**BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN**

Application of Wisconsin Electric Power Company for a Certificate of Public Convenience and Necessity to Construct and Operate the Paris Reciprocating Internal Combustion Engines Project, Consisting of Seven Natural Gas-Fired Reciprocating Internal Combustion Engines Generating up to 128 MW Total at the Lakeshore Capacity Improvement Project Regulator Station in the Town of Paris, Kenosha County, Wisconsin

6630-CE-316

**DIRECT TESTIMONY OF CHELSEA HOTALING
ON BEHALF OF CLEAN WISCONSIN**

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Chelsea Hotaling, and my business address is 91 Main Street, Canton, NY 13617.

Q. By whom are you employed and in what capacity?

A. I am employed by Energy Futures Group ("EFG") as a Consultant. EFG is a clean-energy consulting firm headquartered in Hinesburg, Vermont, with a satellite office in Canton, New York. EFG has two primary areas of practice. The first is in the design, implementation, and evaluation of programs and policies to promote investments in efficiency, renewable energy, other distributed resources, and strategic electrification. The second is in integrated resource planning and related analyses. EFG staff have delivered projects on behalf of energy regulators, government agencies, utilities, and advocacy organizations in at least forty states, eight Canadian provinces, and several countries in Europe.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of Clean Wisconsin.

II. BACKGROUND

Q. Please describe your educational background.

A. I received a Bachelor's Degree in Accounting and Economics from Elmira College in 2011. I also received a Master of Business Administration Degree in 2012, a Master's Degree in Environmental Policy in 2019, and a Master's Degree in Data Analytics in 2020, all from Clarkson University.

Q. Please describe your work experience.

A. I have worked for eight years in electric utility regulation and related fields. I have reviewed dozens of integrated resource plans ("IRPs") and related filings by utilities in Arizona, Colorado, Georgia, Kansas, Kentucky, Iowa, Indiana, Michigan, Missouri, Montana, Minnesota, New Mexico, Nova Scotia, Puerto Rico, and South Carolina. I have performed my own capacity expansion, production cost, and reliability modeling in numerous cases using multiple models, including EnCompass, AURORA, PLEXOS, and the Strategic Energy & Risk Valuation Model ("SERVM"). A copy of my Curriculum Vitae is provided with this testimony as Exhibit CW-Hotaling-1.

III. PURPOSE OF TESTIMONY

Q. Are you sponsoring any exhibits with your testimony?

A. Yes, I am sponsoring the following Exhibits:

Ex.-CW-Hotaling-1: Resume for Chelsea Hotaling

Ex.-CW-Hotaling-2: WEPCO Response to Data Request 2-CW-42

Ex.-CW-Hotaling-3: I&M IRP Stakeholder Meeting Presentation (excerpts)

Ex.-CW-Hotaling-4: KU/LG&E IRP (excerpts)

Ex.-CW-Hotaling-5: WEPCO Response to Data Request 6-CW-11 (6630-CE-317)

Ex.-CW-Hotaling-6: WEPCO Response to Data Request 2-CW-38; Response-Data Request-CW-2.38 CONFIDENTIAL Attach 01 (excerpt)

Ex.-CW-Hotaling-7: WEPCO Response to Data Request 2-CW-23

Ex.-CW-Hotaling-8: "Burns & McDonnel Reaches Substantial Completion on Reciprocating Engine Power Plants in Michigan"

Ex.-CW-Hotaling-9: WEPCO Response to Data Request 2-CW-24

Ex.-CW-Hotaling-10: WEPCO Response to Data Request 2-CW-26

Ex.-CW-Hotaling-11: WEPCO Response to Data Request 5-CW-30

Q. Are you familiar with the Paris RICE Project?

A. Yes, I have reviewed the project application, responses to data requests, and other documents related to this project.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to describe the modifications I made to the PLEXOS modeling performed by Wisconsin Electric Power Company ("WEPCO") for this Application. I will also discuss the results of the PLEXOS capacity expansion and production cost modeling I performed in addition to recommended modeling changes for WEPCO to implement for future proceedings. Recommendations based on the modeling I performed are made within Clean Wisconsin Witness Jester's testimony.[1]

Q. Please summarize your findings.

A. I performed PLEXOS capacity expansion and production cost modeling in the development of alternative portfolios that include different input assumptions from what WEPCO modeled for this Application. I also offer the following recommendations for WEPCO to implement:

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[1] *See* Direct-CW-Jester.

