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businesses running  
and communities strong

# 2014 Economic Planning Study Results

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ATC Economic Planning

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# Introduction

- **Economic Planning Analysis Metrics**
  - Customer Benefit Metric
  - Loss Evaluation – Not Available
- **Project Review**
  - Point Beach 345 kV area
  - Janesville 138 kV area
- **Project Analysis and Results**

# PROMOD Energy Benefits Description

- PROMOD used to analyze 2024 study year
- Difference analysis performed to determine project savings
- All Futures analyzed using ATC Customer Benefit (CB) Metric:

Settlements Format for CB Metric

- Load Pays local Locational Marginal Price (LMP)
- Generator Revenues Received at local Gen LMP
- + Cost of Utility Generation (Production Cost)
- FTR Revenue to the Utility
- Loss Refund Revenues for over-collection
- = Impact to Ratepayers



# Customer Benefit Metric Components

## Customer Benefit Metric Components:

- Net Production Cost excluding IPPs within ATC
- IPP Purchase Cost to Utilities
- Import Cost
- Export Revenue
- Congestion Cost
- Revenue from Existing External FTRs
- ATC Internal FTR Value
- Marginal Loss Cost
- Loss Refund on Internal Transactions and Imports
- “Credit” for Losses Already Captured in Production Cost
- Cost of Load Changes due to Losses
- Cost due to CO<sub>2</sub> Emissions (CO<sub>2</sub> Tax)

# Loss Savings Description

- Loss evaluation is an important component of economic project analysis
- PROMOD difference analysis performed to determine system loss savings (\$)
  - Loss savings (MWHrs) calculated from PROMOD
  - Economic value of loss savings determined by pricing losses (MWHrs) at PROMOD area LMPs (\$/MWHrs)
- ATC is currently working to update internal tools that are used to perform this analysis
- ATC does not use losses as a sole determinant when evaluating the benefits of a project

# ATC 2024 – Analysis Results

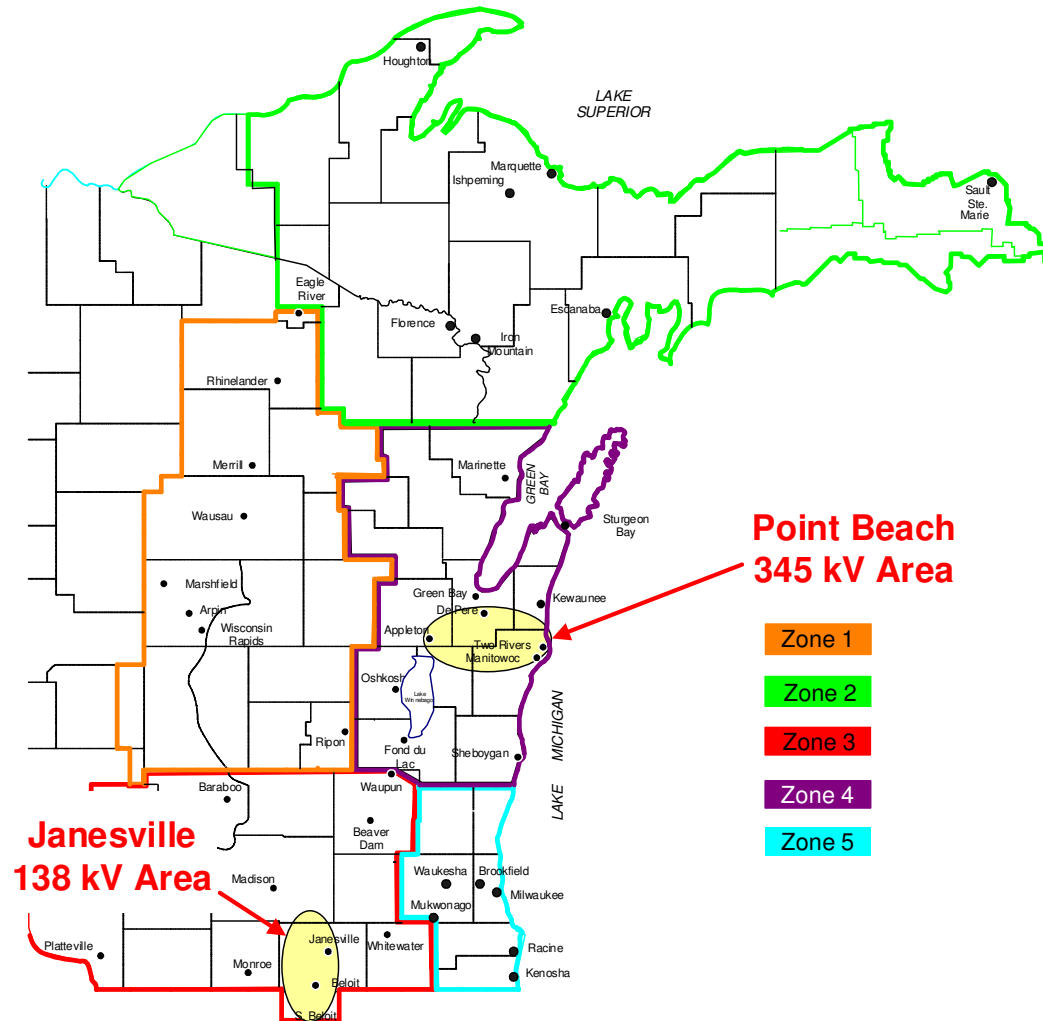
- **Single-Year PROMOD Savings**
  - Shown in Millions of Dollars for 2024 (\$M – 2024)
  - Savings based on difference analysis using Customer Benefit Metric
- **40-Year PROMOD Savings**
  - Shown in Millions of Dollars for 2015 (\$M – 2015)
  - Savings based on difference analysis using Customer Benefit Metric
  - Calculations based on:
    - Assumed 40-Year Economic Life of Project
    - 3.0% Inflation Rate
    - 6.7% Nominal Discount Rate

# ATC 2024 – PROMOD Modeling Updates

- ATC's Economic Planning Team strives to use the most accurate and updated modeling assumptions
- Updates made to MISO MTEP models:
  - Removed portions of Barnhart-Branch River Project
  - Update small distributed generation mapping
  - Generation Shift and Public Policy Future – correct RRF mapping
  - Updated generation characteristics
  - Updated generation maintenance schedules
  - Updated non-conforming and non-scalable load profiles
  - Added 676 Distributed Resources to model future potential EE and DR (totaling 6,653 MW)

