EARTHJUSTICE

July 31, 2026

Overnight Delivery
Ms. Kris Abel
Records and Recording Division
Louisiana Public Service Commission
Galvez Building, 12th Floor
602 North Fifth Street
Baton Rouge, Louisiana 70802

Re: Application for Approval of Generation and Transmission Resources and for Other Relief Pursuant to the Commission's *Lightning Initiative*, **Docket No. U-37882**

Dear Ms. Abel:

I have enclosed, on behalf of the Alliance for Affordable Energy and Union of Concerned Scientists, the original and two copies of the Non-Confidential Public Version of the Direct Testimony and Exhibits of two witnesses. I also have included two USB flash drives, each of which contains one expert's non-confidential Direct Testimony.

In addition, I have also enclosed the original and two copies of the **Confidential** Version of the Direct Testimony and Exhibits of the same two witnesses. The confidential version contains information that is designated either Highly Sensitive Protected Material or Attorney Eyes Only and is being provided to you under seal, in separate envelopes, pursuant to the provisions of the LPSC General Order dated August 31, 1992, and Rules 12.1 and 26 of the Commission's Rules of Practices and Procedures. Finally, I have also included two USB flash drives, each of which contains one expert's Confidential Direct testimony.

Thank you in advance for your assistance and cooperation and please do not hesitate to contact me should you have any questions or concerns.

Respectfully submitted,

Susan Stevens Miller

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CERTIFICATE OF SERVICE

I hereby certify that on this 31st day of July, 2026, I served copies of the foregoing testimony upon all other known parties of this proceeding by electronic mail, and served the Confidential version of this pleading upon all parties entitled to receive HSPM/AEO material.

Respectfully submitted,

Susan Stevens Miller

Susan Stevens Miller, Esq.

STATE OF LOUISIANA

BEFORE THE

LOUISIANA PUBLIC SERVICE COMMISSION

IN RE*: APPLICATION FOR APPROVAL OF GENERATION AND TRANSMISSION RESOURCES AND FOR OTHER RELIEF PURSUANT TO THE COMMISSION'S *LIGHTNING INITIATIVE	)	**DOCKET NO. U-37882**

Direct Testimony and Exhibits of

Nicholas W. Miller

On Behalf of the

Alliance for Affordable Energy and

Union of Concerned Scientists

Public Version

July 31, 2026

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EXHIBITS

I. INTRODUCTION

Q 1. Please state your name, business address, and position.

A. My name is Nicholas W. Miller. I am a principal with HickoryLedge LLC, a consultancy providing technical services. My business address is 124 Clipp Rd, Delmar, NY 12054.

Q 2. On whose behalf are you testifying in this proceeding?

A. I am submitting testimony on behalf of the Alliance for Affordable Energy and Union of Concerned Scientists (collectively, the "NPOs").

Q 3. Please summarize your work experience and educational background.

A. I am an internationally known power system engineer, with specialization in integration of wind and solar power to bulk power systems. I hold Bachelor and Master of Engineering Degrees in Electric Power Engineering from Rensselaer Polytechnic Institute in Troy, New York.

I presently provide technical advice to regulatory bodies (including the Public Utility Commission of Hawai'i), renewable project developers, grid operators in the US, the US Department of Energy, and I perform research with a variety of research entities. I recently conducted research on bulk grid stability for the Midcontinent Independent System Operator ("MISO"). I lead the Stability Task Force of Energy Systems Integration Group, with a focus on oscillatory behavior of inverter dominant power systems.

I spent 3/8 of a century with General Electric Company and affiliated companies ("GE"), serving my final decade in the role of Senior Technical Director for GE Energy Consulting. In the last 16 years at GE, I led analytical developments for integration of GE Wind Turbine-Generators into power systems, spearheading efforts to develop new applications, controls and systems for large-scale coordination of wind and solar generation with other system resources. I have lectured and provided consultation on wind and solar power integration to governments and institutions in more than three dozen countries. My work on new techniques for the analysis and control of transient and voltage stability of very large power systems is cited in my Institute of Electrical and Electronics Engineers ("IEEE") Fellowship.

I am an elected member of the National Academy of Engineering, an IEEE Life Fellow, a Licensed Professional Engineer in NY, and a Distinguished Member of CIGRE.

My resume is attached as Exhibit NWM-2.

Q 4. Have you previously testified before the Louisiana Public Service Commission ("LPSC" or "Commission")?

A. Yes, I submitted testimony on behalf of the same NPOs (the Alliance for Affordable Energy and Union of Concerned Scientists) under LPSC Docket No. U-37425, "Application for approval of generation and transmission resources in connection with service to a single customer for a project in North Louisiana."

Q 5. What is the purpose of your testimony?

A. My testimony evaluates electric system reliability-driven aspects of Entergy Louisiana, LLC's ("ELL" or "Company") proposal.

Q 6. What information did you review in preparing your testimony?

A. I reviewed ELL's testimony, exhibits, workpapers, and discovery responses (including the attachments produced with those responses). I also reviewed industry materials and presentations regarding the interconnection of large loads and impacts of large data centers from the North American Electric Reliability Corporation ("NERC"), the Federal Energy Regulatory Commission ("FERC"), and Energy Systems Integration Group ("ESIG").

Q 7. Please summarize your findings.

A. Based on my review and analysis, I conclude the following:

The Company's generation and transmission-related proposals unnecessarily dismiss options that could improve reliability and reduce project costs to all stakeholders.

The proposal insufficiently addresses flexibility and seasonality issues.

The proposal insufficiently exploits opportunities for transmission to produce reliability benefits and reduce overall project costs.

The proposal insufficiently addresses ongoing technical issues that will inevitably arise after initial approvals and project execution.

II. THE COMPANY'S GENERATION AND TRANSMISSION-RELATED PROPOSALS UNNECESSARILY DISMISS OPTIONS THAT COULD REDUCE PROJECT COSTS TO ALL STAKEHOLDERS.

Q 8. Please briefly describe the reliability-related components of the Company's Application.

A. As noted in ELL testimony[1], the Company is proposing the addition of seven large combined-cycle combustion turbine units ("CCCTs") in the ELL system and three battery energy storage systems along with substantial 500kV and 230kV transmission line additions. Other supporting substations and lower voltage additions are included as well.

Q 9. What considerations are missing that you believe may reduce project costs?

A. Broadly, the justification for the addition of seven large CCCTs is based on insufficiently detailed resource adequacy ("RA") analysis. More temporal and spatial detail over a broader range of alternatives is needed in the analysis used to justify the resource additions. The Company has followed the MISO mandated [2] planning reserve margin requirement ("PRMR") approach to meet their load serving entity ("LSE") resource adequacy requirements ("RAR"). "The RAR is established to ensure that LSEs have enough Planning Resources to reliably serve load"[3]. This method looks at relatively

[1] Direct Testimony of Phillip R. May at 5:18-6:3 ("May Direct").

[2] MISO, Planning Reserve Margin Requirement (PRMR) Allocation (April 15, 2026), https://cdn.misoenergy.org/20260415%20RASC%20Item%2007%20PRMR%20Allocation%20(RASC-2020-4%20and%202019-2)750560.pdf.

[3] MISO, Planning Reserve Margin Requirement (PRMR) (July 6, 2026), https://help.misoenergy.org/knowledgebase/article/KA-01099/en-us.

simple metrics of seasonal coincident load and available accredited capacity. This is appropriate for smaller incremental planning and capacity additions, but insufficient for massive, transformative projects of the scale proposed here.

The Company has provided some seasonal Loss-of-Load Expectation ("LOLE") analysis,[4] mostly specific to their preferred plan, but broadly defers to MISO for more detailed resource adequacy analysis as a matter of course. Ordinarily, MISO controls resource dispatch across the whole regional grid, and ultimately exercises control to avoid loss-of-load events. However, as FERC has noted their intent to "…expedite the integration of large loads onto the transmission system, providing the speed to power that is critical…" [5]. For decisions of this magnitude, postponing or avoiding detailed analysis does not serve the public interest. By having the Company do more complete RA analysis now, rather than MISO doing it as subset of a broader and less focused RA analysis, the kind of detail necessary to adequately evaluate alternatives is applied now. It should lead to better recommendations and decision making. Deferral to MISO has risks, since by the time MISO includes this in their broader RA work, recommendations specific to this project are apt to be *fait accompli*.

Q 10. What additional analysis should the Company do?

A. The Company should conduct a full, multiyear, scenario-based RA analysis that quantitatively reports a variety of reliability metrics and information that will advise strategies for validation and improvement of the proposed project plans.

