
Indiana Michigan Power: 2021 Integrated Resource Plan *Public Stakeholder Meeting #3B*

October 14, 2021

Presented via GoToWebinar --> <https://attendee.gotowebinar.com/register/1321120812922892812>

BOUNDLESS ENERGYSM

Agenda



Time		
9:30 a.m.	WELCOME AND SAFETY MOMENT	Andrew Williamson, I&M Director Regulatory Services
9:35 a.m.	MEETING GUIDELINES AND AGENDA	Jay Boggs, Siemens PTI
9:40 a.m.	CANDIDATE PORTFOLIO DEVELOPMENT	Art Holland, Siemens PTI & Peter Berini, Siemens PTI
10:00 a.m.	REFERENCE CASE RESULTS	Art Holland, Siemens PTI & Peter Berini, Siemens PTI
11:00 a.m.	BREAK	
11:15 a.m.	SENSITIVITY RESULTS	Art Holland, Siemens PTI & Peter Berini, Siemens PTI
12:30 p.m.	LUNCH	
1:30 p.m.	ALIGNMENT DISCUSSION	Art Holland, Siemens PTI
2:15 p.m.	STAKEHOLDER NEXT STEPS	Jay Boggs, Siemens PTI
2:30 p.m.	CLOSING DISCUSSION	Andrew Williamson, I&M Director Regulatory Services
3:00 p.m.	ADJOURN	

WELCOME AND SAFETY MOMENT

Andrew Williamson | I&M Director Regulatory Services

6 TIPS FOR A *Healthy Autumn*

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1 PREVENT THE FLU
Get vaccinated each year in the fall. Stay home if you get sick.
- 

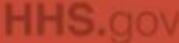
2 GET SMART ABOUT ANTIBIOTICS
The common cold and the flu are viral infections, so avoid using antibiotics.
- 

3 TEST AND REPLACE BATTERIES
Check or replace carbon monoxide batteries twice a year, smoke detectors once a year.
- 

4 HAVE A SAFE AND HEALTHY HALLOWEEN
Make festivities fun, safe, and healthy for trick-or-treaters and party guests.
- 

5 WASH YOUR HANDS
Avoid getting sick and spreading germs - wash your hands with soap for at least 20 seconds.
- 

6 KEEP SEASONAL FOOD SAFE
Separate foods to avoid cross-contamination. Cook to proper temperatures.

 HHS.gov

MEETING GUIDELINES AND TIMELINE

Jay Boggs | Siemens PTI

Questions and Feedback

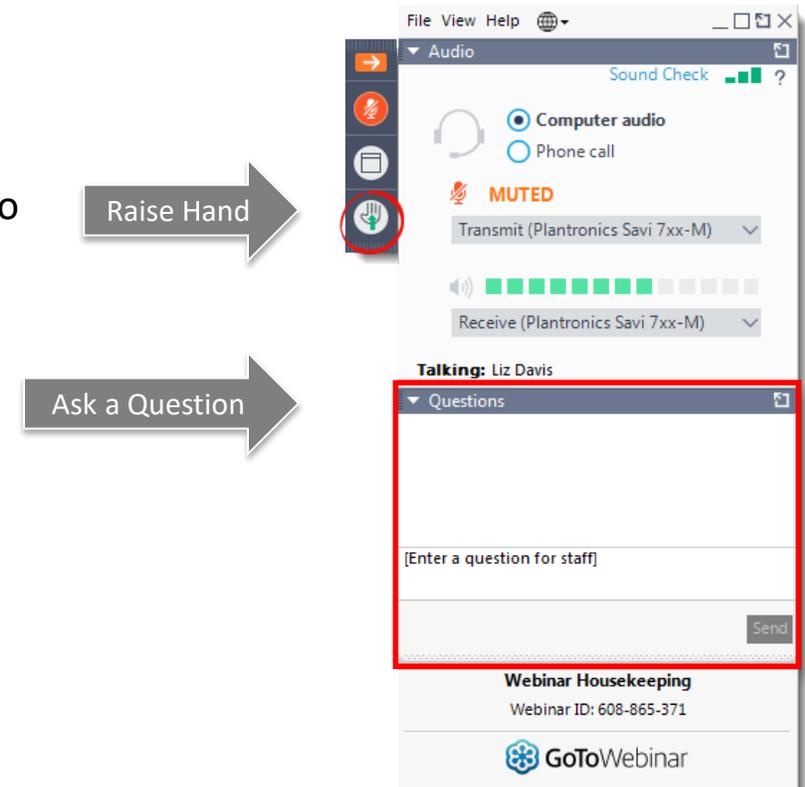
One purpose of today's presentation is to explain the IRP process and collect feedback from stakeholders. Stakeholder feedback will be posted on the I&M website IRP portal and will be considered as part of the Final IRP.

If you have a question about the IRP process during this presentation:

- Type your question in the Questions area of the GoToWebinar panel
- During the feedback and discussion portions of the presentations, please raise your hand via the GoToMeeting tool to be recognized. We plan to hear from all who wish to be heard and address all questions
- Any questions that cannot be answered during the call will be addressed and posted on the website above

If you would like to make a comment or ask a question about the IRP process after the presentation has concluded:

- Please send an email to I&MIRP@aep.com
- Stay informed about future events by visiting the I&M IRP Portal located at www.indianamichiganpower.com/info/projects/IntegratedResourcePlan

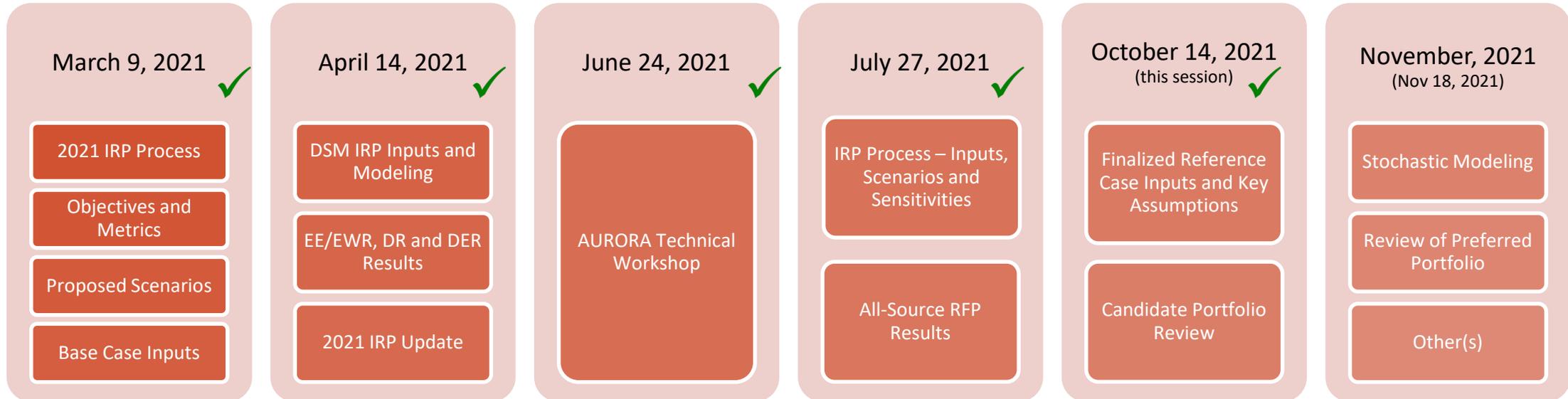


Guidelines



1. Due to the number of participants scheduled to join today’s meeting, all will be in a “listen-only” mode by default.
2. Please enter questions at any time into the GoToWebinar portal. This is the best to way to ensure your question is answered. We will attempt to answer all questions during the session, time permitting.
3. Time has been allotted during the session to answer questions related to the materials presented. Unanswered questions will be addressed after the presentation and posted in accordance with the Questions and Feedback slide.
4. At the end of the presentation, we will open-up the floor for “clarifying questions,” thoughts, ideas, and suggestions.
5. Please provide your feedback or any additional questions on the Stakeholder Meeting #3B presentation within ten business days of the conclusion of this meeting.

Stakeholder Timelines



All-Source RFP Timeline (completed)



Art Holland, Peter Berini, Siemens PTI

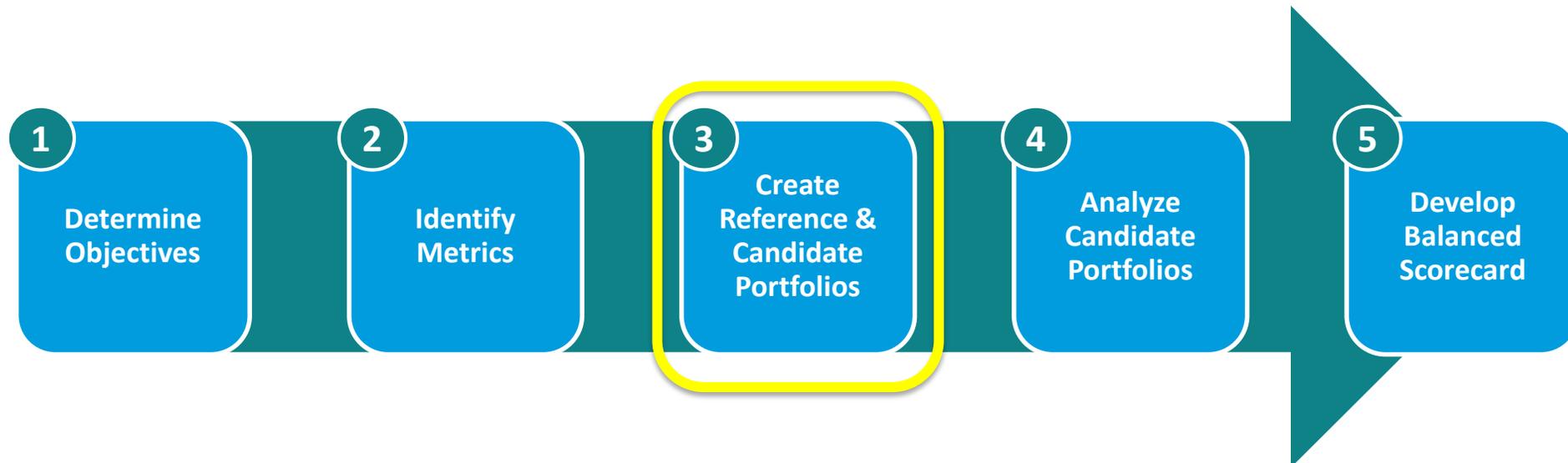
CANDIDATE PORTFOLIO DEVELOPMENT

Candidate Portfolio Development

Important Considerations

Siemens PTI applies the following 5-Step process for modeling, analyzing, and reporting the **Reference Portfolio** and **Candidate Portfolios** related to the AEP I&M IRP. The focus of Stakeholder Meeting 3B will be on results from **Step 3: Create Reference & Candidate Portfolios** of the process.

Siemens PTI: Approach to Integrated Resource Plan Modeling



Candidate Portfolio Development

Reference Case Fundamental Drivers and Resource Options



Input	Unit	2021	2023	2025	2027	2029	2031	2033	2035	2037	2039	2041
Coal (PRB)	2019\$/MMBtu	0.68	0.67	0.68	0.68	0.68	0.68	0.68	0.69	0.70	0.70	0.70
CO2	2019\$/ton	0.00	0.00	0.00	0.00	11.12	11.38	11.67	11.98	12.28	12.58	12.89
Gas (Henry Hub)	2019\$/MMBtu	2.49	2.52	2.84	3.23	3.33	3.24	3.32	3.36	3.40	3.44	3.44
I&M PJM Obligation	MW	3,939	3,994	3,864	3,876	3,904	3,928	3,960	3,548	3,580	3,540	3,573
DG Solar	MW	0.0	1.1	1.7	2.7	4.4	7.3	12.2	20.2	32.7	50.2	71.1
EV Peak Load	MW	2	4	7	10	14	22	37	64	111	196	285
Wind (200 MW)	2019\$/kW	1,449	1,393	1,333	1,269	1,202	1,158	1,139	1,120	1,101	1,082	1,062
Solar Tier 1 (50 MW)	2019\$/kW	1,181	1,087	993	954	854	797	783	769	754	740	726
Solar Tier 2 (50 MW)	2019\$/kW	1,350	1,243	1,135	1,090	977	911	895	879	862	846	830
Solar + Storage (100MW/ 20MW)	2019\$/kW	1,535	1,373	1,214	1,177	1,066	1,000	979	958	937	915	894
Li-Ion Battery (50MW)	2019\$/kW	1,319	1,145	971	898	826	780	760	741	721	701	681
Gas CC (1,070 MW)	2019\$/kW	1,031	1,009	985	973	965	957	948	942	936	930	925
Gas CC (440 MW)	2019\$/kW	1,097	1,073	1,048	1,035	1,027	1,018	1,009	1,003	996	990	984
Gas CT (250 MW)	2019\$/kW	738	726	705	694	688	681	675	670	666	662	658

Note: The costs represent installed cost of resources in \$2019. Renewable and conventional resources are informed by the Renewable RfP, the All-Source RfP and EIA Reports.