ATC 2014 Economic Planning Analysis – Potential Study Areas

Constrained Area
Point Beach 345 kV Area
Janesville 138 kV Area



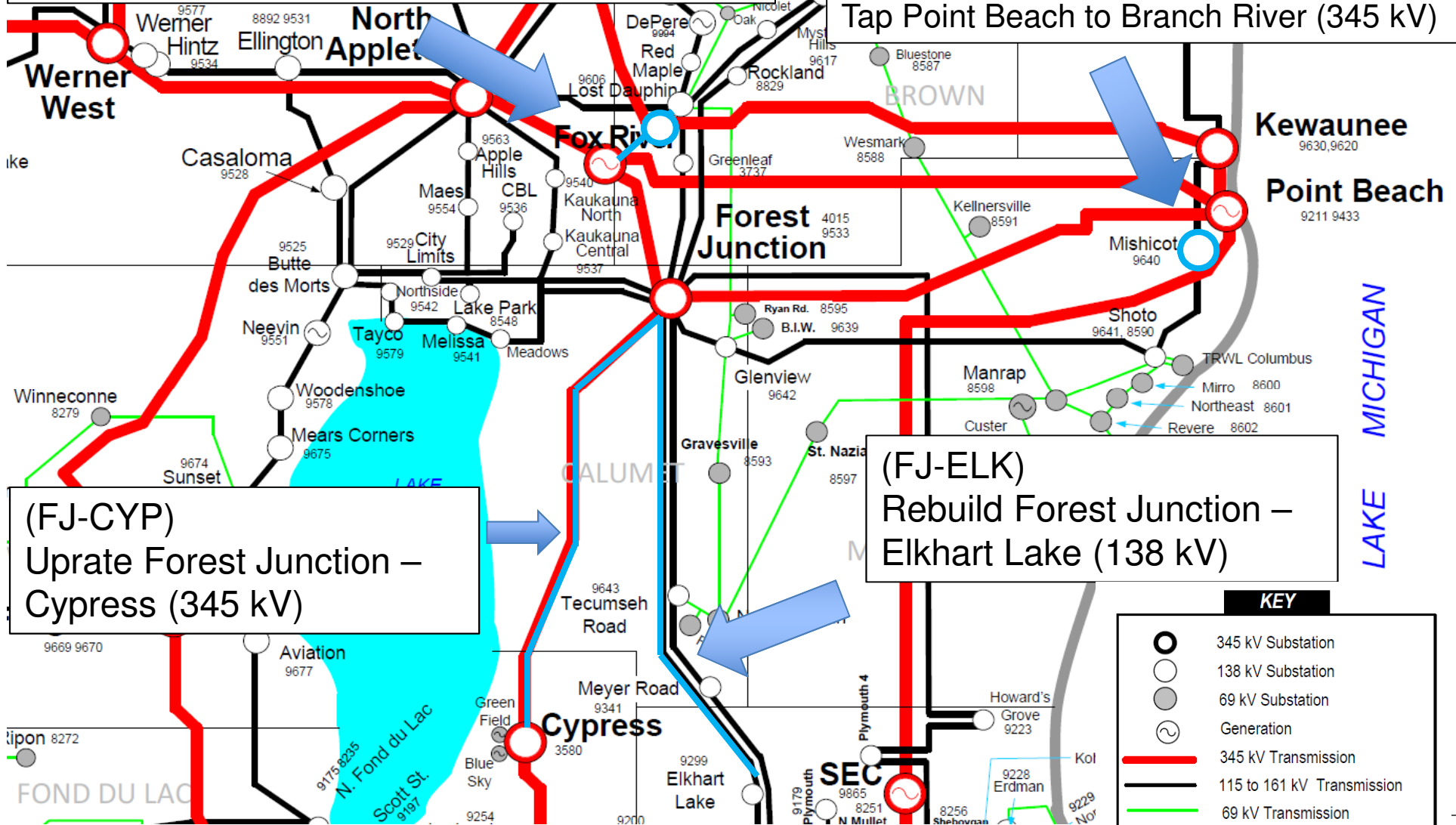


# Point Beach Area Study - Alternatives

- Rebuild Forest Junction – Elkhart Lake 138 kV line
  - Replace old, low rated line
- Uprate Forest Junction – Cypress 345 kV line
  - Relieve slight congestion on south flow
- Build line from Fox River to Lost Dauphin and tap North Appleton – Kewaunee 345 kV line
  - Relieve congestion from loss of Kewaunee – Point Beach 345 kV
- Install 345/138 kV transformer at Mishicot and tap Point Beach – Branch River 345 kV line
  - Relieve congestion from loss of Kewaunee – Point Beach 345 kV

(FOX-LD) Tap Kewaunee – N. Appleton (345 kV)  
 Create 345 kV bus at Lost Dauphin  
 Create 345 kV Line from Fox River to Lost Dauphin

(MISH) Add 345/138 kV Transformer  
 at Mishicot.  
 Tap Point Beach to Branch River (345 kV)

