Capacity Value Results for 2022 LCR at LOE and 2022 RNA 2030 Base Case

Eduardo Ibanez, Ph.D.; Mitch Bringolf

GE Energy consulting

Overview

This slide deck summarizes the capacity value calculations, evaluated for the first two sensitivities:

- NYISO 2022 LCR model at Level of Excess (LOE)

- NYISO 2022 RNA for model year 2030

The capacity value calculations were performed for the same list of marginal units, as presented in previous presentations:

Only includes the 50 MW and 100 MW sizes for incremental units, to reduce the number of simulations

Both ELCC and MRI techniques were applied to the results

Reference

For methodology, assumptions, and more details please refer to previous presentations:

- 3/31: https://www.nyiso.com/documents/20142/29607069/3%20GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0331.pdf

- 4/28: https://www.nyiso.com/documents/20142/30276257/GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0428.pdf

- 5/24: https://www.nyiso.com/documents/20142/30888946/2%20GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0524.pdf

- 6/28: https://www.nyiso.com/documents/20142/31830389/GE-Support-for-NYISO-Capacity-Accreditation-Project-0628.pdf

The base results (based on the 2022 LCR database) were previously presented at ICAPWG meetings:

- 04/28: 5% and 10% EFOR Thermal, Solar, Offshore Wind

- 05/24: Large Hydro, and the 2/4/6/8-hour Energy Duration Limited

- 06/28: Onshore Wind, Run of River Hydro, Landfill Biomass

2022 Level of Excess (LOE) Results

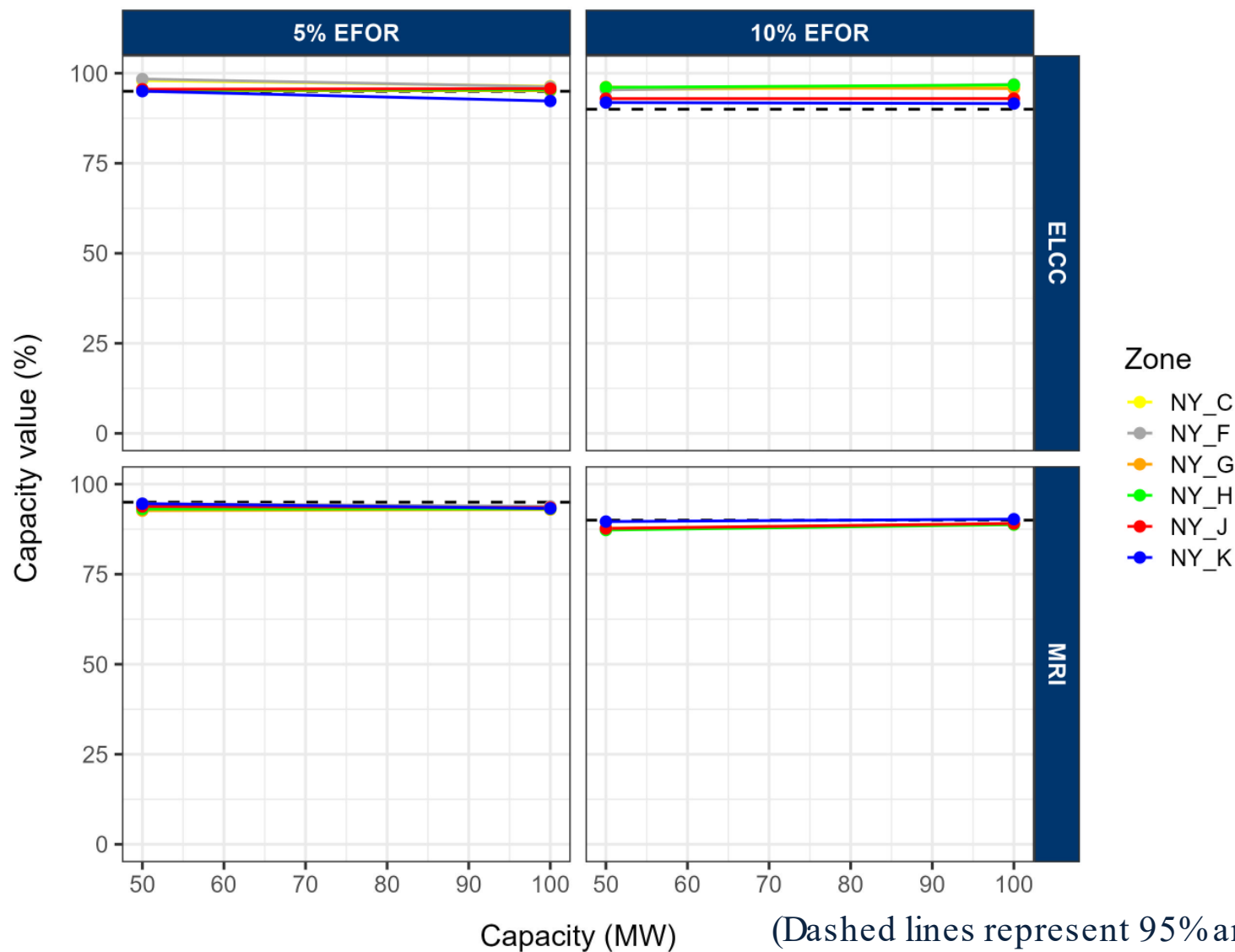# First sensitivity: Level of Excess (LOE) database

For the first proposed sensitivity, we performed the capacity value calculations using the LOE database

In layman's terms, the LOE database is very similar to the 2022 LCR database used to date, but has increased margins, which lead to a smaller base-case LOLE of 0.0548 days/year (instead of 0.10006)
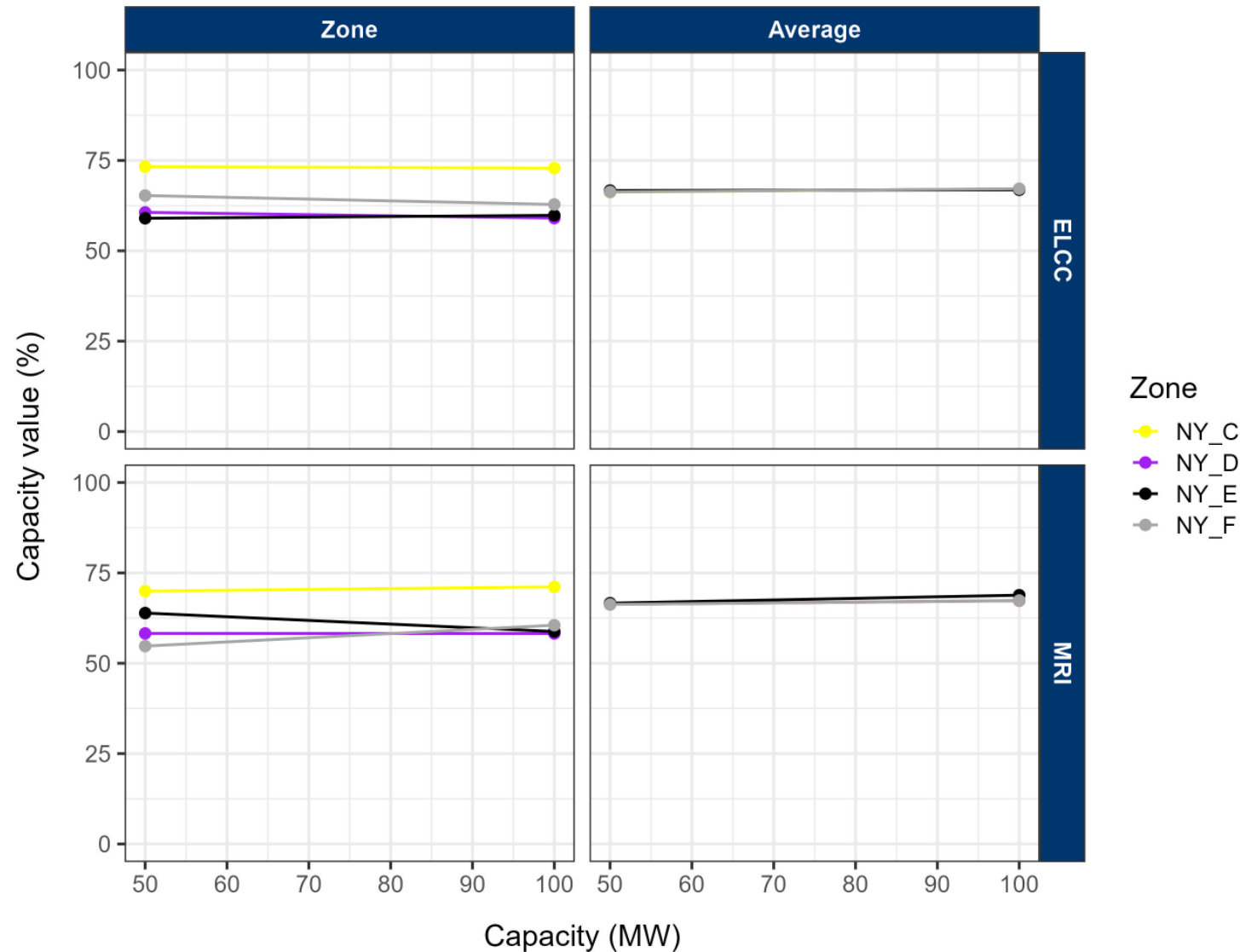
The graphs in the next slides are organized as follows:

- Top row shows the ELCC technique results, bottom shows MRI results
- Columns show different cases modeled (e.g., different EFOR, shape, or ELR duration)
- Horizontal axis shows capacity of incremental unit (50 or 100 MW)
- Colors represent location of the unit
- Values are normalized, as percentage of nameplate capacity of the incremental unit

Thermal - ELCC and MRI capacity values (%)

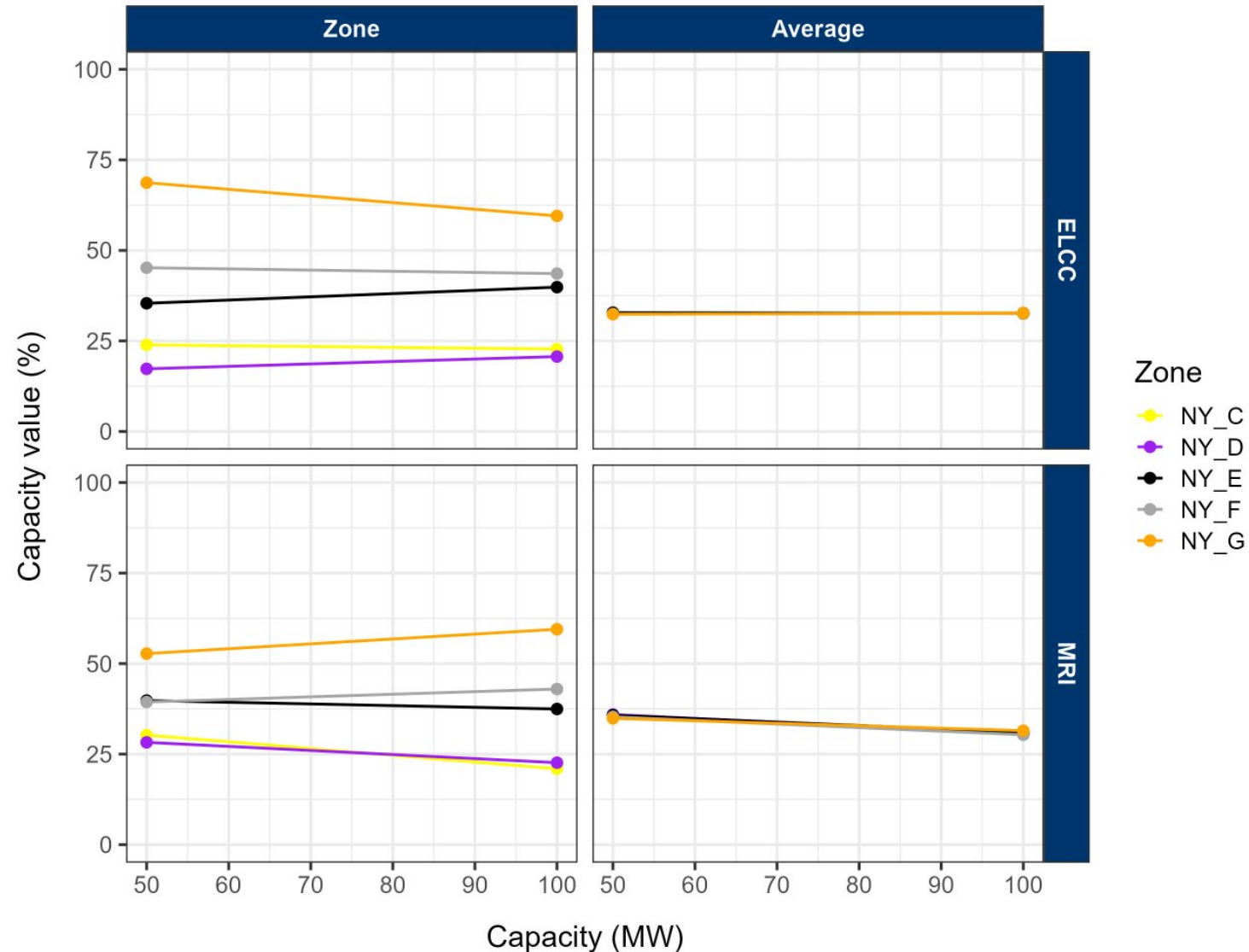(Dashed lines represent 95% and 90%, respectively)

Landfill biomass - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape
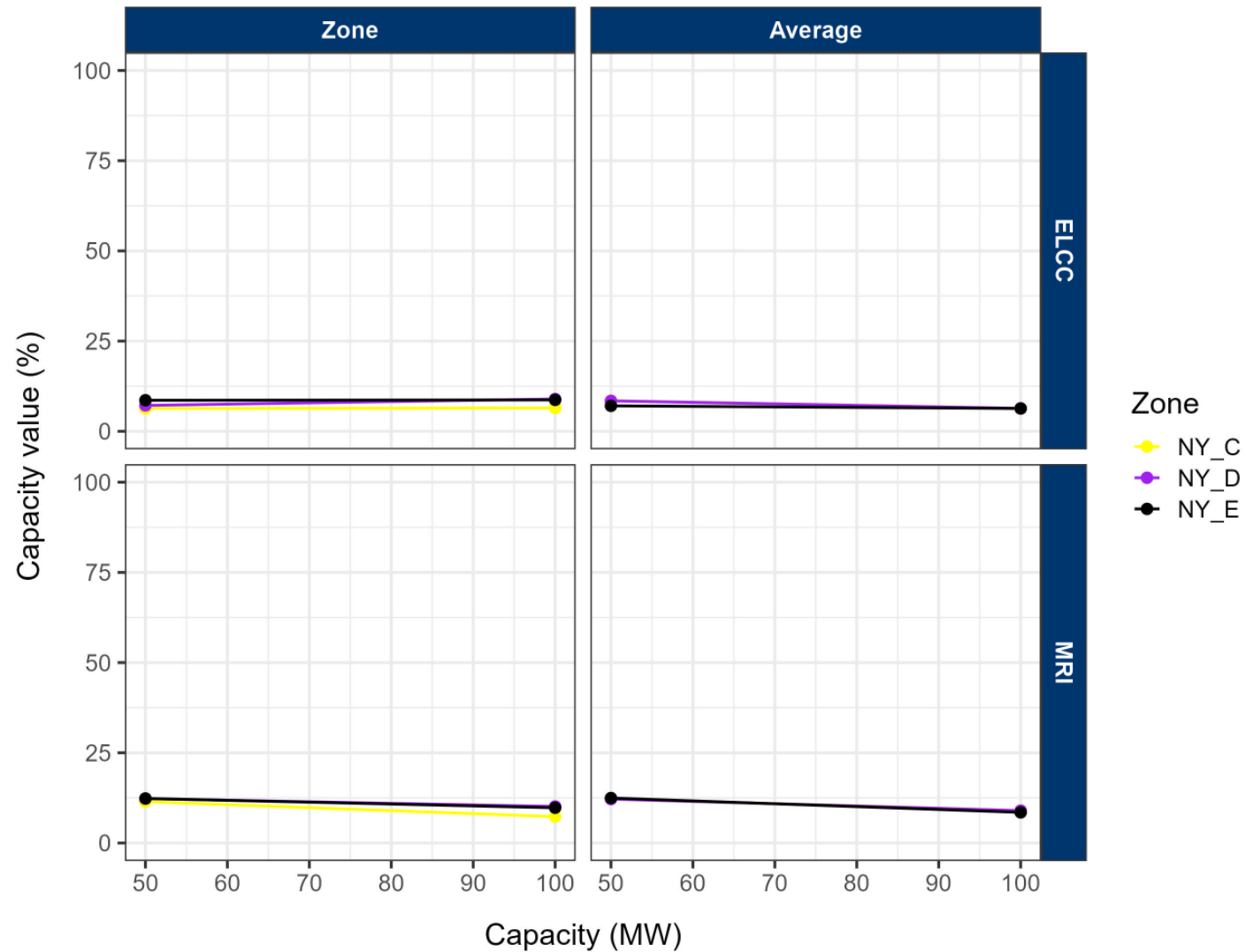
Average = all zones use the same shape

Run-of-river - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape

Average = all zones use the same shape

Onshore wind - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape

Average = all zones use the same shape

Offshore wind - ELCC and MRI capacity values (%)

*Calculations use simulated data

Solar – ELCC and MRI capacity values (%)