Candidate Portfolio Development

Generating Resources



Unit	Fuel	Installed Capacity (MW)	2024	2028	2034	2037	2041
Cook 1	Nuclear	1,084			Retirement		
Cook 2	Nuclear	1,204				Retirement	
Rockport 1	Coal	1,320		Retirement			
Rockport 2	Coal	650	Retirement				
Berrien Springs 1-12	Hydro	7.2				Owned Resource for 7.2 MW through 2041	
Buchanan 1 - 10	Hydro	4.1				Owned Resource for 4.1 MW through 2041	
Constantine 1 - 4	Hydro	1.0				Owned Resource for 1.0 MW through 2041	
Elkhart 1 - 3	Hydro	1.8				Owned Resource for 1.8 MW through 2041	
Mottville 1 - 4	Hydro	1.7				Owned Resource for 1.7 MW through 2041	
Twin Branch 1 - 8	Hydro	4.8				Owned Resource for 4.8 MW through 2041	
Deer Creek	Solar	3				Owned Resource for 2.5 MW through 2041	
Olive	Solar	5				Owned Resource for 5 MW through 2041	
Twin Branch Solar	Solar	3				Owned Resource for 2.6 MW through 2041	
Watervliet	Solar	5				Owned Resource for 4.6 MW through 2041	
St. Joseph Solar	Solar	20				Owned Resource for 20 MW through 2041	
OVEC ICPA	Coal	187					ICPA Obligation ending in 2040
Fowler Ridge 1	Wind	100					PPA Obligation ending in 2029
Fowler Ridge 2	Wind	50					PPA Obligation ending in 2029
Headwaters	Wind	200					PPA Obligation ending in 2034
Wildcat	Wind	100					PPA Obligation ending in 2032

Candidate Portfolio Development

Demand Side Management Resources



Measure	Program	Customer Class	State	Source
Energy Efficiency	Conservation Voltage Reduction	Residential	MI	AEP I&M
Energy Efficiency	Conservation Voltage Reduction	Commercial & Industrial	MI	AEP I&M
Energy Efficiency	Conservation Voltage Reduction	Residential	IN	AEP I&M
Energy Efficiency	Conservation Voltage Reduction	Commercial & Industrial	IN	AEP I&M
Energy Efficiency	Low Income Qualified	N/A	MI/IN	MPS
Energy Efficiency	MI Existing EWR Plan (2021)	Residential and C&I	MI	AEP I&M
Energy Efficiency	MI Pending 2022-2023 EWR Plan (2022)	Residential and C&I	MI	AEP I&M
Energy Efficiency	IN Existing DSM Plan (2021-2022)	Residential and C&I	IN	AEP I&M
Demand Response	Residential Demand Response	Residential	MI/IN	MPS
Demand Response	C&I Demand Response	Commercial & Industrial	MI/IN	MPS
Distributed Energy Resources	Rooftop Solar DER	Rooftop Solar	MI/IN	MPS
Distributed Energy Resources	Combined Heat & Power DER	Combined Heat & Power	MI/IN	MPS

Candidate Portfolio Development

Resource Limitations



Resource	Limit (MW) Annual/Cumulative		
	2025-2034	2035-2037	2038-2050
Solar T1	250 / 1,800	250 / 2,400	250 / 3,500
Solar T2	250 / 1,800	250 / 2,400	250 / 3,500
Solar Hybrid	500 / 1,800	500 / 2,400	500 / 3,500
Wind	800 / 1,600	800 / 3,200	800 / 5,800
Gas CC 2x1	1,070 / 1,070	1,070 / 1,070	1,070 / 1,070
Gas CC 1x1	440 / 880	440 / 880	440 / 880
Gas CT Advanced	500 / 4,000	500 / 4,000	500 / 4,000

¹Resource Limits are informed by the RFP/RFI.

Candidate Portfolio Development

Reference Case and Sensitivities



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Portfolio	Description	Details
Reference Case	Rockport Unit 1 (2028) Rockport Unit 2 (2024) and Cook (2034, 2037)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2024)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2025)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2026)	Appendix
Reference with Cook Sensitivity	Cook Unit 1 and Unit 2 License Extensions (beyond 2034 and 2037)	
Reference with Cook Sensitivity #2	Cook Unit 1 and Unit 2 License Extensions and No Conventional Gas Allowed	
Reference with Relaxed Renewable Limits	Expanded Cumulative Build Limits on Renewable Energy and Storage	Appendix
Reference with 30% Import / Export Limit	Import and Export Limit at ~30% of I&M Load	Appendix
Reference with No Renewable Limits	Removed Cumulative and Annual Build Limits on Renewable Energy and Storage	Appendix
Rapid Technology Advancement	35% Reduction in Renewable, Storage and EE Costs	
Enhanced Regulation	Increased Environmental Regulations Leading to High Gas, Coal and CO2 Prices	
Net Savings Sensitivity 1	Rockport Unit 1 Early Retirement (2024) Replacing SEA with Net to Gross EE Bundle Savings	Appendix
Net Savings Sensitivity 2	Rockport Unit 1 Early Retirement (2026) Replacing SEA with Net to Gross EE Bundle Savings	Appendix
Net Savings Sensitivity 3	Rapid Technology Advancement (RTA) Replacing SEA with Net to Gross EE Bundle Savings	Appendix

Note: Not all sensitivities are represented above. Additional sensitivities will be conducted on the Preferred Portfolio once selected.

FEEDBACK AND DISCUSSION

Art Holland, Peter Berini, Siemens PTI

REFERENCE CASE PORTFOLIO RESULTS

Reference Case Results

Introduction



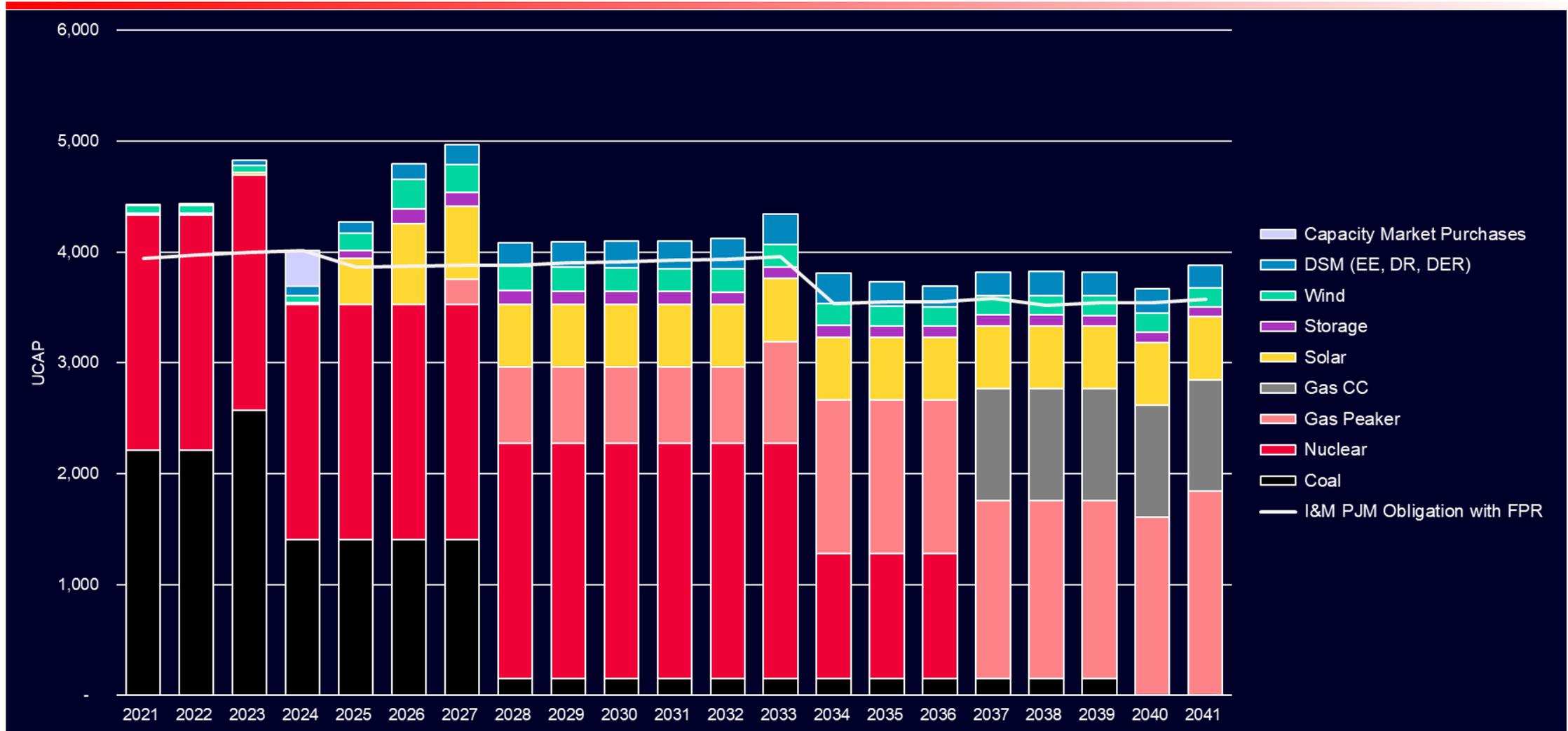
The Reference Case portfolio is the optimized portfolio based on existing resources and expected conditions as a basis for comparing other strategic choices.

- The Reference case does not represent I&M's preferred portfolio but provides a basis to conduct sensitivities and portfolio comparisons
- The Reference Case portfolio has approximately 7 GW of new nameplate capacity (mostly renewable) through the forecast horizon
- Energy Efficiency resources are selected with total Energy Efficiency generation as compared to retail load growing to 5% in 2030
- Wind resources selected in 2025 and 2026 take advantage of the Production Tax Credit¹
- Solar and Solar Hybrid resources selected in 2025 and 2026 take advantage of the Investment Tax Credit¹
- Gas resources are selected with Rockport and Cook Retirements to support portfolio needs for capacity and energy. The resources selected are a combination of hydrogen convertible simple cycle and combined cycle
- The carbon free generation declines after the retirement of the Cook Nuclear facilities and would require market offsets to meet targets thereafter

¹Renewable Resources are expected to come online by December 31st of the previous year in order to capitalize on PTC and ITC benefits

Reference Case Results, I&M Total Portfolio Capacity (MW)

Optimized for Minimum Cost

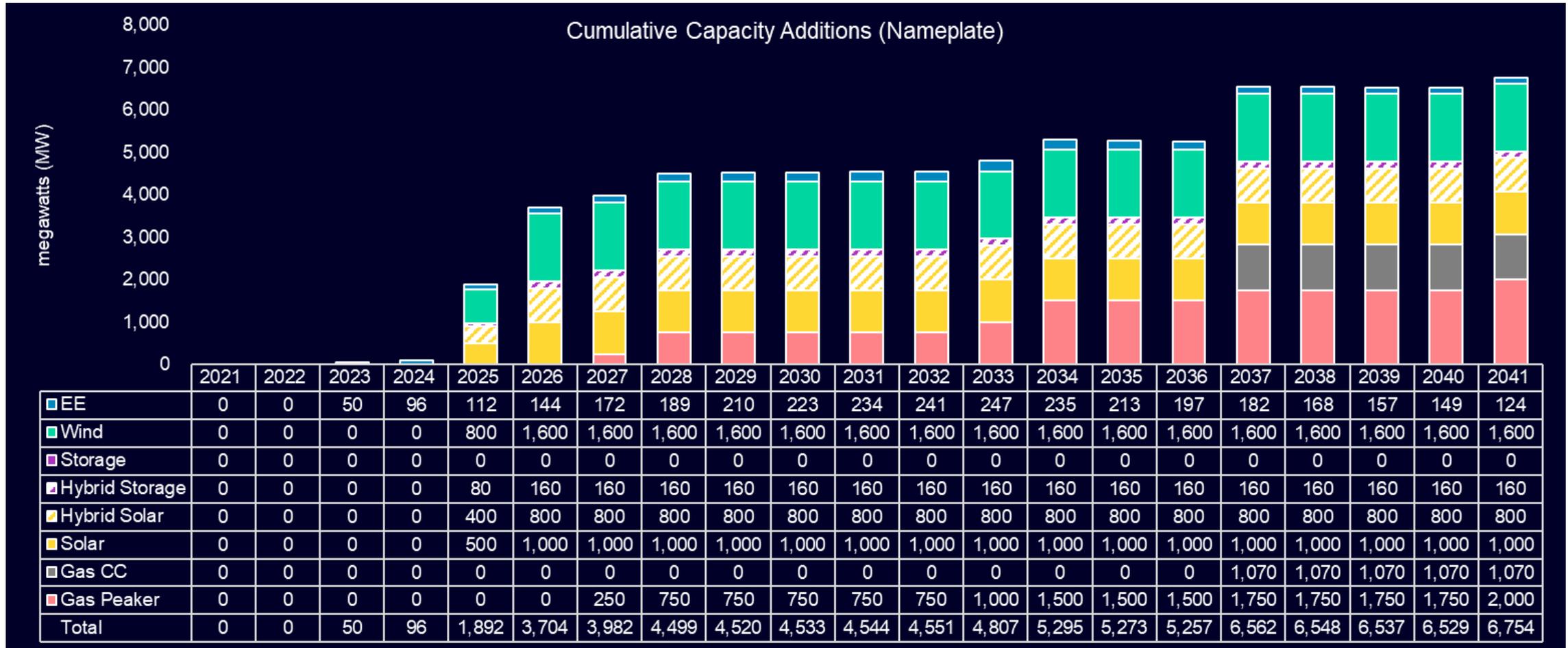


Reference Case Results

Cumulative Capacity Expansion (Nameplate)