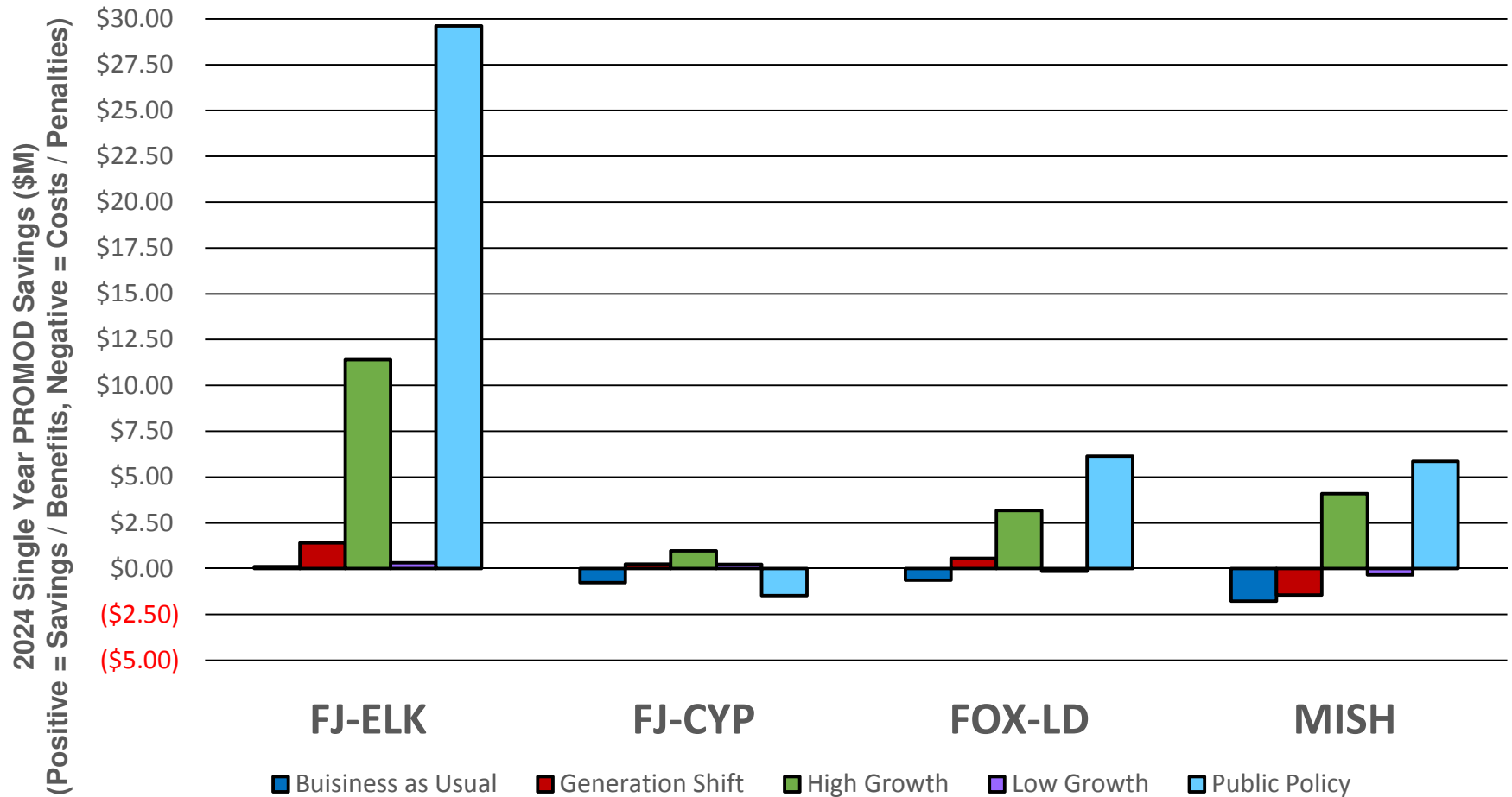


(FJ-CYP)  
 Uprate Forest Junction –  
 Cypress (345 kV)

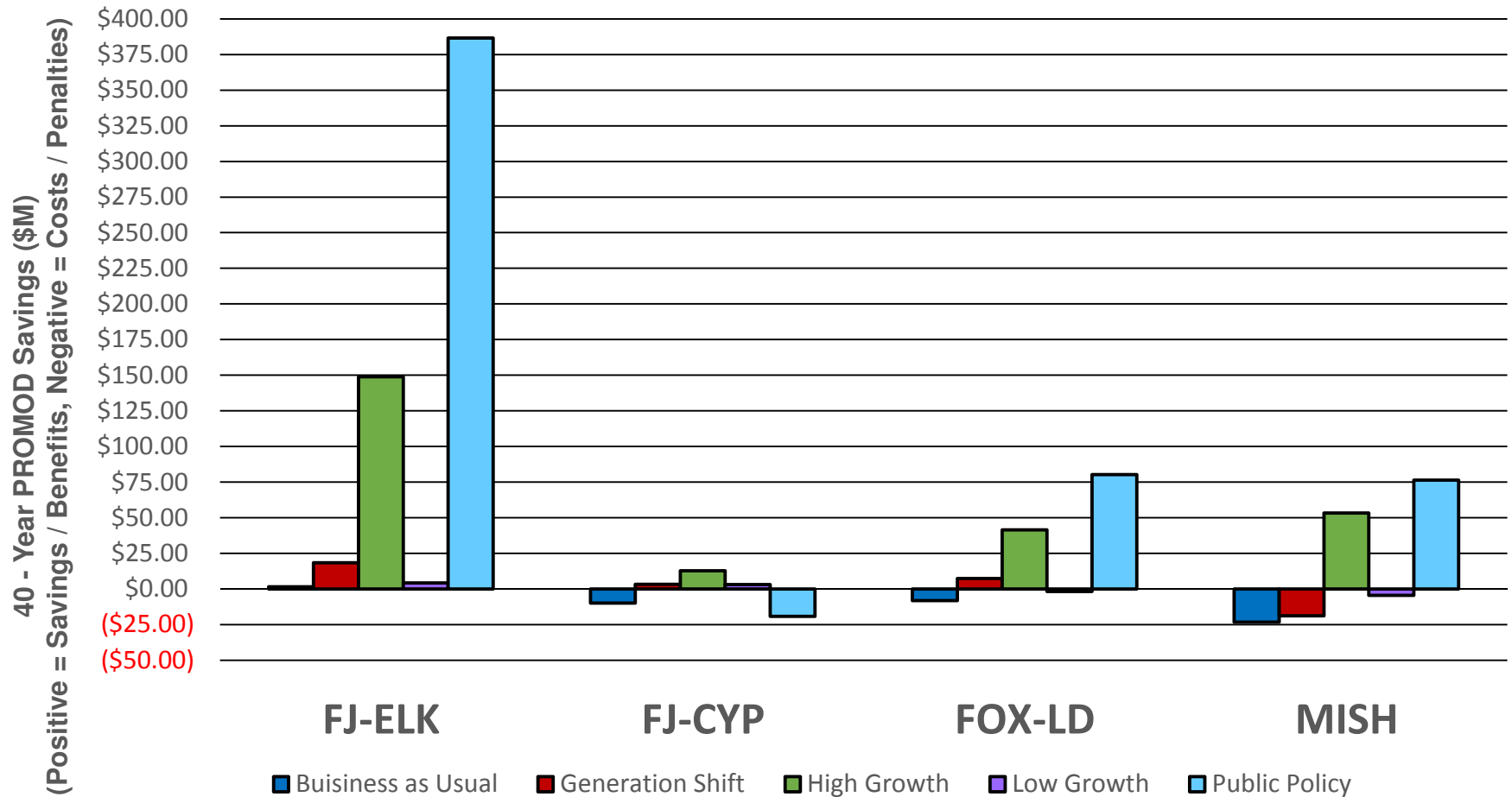
(FJ-ELK)  
 Rebuild Forest Junction –  
 Elkhart Lake (138 kV)



# 2024 Single Year Benefits Point Beach Study Alternatives



# 40 Year Benefits Point Beach Study Alternatives



# Point Beach 345 kV Area Congestion Summary – Business As Usual

<b>Legend</b> (Congestion Reduction)
No Congestion in Current Future

<b>2024 Business As Usual Future</b>								
Constraints	Annual Binding Hours Change				Annual Shadow Price (\$k) Change			
	FJ - ELK	FJ - CYP	FOX - LD	MISH	FJ - ELK	FJ - CYP	FOX - LD	MISH
Elkhart Lake – Forest Junction (138 kV)	(198)	1	3	(10)	(\$16.08)	\$1.55	\$1.20	(\$0.32)
Cypress - Arcadian (345 kV)	28	11	3	2	\$0.50	\$0.15	\$0.05	(\$0.26)
Werner West - N. Appleton (345 kV)	(2)	(2)	11	17	\$0.00	\$0.01	\$0.01	\$0.08
Forest Junction - Fox River (345 kV)	18	3	(26)	144	\$0.23	\$0.09	(\$0.54)	\$3.07
Cypress - Forest Junction (345 kV)	10	(12)	4	(4)	\$0.05	(\$0.49)	\$0.01	(\$0.15)
N. Appleton - Fox River (345 kV)	(1)	(1)	(94)	(86)	\$0.04	\$0.08	(\$0.42)	(\$0.38)
Kewaunee - Point Beach (345 kV)	0	0	(24)	(24)	\$0.03	\$0.03	(\$0.35)	(\$0.35)
Lost Dauphin - Red Maple (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Mirro - Northeast (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Henry St. - Danz Ave. (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Tecumseh Rd. (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Lake Park (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00