1. Perform production cost modeling to evaluate the cost of portfolios

2. Implement a modified approach to modeling energy efficiency

3. Model the Direct Loss of Load ("DLOL") construct instead of a modified Installed Capacity ("ICAP") approach

4. Revise CT and CC first year availability

5. Apply the ITC to battery storage resources without the assumption that amortization is the only option for the ITC

IV. PLEXOS MODELING CHANGES

Q. Please explain how you developed alternative portfolios in PLEXOS.

A. The modeling I performed for Clean Wisconsin was based on the PLEXOS database that WEPCO provided through discovery. [2] The starting point for the modeling I conducted is the "Continued Fleet Change" ("CFC") planning future presented by WEPCO.[3]

Q. Please summarize the changes you made to the PLEXOS database for the modeling you performed.

A. **Table *1*** below provides a high-level summary of the inputs and assumptions that I changed for the modeling I performed in PLEXOS. I discuss the rationale for each of these changes in more detail below. Additional inputs I did not change may warrant adjustment in future proceedings, as discussed later in my testimony.

[2] Ex.-CW-Hotaling-2. The PLEXOS database was upgraded to Version 10 for the modeling presented in my testimony.
[3] Ex.-WEPCO-Application-Volume III Appendix D: 17.

Table 1. Summary of PLEXOS Modeling Changes

Modeling Input	WEPCO	Clean Wisconsin
Energy Efficiency	Generic energy efficiency based on Focus on Energy Potential Study assumption	Energy efficiency proposed by Witness Sherwood
Demand Response	Generic demand response[4]	Residential and behavioral programs proposed by Witness Sherwood
Combined Cycle ("CC") First Year Available	[redacted]	2031
Battery Storage Starting Capital Cost	[redacted]	[redacted]
MISO Market Interaction	Purchases and sales limited to 800 MW in any hour under capacity assurance[5]	Purchases and sales limited to 800 MW in any hour for capacity expansion Purchases relaxed in production cost modeling runs
EPA Greenhouse Gas ("GHG") Rules	High, Medium, and No GHG Restriction Scenario	No rules applied
Paris RICE[6] and Oak Creek	Scenarios with and without the Paris RICE units included and Oak Creek CTs forced in	Allowed PLEXOS to optimize the decision around the Paris RICE units and Oak Creek CTs
Paris RICE Project Size Constraint	7 individual units at 18.4 MW for 128.8 MW	Constraint for PLEXOS to select either 3 units (55.2 MW) or 7 units (128.8 MW)
New Large Load Customer	Included in all modeling runs and high and low sensitivities (+/-50% of load)	Modeling runs with new large load customer, without new large load customer, and WEC's low sensitivity (-50% of load)

Q. Please explain the changes that you made to the level of energy efficiency and demand response.

A. The energy efficiency and demand response included in the alternative portfolio modeling conducted for Clean Wisconsin are based on the recommendations from Ms. Sherwood. Please

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[4] Ex.-WEPCO-Application-Volume III Appendix D: 24.
[5] Ex.-WEPCO-Application: 2-8.
[6] Reciprocating internal combustion engine ("RICE").

see Ms. Sherwood's testimony for more detail.[7]

Table ***2*** below shows the energy efficiency savings that were modeled over the planning period.

Table 2. Energy Efficiency

	Energy Savings (MWh)	Peak Savings (MW)
2025	9,974	2
2026	19,949	4
2027	29,923	7
2028	39,898	9
2029	49,872	20
2030	99,744	31
2031	149,616	41
2032	199,488	52
2033	249,360	63
2034	299,232	74
2035	339,130	83
2036	379,027	92
2037	418,925	100
2038	458,822	109
2039[8]	498,720	109

WEPCO modeled energy efficiency as a supply side generator within PLEXOS. When energy efficiency is modeled as a supply side generator, we typically see an associated 8,760 hourly shape assigned to that resource, similar to how profiles are modeled for renewable resources. I developed a profile to model in PLEXOS based on the hourly load profile from WEC's load inputs.

Table 3 shows the savings associated with the residential and behavioral demand response programs. The residential program is summer only while the behavioral program offers savings in the summer and winter.

[7] *See* Direct-CW-Sherwood.

[8] This level of savings persists under the end of the planning period or 2052.

Table 3. Demand Response

Year	Residential Summer (MW)	Behavioral Summer (MW)	Behavioral Winter (MW)
2025	12.4	-	
2026	24.8	-	
2027	37.2	83.81	54.13
2028	49.6		
2029	62.0		

Q. Did you apply any operational constraints to the demand response programs modeled in PLEXOS?

A. In order to reflect restrictions around the operation of the programs related to number of calls and hours upon which the programs can be called upon, I modeled operational constraints as shown in Table 4 for the demand response programs.