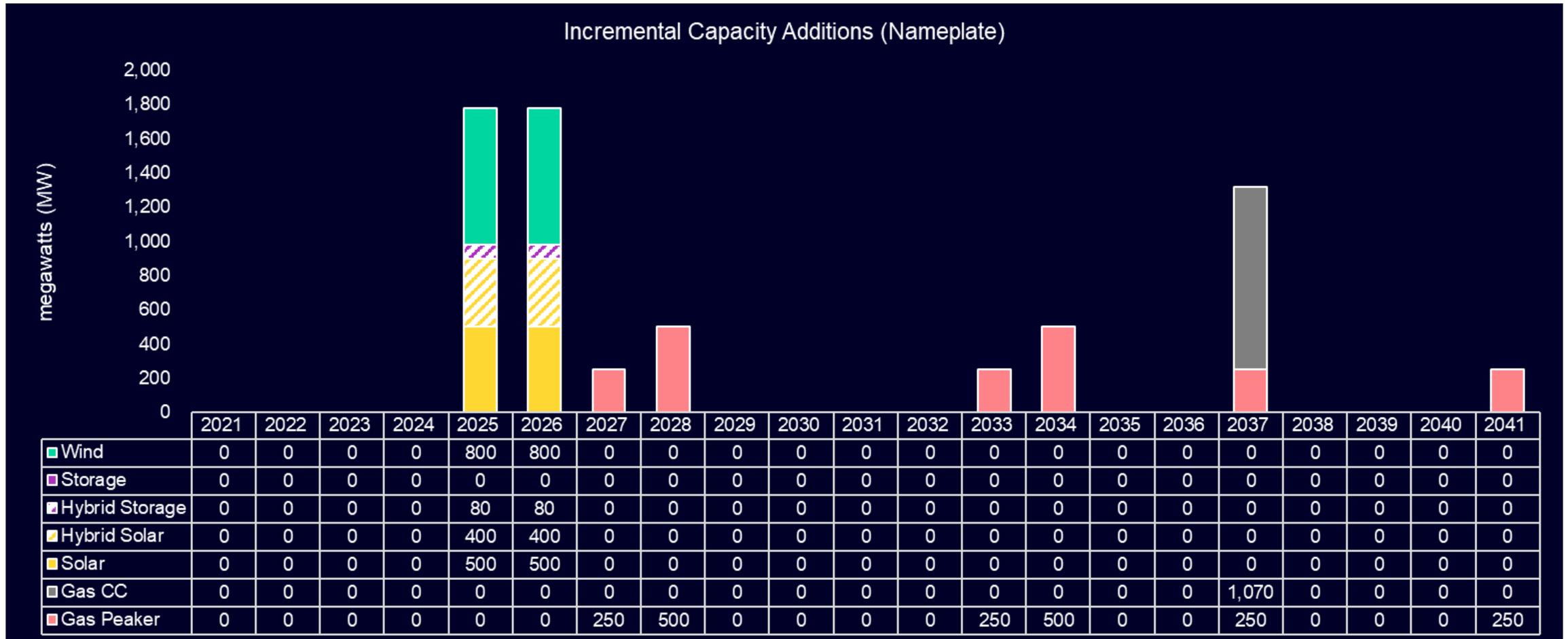


An AEP Company



Reference Case Results

Selection of Renewables and Gas CT/CC



Note: Incremental EE Capacity Additions are not show in the above graphic.

Reference Case Results

Objectives and Design Requirements (1/2)

Reference						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.79%
2024	0%	104%	10%	3%	91%	2.31%
2025	11%	120%	3%	12%	92%	2.79%
2026	24%	145%	1%	31%	94%	3.66%
2027	28%	146%	1%	34%	93%	4.08%
2028	5%	135%	1%	25%	96%	2.82%
2029	5%	138%	1%	27%	96%	3.79%
2030	5%	143%	0%	32%	96%	4.89%
2031	4%	134%	1%	24%	96%	4.95%
2032	5%	139%	1%	27%	97%	4.88%
2033	10%	135%	1%	25%	96%	4.66%
2034	8%	151%	0%	41%	95%	3.01%
2035	5%	108%	8%	8%	93%	4.02%
2036	4%	105%	11%	7%	93%	4.78%
2037	7%	146%	0%	38%	69%	4.64%
2038	9%	97%	14%	3%	52%	4.21%
2039	8%	95%	15%	2%	52%	3.80%
2040	3%	92%	16%	2%	53%	2.82%
2041	9%	90%	16%	2%	55%	3.47%

Metrics Calculations and Notes

Capacity Position against FPR:

(UCAP of resources/PJM Capacity Obligation with Reserve)-1

Energy Balance:

I&M energy generation / energy demand

Imports I&M:

imported energy / energy demand

Exports I&M:

exported energy / energy demand

Carbon Free Generation:

carbon free generation / total generation

Energy Efficiency (EE)

all EE generation / retail energy demand

Color designations – color coding is intended as a visual aid only and should not be used to compare portfolios. Coloring differentiates between threshold values.

Energy Efficiency represents the amount of EE in a mathematically optimized portfolio, subject to further evaluation.

Reference Case Results

Objectives and Design Requirements (2/2)



Reference						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.79%
2024	0%	104%	10%	3%	91%	2.31%
2025	11%	120%	3%	12%	92%	2.79%
2026	24%	145%	1%	31%	94%	3.66%
2027	28%	146%	1%	34%	93%	4.08%
2028	5%	135%	1%	25%	96%	2.82%
2029	5%	138%	1%	27%	96%	3.79%
2030	5%	143%	0%	32%	96%	4.89%
2031	4%	134%	1%	24%	96%	4.95%
2032	5%	139%	1%	27%	97%	4.88%
2033	10%	135%	1%	25%	96%	4.66%
2034	8%	151%	0%	41%	95%	3.01%
2035	5%	108%	8%	8%	93%	4.02%
2036	4%	105%	11%	7%	93%	4.78%
2037	7%	146%	0%	38%	69%	4.64%
2038	9%	97%	14%	3%	52%	4.21%
2039	8%	95%	15%	2%	52%	3.80%
2040	3%	92%	16%	2%	53%	2.82%
2041	9%	90%	16%	2%	55%	3.47%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Capacity position maintains healthy margins through forecast period.

Energy Balance:

Energy Balance is high in the early years as renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

FEEDBACK AND DISCUSSION

BREAK

PLEASE PLAN A RETURN BY 11:15AM

Siemens PTI IRP Team

SENSITIVITY BASED CANDIDATE PORTFOLIOS

Reference and Candidate Portfolios



I&M and Siemens have developed a **Reference Case**, two alternative **Scenarios**, and a handful of **Sensitivities** to implement a scenario- and sensitivity-based approach to inform **Candidate Portfolios**. Each **Candidate Portfolio** will be developed from the **Scenarios** and/or the **Sensitivities** below.

Portfolio	Description	Details
Reference Case	Rockport Unit 1 (2028) Rockport Unit 2 (2024) and Cook (2034, 2037)	
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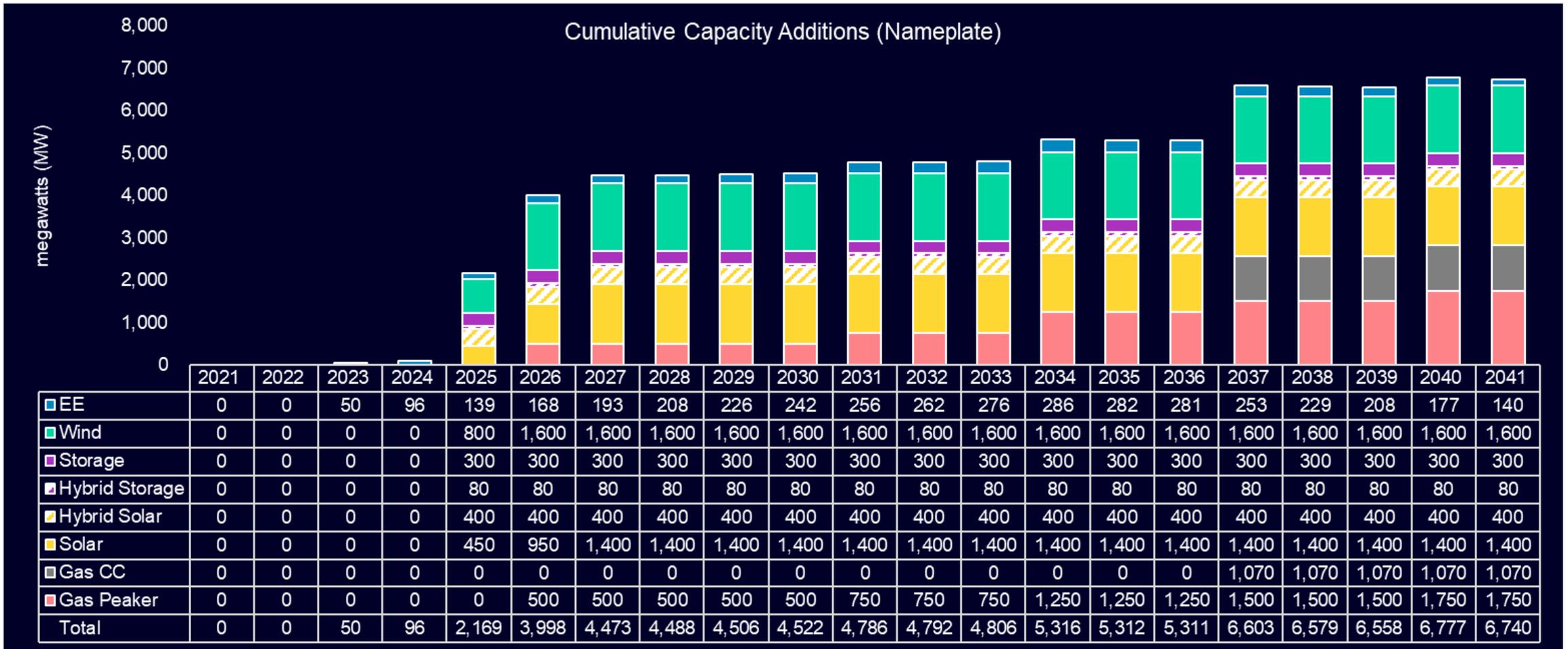
Note: Not all sensitivities are represented above. Additional sensitivities will be conducted on the Preferred Portfolio once selected.

Reference Case Sensitivity

Rockport Unit 1 Early Retirement (2024)



An AEP Company



Reference Case Sensitivity KPI

Rockport Unit 1 Early Retirement (2024)



Rockport 1 2024 Retirement						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.79%
2024	0%	105%	11%	5%	90%	2.31%
2025	0%	114%	5%	8%	97%	3.20%
2026	4%	137%	1%	23%	96%	4.00%
2027	7%	140%	1%	28%	97%	4.35%
2028	4%	135%	1%	25%	97%	2.99%
2029	3%	138%	1%	27%	97%	3.93%
2030	3%	142%	1%	31%	97%	5.04%
2031	9%	135%	1%	24%	96%	5.11%
2032	9%	139%	0%	27%	97%	4.98%
2033	8%	135%	1%	25%	96%	4.85%
2034	6%	151%	0%	41%	96%	3.45%
2035	4%	109%	8%	8%	94%	4.81%
2036	2%	106%	11%	7%	94%	5.86%
2037	4%	148%	0%	39%	69%	5.49%
2038	6%	98%	14%	3%	52%	4.91%
2039	5%	95%	15%	2%	52%	4.36%
2040	7%	93%	15%	3%	53%	3.11%
2041	6%	90%	16%	2%	55%	3.60%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in years 2024 and 2025 to account for early Rockport retirement. Post 2025 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the early years as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

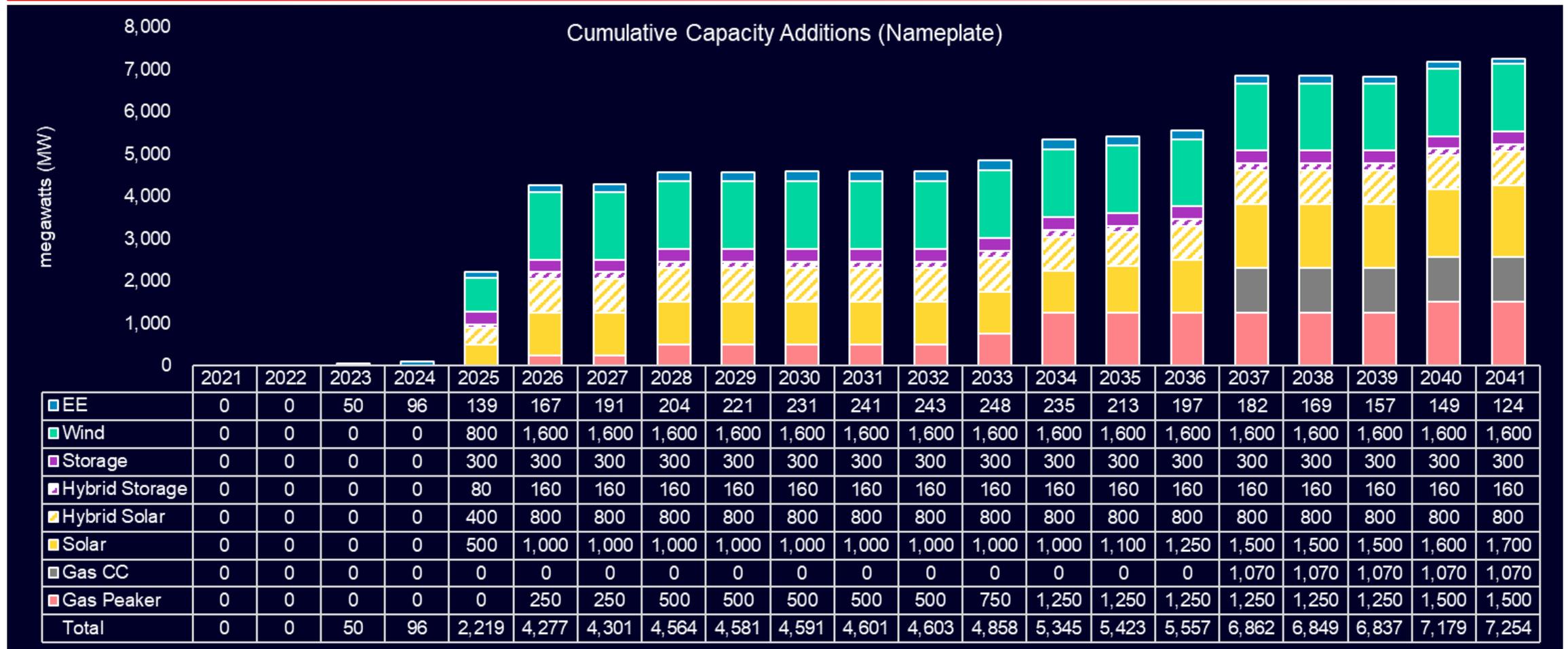
EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Reference Case Sensitivity