# Point Beach 345 kV Area Congestion Summary – Generation Shift

<b>Legend</b> (Congestion Reduction)
No Congestion in Current Future

<b>2024 Generation Shift Future</b>								
Constraints	Annual Binding Hours Change				Annual Shadow Price (\$k) Change			
	FJ - ELK	FJ - CYP	FOX - LD	MISH	FJ - ELK	FJ - CYP	FOX - LD	MISH
Elkhart Lake – Forest Junction (138 kV)	(322)	3	8	(37)	(\$31.66)	(\$0.47)	\$2.13	(\$1.78)
Cypress - Arcadian (345 kV)	32	7	0	(7)	\$0.83	\$0.34	\$0.10	(\$0.30)
Werner West - N. Appleton (345 kV)	1	1	5	6	\$0.01	\$0.01	\$0.03	\$0.03
Forest Junction - Fox River (345 kV)	8	3	(13)	266	\$0.09	\$0.00	(\$0.16)	\$5.90
Cypress - Forest Junction (345 kV)	18	(22)	(1)	(5)	\$0.29	(\$0.36)	\$0.01	(\$0.09)
N. Appleton - Fox River (345 kV)	15	19	(150)	(113)	\$0.05	\$0.11	(\$1.51)	(\$1.18)
Kewaunee - Point Beach (345 kV)	0	0	(8)	(8)	\$0.00	(\$0.01)	(\$0.12)	(\$0.12)
Lost Dauphin - Red Maple (138 kV)	36	3	1	22	\$0.15	\$0.01	(\$0.01)	\$0.07
Mirro - Northeast (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Henry St. - Danz Ave. (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Tecumseh Rd. (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Lake Park (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00



# Point Beach 345 kV Area Congestion Summary – High Growth

<b>Legend</b> (Congestion Reduction)
No Congestion in Current Future
Only in HG and PP Futures

<b>2024 High Growth Future</b>								
Constraints	Annual Binding Hours Change				Annual Shadow Price (\$k) Change			
	FJ - ELK	FJ - CYP	FOX - LD	MISH	FJ - ELK	FJ - CYP	FOX - LD	MISH
Elkhart Lake – Forest Junction (138 kV)	(1,439)	8	0	(21)	(\$275.58)	\$9.09	\$6.37	\$5.03
Cypress - Arcadian (345 kV)	282	34	0	(13)	\$13.40	\$2.43	\$0.04	(\$1.28)
Werner West - N. Appleton (345 kV)	(16)	(7)	89	92	(\$0.17)	(\$0.14)	\$1.90	\$2.16
Forest Junction - Fox River (345 kV)	0	0	0	6	\$0.00	\$0.00	\$0.00	\$0.16
Cypress - Forest Junction (345 kV)	420	(76)	2	(16)	\$13.40	(\$5.19)	(\$0.22)	(\$0.84)
N. Appleton - Fox River (345 kV)	(103)	(8)	(377)	(324)	(\$2.72)	(\$0.04)	(\$6.03)	(\$5.38)
Kewaunee - Point Beach (345 kV)	1	0	(4)	(4)	\$0.05	\$0.02	(\$0.06)	(\$0.06)
Lost Dauphin - Red Maple (138 kV)	52	8	6	4	\$0.24	\$0.01	(\$0.02)	(\$0.04)
Mirro - Northeast (69 kV)	(1)	2	2	3	(\$0.02)	(\$0.01)	\$0.00	\$0.38
Henry St. - Danz Ave. (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Tecumseh Rd. (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Lake Park (138 kV)	0	0	1	0	\$0.00	\$0.00	\$0.00	\$0.00



# Point Beach 345 kV Area Congestion Summary – Low Growth

<b>Legend</b> (Congestion Reduction)
No Congestion in Current Future

2024 Low Growth Future								
Constraints	Annual Binding Hours Change				Annual Shadow Price (\$k) Change			
	FJ - ELK	FJ - CYP	FOX - LD	MISH	FJ - ELK	FJ - CYP	FOX - LD	MISH
Elkhart Lake – Forest Junction (138 kV)	(21)	0	4	1	(\$0.79)	(\$0.04)	\$0.15	\$0.04
Cypress - Arcadian (345 kV)	(1)	0	2	(1)	(\$0.01)	\$0.00	\$0.01	(\$0.02)
Werner West - N. Appleton (345 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Fox River (345 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Cypress - Forest Junction (345 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
N. Appleton - Fox River (345 kV)	0	(1)	(4)	(4)	\$0.00	\$0.00	(\$0.02)	(\$0.02)
Kewaunee - Point Beach (345 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Lost Dauphin - Red Maple (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Mirro - Northeast (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Henry St. - Danz Ave. (69 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Tecumseh Rd. (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Forest Junction - Lake Park (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00





# Point Beach 345 kV Area Congestion Summary – Public Policy

<b>Legend</b> (Congestion Reduction)	No Congestion in Current Future
	Only in HG and PP Futures
	Only in PP Future

<b>2024 Public Policy Future</b>								
Constraints	Annual Binding Hours Change				Annual Shadow Price (\$k) Change			
	FJ - ELK	FJ - CYP	FOX - LD	MISH	FJ - ELK	FJ - CYP	FOX - LD	MISH
Elkhart Lake – Forest Junction (138 kV)	(3,841)	342	(44)	152	(\$1,222.15)	\$119.73	(\$16.32)	\$38.69
Cypress - Arcadian (345 kV)	859	102	41	(97)	\$61.81	\$2.83	\$1.00	(\$5.32)
Werner West - N. Appleton (345 kV)	(36)	0	63	64	(\$1.42)	(\$0.28)	\$1.31	\$1.26
Forest Junction - Fox River (345 kV)	7	2	(14)	39	\$0.18	\$0.02	(\$0.27)	\$0.85
Cypress - Forest Junction (345 kV)	812	(523)	49	(47)	\$59.25	(\$26.34)	\$2.12	(\$5.00)
N. Appleton - Fox River (345 kV)	(117)	30	(438)	(343)	(\$3.47)	\$0.30	(\$9.37)	(\$8.20)
Kewaunee - Point Beach (345 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Lost Dauphin - Red Maple (138 kV)	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00
Mirro - Northeast (69 kV)	(5)	1	(1)	6	(\$0.02)	\$0.08	\$0.06	\$0.32
Henry St. - Danz Ave. (69 kV)	539	(10)	(38)	(23)	\$77.69	(\$0.74)	(\$13.10)	(\$20.99)
Forest Junction - Tecumseh Rd. (138 kV)	6	0	0	0	\$1.17	\$0.00	\$0.00	\$0.00
Forest Junction - Lake Park (138 kV)	0	0	3	0	\$0.00	\$0.00	\$0.78	\$0.00



