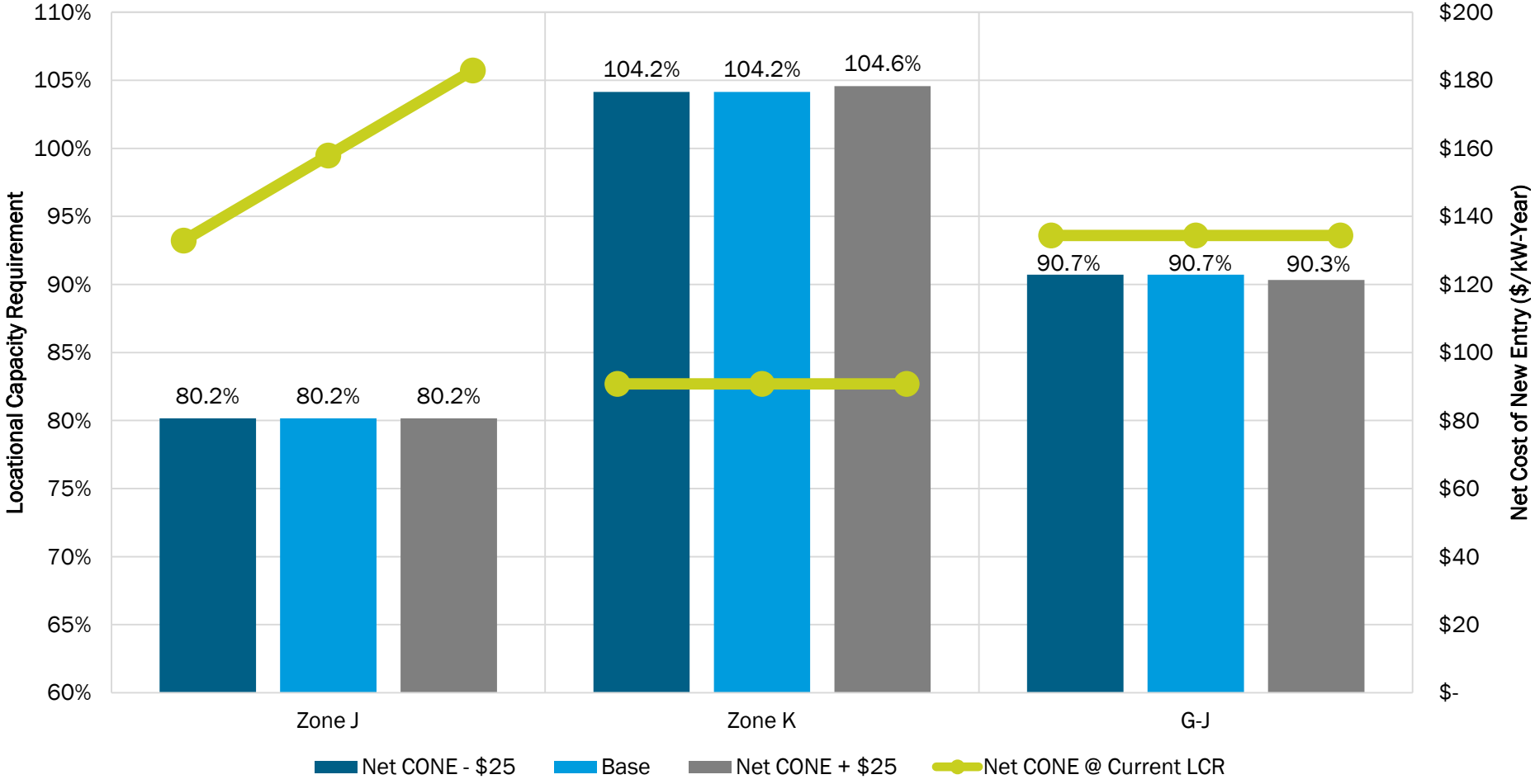
Changes in Net CONE

- +/- $25.00 to G-J Net CONE
- +/- $25.00 to Zone J Net CONE
- +/- $25.00 to Zone K Net CONE
- +/- $25.00 to NYCA Net CONE