Rockport Unit 1 Early Retirement (2025)



An AEP Company



Reference Case Sensitivity KPI

Rockport Unit 1 Early Retirement (2025)



Rockport 1 2025 Retirement						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
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2024	0%	104%	10%	3%	91%	2.31%
2025	0%	121%	4%	14%	92%	3.20%
2026	4%	140%	1%	27%	97%	4.00%
2027	2%	139%	2%	27%	97%	4.34%
2028	5%	135%	1%	25%	97%	2.98%
2029	5%	138%	1%	27%	97%	3.92%
2030	5%	142%	1%	31%	97%	5.00%
2031	4%	134%	2%	23%	96%	5.03%
2032	4%	138%	1%	27%	97%	4.89%
2033	9%	135%	1%	24%	96%	4.67%
2034	7%	150%	0%	40%	96%	3.01%
2035	5%	108%	8%	9%	94%	4.02%
2036	5%	106%	10%	8%	94%	4.78%
2037	3%	150%	0%	42%	70%	4.64%
2038	5%	101%	13%	5%	55%	4.21%
2039	4%	98%	13%	4%	55%	3.80%
2040	7%	97%	13%	5%	56%	2.82%
2041	6%	97%	13%	5%	58%	3.47%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in years 2024 and 2025 to account for early Rockport retirement. Post 2025 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the middle years as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

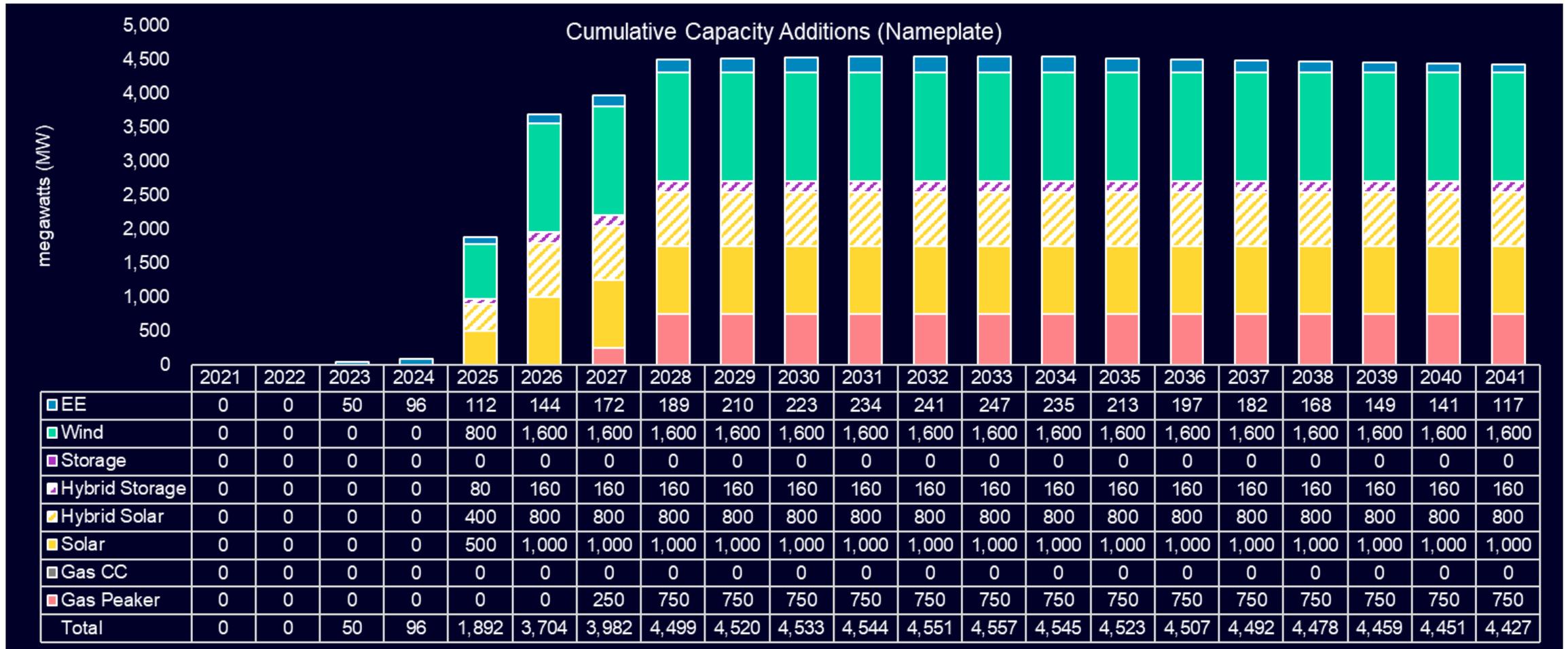
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Reference Case Sensitivity

Cook Unit 1 and Unit 2 License Extensions



Reference Case Sensitivity KPI

Cook Unit 1 and Unit 2 License Extensions



Cook Extension						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.79%
2024	0%	104%	10%	3%	91%	2.31%
2025	11%	120%	3%	12%	92%	2.79%
2026	24%	139%	1%	26%	98%	3.66%
2027	28%	139%	2%	27%	97%	4.08%
2028	5%	135%	1%	25%	96%	2.82%
2029	5%	138%	1%	27%	96%	3.79%
2030	5%	142%	0%	30%	97%	4.89%
2031	4%	134%	1%	24%	96%	4.95%
2032	5%	139%	1%	27%	97%	4.88%
2033	4%	135%	1%	24%	96%	4.66%
2034	16%	145%	0%	35%	97%	3.01%
2035	14%	145%	0%	38%	97%	4.02%
2036	12%	144%	1%	36%	97%	4.78%
2037	12%	146%	0%	37%	97%	4.64%
2038	14%	147%	0%	39%	97%	4.21%
2039	13%	145%	0%	38%	97%	3.65%
2040	9%	143%	0%	38%	98%	2.70%
2041	8%	142%	0%	38%	100%	3.32%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Post 2024 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the middle years and is maintained through the forecast as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%.

Exports I&M:

Exports are slightly higher than in other portfolios due to the extension of nuclear resources. However, in many years the levels do not exceed 30%.

Carbon Free Generation:

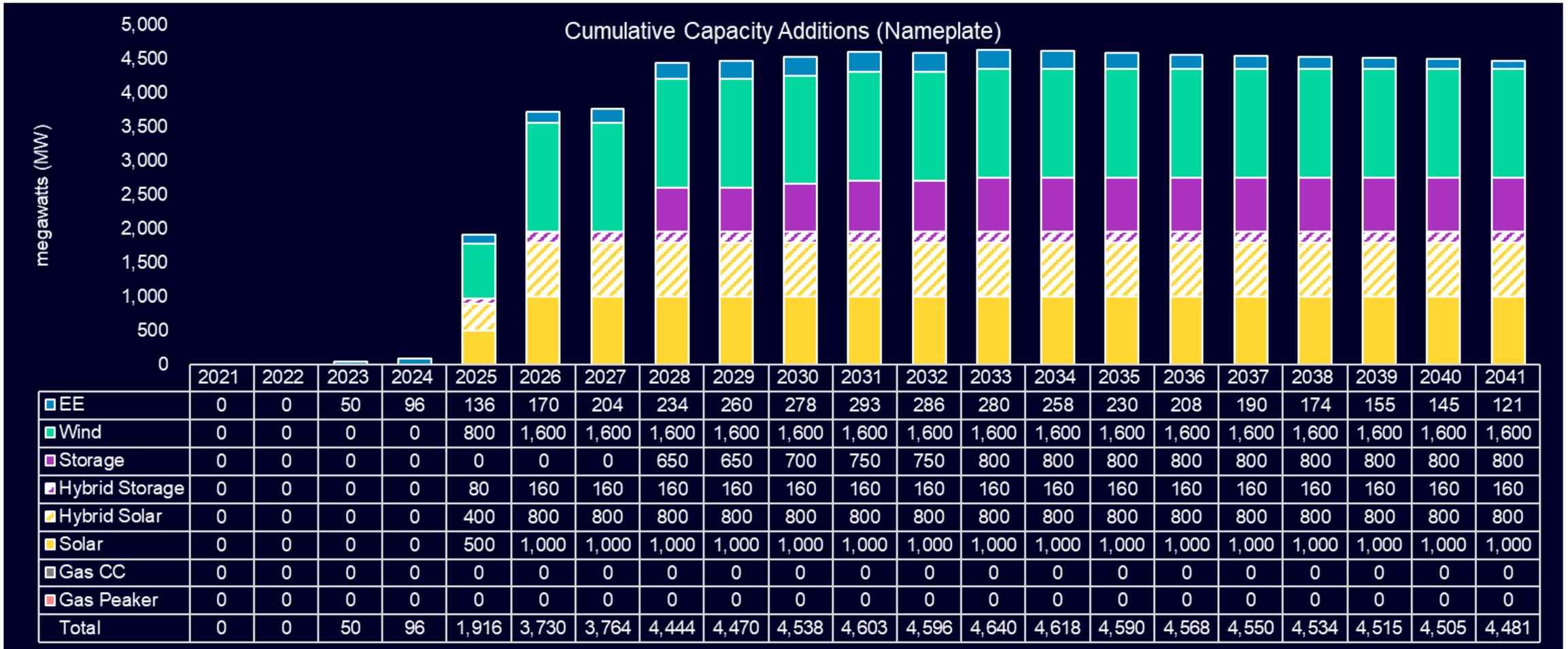
Carbon free generation meets targets for entire forecast period.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Reference Case Sensitivity

Cook Unit 1 and Unit 2 License Extensions and No Conventional Gas



Reference Case Sensitivity KPI

Cook Unit 1 and Unit 2 License Extensions and No Conventional Gas



Cook Extension No Gas						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	8%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.79%
2024	0%	104%	10%	3%	91%	2.31%
2025	11%	121%	3%	12%	92%	3.14%
2026	25%	145%	1%	32%	94%	3.99%
2027	23%	146%	1%	34%	93%	4.44%
2028	2%	134%	2%	24%	98%	3.16%
2029	1%	137%	1%	26%	98%	4.28%
2030	2%	142%	1%	31%	98%	5.54%
2031	2%	133%	2%	23%	98%	5.63%
2032	2%	138%	1%	26%	98%	5.35%
2033	2%	134%	2%	24%	98%	4.95%
2034	13%	147%	0%	38%	98%	3.14%
2035	10%	149%	1%	42%	98%	4.12%
2036	8%	147%	1%	39%	98%	4.84%
2037	8%	149%	0%	41%	98%	4.67%
2038	9%	150%	0%	43%	98%	4.23%
2039	8%	148%	0%	41%	98%	3.66%
2040	3%	146%	1%	41%	99%	2.71%
2041	2%	145%	1%	42%	100%	3.33%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Post 2024 capacity position maintains above obligation.

Energy Balance:

Energy Balance is high in the middle years and is maintained through the forecast as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%.

Exports I&M:

Exports are slightly higher than in other portfolios due to the extension of nuclear resources. However, in many years the levels do not exceed 30%.

Carbon Free Generation:

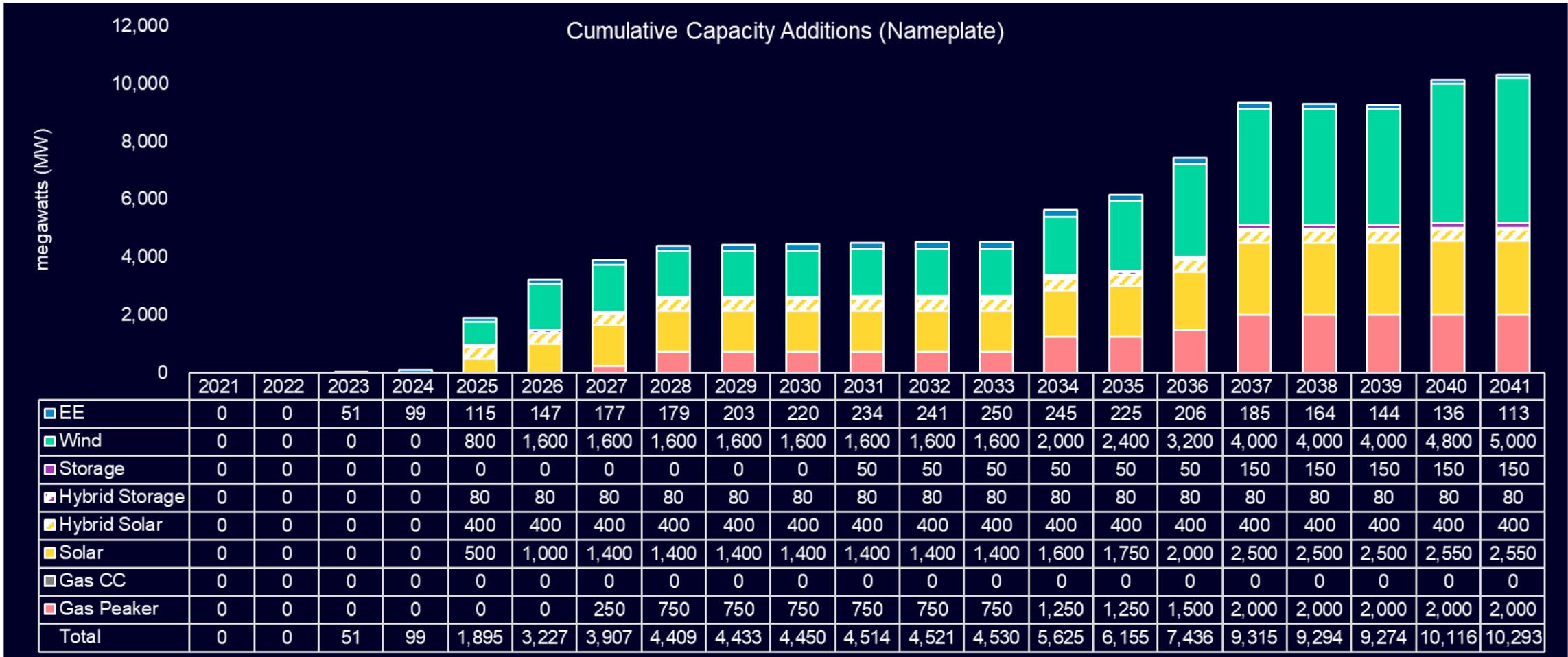
Carbon free generation meets targets for entire forecast period.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Rapid Technology Advancement