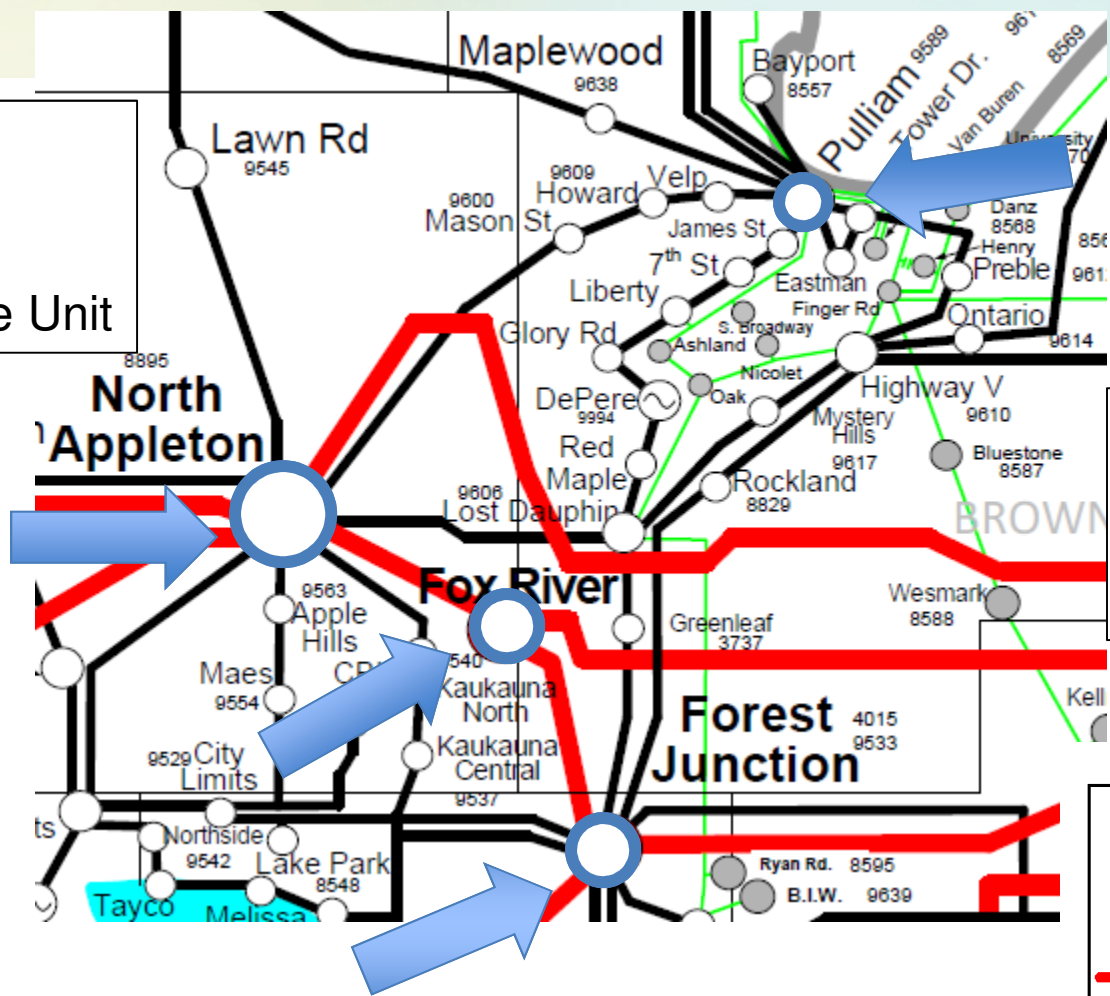
# Units added in HG and/or PP futures

Each unit is modeled as a 600 MW Combined Cycle Unit

2 Units at N. Appleton

Only PP future

Total 3000 MW of new generation in PP future in the Point Beach Area



KEY	
○ (with center dot)	345 kV Substation
○ (empty)	138 kV Substation
● (grey)	69 kV Substation
⊗	Generation
— (thick red)	345 kV Transmission
— (black)	115 to 161 kV Transmission
— (green)	69 kV Transmission



# New Generation

Existing Generation	
Unit	MW
Fox Energy	672
Point Beach 1	617
Point Beach 2	617
Pulliam 7	86
Pulliam 8	134
Pulliam G31	108
<b>Total</b>	<b>2234</b>

New Generation	
Unit	MW
Expansion CC Unit (Fox River)	600
Expansion CC Unit (Forest Junction)	600
Expansion CC Unit (Pulliam)	600
Expansion CC Unit 1 (N. Appleton)	600
Expansion CC Unit 2 (N. Appleton)	600
<b>Total</b>	<b>3000</b>