I note, for example, the good practice of Hawaiian Electric Company ("HECO"), that as part of their Integrated Grid Plan ("IGP") Action Plan Annual Update [6]. They provide the Hawai'i Public Utilities Commission with a multiplicity of "heatmaps" in which

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[4] ELL response to data request Staff 1-108, attachment "Reliability and Scarcity Pricing Exposure Analysis" (HSPM).

[5] FERC, Fact Sheet | FERC Takes Action to Supercharge America's Grid for Efficiency, Reliability, and a Bold Energy Future (June 18, 2026), https://www.ferc.gov/news-events/news/fact-sheet-ferc-takes-action-supercharge-americas-grid-efficiency-reliability-and.

[6] Hawaiian Electric Company, Hawaiian Electric - Integrated Grid Plan Action Plan Annual Update 2024, at 96 figure 2-52, https://hawaiipowered.com/igp/IGP_Action_Plan_Annual_Update_2024-06-24.pdf.

modeled reliability problems (*e.g*. high Expected Unserved Energy or "EUE") are reported by hour and month (288 results) for wide ranging sensitivity analysis, such as the addition of new generation or changes in outage assumptions. Further, they provide corresponding graphs of LOLE sensitivity to assumptions (*e.g*. LOLE vs. count of added combustion turbines at a site). The results provide the Commission with temporal granularity on stress, rather than simple pass/fail indices, that they use when considering HECO requests for permission on infrastructure investment.

Here is an example of such a heatmap from HECO results:

2033 Hawai'i Max. EUE of Mean Sample (No PGV): L – 0 MW Future ICE; R – 24 MW Future ICE,

HOURS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0.0	0.9	0.0	0.2	0.1	0.0	0.1	0.2	0.0	0.5	0.0	0.3
1	0.0	0.7	0.0	0.2	0.1	0.0	0.0	0.3	0.0	0.6	0.0	0.1
2	0.0	1.0	0.1	0.1	0.2	0.0	0.1	0.2	0.0	0.7	0.1	0.2
3	0.0	0.8	0.0	0.2	0.1	0.0	0.2	0.2	0.0	0.5	0.0	0.3
4	0.0	1.1	0.0	0.2	0.2	0.1	0.4	0.4	0.0	0.8	0.0	0.5
5	0.0	2.3	0.1	0.3	0.2	0.4	0.5	0.5	0.0	1.1	0.1	0.5
6	0.1	3.0	0.1	0.5	0.2	0.5	0.4	0.7	0.1	1.2	0.1	0.6
7	0.3	2.7	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.6
8	0.1	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5
9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
10	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3
16	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3
17	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	0.3
18	0.1	0.9	0.0	0.1	0.0	0.0	0.0	0.1	0.0	1.2	0.0	0.4
19	0.1	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.2	0.0	0.4
20	0.1	0.4	0.1	0.0	0.3	0.0	0.1	0.1	0.0	1.0	0.0	0.2
21	0.0	1.0	0.0	0.2	0.1	0.0	0.0	0.2	0.0	0.8	0.1	0.2
22	0.0	0.9	0.0	0.3	0.4	0.0	0.0	0.3	0.0	0.6	0.0	0.2
23	0.0	0.8	0.1	0.2	0.3	0.0	0.1	0.2	0.0	0.5	0.0	0.2

HOURS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
5	0.0	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.2
6	0.0	0.8	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.2
7	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
21	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
22	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MAX
6.6 MW
0 MW
MIN

Figure 2-52: Hawai'i Island EUE heat map, year 2033. Left – no future firm (H_Y33B_Out24_woPGV); Right – three future ICE units (24 MW) (H_Y33B_Out24_woPGV_w24ICE).

This particular example pair shows the impact of adding 24 MW of internal combustion engine ("ICE") generation on EUE. The columns are months, the rows are hour of the day. Warmer colors represent higher EUE. In the base case on the left, the worst performance occurs in February at the hour starting 6:00am. The addition of the generation greatly reduces the number of hours and the amount of EUE, as shown on the right. This case is noted as being a sensitivity in which another generation resource is assumed to be unavailable (*i.e*. PGV, which is a geothermal power plant on Hawai'i Island.).

The point I illustrate here is that for this exercise, the addition of generation (the ICE in this case) greatly reduces, but does not eliminate, the reliability problems. But, the relatively fewer number of hours and lower level of EUE in the improved case would lend itself to solutions that might not include yet more generation. For example, load participation or alternative charge/discharge strategies for available battery energy storage, would have a good possibility to further ameliorate the residual EUE. It is this type of sequential, high temporal resolution investigation that can illuminate economic options that compliment generation additions. In this filing, such analysis might guide maintenance outage refinements, better use of proposed energy storage, and possibilities for load flexibility.

Q 11. What would be the value of such analysis?

A. The analysis will provide sufficient information to advise the Company regarding the viability of the options that the Company previously dismissed as unacceptable based solely on their simple analysis. Specifically, the RA analysis will provide improved both systemic and seasonality insight, allowing for possible reduction of the amount of new CCCT generation added. The analysis will focus on the ELL system with complete representation of adjacent and otherwise relevant systems, so that meaningful insights into systemic reliability emerge. ELL never operates as an electrical island, so understanding the interaction with the rest of MISO and the Eastern Interconnection ("EI") becomes imperative towards making informed investments for reliability. Aspects of the analysis will include sensitivity to powerplant maintenance scheduling, improved understanding of reliability contribution of weather-based renewable resources, and quantification of possible benefits from load flexibility options. Sensitivity analysis includes variations in these parameters as input, determining their impact on LOLE and other reliability metrics. Results will tend to guide investigations towards the best reliability outcomes. For example, practical adjustment in maintenance schedules (from baseline assumptions) may result in improved reliability or obviate the needs for some of the proposed generation projects.

Q 12. Can you provide some details of the results that could be produced by the recommended analysis?

A. Results would include, at the least,

- Loss-of-load-expectation (LOLE) with seasonal granularity
- Expected unserved energy (EUE) with monthly and time-of-day granularity
- Detailed documentation of EUE causality,

For a broad range of resource possibilities, transmission limits, maintenance assumptions, weather assumptions, and outage assumptions. Results should include comparative metrics that quantitatively inform the efficacy of various alternatives that better meet project objectives – especially options that lower cost and reduce stakeholder risk.

Q 13. Can you describe the types of data that would be used in such analysis?

A. Input to the analysis input would include details such as seasonal forced outage rates, detailed maintenance schedules, weather, temporal and spatial load and renewable energy production forecasts, transmission limits as altered by ELL's proposed transmission enhancements, as well as extensive data on thermal and hydro generation. A significant portion of the required data is likely to be available from MISO, but details specific to the Company's service area and assets would need to be current.

Q 14. Can you explain the deficiencies in ELL's proffered seasonal analysis and how the recommended analysis helps ameliorate them?

A. In this context, "seasonal analysis" refers to determination of resource adequacy in which input data is modified according to the four seasons. Results, such as compliance with PRMR and LOLE are produced and reported with seasonal granularity[7] (as well as

[7] ELL response to data request Staff 4-21 (explanation of reliability metrics for Table in response to Staff 1-108).

annual figures). ELL produced LOLE and other seasonal metrics for some cases,[8] However, in their seasonal analysis, ELL insufficiently considers:

- options for addressing reliability concerns surrounding plant maintenance scheduling
- potential contributions of weather-dependent renewables during periods of capacity stress
- potential contributions of load flexibility

Broadly stated, every improvement in LOLE and EUE by non-generation means is directionally towards reducing the amount of new generation needed. Combinations of items such as plant maintenance scheduling, transmission improvements, better representation of weather-dependent renewables, and load flexibility all have the possibility to add up to displacing the need for one or more of the requested CCCTs. More discussion of these non-generation options follows.

Q 15. Can you elaborate on Plant Maintenance Scheduling aspects?

A. The Company, including testimony by Daniel Kline[9], specifically notes that a significant factor in their determination of the need for the seven CCCTs is seasonal planned outage rhythms. This is in keeping with FERC's directive to consider seasonality[10] as well as extreme weather[11]. The Company identified capacity deficiencies occurring during "typical outage seasons," *i.e.* spring and fall; and ELL witness Laura Beauchamp[12] observes ELL "intends to site Pointe Coupee Units 1, 2, & 3 within SELPA [Southeast Louisiana Planning Area], which will help with outage management," indicating that the Company has given some consideration to how maintenance factors into resource planning. [13] However, there is a considerable degree of latitude available in the

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[8] ELL response to data request Staff 1-108 "Reliability and Scarcity Pricing Exposure Analysis" (HSPM).

[9] Direct Testimony of Daniel Kline at 19:11-20:20 ("Kline Direct").