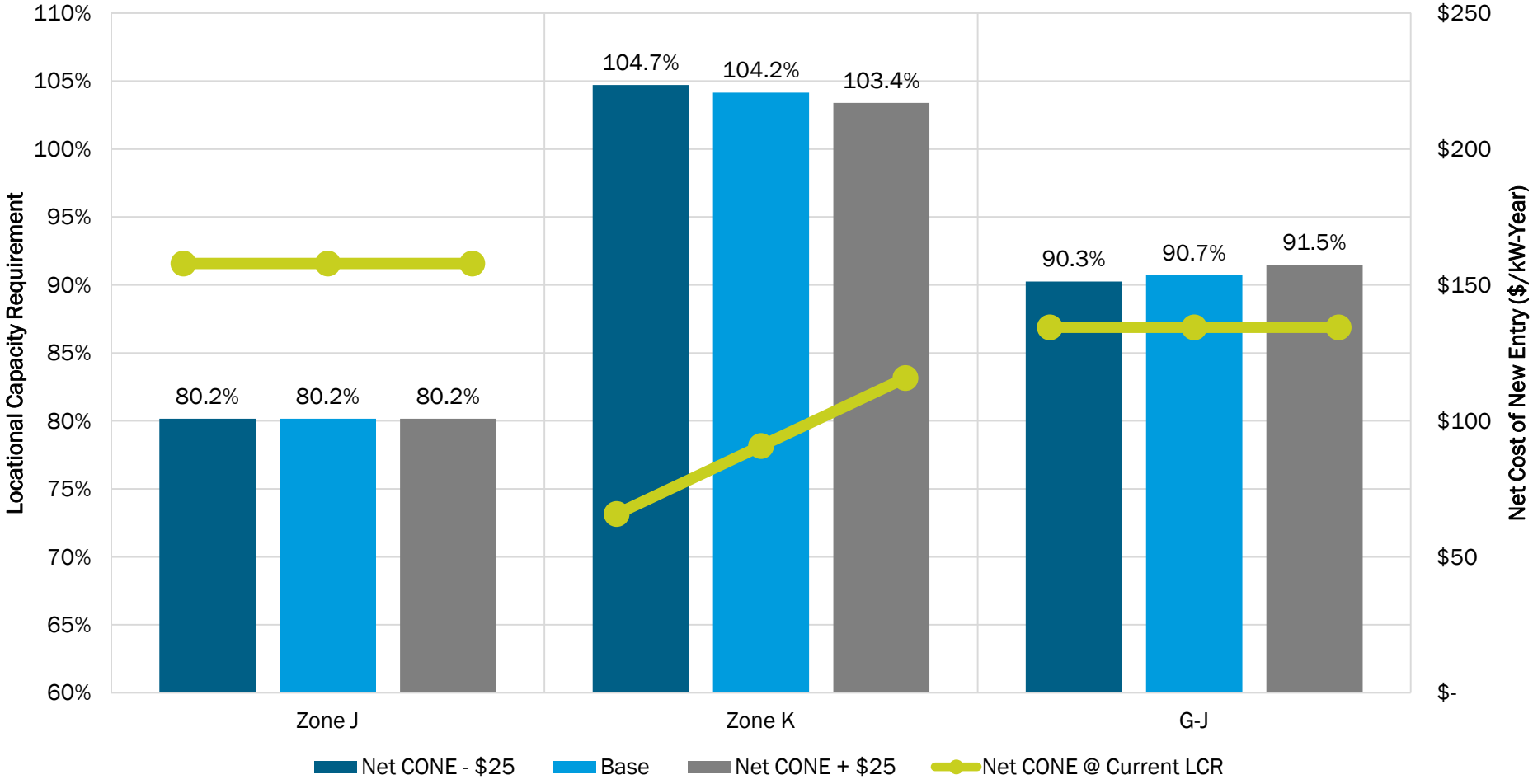
G-J Net CONE +/- $25



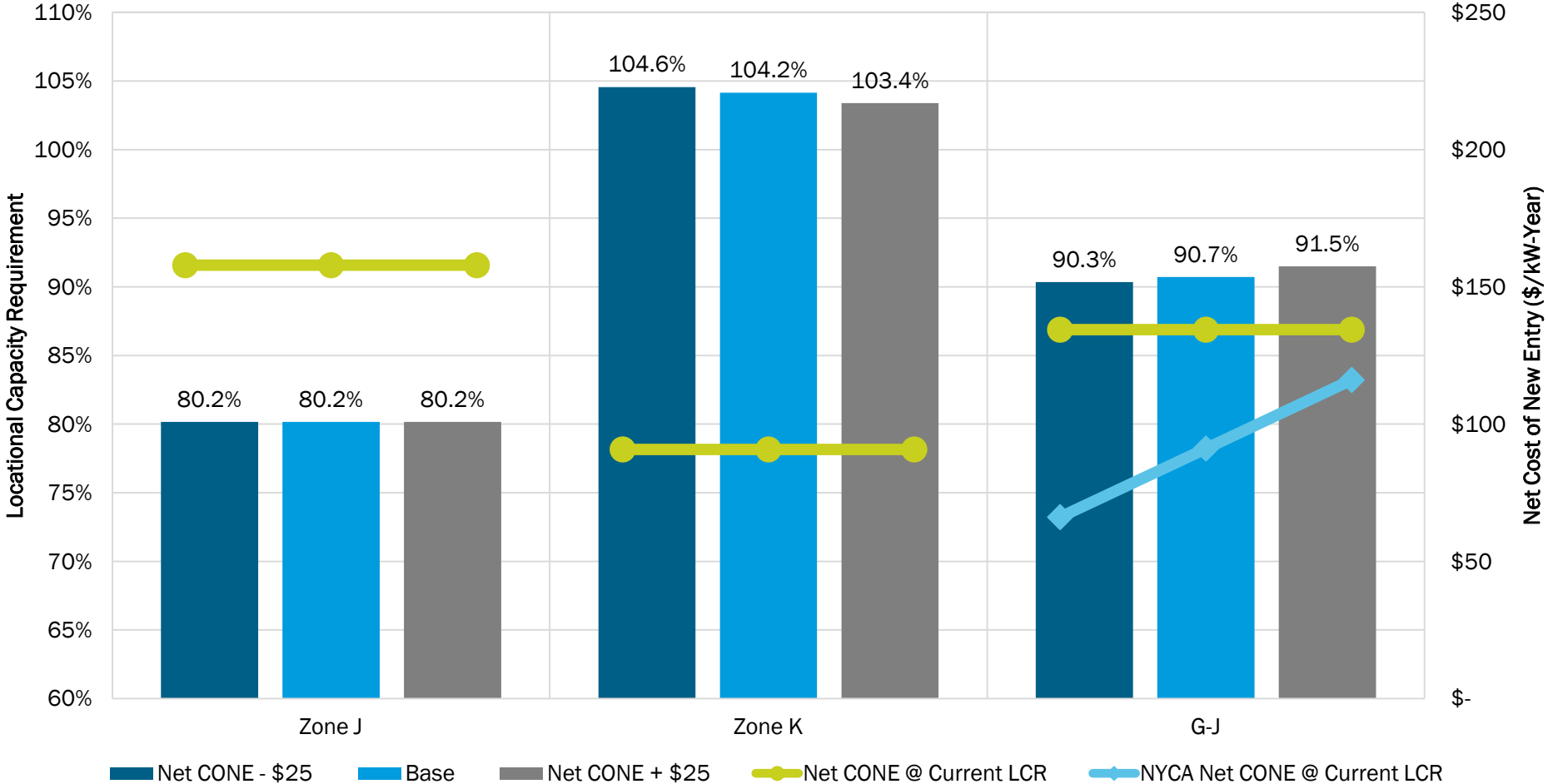
Zone J Net CONE +/- $25



Zone K Net CONE +/- $25



NYCA Net CONE +/- $25



Next Steps

Other Next Steps

- The NYISO will consider input received during today's ICAP Working Group meeting
- Additional comments sent to deckels@nyiso.com will be considered

Questions?

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- 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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