Table 4. Demand Response Operational Constraints

	Max Up Time	Max Starts per Day	Max Starts per Summer	Max Starts per Winter
Residential	4	1	15	-
Behavioral	4	1	10	10

In addition to these constraints, I also allowed the model to dispatch the programs at a non-integer level, which means that PLEXOS could dispatch a portion up to the full max capacity of each demand response program.

Q. What costs were modeled for the energy efficiency and demand response programs recommended by Witness Sherwood?

A. Energy efficiency was modeled at $.2215/kWh, residential demand response was modeled at $208.20/kW, and behavioral demand response was modeled at $87/kW. The costs were escalated by the 2.25% inflation assumption from WEPCO's CFC Planning Future.[9]

Q. Did you allow PLEXOS to optimize the selection of the energy efficiency resources or did you include them as a fixed decision in the alternative portfolio modeling?

A. I included both the energy efficiency and demand response programs as a fixed decision in PLEXOS. I did this because the PLEXOS capacity expansion module, which is known as Long-Term ("LT"), solves using a Load Duration Curve methodology. Under the Load Duration Curve ("LDC") in PLEXOS the chronology is only preserved between each LDC and not within the LDC. Since chronology is important for the value of demand side resources, I included them as fixed decisions.

Q. Please explain the changes that you made to WEPCO's assumptions for new thermal builds.

A. WEPCO's modeling assumed that new combined cycle ("CC") units could be built starting in [redacted] and new combustion turbine ("CT") resources could be built starting in [redacted]. Based upon EFG's work in other jurisdictions, we are seeing utilities model CCs and CTs starting in either 2030 or 2031 due to the high demand across the county for turbines and the time needed to secure equipment for projects. For Indiana Michigan Power Company's ("I&M") upcoming IRP, I&M is modeling a first build date of 2031 for new CCs and new CTs.[10] For Kentucky Utilities Company and Louisville Gas and Electric Company's ("KU/LG&E") most recent IRP filing,

[9] Ex.-WEPCO-Application-Volume III Appendix D: 20.
[10] Please see Ex.-CW-Hotaling-3.

they modeled the earliest new build date of 2030 for new CTs and CCs.[11] For this reason, we modified the first year in which new CCs could be built in PLEXOS.

Q. Please explain the change that you modeled for the battery storage capital cost.

A. WEPCO modeled the costs of the battery storage resources with the assumption that the Investment Tax Credit ("ITC") would need to be amortized over 30 years.[12] Under this approach, WEPCO assumed a pre-ITC starting capital cost of $[redacted]/kW with an ITC reduction of $[redacted]/kW to arrive at a capital cost of $[redacted]/kW.[13] The Inflation Reduction Act ("IRA") extended the ITC under IRS Section 48 for most projects starting construction before January 1, 2025, and expanded its scope to include standalone energy storage systems. However, regulated utilities must follow amortization/normalization accounting rules for ITCs, including the Section 48E clean electricity investment credit. These rules dilute the immediate financial benefits by spreading the ITC across a project's lifecycle, which reduces the upfront value of the tax credit. Utilities may have the option to elect out of normalization for certain public utility property, such as energy storage projects under Section 48. However, given the differing effective dates of Sections 48 and 48E, there is uncertainty about whether this election will apply to energy storage projects beginning construction after December 31, 2024. If the uncertainty around the ability for utilities to elect out of normalization is not resolved, there are alternative pathways that can be pursued in lieu of amortizing the ITC. These include Power Purchase Agreements ("PPAs") with independent power producers, lease agreements with third-party developers, or utilizing tax equity investors to finance projects. Witness Jester goes into more detail in his testimony around alternative ownership structures for WEPCO that would allow them to avoid the amortization

[11] Please see Ex.-CW-Hotaling-4.
[12] Ex.-CW-Hotaling-5. WEPCO's approach to valuing the ITC can be found in the workbook named "Response-Data Request-CW-2.38 CONFIDENTIAL Attach 01" (PSC Ref. #522674).
[13] Ex.-CW-Hotaling-6c.

question on the ITC.[14] With the revised assumption around the ITC, the starting capital cost for battery resources is modeled at $[redacted]/kW in PLEXOS for the alternative portfolios.[15]

Q. Please explain how you treated the assumption around energy market purchases and sales.

A. WEPCO made different assumptions depending on if the modeling was conducted under Capacity Assurance or Energy Assurance Resource Planning. Under WEPCO's Capacity Assurance Resource Planning, an hourly limit of 800 MW for energy purchases and sales was modeled in PLEXOS. [16] Under the Energy Assurance Resource Planning, WEPCO assumed that there was a decreased ability to purchase from or sell energy into the MISO market. This was implemented in PLEXOS so that by 2026 the model could not purchase or sell any level of energy. [17] All of the capacity expansion modeling performed for the alternative portfolios used WEPCO's assumption from the Capacity Assurance Resource Planning. I will note that I did need to relax this assumption for market purchases for the production cost modeling I performed because of infeasibility and run time issues I encountered.