[10] Order, *Midcontinent Indep. Sys. Operator, Inc*., 180 FERC ¶ 61141 (Aug. 31, 2022) (FERC Dkt. Nos. ER22-495-000, ER22-495-001).

[11] Order, *Transmission Sys. Planning Performance Requirements for Extreme Weather*, 183 FERC ¶ 61191 (June 15, 2023) (FERC Dkt. No. RM22-10-000).

[12] Direct Testimony of Laura K. Beauchamp at 69:13-69:17 ("Beauchamp Direct").

[13] *Id.* at 69:13-69:17.

scheduling of maintenance, which ELL has not thoroughly considered. Good utility practice takes this latitude into account when scheduling system reliability, so that maintenance scheduling impacts on resource adequacy are minimized.

I recommend that ELL undertake analysis to identify, at a high level of detail, the extent to which the reliability impact of the Company's scheduling assumptions has affected the capacity addition request. Further, this analysis will advise the Company and the Commission whether reasonable and prudent approaches that alter the Company's assumed maintenance schedules might reduce the claimed need for all seven CCCTs. For example, the addition of new CCCTs and better seasonal representation of wind and solar resources may shift or widen the time window for necessary maintenance of existing resources. In other words, only detailed temporal analysis can reveal how much time is available on an annual and seasonal basis to perform CCCT maintenance, and thus how much redundancy of those resources is required. The HECO example of good practice that I provided above in Q 10 illustrated one approach that could be included for refining maintenance scheduling. Shifting maintenance within acceptable bounds might reduce frequency and depth of EUE exposure (as illustrated in the figure).

Q 16. Can you elaborate on the role of weather-based renewable resources?

A. The Company notes in several places, including testimony of Nicholas Owens[14] and Laura Beauchamp[15], that solutions that rely solely on renewables are "not viable." Asked to elaborate on what "viable" means or how the Company came to the "non-viability" view, ELL fell back on its expert's "experience, professional judgment, and training" and a bare assertion that renewables plus storage are "prohibitively costly" without considering fuel cost savings.[16]

However, the prudent question the Company should be considering is not one of sole reliance on renewables, but rather if more realistic consideration of renewable

[14] Direct Testimony of Nicholas W. Owens at 6:14-7:16 ("Owens Direct").

[15] Beauchamp Direct at 75, n. 57.

[16] ELL responses to data requests Sierra Club 1-23, NPO 3-15, Staff 1-74, Sierra Club 1-7. Note that ELL labeled its response to the data request captioned NPO 3-15 with the caption "AAE 3-15."

contributions might reduce the amount of new CCCT generation that the Company claims is needed. That witness Daniel Kline's testimony specifically notes capacity concerns in the shoulder (maintenance) seasons is significant: wind and solar resources both tend to have higher capacity factors during those times. MISO reports 47% higher seasonal capacity credit for wind generation in fall compared to summer. These are figures calculated by MISO "in accordance with FERC acceptance of the Reliability Availability & Need (RAN) seasonal capacity construct (ER22-495-000)."[17] Wind curtailment is also a factor in present MISO capacity determination. New transmission, including that associated with this project, could favorably impact wind (and solar) deliverability.

The recommended analysis will give finer temporal and spatial resolution results, which in turn provide meaningful, quantitative measures of the reliability impact of renewable resources, which may have been undervalued by the methods used by the Company. Specifically, finer-resolution representation of wind and solar production and grid deliverability may show lowered LOLE and EUE that in turn may reduce the amount of new CCCTs needed to meet reliability goals. This applies for both existing and new wind and solar resources. New wind and solar resources, in particular, may be shown to be more "viable" than ELL has determined, because they make a larger contribution to meeting reliability objectives than ELL's analysis shows.

Q 17. Why should load flexibility be considered?

A. Greater large load flexibility should be considered as it could substantively affect both capacity additions and transmission design (depending on the type of flexibility considered), with possible reductions in the required capital costs as well as producing long-term operational savings. I note that the Company was challenged on this point during discovery, and responded: "The Customer was not interested in being a demand response customer post-ramp period, as it does not meet their operational requirements."

[17] MISO, Planning Year 2025-2026 Wind and Solar Capacity Credit Report (March 2025), https://cdn.misoenergy.org/PY%2025-26%20Wind%20and%20Solar%20Capacity%20Credit%20Report684294.pdf.

[18] This statement does not close the issue of load flexibility, which warrants much further consideration.

Q 18. Why would the Customer (Evest LLC) consider load flexibility when they have explicitly stated they have no interest in participating in demand response programs?

A. The Customer's initial disinterest may be understandable and rational. At this stage they have zero information about how "flexibility" might impact their operations. It is understandable for them to demand "firm" service. Further, existing programs are unlikely to meet their needs. The Customer's needs are important here, but arriving at a solution for all customers that upholds public convenience and necessity[19] may entail that the Company (or Commission) insist that flexibility be included.

Q 19. Then why pursue "flexibility"?

A. New ("reformed") innovative arrangements (as per FERC recommendations)[20] that might be offered here (perhaps bespoke to LPSC jurisdiction or across MISO) could produce huge savings for them, allow them to interconnect and ramp power usage more quickly, or both. The reality of the scale of this project is acknowledged by NERC, which identified "...unique challenges includ[ing] demand forecasting and planning for system behavior when some large loads […] are substantially larger and constructed more quickly than prior loads using the [Bulk-Power System]."[21] A properly designed RA analysis would provide quantitative insights into the operational impacts of load

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[18] ELL response to data request Sierra Club 1-22 (public redacted version).

[19] *See* the Commission's General Order of September 20, 1983 on certification for construction of electric generating facilities.

[20] Order, *PJM Interconnection, L.L.C.*, 195 FERC ¶ 61211, at 5 ¶ 11(June 18, 2026) (FERC Dkt. No. EL26-67-000) ("..customers willing to embrace flexibility can reduce the need for Network Upgrades and generating capacity to serve a co-located load, which speeds up connecting to the grid *and* reduces costs for the co-located load *as well as* other retail customers.").

[21] NERC, Comments in Response to Notice Inviting Comments, FERC Docket No. RM26-4-000 (Nov. 21, 2025), at 5-6, 8 (citing 2024 Long-Term Reliability Assessment (July 11, 2025), https://www.nerc.com/globalassets/our-work/assessments/2024-ltra_corrected_july_2025.pdf.

flexibility through active response to system needs. Metrics of frequency, amplitude and duration of load response would emerge from the analysis.

For an illustrative example, it would be possible to bound the Customer's risk along the lines of "load curtailment would be less than X MW for Y hours, Z times per year" for a project with fewer CCCTs rather than the proposed seven. Such quantitative insight would illuminate how the Customer might save money (through reduced capital expenditure on new generation); guide their decision to offer flexibility; and lead them to demand that ELL offer arrangements that take advantage of flexibility. The analysis would likely drive critical design decisions by the Customer at this early stage of development during which they have flexibility to make critical equipment and process decisions. It is worth noting that the current state-of-the-art resource adequacy practice[22] for consideration of large-load flexibility has a degree of consensus that better economic and reliability outcomes are achieved when flexibility is designed into projects in the early stages. After-the-fact offering of flexible rates is largely ineffective[23] at altering behavior or providing flexibility benefits.

Q 20. What flexibility options might produce benefits for the stakeholders?

A. The industry has proffered a spectrum of strategies that may facilitate faster and more economic interconnection of large-loads. The just-released Lawrence Berkeley National Laboratory ("LBNL") report "Speed to Power: Solutions for Accelerating Large Load Interconnections" [24] approaches the problem in keeping with the urgency expressed by

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[22] ESIG, Flexible Interconnections for Large Loads: Regulatory and Tariff Considerations (June 17, 2026), https://www.esig.energy/event/flexible-interconnections-for-large-loads-workshop/.

[23] ESIG, Large Loads Task Force, Resource Adequacy with Large Loads: Planning for Flexibility to Accelerate Integration, at 2 (Apr. 2026), https://www.esig.energy/wp-content/uploads/2026/04/ESIG-Large-Loads-Resource-Adequacy-ES-2026.pdf ("By treating this flexibility as a planned capacity resource **considered up front**, utilities and regional grid operators can transform a potential source of resource adequacy risk into a system asset......allows planners to flatten the peaks that drive capacity requirements, reducing the need for new firm generation, while increasing the utilization of existing capacity and thereby increasing system efficiency and reducing electricity system costs.") (emphasis added).