Zone = each zone uses a different shape
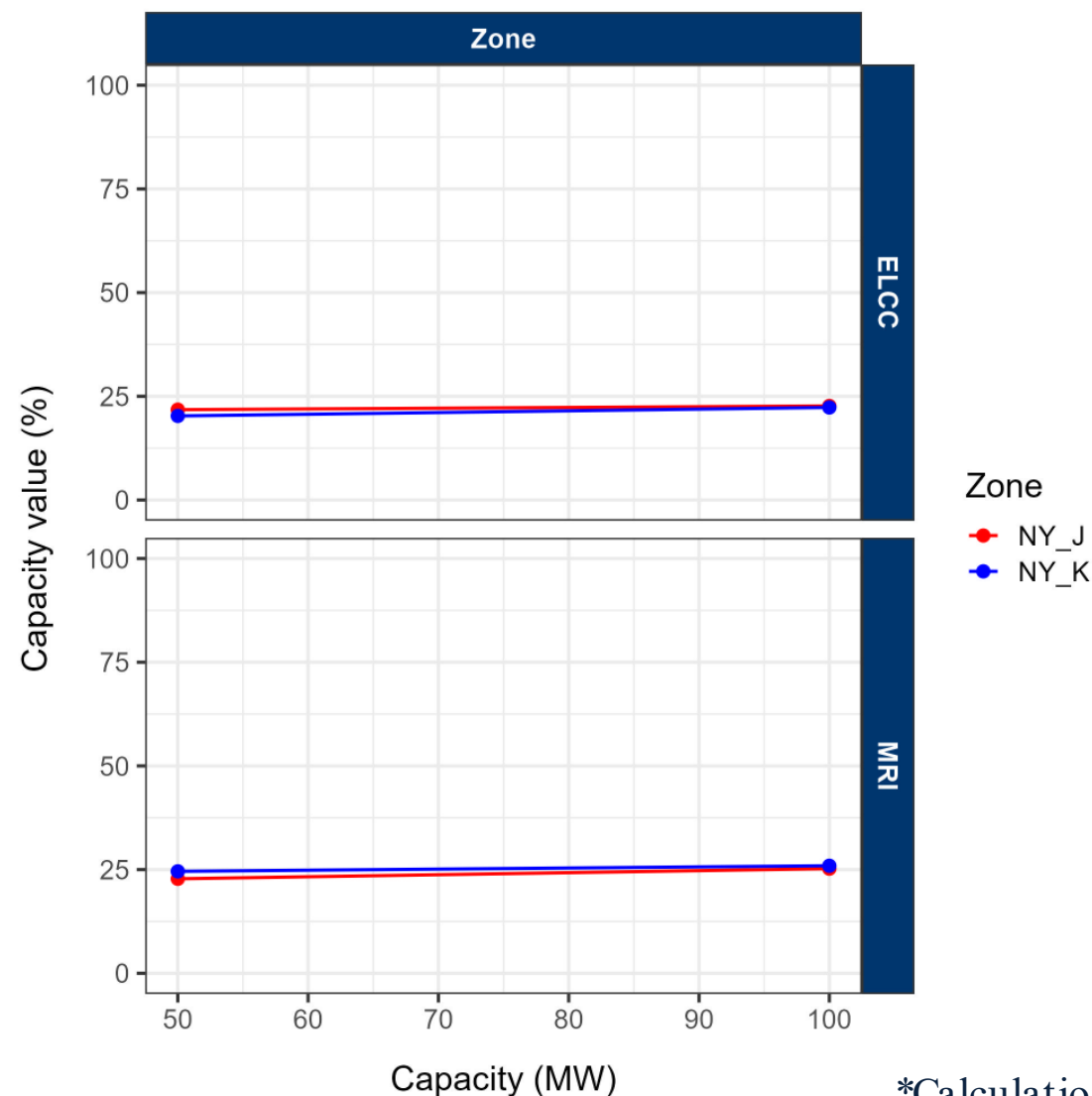
Average = all zones use the same shape

*Simulations use behind-the-meter shapes

Energy Duration Limited – Shape-based model ELCC and MRI capacity values (%)

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

Energy Duration Limited – Dynamic model
ELCC and MRI capacity values (%)

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

Large Hydro - ELCC and MRI capacity values (%)

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

2022 LOE Capacity Value Results (MW)
50-MW incremental unit

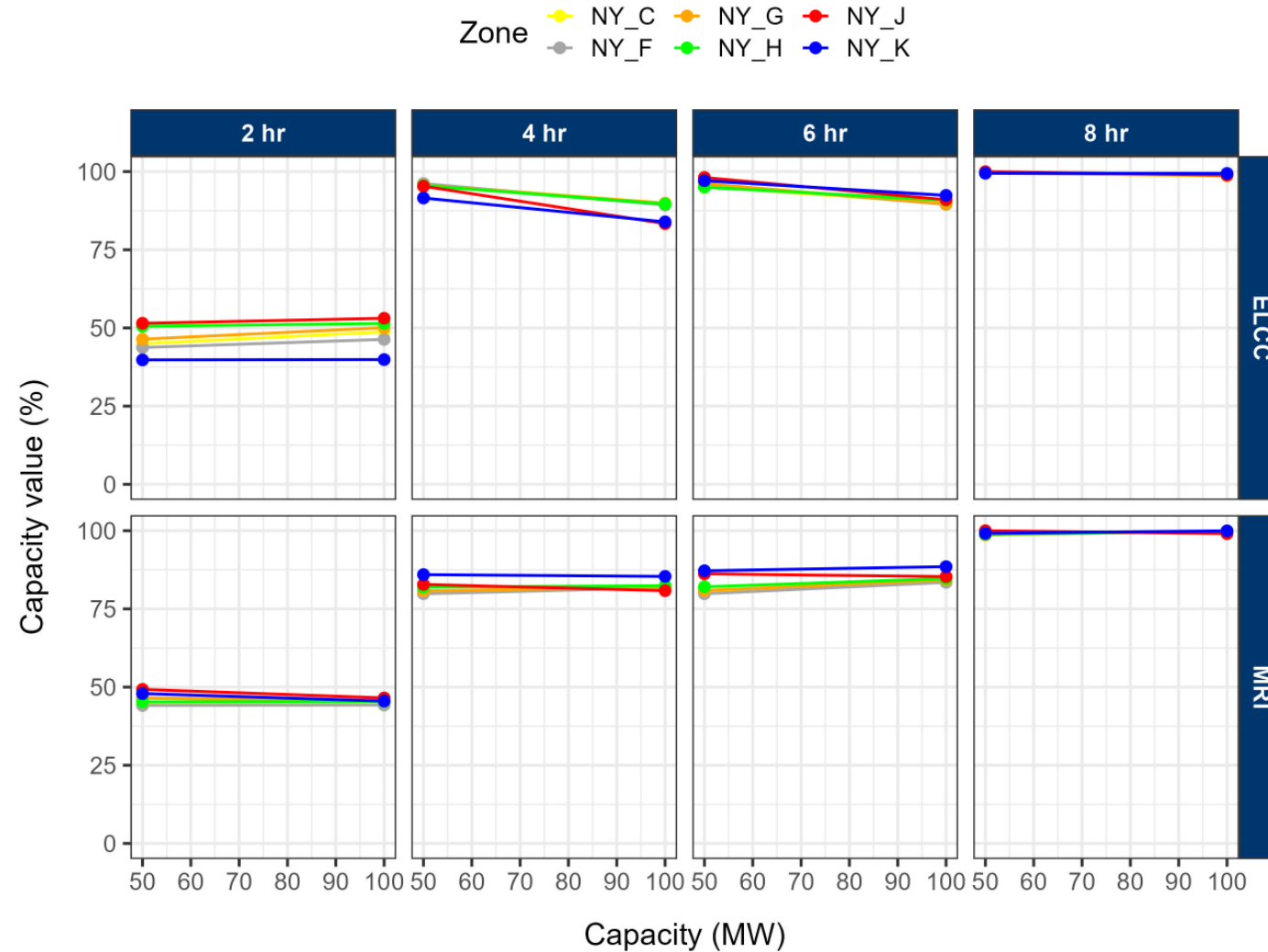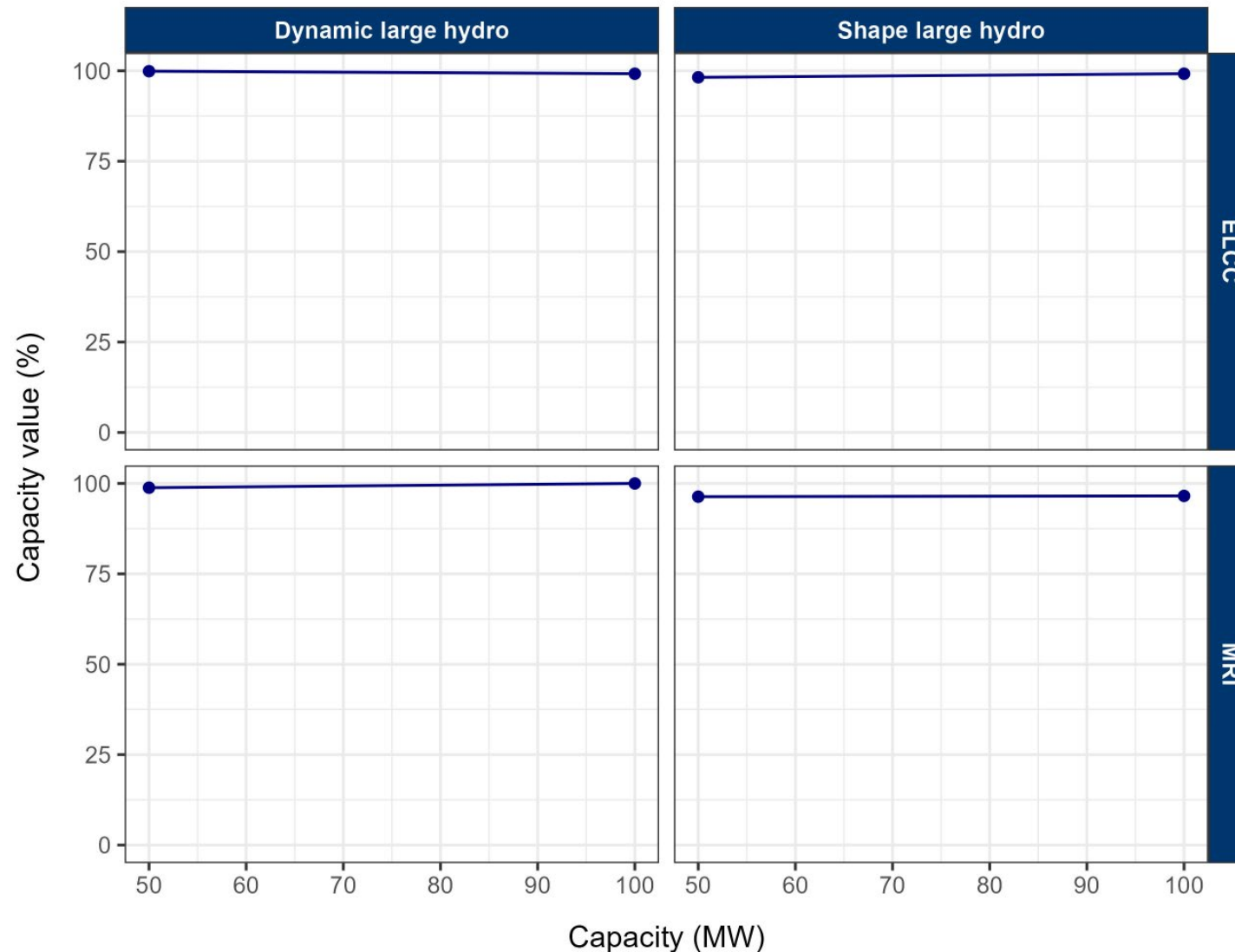| Class	Subtype	ELCC								MRI							
		NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K	NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K
Thermal	5% EFOR	49.0			49.2	47.6	47.7	47.8	47.5	46.7			47.3	46.3	46.6	46.9	47.3
	10% EFOR	47.7			47.7	48.1	48.0	46.5	45.9	43.8			43.8	43.9	43.6	43.8	44.8
Biomass	Zone	36.6	30.3	29.5	32.6					35.0	29.1	31.9	27.4				
	Average	33.1	33.2	33.3	33.1					33.2	33.2	33.3	33.1				
Run of river	Zone	12.0	8.6	17.7	22.6	34.4				15.1	14.1	19.9	19.7	26.4			
	Average	16.2	16.3	16.4	16.2	16.2				17.9	18.0	17.9	17.6	17.4			
Onshore wind	Zone	3.2	3.6	4.3						5.7	6.1	6.2					
	Average	4.2	4.2	3.5						6.1	6.1	6.2					
Offshore wind	Zone							10.9	10.1							11.4	12.3
Solar	Zone	22.3			18.6	16.7	14.3	8.9	9.8	19.6			18.7	16.2	15.1	12.4	12.1
	Average	17.8			17.9	17.7	17.9	17.4	16.5	18.8			18.4	18.5	17.9	15.7	14.8
Shape ELR	2h	22.7			21.9	22.9	25.2	25.5	19.9	22.3			22.0	23.1	22.5	23.7	23.9
	4h	47.8			47.5	47.7	47.5	47.5	45.7	39.4			39.3	39.7	40.4	40.1	42.5
	6h	47.9			47.6	47.5	47.4	48.0	47.9	40.0			39.9	40.3	41.0	42.2	43.5
	8h	49.6			49.9	49.6	49.7	49.6	49.7	48.7			48.7	48.8	48.8	48.7	49.2
Dynamic ELR	2h	22.5			21.9	23.2	25.3	25.7	19.9	22.4			22.1	23.2	22.6	24.6	24.0
	4h	48.0			48.1	47.8	47.8	47.7	45.8	40.1			39.9	40.4	41.0	41.4	43.0
	6h	47.6			48.1	48.1	47.5	49.1	48.5	40.1			39.9	40.4	41.0	43.1	43.6
	8h	49.9			49.9	49.7	49.9	50.0	49.7	49.3			49.3	49.3	49.4	50.0	49.6
Large hydro	Dynamic	49.9								49.4							
	Shape	49.1								48.2							