35% Reduction in Renewable, Storage and EE Costs



Rapid Technology Advancement KPI

35% Reduction in Renewable, Storage and EE Costs



RTA							
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	Adj. Carbon Free Generation	EE Penetration
2021	12%	103%	11%	5%	85%	77%	0.06%
2022	12%	93%	22%	5%	82%	62%	0.46%
2023	6%	100%	14%	4%	90%	76%	0.80%
2024	0%	105%	9%	3%	90%	82%	2.35%
2025	11%	119%	3%	11%	92%	92%	2.85%
2026	18%	136%	1%	23%	97%	97%	3.72%
2027	27%	141%	1%	28%	96%	96%	4.18%
2028	4%	135%	1%	24%	96%	96%	2.62%
2029	4%	138%	1%	27%	96%	96%	3.66%
2030	3%	142%	0%	30%	97%	97%	4.87%
2031	4%	134%	1%	23%	96%	96%	4.96%
2032	4%	139%	0%	27%	97%	97%	4.91%
2033	4%	135%	1%	24%	97%	97%	4.74%
2034	4%	152%	0%	42%	98%	98%	3.09%
2035	4%	125%	3%	20%	95%	95%	4.20%
2036	14%	142%	0%	34%	95%	95%	4.97%
2037	4%	158%	0%	50%	97%	97%	4.72%
2038	6%	116%	10%	17%	94%	94%	4.12%
2039	5%	114%	10%	16%	94%	94%	3.55%
2040	3%	129%	5%	29%	95%	95%	2.61%
2041	3%	133%	3%	32%	97%	97%	3.21%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Post 2024 capacity position maintains above obligation.

Energy Balance:

Energy Balance is high in the middle years and is maintained through the forecast as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%.

Exports I&M:

Exports maintain higher levels than in other portfolios. However, there are not many years where exports exceeds 30%

Carbon Free Generation:

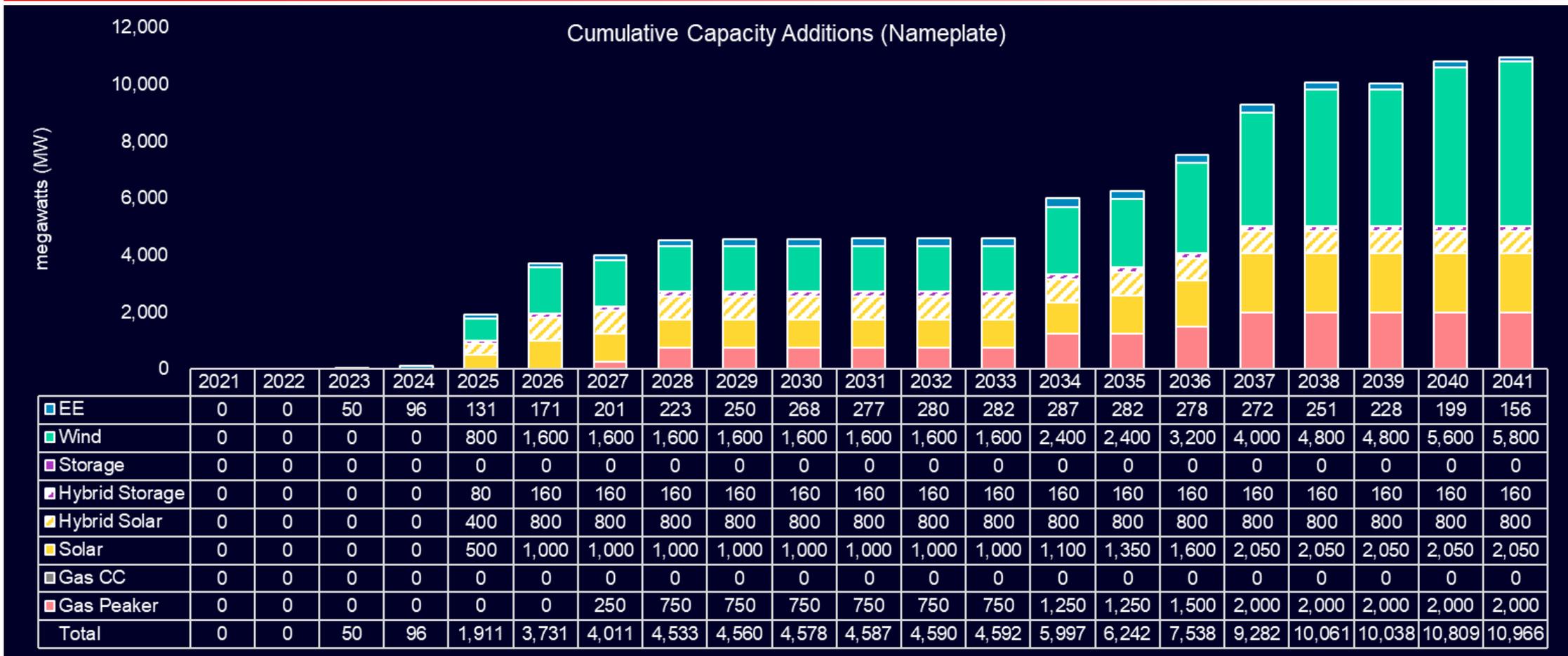
Carbon free generation meets targets for entire forecast period.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Enhanced Regulation

Increased Environmental Regulations Leading to High Gas, Coal and CO2 Prices



Enhanced Regulation KPI

Increased Environmental Regulations Leading to High Gas, Coal and CO2 Prices



Enhanced Regulation						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	104%	11%	5%	84%	0.06%
2022	12%	94%	21%	5%	81%	0.46%
2023	6%	100%	13%	3%	89%	0.79%
2024	0%	105%	9%	3%	90%	2.31%
2025	11%	117%	3%	9%	95%	3.11%
2026	24%	140%	1%	27%	97%	4.04%
2027	28%	140%	1%	28%	97%	4.42%
2028	5%	136%	1%	25%	96%	3.09%
2029	5%	139%	0%	27%	96%	4.17%
2030	5%	143%	0%	31%	97%	5.40%
2031	4%	134%	1%	23%	96%	5.38%
2032	5%	139%	0%	27%	97%	5.22%
2033	4%	135%	1%	25%	97%	4.90%
2034	5%	157%	0%	47%	98%	3.45%
2035	5%	127%	3%	21%	95%	4.80%
2036	14%	144%	0%	35%	95%	5.82%
2037	1%	160%	0%	51%	97%	5.78%
2038	6%	135%	5%	30%	95%	5.26%
2039	5%	132%	5%	28%	95%	4.65%
2040	3%	147%	0%	41%	96%	3.43%
2041	2%	149%	0%	45%	97%	3.89%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Post 2024 capacity position maintains above obligation.

Energy Balance:

Energy Balance is high in the middle years and is maintained through the forecast as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%.

Exports I&M:

Exports maintain higher levels than in other portfolios. However, there are not many years where exports exceeds 30%

Carbon Free Generation:

Carbon free generation meets targets for entire forecast period.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Key Takeaways and Next Steps

- Each **Sensitivity Based Candidate Portfolio** should be thought of as a strategic option that the company may want to evaluate
- Strategic Options
 - Unit retirement timing
 - Cost and performance of gas vs. non-fossil technologies
 - Small changes in timing and additions of solar, storage and wind
- **Candidate Portfolios** are variations in these strategies that will be taken to **Step 4** to compare against similar metrics

Art Holland, Siemens PTI

IRP ALIGNMENT DISCUSSION

Alignment Discussion

Opportunities for Additional Feedback in each Area of the IRP Process



The purpose of this session is to provide the opportunity for additional feedback and discussion with Stakeholders.

Siemens PTI will facilitate discussion in each of the five steps of the IRP process.

Members of the I&M Leadership, as well as the IRP Working Team will be available to answer questions and respond to your feedback.

Alignment Discussion

IRP Process Step 1: Determine Objectives



The purpose of the IRP is to evaluate I&M's current energy resource portfolio and a range of alternative future portfolios to meet customers' electrical energy needs in an affordable and holistic manner. The process evaluates **Candidate Portfolios** in terms of environmental stewardship, market and price risk, reliability, and resource diversity.

IRP Objectives
Affordability
Rate Stability
Sustainability Impact
Market Risk Minimization
Reliability
Resource Diversity

Alignment Discussion

IRP Process Step 2: Assign Metrics



For each **Candidate Portfolio**, the **Objectives** are tracked and measured through **Metrics** which evaluate portfolio performance across a wide range of possible future market conditions. All measures of portfolio performance are based on probabilistic modeling of 200 futures and addressed in Step 4: Analyze Candidate Portfolios.

IRP Objectives	Proposed IRP Metric	Unit
Affordability	NPV-RR	\$
Rate Stability	95 th percentile value of NPV-RR	\$
Sustainability Impact	CO ₂ Emissions	tons
Market Risk Minimization	Spot Energy Market Exposure (Purchases/Sales)	%
Reliability	Reserve Margin	%
Resource Diversity	Number of Unique Resources	#

Alignment Discussion

IRP Process Step 3: Create Reference and Candidate Portfolios



I&M and Siemens have developed a **Reference Case**, two alternative **Scenarios**, and a handful of **Sensitivities** to implement a scenario- and sensitivity-based approach to inform **Candidate Portfolios**. Each **Candidate Portfolio** will be developed from the **Scenarios** and/or the **Sensitivities** below.

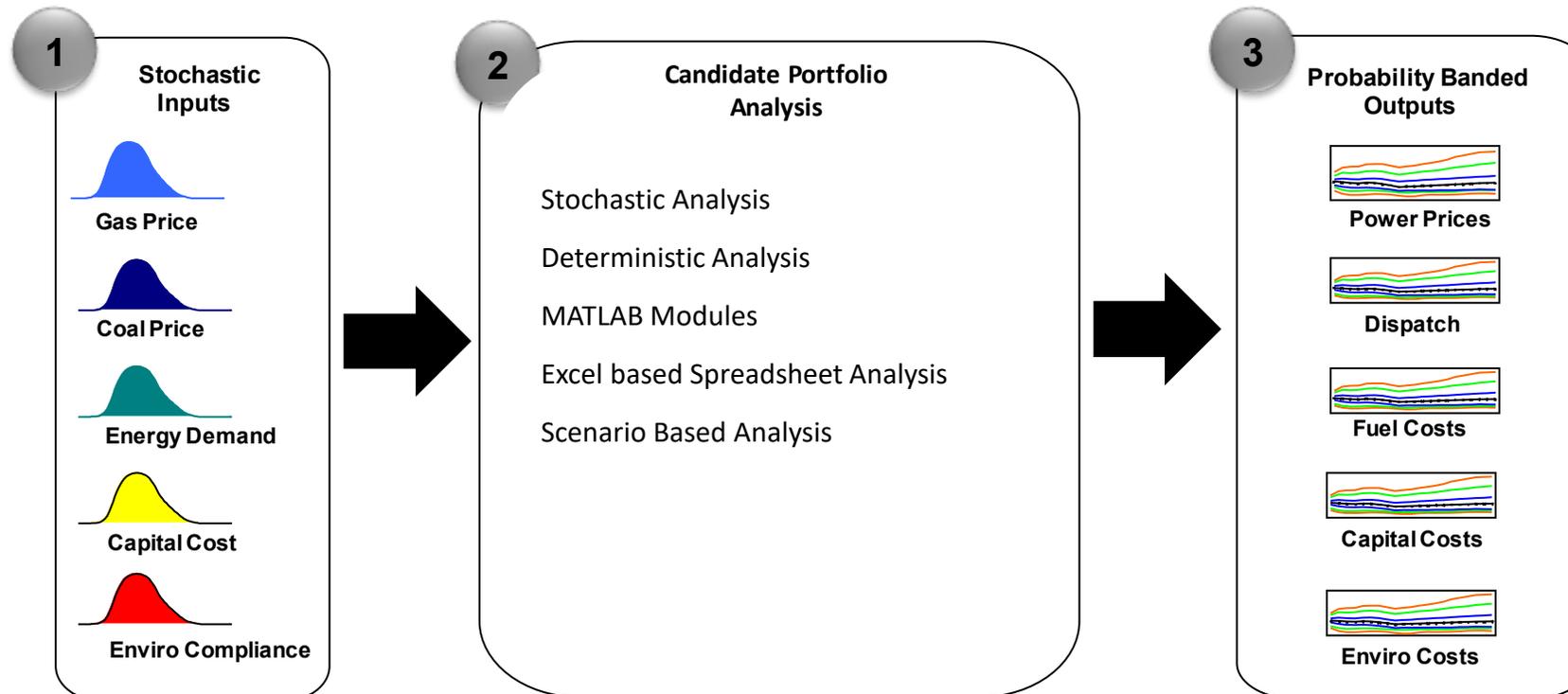
Portfolio	Description	Details
Reference Case	Rockport Unit 1 (2028) Rockport Unit 2 (2024) and Cook (2034, 2037)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2024)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2025)	
Reference with Rockport Sensitivity	Rockport Unit 1 Early Retirement (2026)	Appendix
Reference with Cook Sensitivity	Cook Unit 1 and Unit 2 License Extensions (beyond 2034 and 2037)	
Reference with Cook Sensitivity #2	Cook Unit 1 and Unit 2 License Extensions and No Conventional Gas Allowed	
Reference with Relaxed Renewable Limits	Expanded Cumulative Build Limits on Renewable Energy and Storage	Appendix
Reference with 30% Import / Export Limit	Import and Export Limit at ~30% of I&M Load	Appendix
Reference with No Renewable Limits	Removed Cumulative and Annual Build Limits on Renewable Energy and Storage	Appendix
Rapid Technology Advancement	35% Reduction in Renewable, Storage and EE Costs	
Enhanced Regulation	Increased Environmental Regulations Leading to High Gas, Coal and CO2 Prices	
Net Savings Sensitivity 1	Rockport Unit 1 Early Retirement (2024) Replacing SEA with Net to Gross EE Bundle Savings	Appendix
Net Savings Sensitivity 2	Rockport Unit 1 Early Retirement (2026) Replacing SEA with Net to Gross EE Bundle Savings	Appendix
Net Savings Sensitivity 3	Rapid Technology Advancement (RTA) Replacing SEA with Net to Gross EE Bundle Savings	Appendix

Note: Not all sensitivities are represented above. Additional sensitivities will be conducted on the Preferred Portfolio once selected.