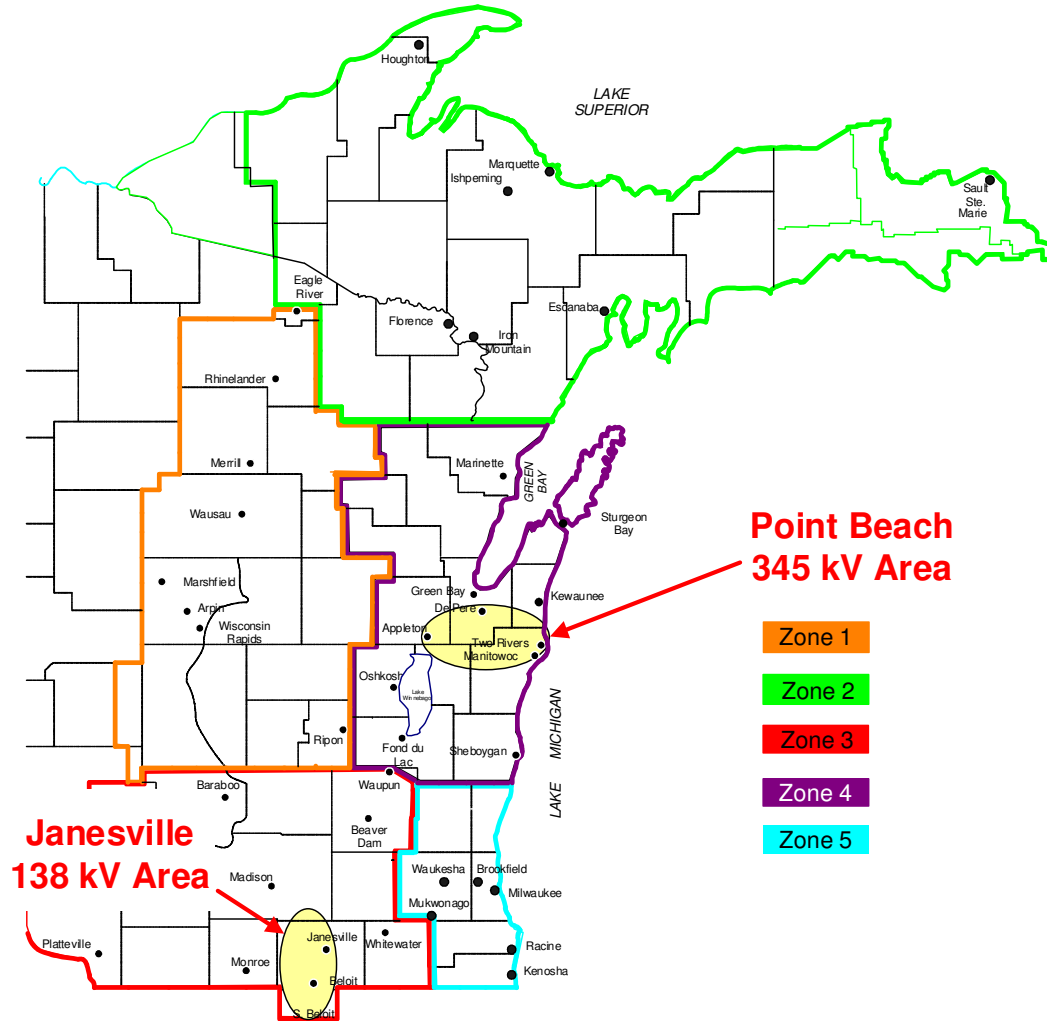
The generation is essentially doubled in the High Growth and Public Policy futures in the Point Beach area.

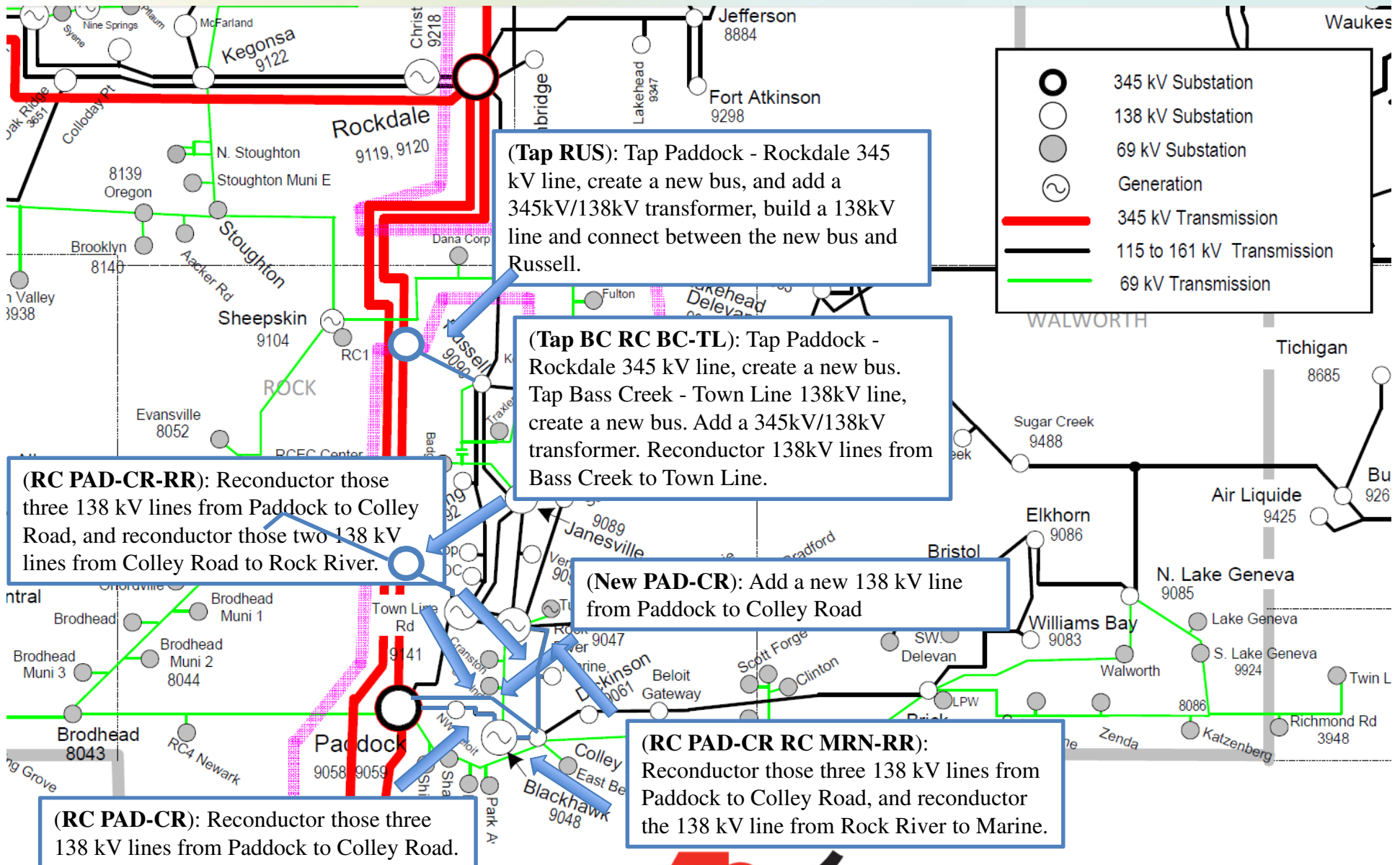
# Point Beach 345 kV Area Conclusions

- Congestion is relatively small in the area
  - Except in HG and PP futures
- Transmission solutions may be needed if future generation expansion occurs in the study area
  - Congestion will depend on placement of new generation