2022 LOE Capacity Value Results (MW)
100-MW incremental unit

Class	Subtype	ELCC								MRI							
		NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K	NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K
Thermal	5% EFOR	96.4			96.3	95.2	95.4	95.7	92.3	93.4			93.9	93.0	93.2	93.5	93.3
	10% EFOR	96.1			96.9	95.7	96.8	93.0	91.6	88.8			88.8	89.0	88.8	89.1	90.3
Biomass	Zone	72.9	59.0	59.8	62.8					71.1	58.2	58.8	60.5				
	Average	67.1	67.1	66.9	67.2					67.3	67.3	68.8	67.4				
Run of river	Zone	22.7	20.7	39.9	43.6	59.5				21.0	22.6	37.5	43.0	59.5			
	Average	32.8	32.7	32.6	32.6	32.6				30.6	30.6	31.0	30.3	31.5			
Onshore wind	Zone	6.5	9.0	8.7						7.3	10.1	9.8					
	Average	6.3	6.4	6.3						9.0	9.0	8.5					
Offshore wind	Zone							22.7	22.3							25.2	25.9
Solar	Zone	43.8			37.2	32.2	28.4	20.0	21.0	39.0			31.2	25.4	25.7	27.9	25.2
	Average	35.0			34.9	35.5	36.0	35.7	31.5	29.8			29.5	29.3	30.7	33.5	30.2
Shape ELR	2h	49.0			46.9	49.3	49.8	52.4	39.5	43.4			42.9	44.2	44.2	45.5	45.1
	4h	86.7			83.5	84.9	85.8	81.7	82.5	80.0			79.9	80.0	80.7	79.3	84.5
	6h	90.4			89.8	90.3	89.8	89.8	90.8	82.3			82.2	82.9	83.5	84.3	88.0
	8h	98.1			97.5	97.4	97.2	97.9	98.7	98.2			98.1	98.1	98.1	97.7	99.1
Dynamic ELR	2h	48.8			46.3	50.1	51.5	53.1	39.9	44.7			44.3	45.5	45.4	46.5	45.5
	4h	89.9			89.3	89.9	89.6	83.4	83.9	81.8			81.7	81.9	82.4	80.8	85.4
	6h	89.8			89.5	89.7	90.9	91.0	92.4	83.6			83.5	84.3	84.7	85.3	88.5
	8h	99.0			99.1	98.7	99.1	98.9	99.4	99.9			99.9	99.9	99.8	99.1	100.0
Large hydro	Dynamic	99.2								100.0							
	Shape	99.2								96.6							

2022 RNA 2030 Base Case Results

Second sensitivity: Reliability Needs Assessment (RNA) database (I)

The second sensitivity uses the 2022 1st pass Base Case Study for study year 2030, recently assembled by the NYISO RNA team

GE used the LCR Optimizer to bring the RNA Base Case for year 2030 to the at criteria LOLE of 0.1

The IRM and LCRs selected as the least-cost requirements by the LCR Optimizer are shown on the right for year 2030 of the RNA Base Case and compared to the current IRM and LCRs