Q. Please explain the assumptions you modeled around the Environmental Protection Agency ("EPA") Greenhouse Gas rules under the Clean Air Act Section 111.

A. WEPCO's modeling included three different assumptions around the EPA Greenhouse Gas Rules. Those scenarios included a High, Medium, and No GHG Restriction, with each scenario placing different restrictions on the operations of new and existing units. Under the High GHG Scenario, existing CC units had a maximum capacity factor of 50% starting January 1, 2030 and

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[14] *See* Direct-CW-Jester.
[15] This is the starting capital cost modeled in PLEXOS. When the 2.25% inflation is applied to extrapolate the capital cost to future years, the 2027 cost is $[redacted]/kW.
[16] Ex.-WEPCO-Application-Application: 2-8.
[17] Ex.-WEPCO-Application-Volume III Appendix D: 16.

new CTs were constrained to a maximum capacity factor of 20% beginning January 1, 2030. [18] The second scenario was the Medium GHG Restriction scenario which applied no restrictions to existing natural gas or new RICE units, but did place a maximum capacity factor of 20% for new CTs, which started January 1, 2030.[19] Under the No GHG Restriction scenario, there were no capacity factor limits placed on any resources. The alternative portfolio modeling was performed under the assumption that there are no operational restrictions for thermal resources. This assumption was modeled because of the updated rules that were released around existing coal and new natural gas combustion turbines and how they differed from what WEPCO modeled for this Application in addition to my understanding that the most recent EPA rules would not apply to RICE units. The updated rules released in April 2024 apply restrictions to existing coal and new natural gas combustion turbines. Under these rules, the pathway compliance options for coal resources include retirement by 2032, co-firing with 40% gas by 2030 and retirement in 2039, or installation of carbon capture sequestration ("CCS") by 2032. The other option for coal resources is to convert to operate on 100% gas, which is how WEPCO modeled Elm Road.[20] For new gas combustion turbines, if they operate at a capacity factor greater than 40%, then the compliance pathway would be CCS by 2032, but if they operate between 20-40% capacity factor then the units would be subject to the CO_2 intensity restrictions. Since these updated rules do not apply to existing units and have different capacity factor requirements than what WEPCO modeled, in combination with the recent election results and the potential implications for the future of the EPA rules, we modeled the alternative plans without restrictions applied to existing or new

[18] Ex.-WEPCO-Application-Volume III Appendix D: 23.
[19] *Id*.
[20] *Id*.

thermal resources. I maintained WEPCO's assumption that Elm Road would convert to operate on 100% gas.

Q. Please explain how you modeled the Paris RICE units and the Oak Creek Combustion Turbines ("CTs").

A. I allowed the Paris RICE units and the Oak Creek CTs to be selectable within PLEXOS. While I understand that the Paris RICE units and the Oak Creek CTs are separate Applications, I evaluated whether PLEXOS included these resources in the capacity expansion plan based on the modeling input changes I made. Even though they are in separate Applications, the consideration for pursuing both Applications arise from the retirement of Oak Creek and the inclusion of the new large load customer in the load forecast.

For the Paris RICE units, I introduced a constraint within PLEXOS to allow the model to select between the project at a configuration of three units for a total of 55.2 MW or 7 units for a total of 128.8 MW. The three-unit configuration alternative was chosen based on the three RICE units that comprise 54 MW at the A.J. Mihm Generating Station.[21] This was done to evaluate the size of the project and whether PLEXOS would choose a modified project size versus the full size of the Paris project.