[24] Fredrich Kahrl & Natalie Mims Frick, *Speed to Power: Solutions for Accelerating Large Load Connections* (June 2026), https://eta-publications.lbl.gov/sites/default/files/2026-06/lbnl_large_loads_speed_to_power_final_1.pdf.

the Commission in this docket. That report identifies thirteen solution areas that can both accelerate and economize interconnection. Of particular relevance here are concepts presented around Energy Resource Interconnection Service ("ERIS") for Loads and Flexible Interconnection. Both of these classes of solution customized to the needs of the Customer could result in lower overall capital expenditure, building of less new generation, and reduced risk for ratepayers. Here again, I note the scale of the project: this new data center load[25] (including that announced in last year's Docket No. U-37425) is roughly equivalent to the average MW loading of New York City. The load is not monolithic, and inevitably some portions of the customer load should be suitable for ERIS or other creative solutions.

Q 21. Are there risks associated with developing proposals that include reliance on load flexibility from the Customer?

A. Yes. Some of the available mechanisms for achieving load flexibility have adverse impacts. One specific concern is that the Customer may shift load from the grid to diesel generation within the facility. This strategy likely would result in increased polluting emissions and other environmental (and fuel) costs. Strategies that result in substantial increase in diesel operation are at odds with the LPSC's large load guidelines.[26] More creative solutions, such as temporal shifting of some loads within the facility, as well as regional and national shifting of computational burden to other Customer facilities under conditions of high system stress, are more environmentally palatable and likely to be more economic. Should the Commission determine to direct that a load flexibility option be offered, it should contain guardrails to limit potential resultant environmental harms.

Q 22. Would inclusion of load flexibility impact "around the clock energy needs"?

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[25] Meta, *Teachers and Local Businesses Win as Meta Expands Louisiana Data Center* (July 13, 2026), https://about.fb.com/news/2026/07/teachers-local-businesses-win-as-meta-expands-louisiana-data-center ("Meta is expanding its Richland Parish, Louisiana data center to 5GW of compute capacity…").

[26] LPSC, Large Load Additions Non-Binding Guidelines, https://lpsc.louisiana.gov/docs/general/Non-Binding_Guidelines_for_Potential_Large_Load_Customers.pdf (last accessed July 21, 2026). ("Utility needs to demonstrate that environmental and local system impacts associated with the utility serving the load have been identified, and to the extent mitigation is required, a mitigation plan is developed and that compliance costs are appropriately assigned.").

A. Almost certainly yes. In ELL testimony,[27] the question regarding prudency "to plan a portfolio capable of producing enough around-the-clock energy needs, rather than planning to 'lean' on its existing fleet and/or the wholesale spot market" is raised. Mr. Owens acknowledges that there is risk of overbuilding, which is presented as a benefit: "This asymmetry feature of the minimum bill provisions of the ESA not only ensures sufficient Customer revenue to cover the cost of the proposed resource portfolio but also creates an upside opportunity for ELL's customers in the form of potential surplus capacity that can either can be sold or used to displace resource additions that would otherwise be needed." This argument ignores risks to the ratepayers associated with having even more capital expenditure included in the project than is necessary. Testimony by Edward Burgess[28] states "ELL's proposal exposes existing customers to substantial cost risk" and outlines suggestions that "would minimize the risks to existing customers from rushing to lock in fixed costs for seven new combined cycle generators."[29]

III. THE PROPOSAL INSUFFICIENTLY EXPLOITS OPPORTUNITIES FOR TRANSMISSION TO PRODUCE RELIABILITY BENEFITS AND REDUCE OVERALL PROJECT COSTS

Q 23. Explain opportunities for transmission to produce reliability benefits and reduce overall project costs.

A. The Company may have the opportunity to increase or even maximize power transfer capability on new, and existing lines. Some of the appropriate steps will work towards satisfying FERC mandates for considering new technology and alternative technical approaches to transmission. Incremental engineering and possibly capital investment in

[27] Owens Direct at 7:18-7:21.

[28] Docket No. U-37882, Direct Testimony and Exhibits of Edward Burgess on behalf of the Alliance for Affordable Energy and Union of Concerned Scientists at 2 (filed contemporaneously with this testimony).

[29] *Id.* at 3.

the proposed new lines and existing transmission, beyond that included in the proposal, may produce substantial benefits,

Q 24. What benefits?

A. A major benefit to increased transmission capability is the potential to reduce the amount of new generation needed. These benefits would be possible due to reduced constraints on transmission utilization and access to more generation sources including import of renewable energy to save operational costs. Specifically, increased power carrying capability on key transmission lines (e.g. the new El Dorado to Smalling line[30]), may relieve interface constraints that limit import from available (and perhaps more economic) generation resources. As I note below, potential increases with advanced designs and materials could be substantial. Ratepayers and other stakeholders would further benefit from reduced fuel usage, and ELL's ability to better meet Company and Customer renewable objectives. The ability to move more power around the system will also produce less stress and fewer constraints associated with maintenance, again by increasing access to more generation resources during critical maintenance periods. As I noted above, maintenance outages are one concern driving the capacity additions.

The testimony of Nicholas W. Owens[31] is one of several places where the Company expresses support and expectation that renewables will play a significant role in meeting portfolio needs. While he dismisses renewable and storage only options, he states: "To be clear, that is not to say that renewables and storage are non-viable or unattractive as a general matter. To the contrary, both resource types have attractive characteristics, and ELL is actively planning large amounts of both. For example, ELL has been actively engaged in efforts to procure up to 3,000 MW of solar through an accelerated procurement process authorized by the Commission in Docket No. U-36697 and an additional 1,500 MW of solar." But the Company has performed little analysis to determine the deliverability of such resources. Assuring that the new transmission built

[30] May Direct at 33:9-33:16.

[31] Owens Direct at 7:5-7:11.

for this project is designed with the maximum power carrying capability is a least-regrets investment in the uncertain future of the regional grid.

Q 25. How would the Company quantify these benefits?

A. The performance benefits, particularly changes in individual line and inter-area power transfer limits would be quantified by standard network analysis (loadflow and transient stability) of the type already performed as due diligence by the Company for this project. Incremental sensitivities, using improved thermal (and possibly dynamic) limits would be quantified through sensitivity (with and without) cases. Reliability quantification, primarily in the form of improved reliability metrics of the type outlined above, would come out of sensitivity analysis that would be a natural part of the recommended reliability analysis.

Q 26. What technologies are likely to produce overall benefits for the project and stakeholders?

A. FERC Order 1920 mandates[32] that systems must consider the use of Grid Enhancing Technologies ("GETs") such as "(1) dynamic line ratings, (2) advanced power flow control devices, (3) advanced conductors and (4) transmission switching" in the design of new transmission. The recent FERC Show Cause Order[33] will also require MISO to consider advanced transmission technologies. The Company is already accustomed to including static VAR compensators (SVCs) - a flexible AC transmission (FACTS) technology in their "toolkit". However, advanced line designs, especially for the new 500kV lines, that use the latest configurations and advanced conductors will almost certainly increase the power carrying capability of the proposed lines. It is unclear whether the Company considered advanced conductors in its analysis. In rebuttal, I recommend that the Company clarify. I do not expect that major changes, such as rerouting or elimination of proposed lines from the portfolio will result from such power

[32] Order, *Building for the Future Through Electric Regional Transmission Planning and Cost Allocation*, 187 FERC ¶ 61068, P 1198 (May 13, 2024) (FERC Dkt. No. RM21-17-000), https://www.ferc.gov/media/e1-rm21-17-000.

[33] Order, Midcontinent Independent System Operator, Inc., 195 FERC ¶ 61212, at 74, P 126 (June 18, 2026) (FERC Dkt. No. EL26-70-000) (https://www.ferc.gov/media/e-8-el26-70-000).

carrying increases. However, as I note above, increases in transfer capability may facilitate access to more generation resources, especially under high stress conditions. Transfer limits may change with temperature, time-of-day, or season. Increased capability during shoulder seasons with milder temperatures are possible. Such increased transfer capability will aid reliability and will provide more access to renewable generation in the region. Both are stated objectives of the Company.

I note that the line designs proposed[34] are 20 years old. Consideration of newer, advanced line design offers a means to increase power transfer capability on individual circuits, often with the same or even reduced tower height and right-of-way width. The standard line (and tower) design has a natural constraint on power transfer: the surge impedance loading. New line designs, so-called high surge impedance lines (HSIL)[35], (including commercially available offerings such as the BOLD^tm design[36]) can raise this limit by as much as 30%, while having minimal impact on capital cost.