Alignment Discussion

IRP Process Step 4: Analyze Candidate Portfolios

Candidate Portfolios are then subjected to **Portfolio Analysis** (including stochastic risk analysis) to measure performance across many future scenarios. The stochastic process will produce hundreds of internally consistent simulations that can provide a more realistic understanding of the potential variation in future scenarios.



Alignment Discussion

IRP Process Step 5: Develop Balanced Scorecard

Detailed portfolio results will be included for each **Candidate Portfolio** in the report write-up filed with the Commission. The **Candidate Portfolios** will be summarized in terms of each **Objective** and **Metric** through a color-coded balanced scorecard.

Balanced Scorecard (Illustrative)						
Candidate Portfolios	Affordability	Rate Stability	Sustainability Impact	Market Risk Minimization	Reliability	Resource Diversity
	NPV RR	95th Percentile Value of NPV RR	CO2 Emissions	Purchases as % of Generation	Reserve Margin	Mix of Resources
Reference Case	\$92.0	\$115.0	-62.0%	10.0%	15%	5
Portfolio #1	\$94.0	\$138.0	-39.0%	15.0%	15%	4
Portfolio #2	\$108.0	\$145.0	-50.0%	18.0%	15%	6
Portfolio #3	\$81.0	\$123.0	-38.0%	24.0%	15%	4
Portfolio #4	\$97.0	\$146.0	-42.0%	42.0%	15%	4
Portfolio #5	\$101.0	\$167.0	-54.0%	34.0%	15%	5
Portfolio #6	\$87.0	\$113.0	-64.0%	41.0%	15%	3
Portfolio #8	\$102.0	\$172.0	-40.0%	34.0%	15%	5
Portfolio #9	\$120.0	\$198.0	-90.0%	24.0%	15%	6
Portfolio #10	\$99.0	\$210.0	-84.0%	12.0%	15%	5

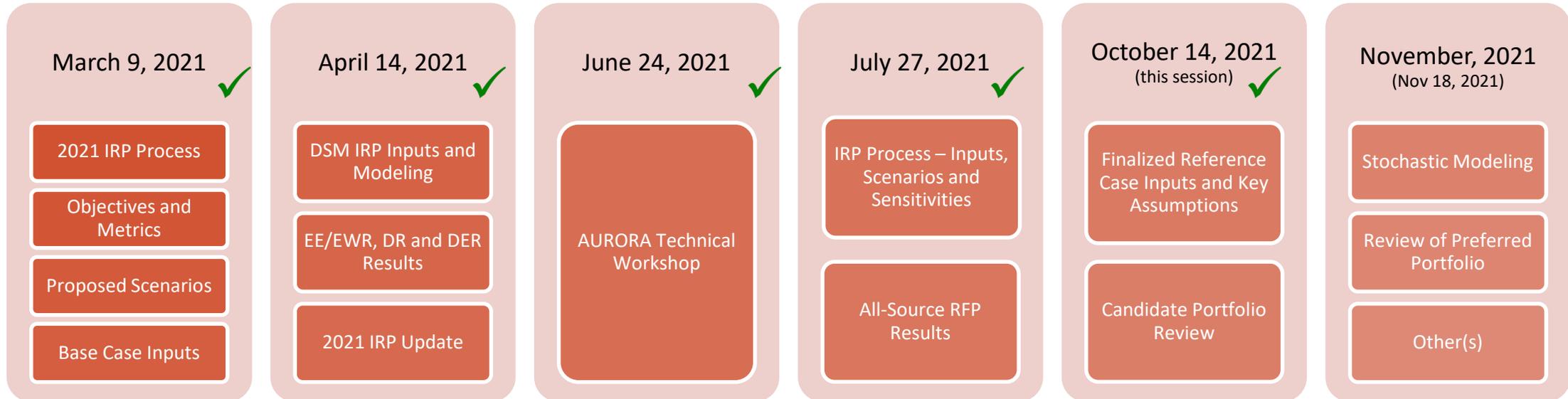
ALIGNMENT DISCUSSION

CONCLUSION

STAKEHOLDER NEXT STEPS AND DATA PROVISION PLANS

Jay Boggs | Siemens PTI

Stakeholder Timelines



All-Source RFP Timeline (completed)



FEEDBACK AND DISCUSSION

CLOSING DISCUSSION

Andrew Williamson | I&M Director Regulatory Services

THANK YOU!

Definitions



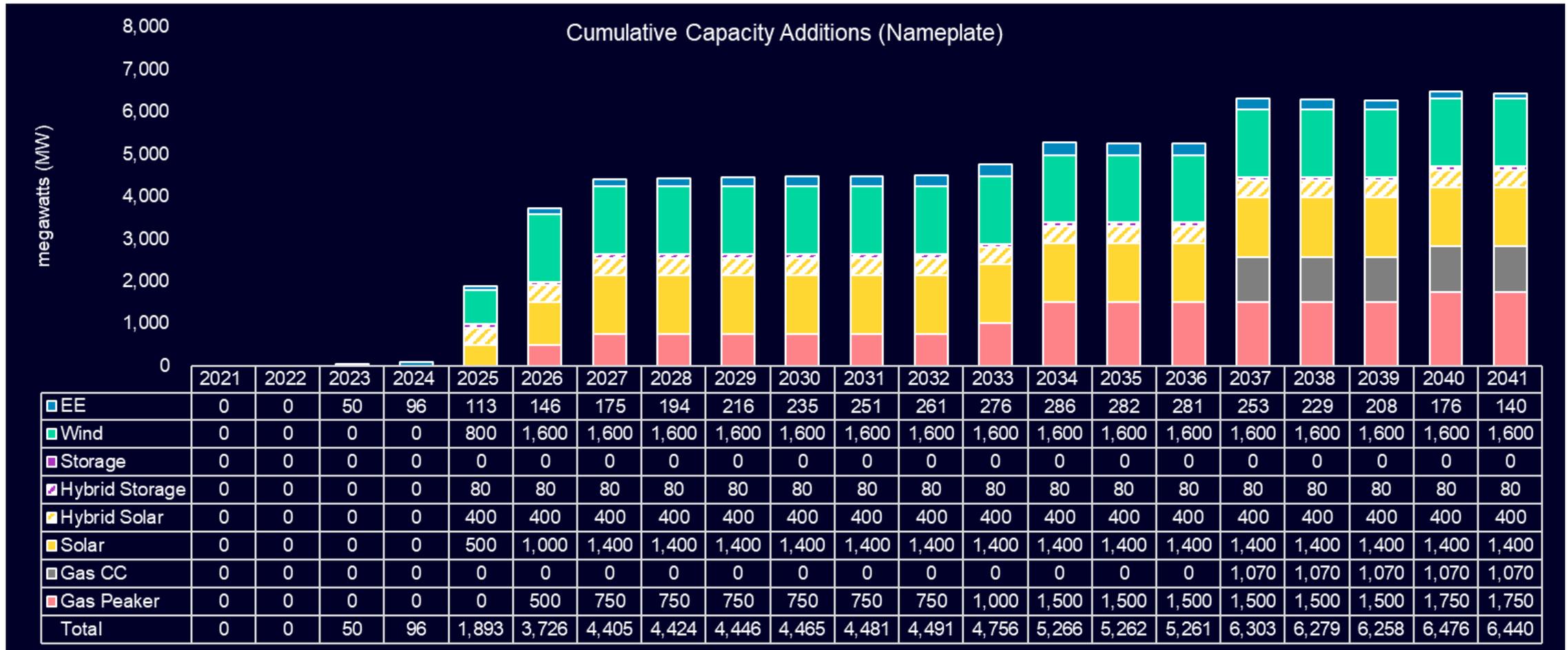
Term	Definition
AURORAxmp	Electric modeling forecasting and analysis software. Used for capacity expansion, chronological dispatch, and stochastic functions
Condition	A unique combination of a Scenario and a Sensitivity that is used to inform Candidate Portfolio development
Deterministic Modeling	Simulated dispatch of a portfolio in a pre-determined future
Renewable Portfolio Standards	Renewable Portfolio Standards (RPS) are policies designed to increase the use of renewable energy sources for electricity generation
Portfolio	A group of resources to meet customer load
Preferred Portfolio	The portfolio that management determines will perform the best, with consideration for cost, risk, reliability, and sustainability
Probabilistic modeling	Simulate dispatch of portfolios for several randomly generated potential future states
Reference Scenario	The most expected future scenario that is designed to include a current consensus view of key drivers in power and fuel markets (reference case, consensus case)
Scenario	Potential future State-of-the-World designed to test portfolio performance in key risk areas important to management and stakeholders alike
Sensitivity Analysis	Analysis to determine the impact of early retirements and other inputs portfolios are most sensitive to

Reference Case Sensitivity

Rockport Unit 1 Early Retirement (2026)



An AEP Company



Reference Case Sensitivity KPI

Rockport Unit 1 Early Retirement (2026)



Rockport 1 2026 Retirement						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	6%	98%	16%	4%	91%	0.79%
2024	0%	104%	10%	3%	91%	2.31%
2025	11%	120%	3%	12%	92%	2.80%
2026	0%	144%	1%	30%	92%	3.67%
2027	6%	139%	1%	27%	97%	4.08%
2028	4%	135%	1%	25%	96%	2.83%
2029	4%	138%	1%	27%	96%	3.80%
2030	4%	143%	0%	32%	96%	4.93%
2031	3%	134%	1%	24%	96%	5.02%
2032	4%	139%	1%	27%	97%	4.97%
2033	9%	136%	1%	25%	96%	4.85%
2034	7%	152%	0%	41%	95%	3.45%
2035	5%	110%	8%	9%	93%	4.81%
2036	3%	107%	10%	8%	93%	5.86%
2037	0%	148%	0%	39%	69%	5.49%
2038	1%	98%	14%	3%	52%	4.91%
2039	1%	95%	15%	2%	52%	4.36%
2040	3%	93%	15%	3%	53%	3.11%
2041	1%	90%	16%	2%	55%	3.59%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 and 2026 to account for early Rockport retirement. Post 2026 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the middle years as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

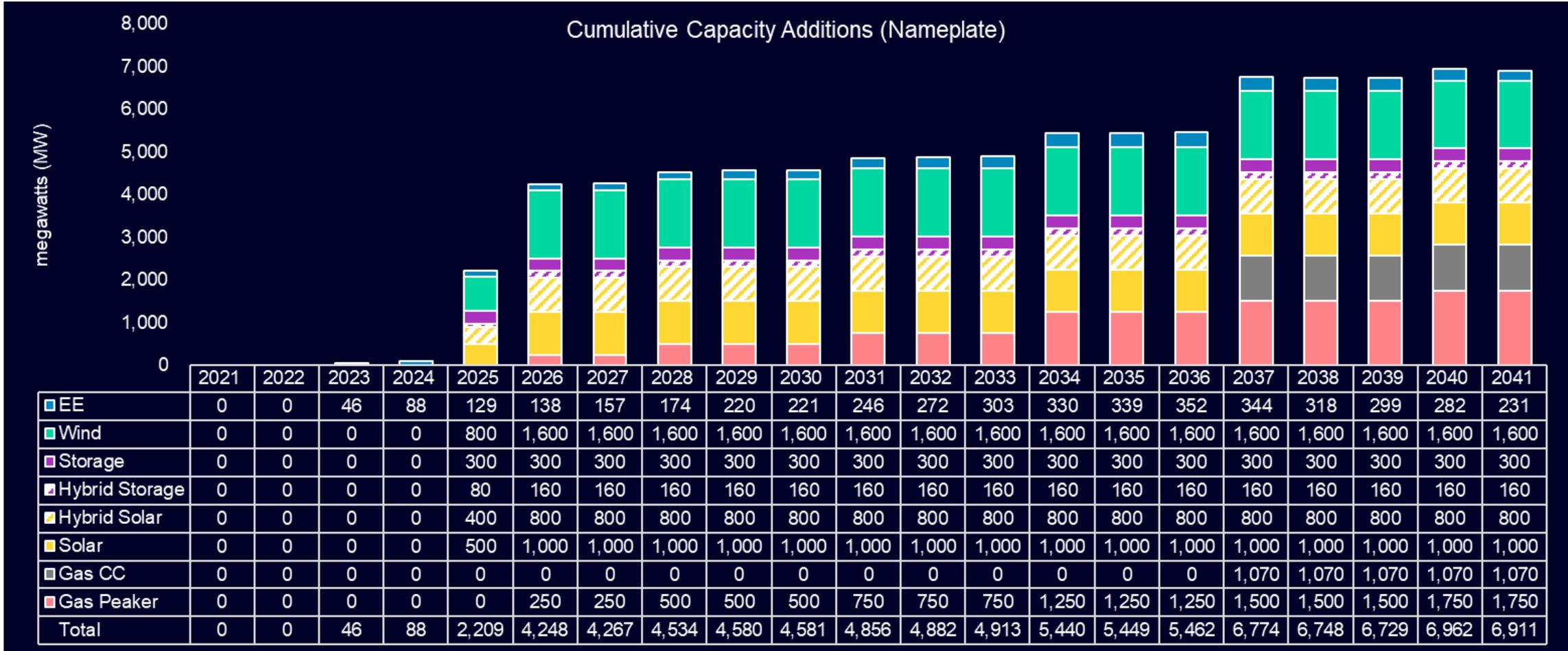
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Net Savings Sensitivity 1