Q. Please explain the different load scenarios modeled for the new large customer included in the load forecast.

A. WEPCO reported that the 2024 forecast, which is the forecast modeled in PLEXOS, "includes the assumed new load in the I-94 corridor starting in 2025".[22] WEPCO did perform sensitivities on this new load level by changing the requirements by plus and minus 50 percent for capacity

[21] Please see Ex.-CW-Hotaling-8.
[22] Ex.-WEPCO-Application-Volume III Appendix D: 18.

and energy.[23] I tested the impact of this new customer by removing this load from the load forecast[24] in addition to evaluating the level of new resource builds if the load is at the minus 50% level modeled under WEPCO's low sensitivity. Please see Witness Jester's testimony for a more detailed discussion around the load scenarios and why they were evaluated in our alternative portfolio modeling.[25]

Q. Were there any changes that you made to the modeling approach WEPCO used for this Application?

A. Yes, I took an additional step to put the alternative portfolios through the production cost function within PLEXOS, which is known as the Short Term ("ST" or "ST Schedule") model. WEPCO's approach utilized the capacity expansion functionality within PLEXOS, otherwise known as Long-Term ("LT") to develop the costs of the portfolios evaluated in the economic evaluation for this Application. [26] The difference between LT and ST is that modeling using ST is done at a more granular level, which is usually every hour of the modeling horizon. This is in contrast with LT, which is based on a less granular time horizon. For WEPCO's modeling, the LDC within PLEXOS was modeled at 12 blocks of the Load Duration Curve within each month.[27]

When performing modeling, the standard approach is to place any portfolios developed from capacity expansion through production cost modeling because of the difference in time granularity between the two steps. Simulating resource dispatch using hourly, chronological

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[23] Ex.-WEPCO-Application-Volume III Appendix D: 29.
[24] I used the same modeling approach in PLEXOS that WEPCO used to develop each of its load forecasts. *See* Ex.-CW-Hotaling-7. The new load customer was removed based on the information provided in Response-Data Request-CW-2.38 CONFIDENTIAL Attach 01.
[25] *See* Direct-CW-Jester.
[26] Ex.- CW-Hotaling-9.
[27] Direct-WEPCO-Sieber-4.

modeling should eliminate any inaccuracies in generation and therefore cost that can arise from sampling time in the capacity expansion modeling.

V. PLEXOS MODELING RESULTS

Q. Please explain how you developed the WEPCO Reference portfolio.

A. In order to have a representative portfolio from WEPCO to compare against any alternative portfolios, I needed to develop a portfolio that represents WEPCO's proposed resources, which include the Paris RICE units and the Oak Creek CTs. While WEPCO did develop a portfolio under the CFC future pathway with no EPA rules applied, the modeling results from this run conducted by WEPCO resulted in a CC build in 2028.[28] Since the modeling input changes I made included no EPA Greenhouse Gas rule restrictions for thermal generators and moved the first year available date for CCs to be first selected in 2031, this meant I needed to develop a representative plan for WEPCO that considered the delay in when CCs could be selected. For this modeling run, I fixed in the Paris RICE units and the Oak Creek CTs, did not apply any EPA rule restrictions, and allowed the model to select CCs starting in 2031. The capacity expansion results for this modeling run through 2030 are shown in Table 5 below.

Table 5. WEPCO Rerun Capacity Additions (Cumulative MW)

Year	Oak Creek CT	Paris RICE	Generic CT	Generic RICE	Solar	Wind	Battery	EE	DR
2025	0	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0	0
2027	1,185	129	1,422	129	800	300	0	15	0
2028	1,185	129	1,896	129	1,600	600	0	29	0
2029	1,185	129	1,896	129	1,900	800	0	44	0
2030	1,185	129	1,896	129	1,900	1,100	0	44	0

[28] PLEXOS expansion plans are contained in Data Request Response "WEPCO – Paris RICE NPV Results" (PSC Ref. #505820). The modeling run I reference is labeled 206A, which was optimized under the CFC Pathway and no GHG restrictions.

Q. Is there a level of additional generic capacity that is being selected in the capacity expansion model to meet the capacity requirements?

A. Yes, there is. These results are consistent with the different modeling runs that WEPCO performed for this Application. PLEXOS selects additional generic resources, including CTs, CCs, RICE units, solar, wind, battery storage resources, demand response, and energy efficiency. Figure 1 below shows the cumulative new resource additions for a portion of the modeling runs that WEPCO performed for this Application. As can be seen by the blue shaded bars, there is a level of generic CT and RICE builds above the capacity that can be provided by the Paris RICE or Oak Creek CTs, which is 128 MW and 1,185 MW, respectively.