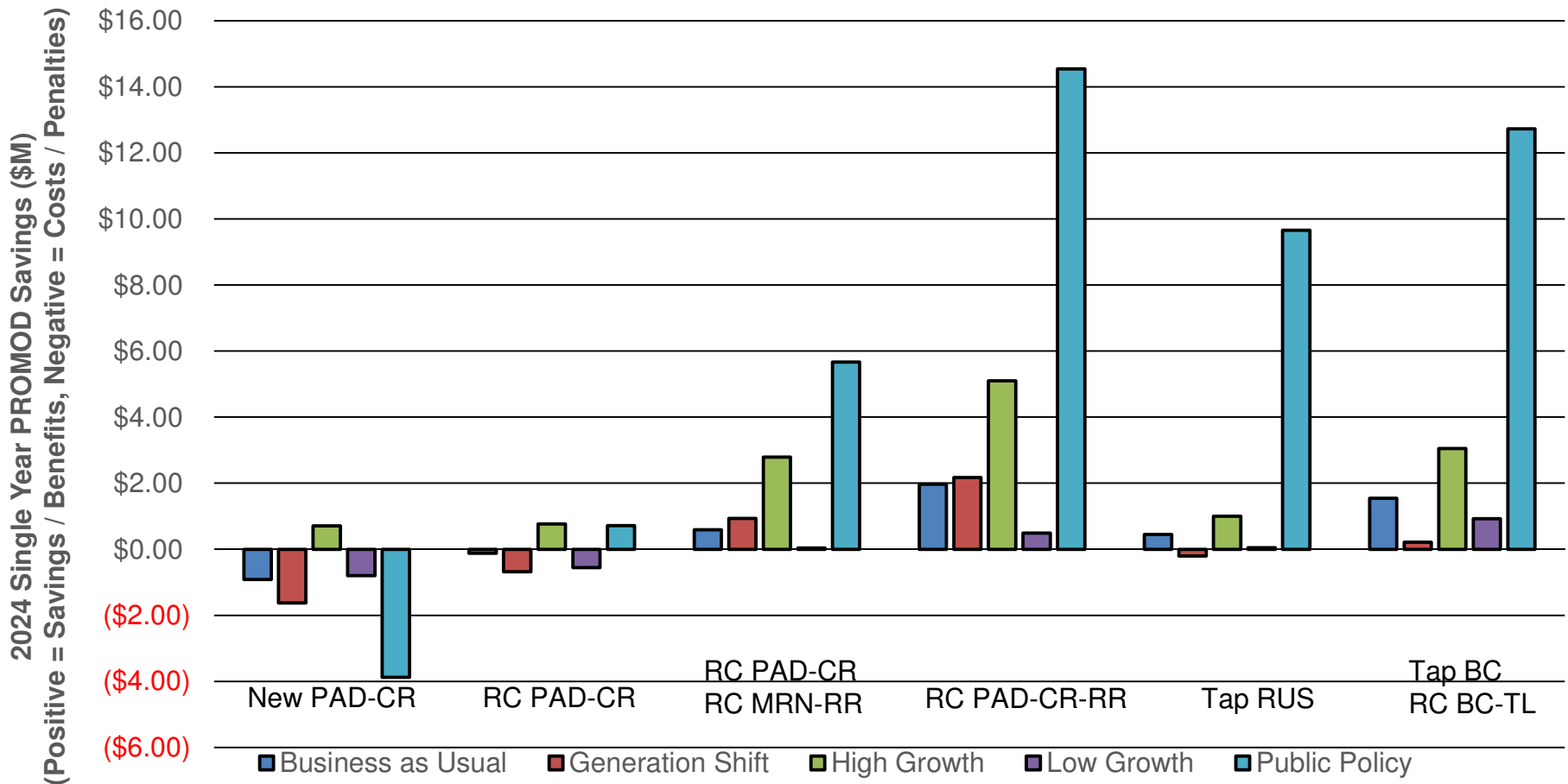
ATC 2014 Economic Planning Analysis – Potential Study Areas