Further, I note that system analysis, especially transient stability work has been performed on "[redacted]"[37]. While I appreciate that the Company has included light load conditions in their analysis this time, the huge scale of the project greatly increases the likelihood that other operating conditions will be found that challenge the system operability – stressing thermal, voltage and transient stability limits. Higher performance transmission designs represent low regrets, proactive approaches to anticipated, but as yet unquantified, performance challenges.

Q 27. Please elaborate on reliability quantification and sensitivity analysis.

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[34] Kline Direct, Exhibit DK-3 at 1 of 5.

[35] Bhuban Dhamala & Mona Ghassemi, *Transmission Expansion Planning via Unconventional High Surge Impedance Loading (HSIL) Lines*, IEEE 2023, NAPS58826.2023.10318761 (2023), https://par.nsf.gov/servlets/purl/10524659.

[36] Bold, Testing & Development, https://boldtransmission.com (last accessed July 21, 2026).

[37] ELL response to data request Staff 1-129, attachment "Project Omega Transient Stability Analysis" (HSPM).

A. Reliability analysis of the type recommended here relies on relatively detailed representation of both the load and generation across seasons, days and hours. Reliability metrics such as LOLE and EUE that underpin simpler targets such as planning reserve margin ("PRM") consider not only the ability of the grid to generate enough power to meet demand, but also its ability to deliver that power to where it is needed. A failure of either condition contributes to degraded reliability metrics. The Company has used individual circuit power carrying limits, based on assumed line design, in their analysis. Such limits are only one of the class of inputs (as mentioned above) to the reliability analysis. Situations in which there is sufficient generation to meet load, but under which transmission limits preclude delivery will be one of the class of outputs from analysis. The amount (MW), duration (hours) and EUE – including specifically statistical expectation of Customer unserved load energy - for "base" and "improved" designs would be revealed by sensitivity cases. Improved performance could be monetized, most importantly in this context by conceivably reducing the amount of new generation that needs to be added to the system for the Evest hyperscale data center proposal.

IV. THE PROPOSAL INSUFFICIENTLY ADDRESSES ONGOING TECHNICAL ISSUES THAT WILL INEVITABLY ARISE AFTER INITIAL APPROVALS AND PROJECT EXECUTION

Q 28. What "ongoing" technical issues present reliability concerns?

A. The Company properly recognizes that there are risks associated with the project, not all of which are fully addressed at this time. In a discovery response [38], ELL states "Company will impose project-specific performance requirements to ensure the load can be reliably served without degrading overall system performance. This process is currently ongoing with the Customer."

[38] ELL response to data request UCS 1-3 (public redacted version).

Further, MISO also recognizes that integration of large loads is not a fully developed art. The recent MISO white paper[39] states: "As large load growth accelerates across the MISO footprint, additional reliability considerations may be necessary". MISO raises four specific points of concern:

i. Data, Modeling, Telemetry, Forecasting, and Outage Coordination Requirements
ii. Ramp Requirements
iii. Ride-through Requirements
iv. Stability Assessment Requirements

I note that the Company has considered all of these to some extent in its initial engineering. Mr. Kline's testimony specifically addresses such items as reliability-must-run constraints,[40] voltage constraints,[41] and torsional impacts[42]. Beyond acknowledging this reality, as ELL has done, the primary concern here is the "ongoing" nature of the challenge as the Customer (as well as Laidley LLC, the Meta-affiliated customer also taking electric service for computing capacity adjacent to the Customer's facility) takes electric service for large computational facilities for years to come. The Company needs to present formal processes by which it will meet the reliability needs with the changing landscape and the intent of the MISO directives. I note that on July 16, 2026, MISO indicated that for its forthcoming large load reliability requirements tariff filing at FERC, it intends a "transition plan" apparently intended to "prevent[]" "retroactive" application to load projects already operational.[43] Given the uncertainty of whether the new MISO requirements would apply to the Evest project, ELL should seriously consider its responsibilities to steward grid reliability.

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[39] MISO, Interconnection Reliability Requirements for Large Load, at 1 (June 29, 2026), 20260629 LLWG Item 07 Draft MISO Large Load Interconnection Requirement Technical Compendium765704.pdf.

[40] Kline Direct at 47:2-47:7.

[41] *Id.* at 47:20-48:8.

[42] *Id.* at 49:8-50:3.

[43] MISO, Liaison Report, Large Load Working Group, at 5 (July 16, 2026), https://cdn.misoenergy.org/20260716%20LLWG%20Item%2004%20Liaison%20Report768708.pdf.

Additionally, FERC has issued an order[44] on July 16, 2026 directing NERC to file Reliability Standard(s) Pertaining to Computational Load Integration. The Commission also directs NERC to develop revisions to its Rules of Procedure, including registry criteria for computational load entities. In that order FERC reinforces the widespread understanding that integration of computational large loads is ongoing: "we expect NERC to prioritize near-term measures capable of reducing identified reliability risks related to computational loads while preserving flexibility for subsequent refinements as additional experience is gained with large-load interconnections". This order anticipates the need I have outlined here for formal ongoing processes to assure satisfactory performance as equipment and understanding evolves.

Q 29. Do you have concerns about the Company's modeling of the Customer load and facility?

A. Yes. The Company has responsibly worked with the Customer to produce models for Electromagnetic Transients ("EMT") and phasor analysis that are appropriate for the initial engineering behind this proposal. The concerns here surround the processes and actions necessary for reliable operation moving forward. The MISO Large Load Working Group (LLWG) document also states: "The final models of a Large Load shall reflect the as-built configuration and actual operating characteristics of the Large Load and Large Load Equipment. The Large Load Customer shall maintain and update models as required by the Transmission Provider. Failure to provide requested information may result in a delayed Service Commencement Date, operational limitations, or disconnection from the Transmission System."

These concerns fall under the "Data, Modeling, Telemetry" portion of bullet "i" in the previous answer. Satisfying these requirements is in practice a relatively heavy burden on both the Customer and The Company. An ongoing model validation process is necessary, not only up to the "as built" (*i.e*. commissioning) stage but beyond. Ongoing model validation will require a relatively formal process. The process should include a

[44] Order, *Reliability Standard(s) Pertaining to Computational Load Integration*, 196 FERC ¶ 61,031, P 11 (July 16, 2026) (FERC Dkt. No. RD26-7-000).

structure with automatic triggering to utilize recordings from digital fault recorders (DFRs), phasor measurement units (PMUs) and other instrumentation, as well as staged field measurement and verification. The Company has appropriately indicated its requirement for a range of "power quality" monitoring equipment. Full integration of the measured data, including archiving and post-processing, is needed in order for these prudent measures to produce good reliability outcomes.

It is imperative that the Commission ensure that the interconnection of the Customer does not adversely impact the stability and reliability of ELL's grid. This requires transparency; because the Commission cannot make this determination without access to the final operating parameters and requirements that will be applicable to the Customer. The Commission should require that ELL: 1) provide all completed studies and finalized operating parameters, when available, to the Commission and parties in this docket; 2) host a public, virtual workshop to provide parties in this docket an overview of the study results and parameters and to take questions; and 3) confirm that the Company can update or modify the operating parameters applicable to this Customer at any time up to or after the Customer's interconnection, if necessary to comply with requirements imposed by the Commission, NERC, or MISO (even if such requirements on their own are not intended to be applied retroactively). The Company should document the full integration strategy (collection and maintenance of recorded data, post-processing, archiving, dissemination, and action triggers) before commercial operation commences. A process for sharing the results with the Commission, and with the public (intervenors at the very least) is necessary.

These processes are a subset of the broader concerns raised in the previous answer. While not presently required, a schedule of model testing similar to NERC model validation requirements[45] (*e.g.* MOD-25 and MOD-26) is appropriate, and will be required by NERC[46] in the future. The project should plan accordingly.

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[45] NERC, MOD-Modeling, Data, and Analysis, https://www.nerc.com/standards/reliability-standards/mod (last accessed July 21, 2026).

[46] FERC Order, *Reliability Standard(s) Pertaining to Computational Load Integration, supra* note 44.

Q 30. Have examples of these risks from large computational loads actually materialized in the American bulk power grid?

A. The systemic and societal risks that are connected to poor performance of large data center loads are very real. In addition to other recent disruptive events,[47] I note that on July 22, 2026 at 7:56am Eastern Daylight Time, as this testimony was being prepared, a massive disruption of the US Eastern interconnection[48] appears to have been caused by simultaneous load disconnection of 3,000 MW of data center load in Northern Virginia.