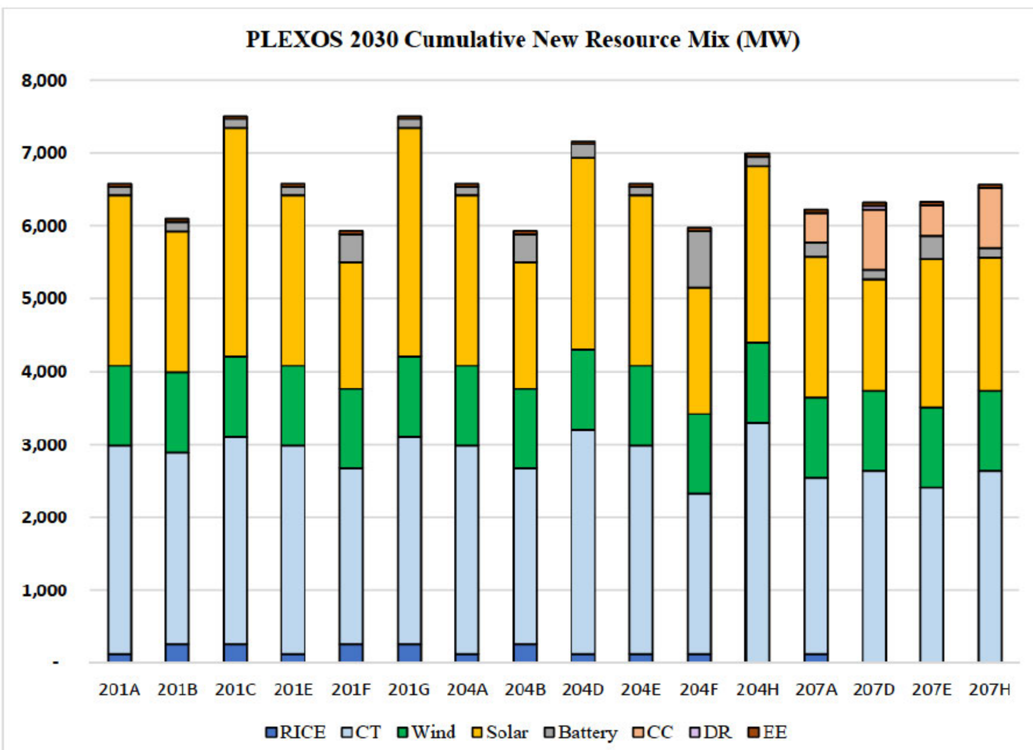

Figure 1. WEPCO Modeled Portfolio Cumulative Builds Through 2030 (MW)[29]

[29] Ex.-WEPCO-Application-Volume III Appendix D: Figure 7.

Q. Please explain the results of the alternative modeling that you performed.

A. The alternative modeling that I performed looked at three different portfolios that include the modeling input changes I outlined in **Table *1***.

Table 6 below shows the capacity additions for this alternative plan through 2030 when the full capacity and energy from the new customer is included in the load forecast. This plan includes the level of energy efficiency and demand response discussed earlier in my testimony. The key results include:

- When PLEXOS was allowed to choose between the Paris project configuration at three units instead of seven units, it selects the smaller configuration.
- The modified battery storage capital cost also results in PLEXOS selecting a larger build of battery storage resources.

Table 6. Alternative Plan New Customer Full Load Capacity Additions (Cumulative MW)

Year	Oak Creek CT	Paris RICE	Generic CT	Solar	Wind	Battery	EE	DR
2025	0	0	0	0	0	0	2	12
2026	0	0	0	0	0	0	4	25
2027	711	55	1,185	800	300	780	7	121
2028	1,185	55	1,185	1,600	600	845	9	133
2029	1,185	55	1,185	1,700	800	845	20	146
2030	1,185	55	1,185	1,700	1,100	845	31	146

Q. Did you also evaluate different assumptions around the new customer load?

A. Yes, as outlined in **Table *1***, two additional modeling runs were performed to evaluate the capacity additions if the assumption is that the load from the customer is reduced by 50% or if the load from the new customer is not included.

Table *7* shows the capacity expansion results through 2030 if the new load is reduced by 50% and Table 8 shows the capacity expansion results through 2030 if the new load is not included.

Table 7. Alternative Plan New Customer Load Low Sensitivity Capacity Additions (Cumulative MW)

Year	Oak Creek CT	Paris RICE	Generic CT	Solar	Wind	Battery	EE	DR
2025	0	0	0	0	0	0	2	12
2026	0	0	0	0	0	0	4	25
2027	237	55	0	800	300	780	7	171
2028	474	55	0	1,600	600	910	9	183
2029	474	55	0	1,600	800	910	20	196
2030	474	55	0	1,900	1,100	910	31	196

With the lower load forecast from the new customer, there is an impact on what PLEXOS selects related to the Oak Creek CTs and the generic CTs. Under this low load sensitivity, PLEXOS selects less of the Oak Creek CTs and none of the generic CTs. It is important to note that the level of demand response in Table **7** is larger because it includes the level of demand response discussed earlier in my testimony and the model also selects one of the 50 MW generic demand response resource that WEPCO modeled.