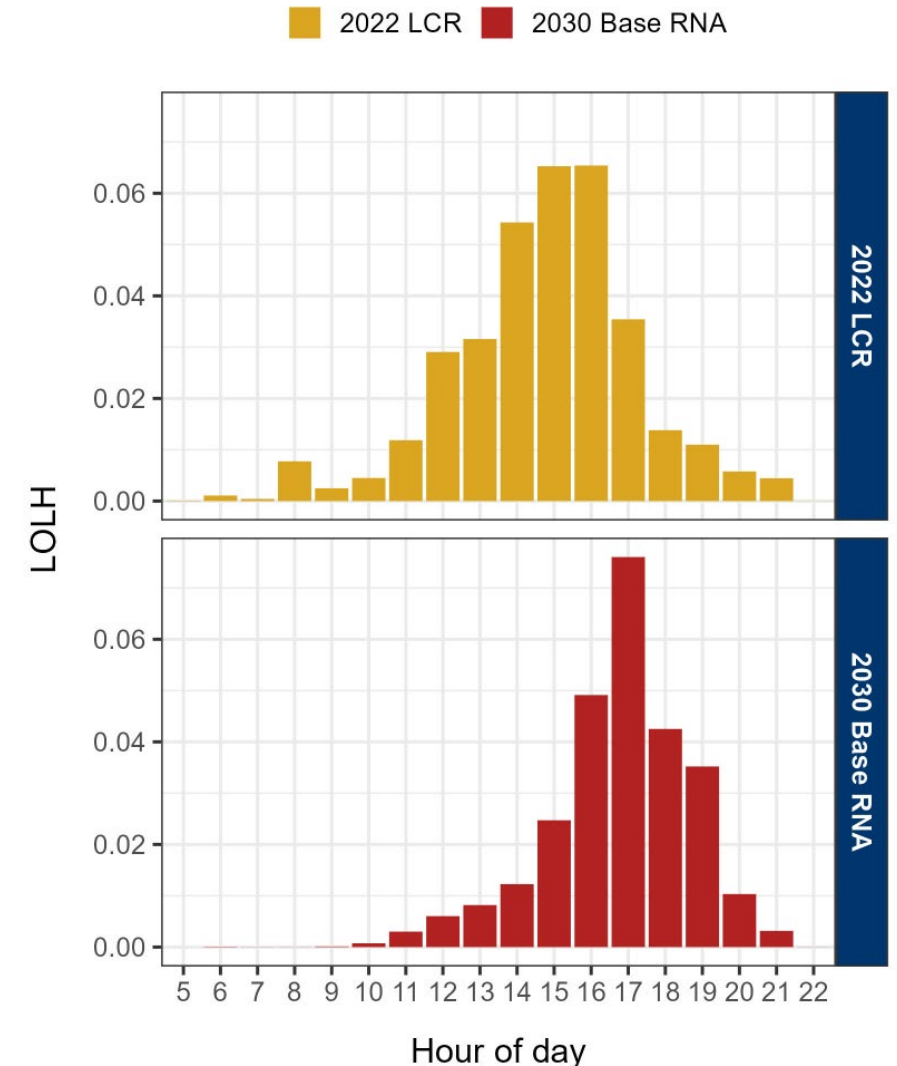|	Current	RNA Base Case 2030
NYCA IRM	119.6%	126.2%
G-J LCR	89.2%	84.2%
J LCR	81.2%	98.1%
K LCR	99.5%	114.5%

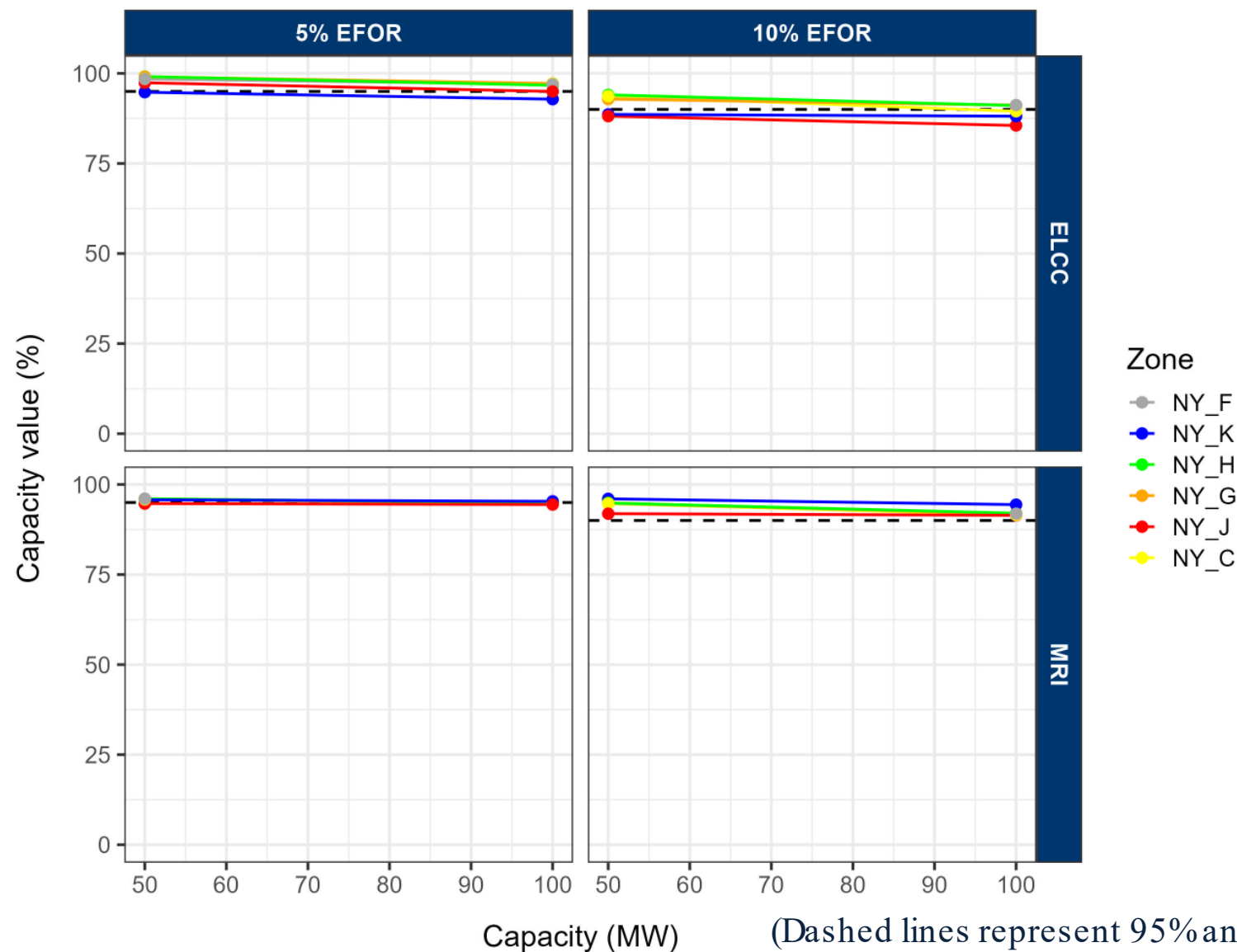# Second sensitivity: Reliability Needs Assessment (RNA) database (II)

The hourly LOLE distribution shifts to later in the day for study year 2030 of the 2022 1st pass Base Case Study in comparison to the hourly LOLE distribution from the 2022 NYISO LCR database, as shown in the table and figures

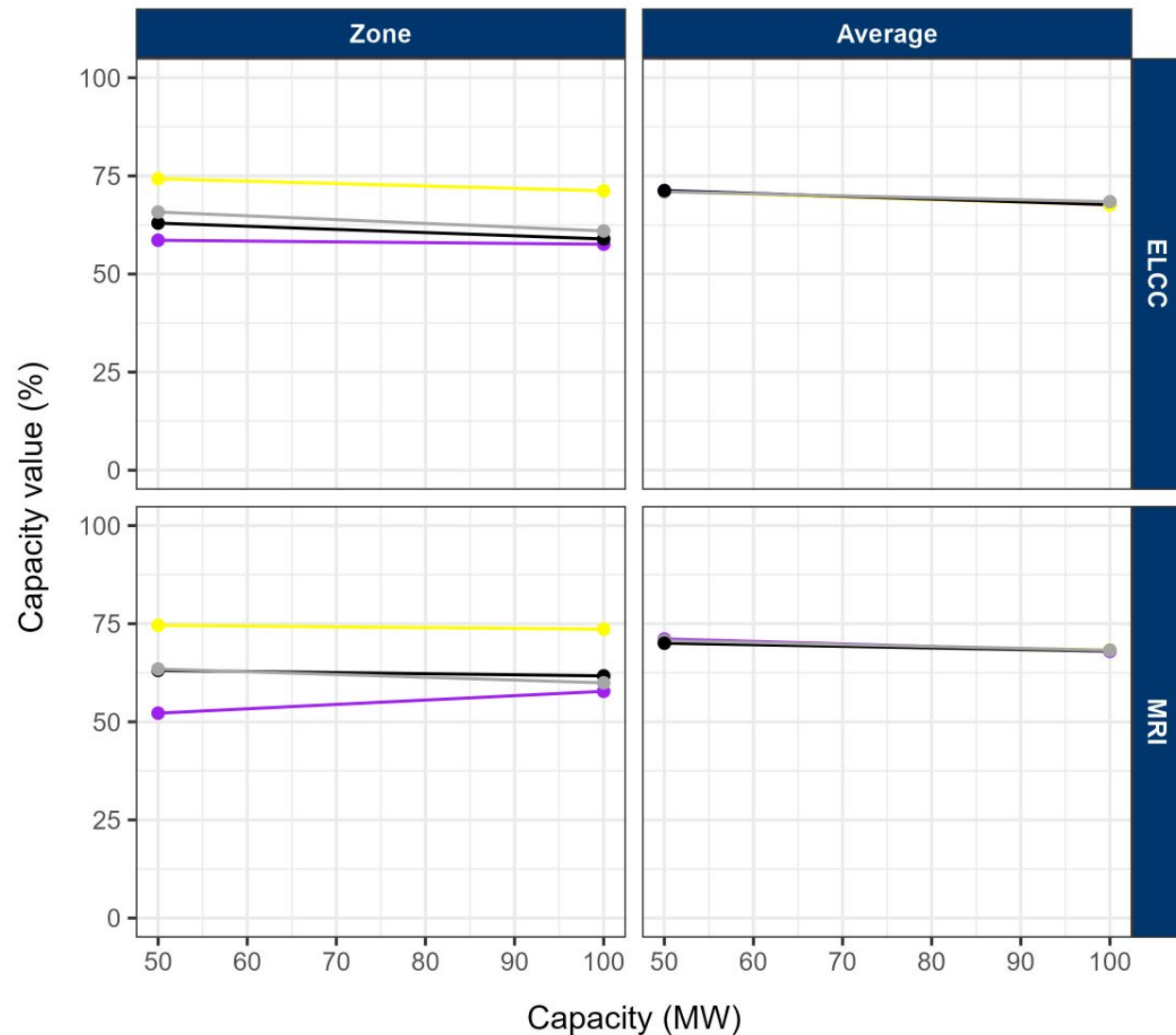- Highlighted in yellow below are the four hours with the highest percentage of total hourly LOLE in each case