Rockport Unit 1 Early Retirement (2024) Replacing SEA with Net to Gross EE Bundle Savings



Net Savings Sensitivity 1 KPI

Rockport Unit 1 Early Retirement (2024) Replacing SEA with Net to Gross EE Bundle Savings



NSA 1 - Rockport 1 2024 N2G EE						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	21%	98%	16%	4%	91%	0.72%
2024	0%	104%	11%	5%	90%	2.07%
2025	0%	114%	5%	8%	97%	2.89%
2026	4%	139%	1%	26%	97%	3.45%
2027	2%	138%	2%	27%	97%	3.72%
2028	5%	133%	2%	24%	97%	2.28%
2029	5%	137%	1%	27%	97%	3.60%
2030	4%	142%	1%	31%	97%	4.72%
2031	10%	134%	1%	24%	96%	4.90%
2032	10%	139%	0%	27%	97%	5.05%
2033	9%	136%	1%	25%	96%	5.07%
2034	7%	150%	0%	40%	96%	3.21%
2035	5%	110%	8%	9%	94%	5.35%
2036	3%	109%	10%	8%	94%	6.96%
2037	6%	152%	0%	41%	69%	7.04%
2038	8%	101%	13%	3%	53%	6.39%
2039	7%	98%	14%	2%	53%	5.87%
2040	9%	95%	15%	3%	54%	4.58%
2041	7%	94%	15%	3%	56%	5.51%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in years 2024 and 2025 to account for early Rockport retirement. Post 2025 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the early years as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

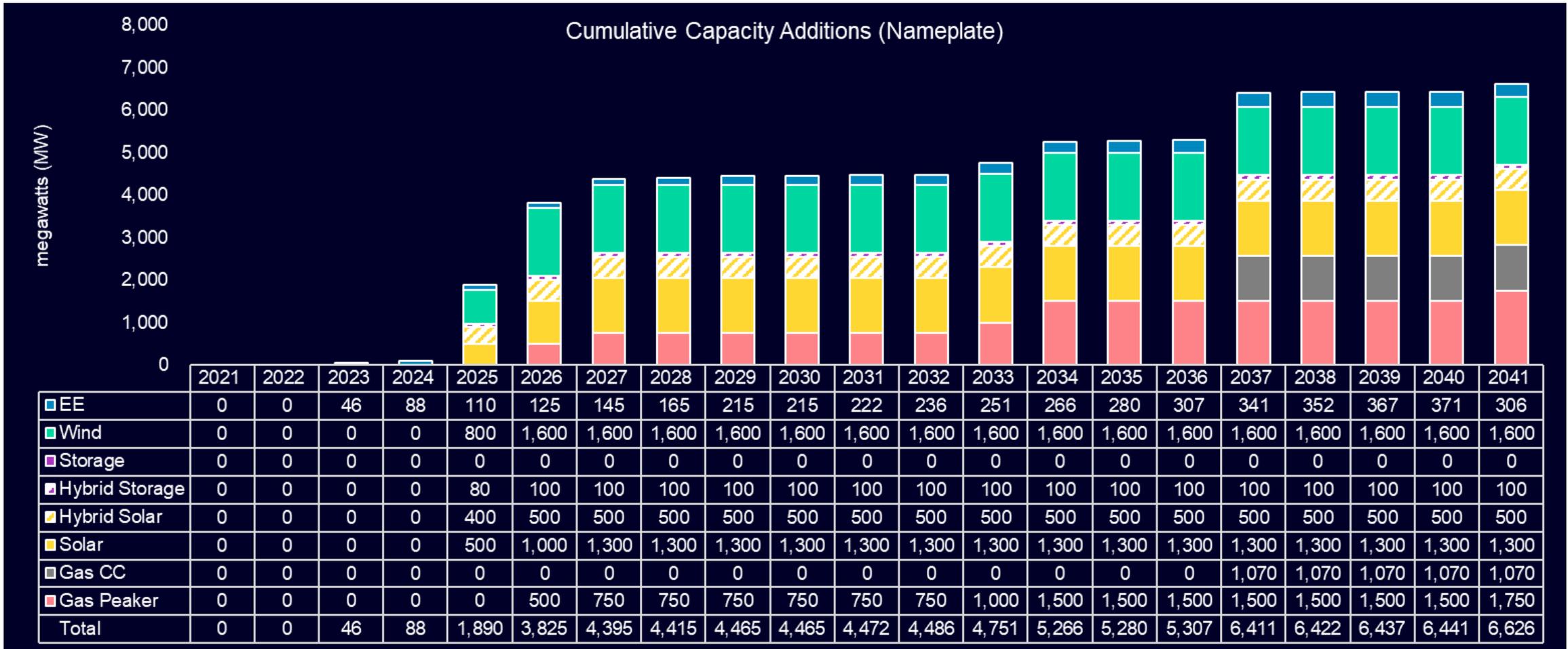
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs is slightly less than ~5% of retail load obligation by 2030.

Net Savings Sensitivity 2

Rockport Unit 1 Early Retirement (2026) Replacing SEA with Net to Gross EE Bundle Savings



Net Savings Sensitivity 2 KPI

Rockport Unit 1 Early Retirement (2026) Replacing SEA with Net to Gross EE Bundle Savings



NSA 2 - Rockport 1 2026 N2G EE						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	12%	6%	85%	0.06%
2022	12%	92%	25%	7%	83%	0.46%
2023	6%	98%	16%	4%	91%	0.72%
2024	0%	103%	11%	3%	92%	2.07%
2025	11%	120%	3%	12%	92%	2.66%
2026	0%	144%	1%	30%	92%	3.29%
2027	6%	138%	1%	27%	97%	3.58%
2028	4%	134%	1%	24%	96%	2.18%
2029	4%	138%	1%	27%	96%	3.51%
2030	4%	142%	0%	31%	96%	4.62%
2031	3%	133%	1%	23%	96%	4.61%
2032	4%	138%	1%	27%	97%	4.73%
2033	8%	135%	1%	25%	96%	4.63%
2034	7%	149%	0%	40%	95%	2.55%
2035	4%	109%	8%	9%	93%	4.65%
2036	3%	108%	10%	8%	93%	6.33%
2037	0%	152%	0%	41%	69%	6.91%
2038	2%	101%	13%	4%	53%	6.62%
2039	1%	99%	13%	2%	53%	6.38%
2040	0%	96%	14%	3%	54%	5.35%
2041	2%	95%	15%	3%	56%	6.20%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 and 2026 to account for early Rockport retirement. Post 2026 capacity position maintains healthy margin.

Energy Balance:

Energy Balance is high in the middle years as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

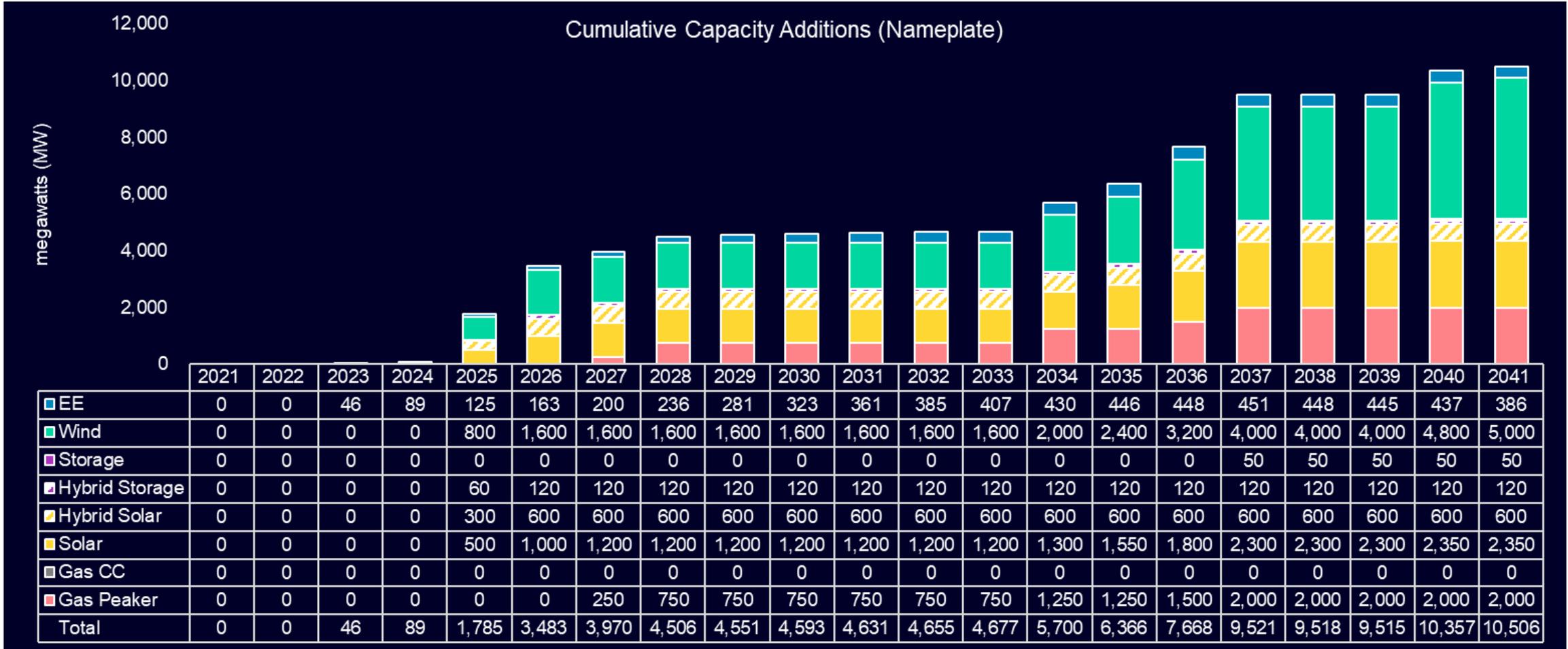
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs is slightly less than ~5% of retail load obligation by 2030.

Net Savings Sensitivity 3

Rapid Technology Advancement Replacing SEA with Net to Gross EE Bundle Savings



Net Savings Sensitivity 3 KPI

Rapid Technology Advancement Replacing SEA with Net to Gross EE Bundle Savings



NSA 3 - RTA N2G EE						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	11%	5%	85%	0.06%
2022	12%	93%	22%	5%	82%	0.45%
2023	6%	99%	14%	4%	90%	0.72%
2024	0%	104%	9%	3%	90%	2.08%
2025	9%	119%	3%	11%	92%	2.83%
2026	21%	138%	1%	25%	97%	3.68%
2027	28%	141%	1%	28%	96%	4.13%
2028	5%	135%	1%	25%	96%	2.85%
2029	4%	139%	1%	28%	96%	4.21%
2030	4%	144%	0%	31%	97%	5.88%
2031	4%	137%	1%	25%	96%	6.24%
2032	4%	142%	0%	29%	97%	6.26%
2033	3%	138%	1%	26%	97%	6.15%
2034	3%	153%	0%	42%	98%	4.04%
2035	4%	131%	2%	23%	95%	6.59%
2036	14%	150%	0%	37%	95%	8.27%
2037	2%	167%	0%	54%	98%	8.36%
2038	4%	125%	9%	21%	94%	7.99%
2039	4%	122%	9%	20%	94%	7.54%
2040	2%	138%	3%	33%	96%	6.17%
2041	1%	142%	3%	37%	98%	7.50%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Post 2024 capacity position maintains above obligation.

Energy Balance:

Energy Balance is high in the middle years and is maintained through the forecast as energy rich renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%.

Exports I&M:

Exports maintain higher levels than in other portfolios. However, there are not many years where exports exceeds 30%

Carbon Free Generation:

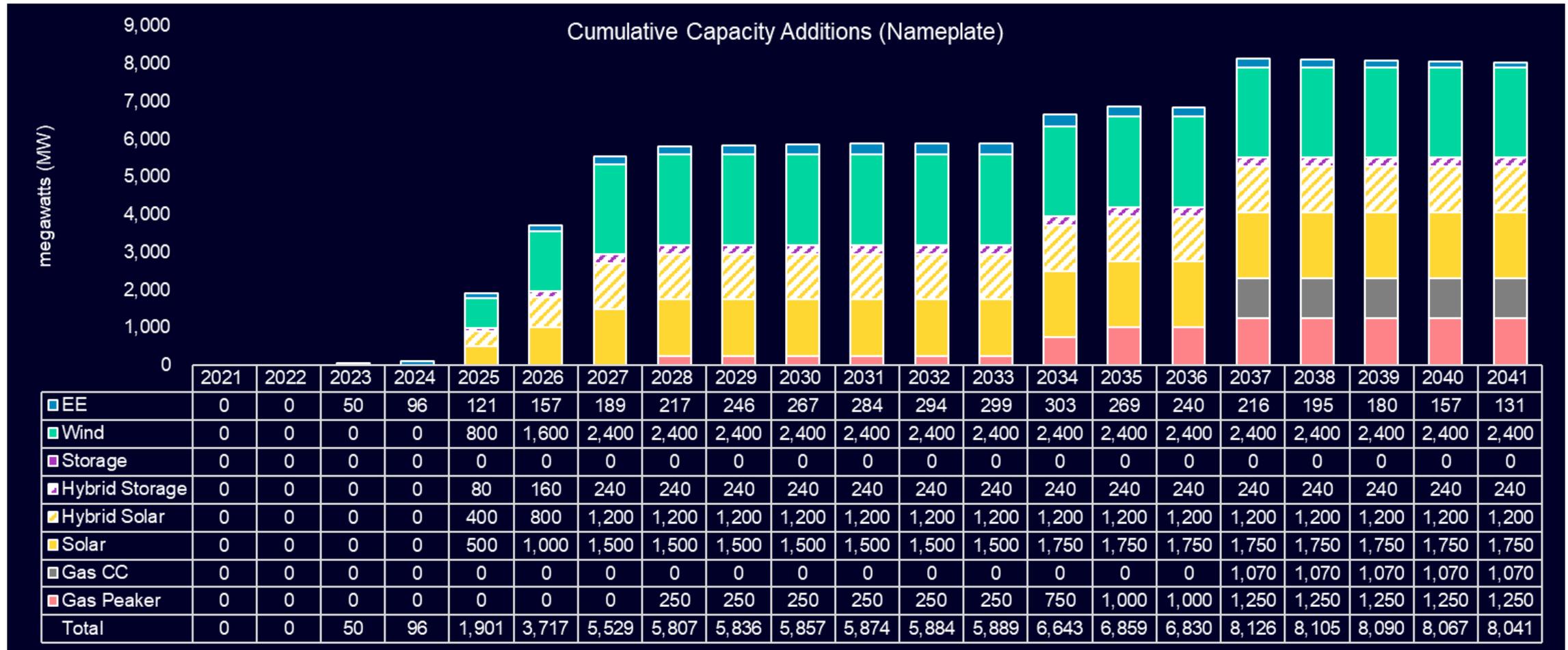
Carbon free generation meets targets for entire forecast period.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030 but is slightly higher than the SEA Portfolio.