Under the load forecast where the new customer is not included, PLEXOS does select the Paris project at the smaller configuration, it continues to not select the generic CTs, and it does not select any of the Oak Creek CTs.

Table 8. Capacity Additions (MW) for Alternative Plan No New Customer Load Capacity Additions (Cumulative MW)

Year	Oak Creek CT	Paris RICE	Generic CT	Solar	Wind	Battery	EE	DR
2025	0	0	0	0	0	0	2	12
2026	0	0	0	0	0	0	4	25
2027	0	55	0	0	300	0	7	121
2028	0	55	0	400	500	325	9	133
2029	0	55	0	400	800	325	20	146
2030	0	55	0	400	1,100	325	31	146

Q. How did the alternative portfolios compare on a Present Value of Revenue Requirements ("PVRR") basis?

A. Table 9 below shows the comparison of the PVRR results. I used the PLEXOS outputs from the production cost modeling to develop the PVRR components, which include costs from new resource builds, generation costs, net market revenue, cost of carbon, and the costs for the energy efficiency and demand response included in the alternative runs.

Table 9. PVRR Comparison ($000)

Portfolios	**PVRR ($000)**
WEPCO Rerun	$23,883,062
Alternative with Full New Load	$23,656,644
Alternative with 50% New Load*	$20,582,240
Alternative without New Load*	$15,871,459

The difference between the PVRR of the WEPCO Rerun and the Alternative with Full New Load indicates that these portfolios are within a similar cost range and are comparable on a PVRR basis. The alternative plans with the modified new customer load are denoted with an asterisk because I added back the sales revenues from these modeling runs in an effort to be conservative on the costs since both of these plans have a higher level of market revenue.

Q. Did you perform any additional modeling runs to test the selection of the Paris RICE project at a three-unit configuration under the Alternative without New Load?

A. Yes, I conducted an additional capacity expansion run that removed the 800 MW constraint on market purchases and removed the availability of the Paris RICE project from selection within PLEXOS. With these two changes, PLEXOS chose an additional battery storage resource in place of the Paris RICE project at the 55 MW size and added 100 MW of solar in 2027. The capacity expansion build from this modeling run is shown in Table ***10*** below.

Table 10. Capacity Additions (MW) for Alternative Plan No New Customer Load and No Paris Project Capacity Additions (Cumulative MW)

Year	Oak Creek CT	Paris RICE	Generic CT	Solar	Wind	Battery	EE	DR
2025	0	0	0	0	0	0	2	12
2026	0	0	0	0	0	0	4	25
2027	0	0	0	100	300	0	7	121
2028	0	0	0	400	500	390	9	133
2029	0	0	0	400	800	390	20	146
2030	0	0	0	400	1,100	390	31	146

Table 11 below shows the PVRR comparison. The results indicate that the costs of the two plans are within a comparable range. Since the PVRR of each portfolio are comparable on a cost basis, this tells me that if the load from the new customer does not materialize, then there is an alternative pathway that does not include the proposed Paris project, regardless of the size of the project at three units or seven units.

Table 11. PVRR Comparison ($000)

Portfolios	PVRR ($000)
Alternative without New Load	$13,091,167
Alternative without New Load and No Paris	$13,068,460

Q. What do the results of your alternative modeling show?

A. The results of the alternative modeling provide important information around the impact that changes to the ITC assumption applied to battery storage resources and the level of new customer load that is included in the forecast. When the ITC credit is taken as a reduction in the capital cost in the first year of the project rather than normalized, the model selects between 325 and 910 MW of battery storage resources by 2028, depending on the level of new customer load modeled. When the assumptions around the level of the new customer load change, there are implications for the type and level of new resource builds that are needed to meet that new customer load.

VI. RECOMMENDED CHANGES

Q. Do you have other recommended modeling changes to improve how WEPCO evaluates resource alternatives and performs modeling for future Applications?

A. Yes, I offer the following recommendations:

1. Perform production cost modeling to evaluate the cost of portfolios
2. Implement a modified approach to modeling energy efficiency
3. Model the Direct Loss of Load ("DLOL") construct instead of a modified Installed Capacity ("ICAP") approach
4. Revise CT and CC first year availability
5. Apply the ITC to battery storage resources without the assumption that amortization is the only option for the ITC

Q. Please explain your first recommendation around using production cost modeling to develop the costs of portfolios.

A. As discussed earlier in my testimony, putting portfolios that are developed from capacity expansion modeling through the production cost model is important because of the difference in time granularity. Simulating resource dispatch using hourly, chronological modeling should eliminate any inaccuracies in generation and therefore cost that can arise from sampling time in the capacity expansion modeling.