Constrained Area
Point Beach 345 kV Area
Janesville 138 kV Area

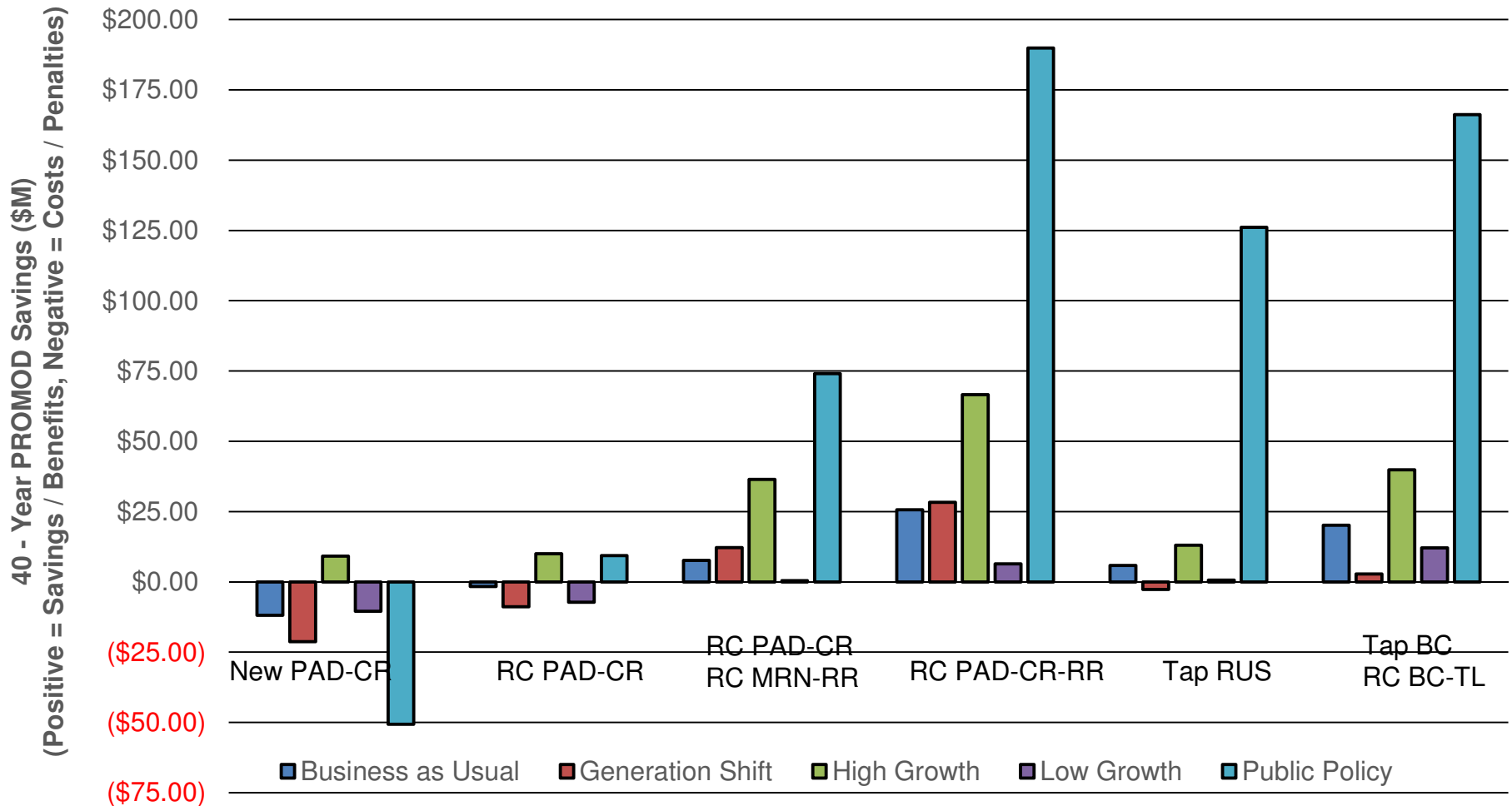




# 2024 Single Year Benefits Janesville Study Alternatives



# 40 Year Benefits Janesville Study Alternatives





# Janesville 138 kV Area Congestion Summary – Business As Usual

**Legend**  
(Congestion Reduction)

2024 Business As Usual Future												
Constraints	Annual Binding Hours Change						Annual Shadow Price (\$k) Change					
	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL
Rock River – Marine (138 kV)	135	13	(654)	(654)	(358)	(533)	(\$4.02)	(\$1.23)	(\$22.4)	(\$22.4)	(\$1.67)	(\$9.03)
Rock River – Townline (138 kV)	(15)	0	21	10	(3)	(15)	(\$0.17)	\$0.04	\$0.32	\$0.12	(\$0.03)	\$0.29
North Lake Geneva – Elkhart (138 kV)	1	0	1	2	1	0	\$0.00	\$0.00	\$0.00	\$0.06	\$0.00	\$0.00
Colley Road – Marine (138 kV)	0	0	360	0	0	0	\$0.00	\$0.00	\$8.28	\$0.00	\$0.00	\$0.00
Blackhawk – Colley Road (138 kV)	(1)	(1)	(1)	(1)	(1)	(1)	(\$0.07)	(\$0.07)	(\$0.07)	(\$0.07)	(\$0.07)	(\$0.07)
Colley Road 138/69 kV Transformer	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00



# Janesville 138 kV Area Congestion Summary – Generation Shift

**Legend**  
(Congestion Reduction)

2024 Generation Shift Future												
Constraints	Annual Binding Hours Change						Annual Shadow Price (\$k) Change					
	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL
Rock River – Marine (138 kV)	186	(3)	(901)	(901)	(361)	(544)	(\$17.43)	(\$1.93)	(\$45.28)	(\$45.28)	\$8.05	(\$2.41)
Rock River – Townline (138 kV)	(7)	2	66	134	(4)	(5)	(\$0.33)	(\$0.03)	\$2.32	\$3.05	(\$0.24)	\$0.13
North Lake Geneva – Elkhart (138 kV)	9	0	1	4	(1)	0	\$0.37	\$0.03	\$0.12	\$0.23	(\$0.02)	(\$0.03)
Colley Road – Marine (138 kV)	0	0	580	0	0	0	\$0.00	\$0.00	\$17.02	\$0.00	\$0.00	\$0.00
Blackhawk – Colley Road (138 kV)	(4)	(4)	(4)	(4)	(4)	(4)	(\$0.24)	(\$0.24)	(\$0.24)	(\$0.24)	(\$0.24)	(\$0.24)
Colley Road 138/69 kV Transformer	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00



# Janesville 138 kV Area Congestion Summary – High Growth

**Legend**  
(Congestion Reduction)

2024 High Growth Future												
Constraints	Annual Binding Hours Change						Annual Shadow Price (\$k) Change					
	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL
Rock River – Marine (138 kV)	248	30	(1109)	(1109)	(526)	(660)	(\$27.49)	(\$3.70)	(\$63.82)	(\$63.82)	\$5.48	(\$8.39)
Rock River – Townline (138 kV)	25	5	136	106	(9)	4	\$0.03	\$0.41	\$3.55	\$1.97	(\$0.36)	\$0.43
North Lake Geneva – Elkhart (138 kV)	5	1	3	15	0	0	\$0.69	\$0.00	\$0.08	\$1.41	\$0.00	\$0.00
Colley Road – Marine (138 kV)	0	0	527	0	0	0	\$0.00	\$0.00	\$15.20	\$0.00	\$0.00	\$0.00
Blackhawk – Colley Road (138 kV)	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Colley Road 138/69 kV Transformer	2	0	0	1	0	0	\$0.38	\$0.00	\$0.00	\$0.13	\$0.00	\$0.00



# Janesville 138 kV Area Congestion Summary – Low Growth

**Legend**  
(Congestion Reduction)

2024 Low Growth Future												
Constraints	Annual Binding Hours Change						Annual Shadow Price (\$k) Change					
	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL
Rock River – Marine (138 kV)	63	(1)	(387)	(387)	(208)	(321)	(\$1.32)	(\$0.67)	(\$9.42)	(\$9.42)	(\$1.71)	(\$5.93)
Rock River – Townline (138 kV)	(8)	3	11	8	(3)	(12)	(\$0.14)	\$0.05	\$0.16	\$0.03	(\$0.11)	(\$0.17)
North Lake Geneva – Elkhart (138 kV)	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Colley Road – Marine (138 kV)	0	0	231	0	0	0	\$0.00	\$0.00	\$3.26	\$0.00	\$0.00	\$0.00
Blackhawk – Colley Road (138 kV)	(4)	(4)	(4)	(4)	(4)	(4)	(\$0.10)	(\$0.10)	(\$0.10)	(\$0.10)	(\$0.10)	(\$0.10)
Colley Road 138/69 kV Transformer	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00



# Janesville 138 kV Area Congestion Summary – Public Policy

**Legend**  
(Congestion Reduction)

2024 Public Policy Future												
Constraints	Annual Binding Hours Change						Annual Shadow Price (\$k) Change					
	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL	New PAD-CR	RC PAD-CR	RC PAD-CR MRN-RR	RC PAD-CR-RR	Tap RUS	Tap BC RC BC-TL
Rock River – Marine (138 kV)	390	21	(3304)	(3304)	(1809)	(2835)	(\$21.69)	(\$5.52)	(\$149.03)	(\$149.03)	(\$44.37)	(\$101.38)
Rock River – Townline (138 kV)	(10)	0	53	17	12	(11)	(\$0.62)	(\$0.07)	\$0.92	(\$0.03)	\$0.12	\$0.40
North Lake Geneva – Elkhart (138 kV)	11	7	3	1	(6)	(10)	\$0.39	\$0.25	\$0.06	\$0.13	\$0.05	(\$0.14)
Colley Road – Marine (138 kV)	0	0	2292	0	0	0	\$0.00	\$0.00	\$70.87	\$0.00	\$0.00	\$0.00
Blackhawk – Colley Road (138 kV)	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Colley Road 138/69 kV Transformer	0	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00



# Janesville 138 kV Area Conclusions

- Benefits exist in the area, but may not outweigh the costs of projects
- More precise modeling of proposed Alliant generation may impact benefits

# Questions?

## ATC Economic Planning

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Thank you for your time!