Independent (and not officially corroborated) measurements by Robert Orndorff, a Principal Engineer at Elevate Energy Consulting, showed frequency excursions as high as 100millihertz following the event.[49] Frequency was returned to normal 60.00 hertz after about 800 seconds (12 minutes). These are extremely early and limited data. NERC and others will perform detailed post-mortem analysis. Nevertheless, the causality link between the data center failure to ride-through to the massive frequency excursion seems clear. This event is two to three times the NERC deadband settings[50] for the eastern interconnection. Which means that every generating asset with active primary frequency control in the entire Eastern Interconnection probably "saw" and responded to this event. This primary frequency response action by generators is normal, expected and required (of most generators, but nevertheless results in some stress on the participating units. One might compare this reaction to slamming on the brakes in an automobile. Reacting to problems is one of the reasons for having brakes, but events that require rapid, aggressive braking put stress on the vehicle, driver and are generally to be avoided.

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[47] NERC, Incident Review: Considering Simultaneous Voltage-Sensitive Load Reductions (Jan. 8, 2025), https://www.nerc.com/globalassets/our-work/reports/event-reports/incident_review_large_load_loss.pdf.

[48] Tim McLaughlin, *Massive disconnect of power roils largest US electric grid*, Reuters (July 22, 2026), https://www.reuters.com/business/energy/massive-disconnect-power-roiled-largest-us-electric-grid-2026-07-22.

[49] Robert Orndorff's Post, LinkedIn (July 23, 2026), https://www.linkedin.com/feed/update/urn:li:activity:7486030885419474944.

[50] NERC, Reliability Guideline: Primary Frequency Control, at 12, Table 4.1 (Sep. 2023), https://www.nerc.com/globalassets/who-we-are/standing-committees/rstc/rs/primary_frequency_control_reliability_guideline_v_4.0_clean_v3---dr.pdf.

Similar bad behavior in US power systems, with many huge data centers, might cause significantly more violent high frequency events. Making the simple, reasonable approximation of linearity, a similar ill-performance of just the Customer's (Evest) facility might be expected to cause a frequency excursion in excess of 150millihertz. In a future with a multiplicity of large data centers, the risks created by their possible combined behavior is motivation to have complete management processes in place that stay updated, as I have recommended.

Q 31. Is the Company's handling of Forecasting, and Outage Coordination Requirements adequate?

A. No. The MISO concerns for "Forecasting, and Outage Coordination Requirements" (a portion of bullet "i" in the Question 28 answer above) need further substantiation. As I noted above, outage management for existing thermal generation in the region was identified by the Company as significant driver for new generation additions. Both <u>Forecasting, and Outage Coordination</u> for the Customer's load present opportunities for operation of the customer facilities that is complementary to operating constraints, including unit maintenance, on the host grid. One example would be simultaneous scheduling of Customer load maintenance, enabled by customer load forecasting, with generating unit maintenance. Such scheduling could reduce resource adequacy limits that are driven by uncoordinated outages. The Company needs to produce a process and plan by which coordination with the Customer on these issues is used specifically to produce reliability benefits, including possible reduction in addition of new generation.

V. CONCLUSION AND RECOMMENDATIONS

Q 32. What do you recommend to the Commission?

A. First, the Company and the Customer must actively and immediately engage to explore possibilities for flexibility on the design and operation of the customer facilities that may improve system reliability and reduce the need for capital investment, especially for new generation.

Second, the Company must explore options for increasing the power carrying capability of the new transmission proposed, with a specific view towards quantifying reliability benefits and improved delivery of regional renewable energy.

Third, the Company must perform and make available detailed reliability analysis for its electric system, with quantification of reliability metrics including LOLE and EUE presented with detailed temporal granularity (month, time-of-day). This analysis must include consideration of the options within my first two recommendations. The results would be used by the Commission to guide its qualifications for approval of the Company's request. As noted, every improvement in LOLE and EUE by non-generation means is directionally towards reducing the amount of new generation needed. Combinations of all the considerations I've advocated have the possibility to add up to displacing one or more CCCTs. The Commission can exercise its judgment as to whether improvements in flexibility, maintenance scheduling and transmission power carrying capability obviate the need for all the new generation requested. The Commission should condition approval of the proposed assets (including transmission) on future submission of Advanced Transmission Technology and Flexibility proposals.

Fourth, the Company must develop and present a plan for addressing the expected on-going technical performance challenges, particularly those related to system stability, dynamic behavior of the customer load, and tolerance for system disturbances (as discussed above) that will inevitably develop as understanding improves and designs (especially of customer facilities) progress. Such processes must include mechanisms to transparently and completely address issues that arise after commercial operation begins.

Q 32. Does this conclude your testimony?

A. Yes.

STATE OF LOUISIANA

BEFORE THE

LOUISIANA PUBLIC SERVICE COMMISSION

IN RE*: APPLICATION FOR APPROVAL OF GENERATION AND TRANSMISSION RESOURCES AND FOR OTHER RELIEF PURSUANT TO THE COMMISSION'S *LIGHTNING INITIATIVE	))))))))	**DOCKET NO. U-37882**

State of New York)
County of Albany)

AFFIDAVIT

I, Nicholas Miller, being first duly sworn, deposes and says that I am the same Nicholas Miller whose Direct Testimony accompanies this affidavit; that such testimony was prepared by me; that I am familiar with the contents thereof; that the facts set forth therein are true and correct to the best of my knowledge, information and belief; and that I adopt the same as my sworn testimony in this proceeding.

Nicholas Miller

Sworn to and subscribed before me on this 23RD day of July, 2026, in the Town of New Scotland.

Lisa L. Williams
NOTARY PUBLIC

My commission expires: 11/30/2028

Docket No. U-37882

Exhibit NWM-1

ELL Response to Staff 4-21 (Public)
ELL Response to Staff 1-108 (Public)
ELL Response to SIERRA 1-23 (Public)
ELL Response to NPO 3-15
ELL Response to Staff 1-74
ELL Response to SIERRA 1-7
ELL Response to SIERRA 1-22
ELL Response to Staff 1-129 (Public)
ELL Response to UCS 1-3

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the Fourth Set of Data Requests
of Requesting Party: Louisiana Public Service
Commission Staff

Question No.: STAFF 4-21 Part No.: Addendum:

Question:

Regarding the HSPM attachment provided in response to Staff 1-108, please provide a detailed explanation of every metric, input, output, assumption, and calculation contained in the model and supporting tables. At a minimum, please explain:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Question No.: STAFF 4-21

[redacted]

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

a. The Mean LOLE represents the mean seasonal or annual frequency of loss of load events (i.e., instances when the total supply in the MISO system is not sufficient to meet the total demand each hour). This metric is derived from the results of a stochastic analysis that estimates the amount of capacity each hour in a year by modeling planned and probabilistic forced outages, and the probabilistic amount of energy available from solar and wind resources, that is available to serve the hourly load obligation in the system. The resulting outcome of the analysis is an hourly chronological representation of the number of instances of load shed events across a large number of such simulations to obtain a probabilistic estimate of the number of load shed events in a season or year. This probabilistic estimate of the loss of load events can be expressed by various percentiles of the resulting metric across all the simulations run. The mean (or average) of all such values is presented as the mean LOLE. Similarly, the 95th percentile (or the worst 5%) is the P95 LOLE. A value of [redacted] of Mean LOLE represents a reliability level corresponding to an average of [redacted] events of loss of load in the given period (season or year).

b. Please see the response to subpart (a) above. Further, the duration associated with a loss of load event can be determined by identifying the number of hours where the demand obligation exceeds the probabilistic amount of supply available during any instance of loss of load during a stochastic simulation, and the sum of the total loss of load hours across a year is expressed as the LOLH. The mean (or average) is presented as the mean LOLH. Similarly, the 95th percentile (or the worst 5%) of the loss of load hours is the P95 LOLH. A value of [redacted] of mean LOLH represents a reliability level corresponding to an average of [redacted] cumulative hours of loss of load in a year.

c. Please see the response to subparts (a) and (b) above. The stochastic resource adequacy simulations referenced to in these two subparts, all instanced in the hourly simulations wherein the operations reserve margin in the MISO system drops below the required MISO-wide requirement (i.e., 2400 MW) which will result in the imposition of a price adder associated with the Operations Reserve Demand Curve on top of the prevailing LMP, or instances of actual loss of load (i.e., instances when the Value of Lost Load (i.e., $10,000/MWh) is similarly imposed on top of the prevailing

LMP), are considered to be occasions when scarcity energy prices occur in the system. The exposure of a particular Load Serving Entity (LSE), such as ELL, depends on whether the Company is long or short energy in the operating hour when such scarcity pricing is observed in the energy market. The number of hours in the simulation when scarcity energy pricing is observed is stochastic in nature (similar to the LOLE or LOLH metrics), and the number of hours of scarcity pricing can similarly be grouped by percentile of occurrence across all of the probabilistic simulations run for the system. The mean, or average, of the number of hours of occurrences of scarcity pricing is the "Mean Scarcity Hours" metric, and the [redacted] of Mean Scarcity Hours in the question represents an observation of an average of [redacted] hours of scarcity energy pricing per year in the system across all of the resource adequacy simulations conducted.