Q. Please explain your second recommendation related to energy efficiency.

A. There are a few recommendations related to how WEPCO modeled energy efficiency in PLEXOS. First, energy efficiency resources should include a reduction from the avoided transmission and distribution ("T&D") costs as a reduction in the energy efficiency program cost. One of the benefits of energy efficiency is that it avoids costs that supply-side generators cannot such as transmission and distribution ("T&D") costs. Most IRP models, including PLEXOS, do not have a way to explicitly include avoided T&D costs, but those avoided costs can be captured as a reduction in energy efficiency program cost modeled in PLEXOS. Second, energy efficiency should be grouped into bundles, with separation between the commercial and industrial ("C&I") and residential classes. Within the residential class, there should be a separate bundle for behavioral measures given its one-year measure life, and another separate bundle for any income qualified programs since these would typically be forced into the model. Modeling energy efficiency using a bundling approach will help group savings in a manner that aligns as much as possible with the manner in which they would be procured. Third, implementing a bundling approach should help combat the issue that can arise with WEPCO's approach, which is when there is not a consistent selection of energy efficiency over the planning period. In WEPCO's modeling, the energy efficiency resource was selected in the majority of runs between 2027-2029 and then was not selected in the majority of runs until 2043.[30] Under a bundling approach, several different points would be modeled as resources throughout the planning period. For instance, there might be bundles available that would cover the near-term of the planning period, such as 2025-2028, a second longer term bundle that would cover 2029-2036, and a third additional bundle that would cover 2037 and beyond.

[30] PLEXOS expansion plans are contained in Data Request Response "WEPCO – Paris RICE NPV Results" (PSC Ref. #505820).

Q. Please explain your third recommendation related to modeling MISO's DLOL construct instead of the modified ICAP approach that WEPCO used for this Application.

A. As WEPCO discussed in its Application, there are resource adequacy changes within MISO, in particular the Direct Loss of Load ("DLOL") construct, that will go into effect for the planning year 2028/2029. [31] The DLOL construct will impact resource accreditation for all resources and the Planning Reserve Margin Requirement ("PRMR"). WEPCO's approach for this Application was to model the Planning Year 2024/25 Installed Capacity ("ICAP") seasonal planning reserve margins[32] along with a declining seasonal capacity accreditation for solar, wind, and battery storage resources. In its Application, WEPCO denoted that DLOL estimates were applied for these resources starting in 2028.[33] However, for existing units, WEPCO reported that the seasonal capacity tested rating was used[34] and the Paris RICE units were assigned the full nameplate as the capacity credit since "RICE units are not affected by seasonal temperature changes in the same way as CTs."[35] I recommend that WEPCO should model the full aspect of the MISO DLOL approach, which would include modifying the seasonal PRMs and the capacity accreditation for thermal, renewable, and battery storage resources to reflect the accreditation for these resource classes under the DLOL construct.

Q. Please explain your fourth recommendation related to the first build date for CCs and CTs.

A. As discussed earlier in my testimony, other utilities are modeling first year build dates for new CCs and CTs in the 2030-2031 timeframe due to the high demand and time needed for

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[31]Ex.-WEPCO-Application-Volume III Appendix D: 10-13.
[32] Ex.-WEPCO-Application-Volume III Appendix D: Table 3. Table 3 reports ICAP Planning Reserve Margin of 17.7% for the summer, 25.2% for the fall, 49.4% for the winter, and 40.8% for the spring.
[33] Ex.-WEPCO-Application-Volume III Appendix D: 16.
[34] Ex.-CW-Hotaling-10; Ex.-CW-Hotaling-11.
[35] Ex.-CW-Hotaling-10.

combustion turbines and generation equipment. WEPCO should revise the first-year build dates that have been modeled in PLEXOS for CCs and CTs to reflect the market dynamic and the time that will be needed to bring any new thermal capacity online.

Q. Please explain your fifth recommendation related to the cost of battery storage resources.

A. WEPCO should apply the ITC to battery storage resources without the assumption that amortizing the ITC over a 30-year life is the only pathway to pursue.

VII. CONCLUSION

Q. What are your recommendations to the Commission in this proceeding?

A. Recommendations based on the modeling I performed are made within Witness Jester's testimony.

Q. Does this conclude your testimony?

A. Yes.