HB	2022 LCR	RNA Base Case Year 2030
10	1.3%	0.3%
11	3.4%	1.1%
12	8.4%	2.2%
13	9.2%	3.0%
14	15.8%	4.5%
15	19.0%	9.1%
16	19.0%	18.1%
17	10.3%	28.0%
18	4.0%	15.7%
19	3.2%	13.0%
20	1.7%	3.8%
21	1.3%	1.2%

Thermal - ELCC and MRI capacity values (%)

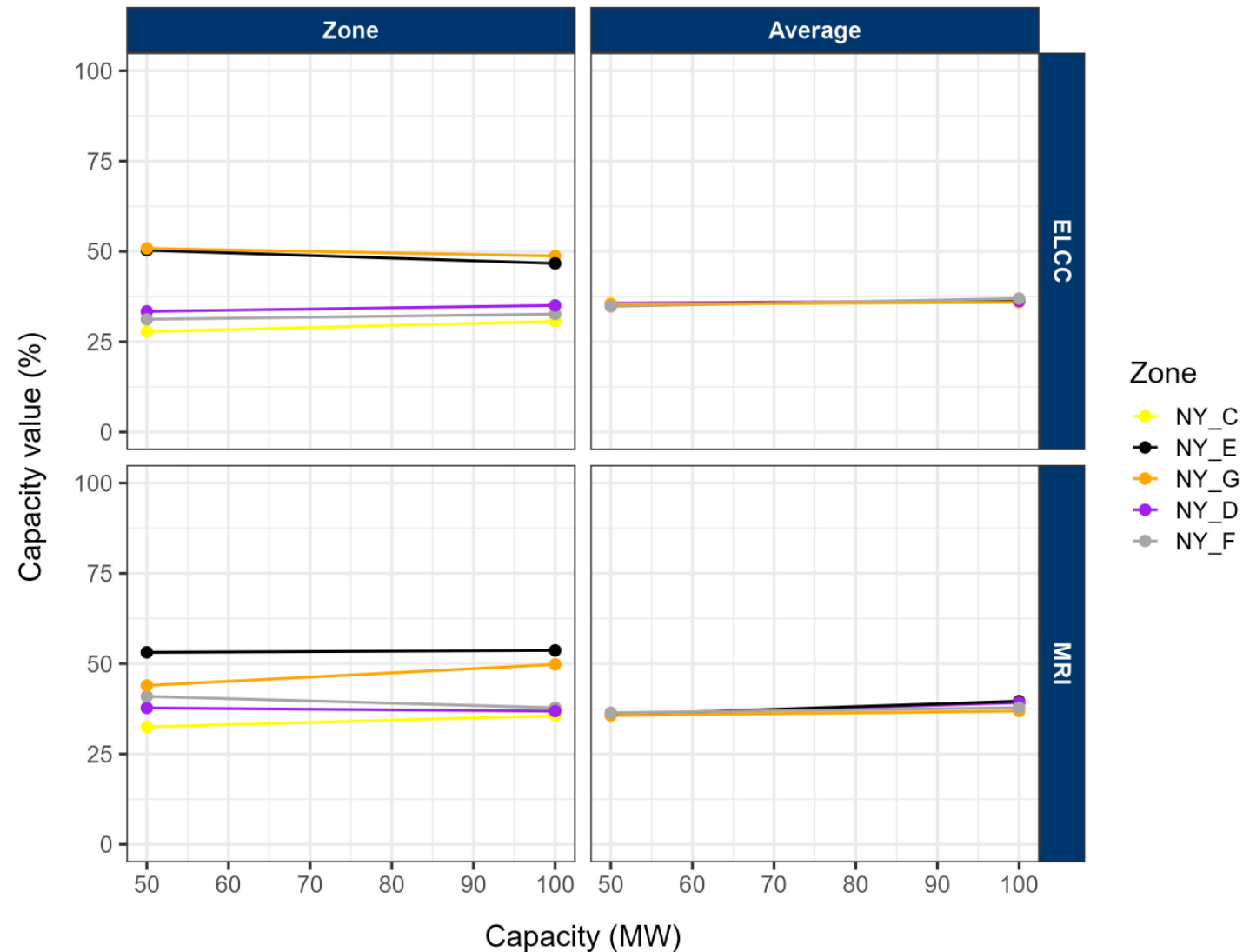(Dashed lines represent 95% and 90%, respectively)

Landfill biomass - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape
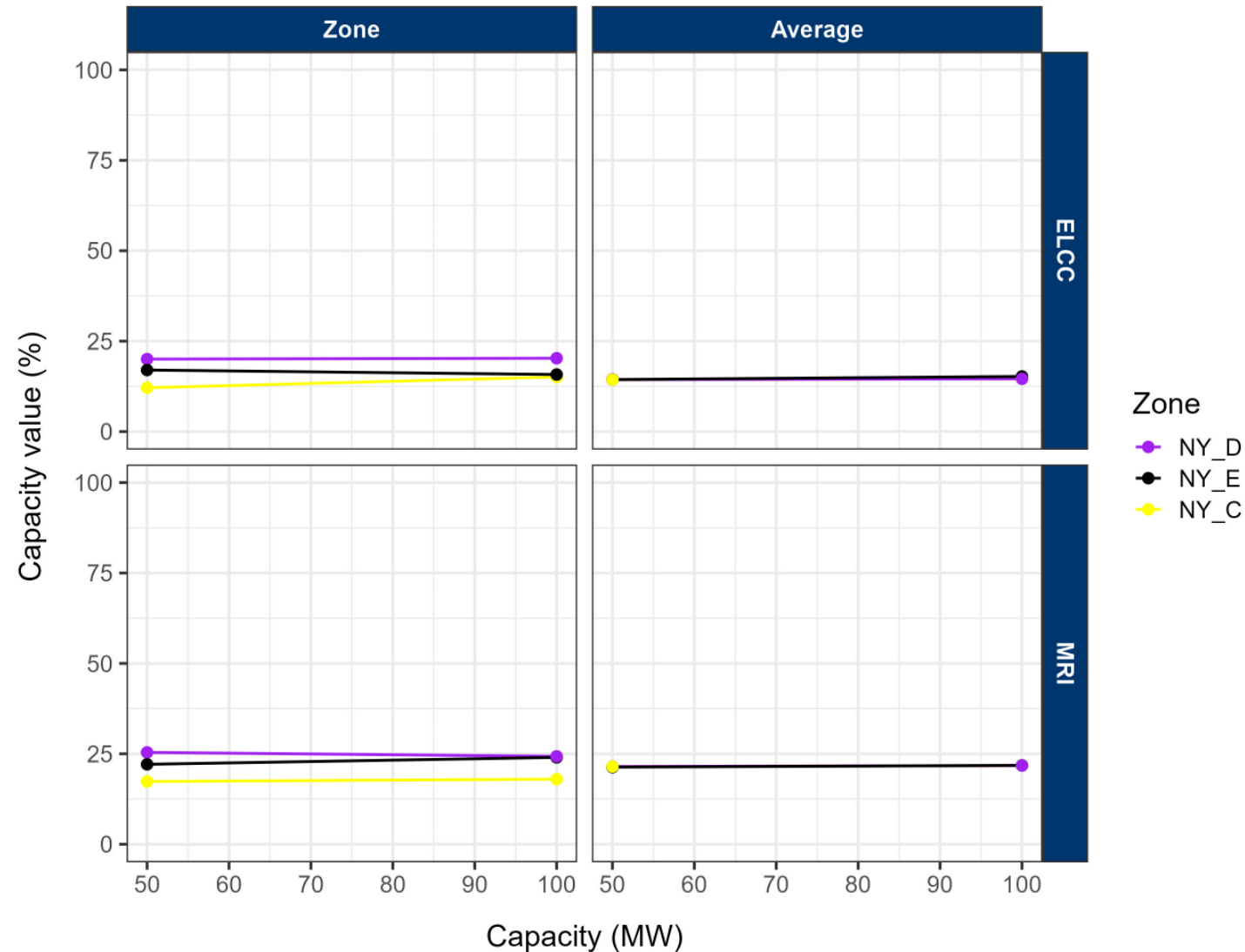
Average = all zones use the same shape