d. Please see the response to subpart (a) above. A value of 1 of P95 LOLE, for example, represents an observation, in the worst 5% of all resource adequacy simulations performed in the analysis, of 1 loss of load event in a year.

e. Please see the response to subpart (b) above. The P95 LOLH values represent observations, in the worst 5% of all resource adequacy simulations performed in the analysis, of the total duration, in hours, of loss of load events in a year.

f. Please see the response to subpart (c) above. The P95 scarcity hour values represent observations, in the worst 5% of all resource adequacy simulations performed in the analysis, of the summation of all instances of hours when scarcity energy pricing was observed in the MISO system in a year.

g. Please see the response to subpart (c) above. Further, when an LSE has a short energy position in the MISO market in any hour when scarcity energy pricing is also observed, such an LSE must purchase energy from the MISO market to meet its load's energy requirement even with the prevailing marginal energy prices reflecting scarcity conditions. Such a phenomenon has been termed gross Scarcity Purchases at Risk (or "SPaR") in the economic analysis performed in support of the Company's Applications. Thus, the SPaR metric represents the stochastic quantification of all instances of energy purchases an LSE had to make during instances when such an LSE has a short position in the energy market in an operating hour while there also being scarcity energy pricing in the MISO market (indicating the occurrence of operations reserve scarcity or an instance of actual loss of load). This SPaR metric is a gross quantification of energy purchases, and does not net out instances when the same LSE may have a long energy position with the simultaneous occurrence of scarcity pricing in the MISO market, thus benefiting from such an energy crisis in the MISO market, and is, therefore, a pessimistic representation of a LSE's exposure to risk of scarcity pricing in the MISO energy market. The SPaR metric may be expressed as the total purchases in any study planning year for an LSE, and is presented as an absolute dollar value in $MM in such a representation, or may be expressed as scarcity purchases normalized over the total energy requirement across a year for the LSE, and is represented as a $/MWh value in such a representation.

h. Please see the response to subpart (g) above.

i. Please see the responses to subparts (c) and (g) above.

j. The resource adequacy analyses resulting in the various metrics referenced in Staff 4-21 were performed for the Commissioning Period (as defined in the ESA and explained further in page 22 of Question 22 of Company witness Samrat Datta's Direct Testimony) and covered the 2026 through 2032 planning years. 1000 simulations were run using the Monte Carlo statistical methodology.

k. As explained in lines 20 and 21 of page 21 in Question 22 of Mr. Datta's Direct Testimony, the Company sought to ensure the same level of supply adequacy and reliability, as quantified by the various metrics referenced in Staff 4-21, in the system with the Evest load and resources (or the "Change Case"), as there would have been in the system without the Evest Customer. Levels of firm and non-firm load for which the Customer is permitted to take service were adjusted according to the resulting metrics and were informed by this principle, as also explained in Question 22 of Mr. Datta's Direct Testimony.

l. Please see the response to subpart (k).

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Louisiana Public Service
Commission Staff

Question No.: STAFF 1-108 Part No.: Addendum: 1

Question:

Regarding EX LKB-3 page 80 [redacted], please address the following:

a. Provide the data that supports the bar and line graphs on the demonstrative.

b. Please explain [redacted]

Response:

The Company objects to the "Instructions" included with the request to the extent they seek to impose any obligations or requirements on ELL that exceed the obligations or requirements provided for in the articles of the Louisiana Code of Civil Procedure. The Company further objects to the directive that "these requests are continuing so as to require supplemental responses" as such directive seeks to impose obligations beyond what is required under the Louisiana Code of Civil Procedure, Article 1428. Subject to and without waiving the objections, the Company responds as follows.

b. As a preliminary matter, please note that the referenced graph contained in Exhibit A to HSPM-AEO Exhibit LKB-3 (the CIAC Agreement) is superseded by the Ramp Schedule shown in Appendix C of HSPM-AEO Exhibit LKB-2 (the ESA and Rider 1), which shows the total quantity of load for which the Customer is allowed to take service, inclusive of transmission limits, and the quantity of non-firm load [redacted], at various points during the Ramp Schedule. See also Section 4 of Rider 1 to the ESA, which sets forth the terms and conditions related to Appendix C, [redacted].

The bar graphs on the demonstrative chart represent the amount of total load (made up of firm load, and non-firm load [redacted]) that the Customer is permitted to take from the ELL system and the limits of the transmission system in supplying the Evest Load, while the line graphs represent the capacity of the resources that ELL has proposed in connection with extending service to Project Evest and [redacted] for the non-firm portion of the Customer load. The values in the graph were current and valid as of the date on which the graph was created (which was late November 2025), but are now superseded as noted above.

As explained in pages 21 and 22 of Company witness Mr. Samrat Datta's Direct Testimony, the amount of firm and non-firm load for which the Customer is permitted to take service during the Ramp Schedule was negotiated with the Customer with the aim of maintaining the same level of reliability and supply adequacy as would have existed for the ELL system if the Customer load and resources proposed in connection with serving the Customer had not been connected to the system.

The Company used a reliability model to estimate the loss of load expectation and the exposure of ELL customers to scarcity-level energy prices that occur in the MISO market if Operations Reserve scarcity events and loss of load events were to occur in the system. While successive reliability analyses were performed to identify the amount of firm and non-firm load that ELL would permit the Customer to receive during the Ramp Schedule, the HSPM Attachment to this response contains the final version of such reliability analyses that contains the estimation of the loss of load expectation and the exposure to scarcity pricing metric that is applicable for the final firm and non-firm load schedule that is documented in Appendix C of HSPM-AEO Exhibit LKB-2.

b. [redacted] and is not related to, or driven by, any local transmission constraints or transmission limits that might limit the total amount of Customer load that may take service. Therefore, while the total (firm and non-firm) Customer load allowable at any given month or date of the Ramp Schedule in the ESA also takes into account any limits of the transmission system, the amount of firm and non-firm load allowable is driven by supply adequacy and supply reliability considerations that are inherently zonal in nature and that ignore granular transmission limits. [redacted]

[redacted]

Addendum 1

Subject to, and without waiving its objections as originally stated, the Company supplements its original response to subpart (a) of the request, as follows:

As the Company noted in its original response to subpart (a), the HSPM Attachment to that response contains the final version of reliability analyses estimating the change in (1) the loss of load expectation risk and (2) the risk of exposure to the scarcity energy prices that could result from the addition of the Customer's resources along with the addition of its firm and non-firm load on the schedule that is shown in ESA, Rider 1, Appendix C (attached to the Company's Application as HSPM-AEO Exhibit LKB-2). The Company wishes to clarify that the change in these two risks that arises from the addition of the Customer's load and resources as shown in those analyses fully reflects (1) the presence of the Customer's firm and non-firm demand (load) as shown in Appendix C; and (2) [redacted]. The balance of this addendum response explains this in more detail.

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Sierra Club

Question No.: SIERRA 1-23 Part No.: Addendum:

Question:

With respect to the Direct Testimony of Witness Owens at 6-7, and specifically Mr. Owens's statement that a storage and renewables option to serve the Project Evest is not "viable" (pages 6-7):

a. Provide the nameplate and accredited capacity of storage, solar, and wind that would be required for a "technically possible" solution.

b. Provide the cost of a storage and renewables for a "technically possible" solution to serve Project Evest.

c. Provide the complete factual basis, including all economic and technical studies, for supporting Mr. Owens' statement that a storage and renewables alternative is not "viable."

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

a. Mr. Owens has not performed an analysis to quantify the precise amount of nameplate and accredited solar, storage, and wind that would be required for a technically possible solution. However, as illustrated by the example provided in part c, the amount that would be required makes the "renewables plus storage" a non-viable substitute for the CCCTs that ELL has proposed to meet its incremental around the clock energy needs.

b. See response to subpart (a).

c. Mr. Owens' made the following statement on pages 6-7 of his Direct Testimony: "Solar and wind are also not viable stand-alone options to provide around-the-clock energy because they are intermittent resources, and while it is technically possible to use energy storage to, for example, shift some solar production from midday until early evening, the amount of storage that would be required to create an around-the-clock energy profile comparable to that provided by a CCCT makes the "renewables plus storage" option a non-viable substitute for the CCCTs that ELL has proposed to meet its incremental around-the clock energy needs."