Reference Case Sensitivity

Expanded Cumulative Build Limits on Renewable Energy and Storage



Reference Case Sensitivity KPI

Expanded Cumulative Build Limits on Renewable Energy and Storage



Reference Renewable Limits Adjusted						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	11%	5%	85%	0.06%
2022	12%	93%	23%	5%	83%	0.46%
2023	6%	100%	14%	4%	90%	0.79%
2024	0%	104%	9%	2%	91%	2.31%
2025	11%	120%	3%	11%	92%	2.91%
2026	24%	140%	1%	26%	97%	3.79%
2027	35%	154%	0%	41%	97%	4.22%
2028	5%	150%	0%	38%	97%	3.02%
2029	4%	153%	0%	41%	98%	4.09%
2030	4%	157%	0%	45%	98%	5.33%
2031	4%	150%	0%	38%	98%	5.48%
2032	4%	154%	0%	42%	98%	5.43%
2033	3%	151%	0%	39%	97%	5.15%
2034	2%	164%	0%	53%	98%	3.56%
2035	7%	133%	3%	28%	95%	4.62%
2036	5%	130%	5%	25%	95%	5.26%
2037	8%	136%	1%	28%	93%	4.97%
2038	10%	121%	5%	17%	63%	4.45%
2039	9%	117%	6%	15%	63%	3.99%
2040	4%	115%	6%	16%	64%	2.85%
2041	3%	113%	6%	15%	65%	3.49%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Capacity position maintains healthy margins through forecast period with slight overbuild in advance of Rockport.

Energy Balance:

Energy Balance is high in the middle years as renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain higher levels than in other portfolios. However, there are not many years where exports exceeds 30%

Carbon Free Generation:

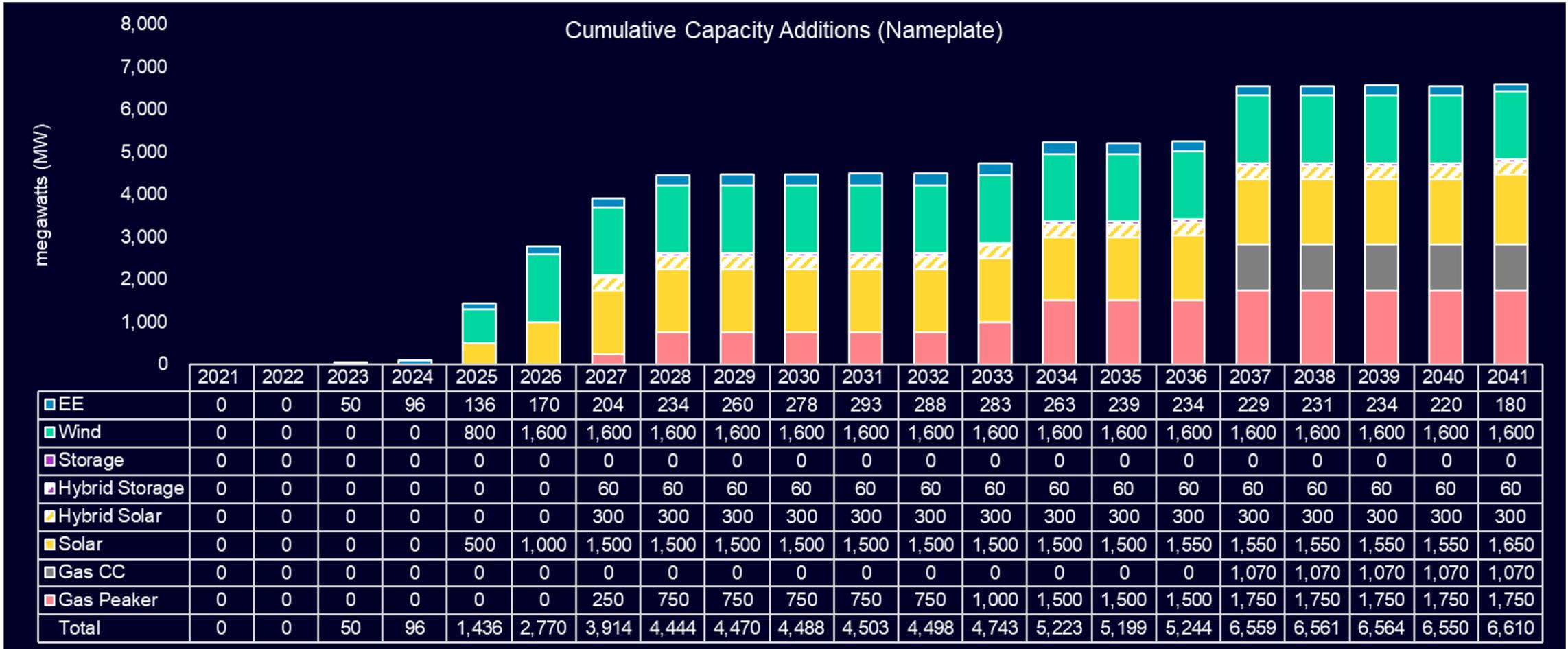
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Reference Case Sensitivity

Import and Export Limit at ~30% of I&M Load



Reference Case Sensitivity KPI

Import and Export Limit at ~30% of I&M Load



Reference 30% Import / Export						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	11%	5%	85%	0.06%
2022	12%	93%	23%	5%	83%	0.46%
2023	6%	100%	14%	4%	90%	0.79%
2024	0%	104%	9%	2%	91%	2.31%
2025	5%	117%	4%	9%	92%	3.14%
2026	13%	133%	1%	20%	97%	3.99%
2027	27%	141%	1%	28%	96%	4.44%
2028	4%	136%	1%	25%	96%	3.16%
2029	4%	140%	1%	28%	96%	4.28%
2030	4%	143%	0%	31%	97%	5.54%
2031	4%	136%	1%	24%	96%	5.63%
2032	4%	140%	0%	28%	97%	5.36%
2033	9%	136%	1%	25%	96%	4.96%
2034	7%	146%	0%	35%	97%	3.15%
2035	4%	109%	8%	8%	93%	4.16%
2036	3%	106%	10%	7%	93%	5.12%
2037	6%	136%	0%	28%	75%	5.11%
2038	8%	100%	13%	4%	52%	4.95%
2039	8%	97%	14%	2%	52%	4.72%
2040	3%	95%	14%	3%	53%	3.68%
2041	3%	94%	14%	3%	56%	4.26%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Capacity position maintains healthy margins through forecast period.

Energy Balance:

Energy Balance is high in the early and middle years as renewable energy is being selected to meet capacity position.

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30%

Exports I&M:

Exports maintain reasonable balance without many years exceeding +30%

Carbon Free Generation:

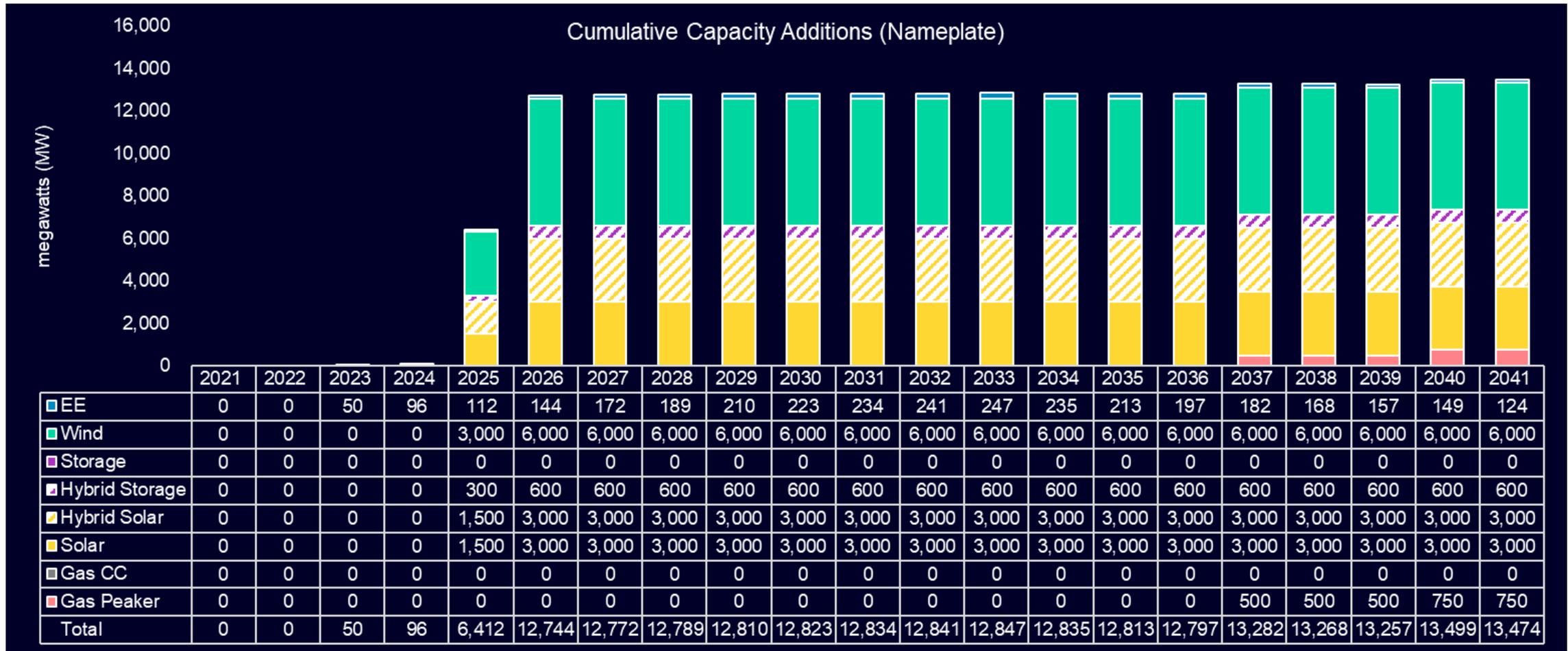
Carbon free generation meets targets until the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030

Reference Case Sensitivity

Removed Cumulative and Annual Build Limits on Renewable Energy and Storage



Reference Case Sensitivity KPI

Removed Cumulative and Annual Build Limits on Renewable Energy and Storage



Reference Unlimited Renewables						
Year	Capacity Position	Energy Balance	Imports I&M	Exports I&M	Carbon Free Generation	EE Penetration
2021	12%	103%	11%	5%	85%	0.06%
2022	12%	93%	22%	5%	83%	0.46%
2023	6%	100%	14%	4%	90%	0.79%
2024	0%	103%	10%	2%	91%	2.31%
2025	47%	159%	0%	47%	98%	2.79%
2026	91%	228%	0%	114%	99%	3.66%
2027	84%	229%	0%	116%	99%	4.08%
2028	42%	221%	0%	109%	99%	2.82%
2029	41%	226%	0%	115%	99%	3.79%
2030	41%	231%	0%	119%	99%	4.89%
2031	40%	223%	0%	111%	99%	4.95%
2032	40%	228%	0%	116%	99%	4.88%
2033	39%	223%	0%	111%	99%	4.66%
2034	28%	243%	0%	133%	99%	3.01%
2035	25%	210%	0%	102%	98%	4.02%
2036	23%	208%	0%	100%	98%	4.78%
2037	4%	210%	0%	101%	98%	4.64%
2038	6%	173%	2%	67%	96%	4.21%
2039	5%	170%	2%	65%	96%	3.80%
2040	6%	170%	1%	66%	97%	2.82%
2041	5%	169%	1%	66%	98%	3.47%

Metrics Calculations and Notes

Capacity Position against FPR:

Short-term capacity contracts are required in 2024 to account for shortage in capacity. Capacity position maintains high margins through forecast period with overbuild in advance of Rockport.

Energy Balance:

Energy Balance is throughout the forecast period

Imports I&M:

Imports maintain reasonable balance without any years exceeding +30% and with little need after 2025.

Exports I&M:

Exports are very high compared to other portfolios with many years exceeding 30%.

Carbon Free Generation:

Carbon free generation meets targets for entire forecast period, despite the retirement of Cook Nuclear facilities.

Energy Efficiency (EE)

EE Penetration for new and existing programs reaches ~5% of retail load obligation by 2030