Run-of-river - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape

Average = all zones use the same shape
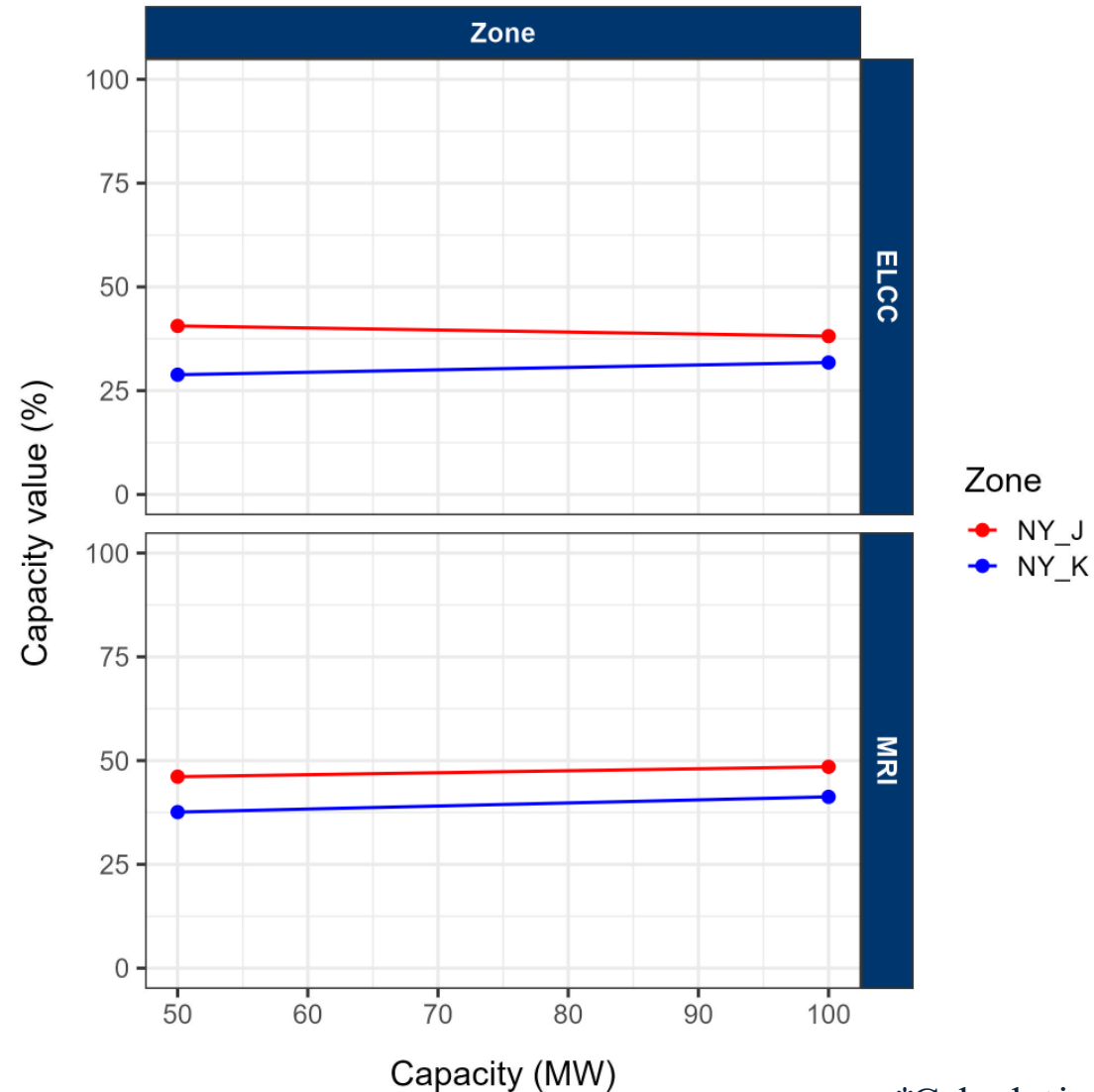
Onshore wind - ELCC and MRI capacity values (%)

Zone = each zone uses a different shape

Average = all zones use the same shape

Offshore wind – ELCC and MRI capacity values (%)

*Calculations use simulated data

Solar – ELCC and MRI capacity values (%)

Zone = each zone uses a different shape

Average = all zones use the same shape

*Simulations use behind-the-meter shapes

Energy Duration Limited – Shape-based model
ELCC and MRI capacity values (%)

Zone

NY_C · NY_H · NY_G
NY_F · NY_K · NY_J

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

Dispatch shifted back 1 hour to match events hours

Energy Duration Limited – Dynamic model
ELCC and MRI capacity values (%)

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

Dispatch shifted back 1 hour to match events hours

Large Hydro - ELCC and MRI capacity values (%)

Shape = fixed shape dispatch

Dynamic = MARS dispatch algorithm

2023 RNA 2030 Base Case Capacity Value Results (MW)
50-MW incremental unit

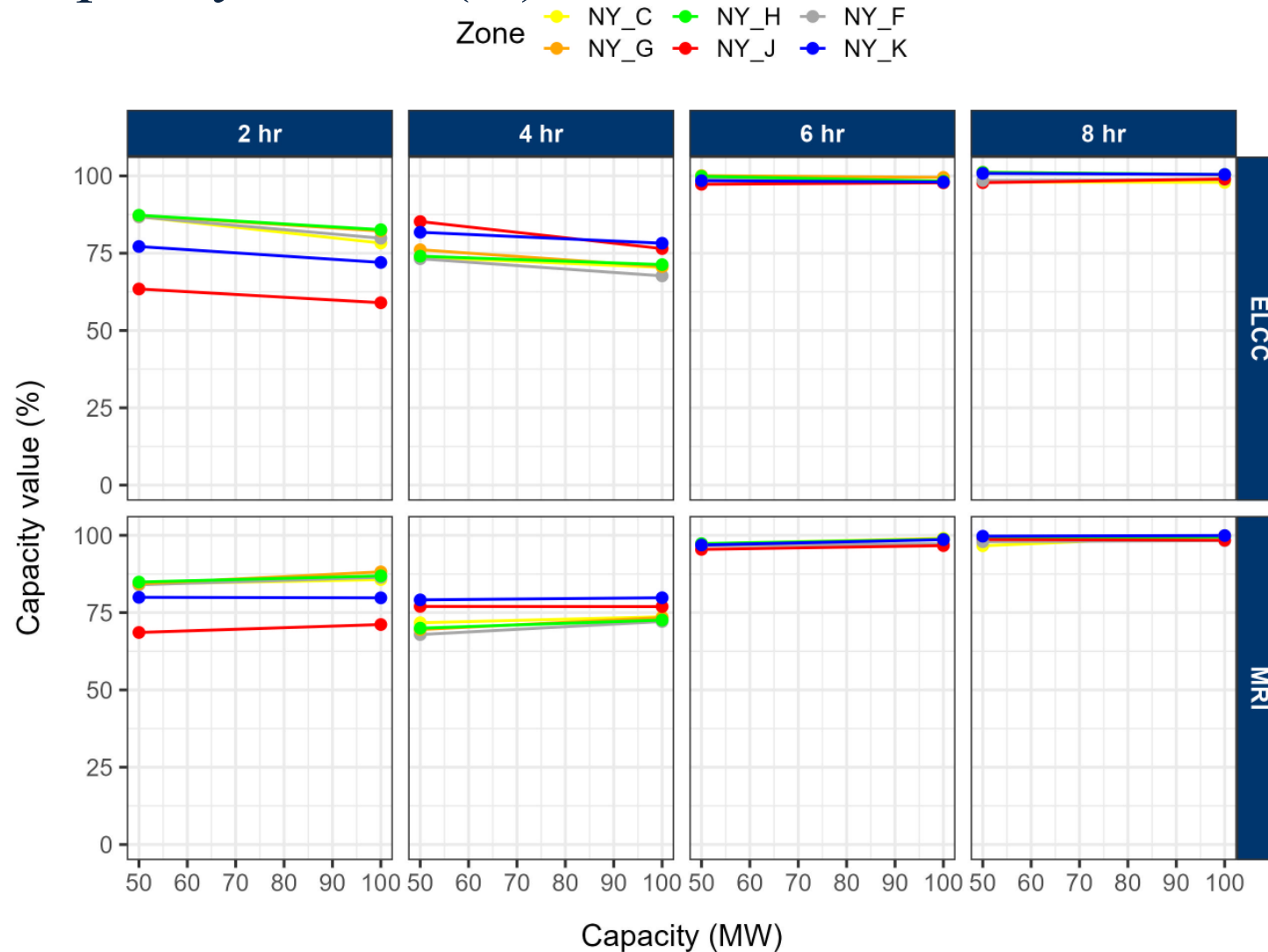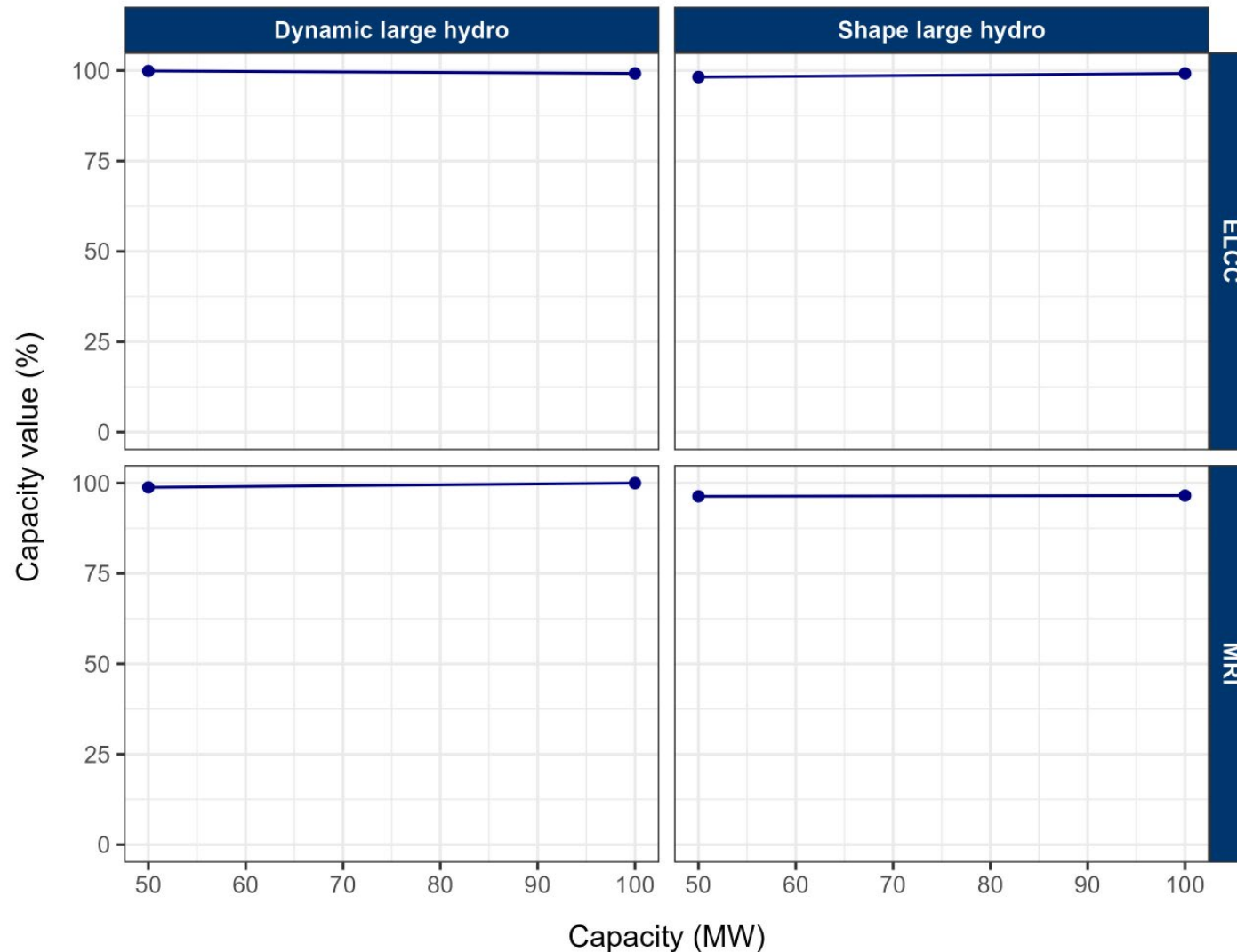| Class	Subtype	ELCC								MRI							
		NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K	NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K
Thermal	5% EFOR	49.2			49.2	49.5	49.6	48.7	47.4	47.9			48.0	48.0	48.0	47.4	47.9
	10% EFOR	46.8			46.5	46.4	47.0	44.1	44.3	47.3			47.4	47.4	47.4	45.9	48.0
Biomass	Zone	37.1	29.3	31.5	32.9					37.3	26.1	31.6	31.7				
	Average	35.5	35.6	35.6	35.5					35.2	35.5	35.0	35.3				
Run of river	Zone	13.9	16.7	25.2	15.6	25.4				16.3	18.9	26.6	20.5	22.0			
	Average	17.8	17.8	17.6	17.4	17.7				17.9	17.9	17.9	18.2	17.8			
Onshore wind	Zone	6.1	10.0	8.5						8.7	12.7	11.1					
	Average	7.2	7.2	7.2						10.7	10.7	10.7					
Offshore wind	Zone							20.3	14.4							23.1	18.8
Solar	Zone	3.8			4.6	4.8	4.4	7.7	4.2	4.6			4.1	5.4	5.8	7.0	5.7
	Average	4.2			3.9	3.8	3.8	5.8	4.4	5.0			6.6	6.2	6.2	8.8	5.5
Shape ELR	2h	22.6			22.6	23.4	23.4	21.2	27.2	28.6			28.5	28.7	29.1	26.2	31.6
	4h	28.6			28.3	29.1	30.1	40.1	39.2	32.5			32.4	32.5	32.9	37.4	38.5
	6h	49.1			49.0	49.1	49.1	48.4	48.7	47.8			47.6	47.4	47.7	47.4	47.9
	8h	49.3			49.4	49.2	49.4	49.0	49.3	48.5			48.6	48.4	48.6	49.0	49.3
Dynamic ELR	2h	43.4			43.4	43.6	43.6	31.7	38.6	42.1			42.0	42.2	42.4	34.3	40.0
	4h	36.9			36.6	38.1	37.0	42.6	40.9	35.9			33.9	34.8	35.0	38.5	39.6
	6h	49.4			49.5	50.0	49.9	48.6	49.2	48.6			48.3	48.4	48.7	47.7	48.4
	8h	49.0			49.3	50.0	50.0	48.9	50.0	48.3			49.0	49.7	49.6	49.3	49.9
Large hydro	Dynamic	50.0								48.0							
	Shape	48.8								47.5							

2023 RNA 2030 Base Case Capacity Value Results (MW) 100-MW incremental unit

Class	Subtype	ELCC								MRI							
		NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K	NY_C	NY_D	NY_E	NY_F	NY_G	NY_H	NY_J	NY_K
Thermal	5% EFOR	97.2			97.0	97.2	96.7	95.0	92.8	94.8			94.8	94.8	94.9	94.4	95.3
	10% EFOR	89.5			91.2	91.2	91.1	85.5	88.1	91.6			91.9	91.8	92.0	91.4	94.4
Biomass	Zone	71.2	57.6	58.9	61.0					73.6	57.8	61.7	59.9				
	Average	67.6	67.6	67.7	68.4					68.3	68.0	68.0	68.2				
Run of river	Zone	30.6	35.1	46.7	32.7	48.7				35.6	36.9	53.7	37.8	49.8			
	Average	36.3	36.3	36.5	36.9	35.9				39.2	39.2	39.6	37.8	36.9			
Onshore wind	Zone	15.1	20.3	15.8						18.0	24.3	24.0					
	Average	14.6	14.6	15.2						21.8	21.8	21.8					
Offshore wind	Zone							38.1	31.8							48.5	41.3
Solar	Zone	9.1			10.5	9.3	9.6	13.4	8.5	12.5			10.5	8.8	9.9	17.5	9.9
	Average	9.0			9.5	9.5	9.3	13.1	10.0	12.1			13.0	11.7	11.3	17.2	11.7
Shape ELR	2h	51.5			54.7	54.9	55.0	46.6	57.1	59.5			58.9	60.6	60.1	54.6	62.8
	4h	61.9			62.6	66.0	66.3	72.2	74.6	66.0			65.6	67.4	66.8	74.0	76.2
	6h	98.2			96.3	98.3	98.5	96.6	96.2	97.9			96.0	98.1	98.1	96.3	98.2
	8h	98.4			98.5	98.5	98.4	98.3	98.3	97.6			97.5	98.1	98.1	97.6	99.2
Dynamic ELR	2h	78.3			79.9	82.2	82.6	59.0	72.0	85.7			86.4	88.2	86.9	71.1	79.8
	4h	70.4			67.7	70.7	71.3	76.5	78.2	73.7			72.1	73.4	72.6	76.9	79.8
	6h	98.0			98.1	99.5	98.3	97.8	98.0	99.0			97.3	98.8	98.7	96.7	98.6
	8h	97.9			98.9	100.0	100.0	99.0	100.0	99.9			98.3	99.8	99.5	98.4	99.9
Large hydro	Dynamic	100.0								99.4							
	Shape	96.4								98.2							

9/30/2022

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- GE Industrial operating & Vertical earnings and EPS, which is operating earnings of our industrial businesses and the GE Capital businesses that we expect to retain.
- GE Industrial & Verticals revenues, which is revenue of our industrial businesses and the GE Capital businesses that we expect to retain.
- Industrial segment organic revenue, which is the sum of revenue from all of our industrial segments less the effects of acquisitions/dispositions and currency exchange.
- Industrial segment organic operating profit, which is the sum of segment profit from all of our industrial segments less the effects of acquisitions/dispositions and currency exchange.
- Industrial cash flows from operating activities (Industrial CFOA), which is GE's cash flow from operating activities excluding dividends received from GE Capital.
- Capital ending net investment (ENI), excluding liquidity, which is a measure we use to measure the size of our Capital segment.
- GE Capital Tier 1 Common ratio estimate is a ratio of equity