To illustrate why "renewables plus storage" is a non-viable substitute, consider a scenario where solar operates predictably at a 25% capacity factor every day throughout the year. In this hypothetical scenario, it would take approximately [redacted] of solar to serve [redacted] of load per year and approximately [redacted] of 18-hour batteries to store energy during periods of solar surpluses and to discharge energy during periods with solar shortfalls. Assuming $1,900/kW for solar and $6,000/kW for 18-hour batteries, the capital cost of this solution would be approximately [redacted], which is prohibitively costly, and that's before incorporating the cost of transmission that would be necessary to reliably deliver the energy to the customer's site around the clock. The reality is that much more infrastructure would be required and that it would cost much more than [redacted] (a cost that is already prohibitive) because solar does not operate at a 25% capacity factor every day. In fact, there are long periods when solar operates at less than a 25% capacity factor. For example, solar produces less than the average level during a rainy week or during the winter season. To provide firm renewable power around the clock during these periods would require much more solar and/or much more storage than described in the illustrative example above.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the Third Set of Data Requests
of Requesting Party: Alliance for Affordable Energy

Question No.: AAE 3-15 Part No.: Addendum:

Question:

Referring to Direct Testimony of Mr. Owens 2:17-23, where Mr. Owens states:

"Solar and wind are also not viable stand-alone options to provide around-the-clock energy because they are intermittent resources, and while it is technically possible to use energy storage to, for example, shift some solar production from midday until early evening, the amount of storage that would be required to create an around-the-clock energy profile comparable to that provided by a CCCT makes the 'renewables plus storage' option a non-viable substitute for the CCCTs that ELL has proposed to meet its incremental around-the-clock energy needs."

a. Please provide any studies and analyses ELL relied upon to determine that "the 'renewables plus storage' option [is] a non-viable substitute" for the proposed combined-cycle gas generating plants.

b. Please define what is meant by the term "viable" in this context.

c. Please provide any studies, analyses or documentation which demonstrate that the Evest LLC data center load is "around the clock".

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

a. The Company objects to subpart (a) as vague to the extent the request seeks "any studies and analyses ELL relied upon" in reference to the independent expert testimony of Mr. Owens. ELL understands the request to seek studies and analyses on which Mr. Owens relied in reaching his conclusions as set forth in the passage quoted from his testimony. In reaching the conclusions in his testimony, Mr. Owens relied on his experience, professional judgment, and training, and the analysis set forth in his testimony. Mr. Owens provided additional analysis in connection with the Company's response to Sierra 1-23 and in the response to subpart (b) below.

b. The Company objects to the request as vague. The referenced testimony uses the term “viable” in two instances. With respect to the statement that “[s]olar and wind are also not viable stand-alone options to provide around-the-clock energy because they are intermittent resources,” the term “not viable” refers to the fact that stand-alone solar and wind are technically incapable of producing energy around the clock. With respect to the statement that “while it is technically possible to use energy storage to, for example, shift some solar production from midday until early evening, the amount of storage that would be required to create an around-the-clock energy profile comparable to that provided by a CCCT makes the ‘renewables plus storage’ option a non-viable substitute for the CCCTs that ELL has proposed to meet its incremental around-the-clock energy needs,” the term “non-viable” refers to the fact that the renewables plus storage option would be prohibitively costly. See also the Company’s response to Sierra 1-23.

a. The Customer provided its load requirements, power factor, and load factor as part of their Transmission Questionnaire. The data provided by the Customer in its Transmission Questionnaire is indicative of an “around the clock” load. The Transmission Questionnaire is incorporated in the Company’s application as Exhibit H in the CIAC Agreement, included in -HSPM-AEO Exhibit LKB-3. For additional responsive information, see also the Company’s response and AEO attachment to Staff 1-66.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Louisiana Public Service Commission Staff

Question No.: STAFF 1-74 Part No.: Addendum:

Question:

Provide a complete description of all alternative resource portfolios considered to serve the Customer's load. For each alternative:

a. Identify capacity sufficiency (including **PRM);**

b. Identify estimated cost;

c. Identify the reason the alternative was rejected.

Response:

The Company objects to the "Instructions" included with the request to the extent they seek to impose any obligations or requirements on ELL that exceed the obligations or requirements provided for in the articles of the Louisiana Code of Civil Procedure. The Company further objects to the directive that "these requests are continuing so as to require supplemental responses" as such directive seeks to impose obligations beyond what is required under the Louisiana Code of Civil Procedure, Article 1428. The Company further objects to the request as vague, overbroad, and overly burdensome to the extent that the Staff is seeking a "complete description" related to "all alternative resource portfolios considered". Subject to and without waiving the objections, the Company responds as follows.

As discussed by Company witness Nicholas W. Owens at pages 6-7, there are "hypothetical alternatives" to the Proposed Resources, including nuclear and wind or solar combined with battery storage, but they are either non-viable or less attractive than the Proposed Resources identified by ELL in its Application. In particular, Mr. Owens testifies that the intermittent nature of wind and solar can be extended with storage, but the amount of storage that would be required to meet the Customer's around-the-clock energy needs would be infeasible. He also testifies at pages 7-8 about the reasons why ELL should not rely on the spot market to supply the Customer Project.

In addition, Company witness Laura Beauchamp at pages 77-80 of her testimony discusses alternative supply plan options that were considered specifically in relation to the Customer Project: (1) all new gas CCCTs, with minimal transmission and no renewable resources; (2) a 2x1 CCCT in lieu of two 1x1 CCCTs; and (3) a transmission-only solution, and that each of these options was determined to be infeasible or inferior to the Proposed Resources identified in ELL's Application.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Sierra Club

Question No.: SIERRA 1-7 Part No.: Addendum:

Question:

Refer to the Direct Testimony of Witness Beauchamp at 77-78, which discusses the Company's analysis of alternative supply plan options:

a. How did the Company decide on the three alternative supply plans to analyze? Please explain.

b. Did the Company test any alternative supply plans that replaced a portion of the CCCT capacity with other resource types? Explain why or why not.

c. Please provide a summary of all quantitative inputs and outputs of the Company's alternatives analysis in native file format with formulas intact.

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

a. Please see the response to subpart (b).

b. Yes, please see responses to Question 10 of Direct Testimony of Company Witness Nicholas W. Owens and Question 75 of Direct Testimony of Company Witness Laura K. Beauchamp.

c. See the response to subpart (b). As noted in the cited testimony, the alternative supply plan options were demonstrably less viable or non-viable without the need for quantitative analysis.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Sierra Club

Question No.: SIERRA 1-22 Part No.: Addendum:

Question:

Regarding the potential for load flexibility at the Evest data center:

a. Did the Company engage in any discussions with Meta about the potential for load flexibility at the Evest data center, after the ramp-up period? Explain why or why not.

b. Please provide data on the hourly load shape of demand from the Evest data center.

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

a. Yes. The Customer was not interested in being a demand response customer post-ramp period, as it does not meet their operational requirements.

b. See the Company's response to Staff 1-66.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC to the First Set of Data Requests of Requesting Party: Louisiana Public Service Commission Staff	Prepared By: Chad Ladner Sponsoring Witness: Daniel Kline Beginning Sequence No. Ending Sequence No.

Question No.: STAFF 1-129 Part No.: Addendum:

Question:

Please provide the inputs, assumptions and results of all steady-state, stability, and short circuit analysis performed to identify the transmission and generation upgrades needed to accommodate the project.

Response:

The Company objects to the "Instructions" included with the request to the extent they seek to impose any obligations or requirements on ELL that exceed the obligations or requirements provided for in the articles of the Louisiana Code of Civil Procedure. The Company further objects to the directive that "these requests are continuing so as to require supplemental responses" as such directive seeks to impose obligations beyond what is required under the Louisiana Code of Civil Procedure, Article 1428. Subject to and without waiving the objections, the Company responds as follows.

Information responsive to this request has been designated as Highly Sensitive Protected Material ("HSPM") and will be produced only to the appropriate Reviewing Representatives in accordance with the Confidentiality Agreement in effect and executed in this docket. HSPM files will be served upon appropriate reviewing representatives through an OpenText™ Core Share link. Any downloads of such files shall be treated in accordance with the applicable provisions of the Confidentiality Agreement regarding duplication of HSPM files.

See the following attachments for inputs, assumptions and study results associated with Project Evest:

- "Series 2024_Gen Assumptions_HSPM" – generator assumptions for additions and retirements.

- "MTEP25 Block Load Assumptions_HSPM" – block load assumptions representing all block load additions backed by an executed electric service agreement.

- "PFA Project Omega [redacted]" – steady-state power flow analysis report confirming the proposed transmission upgrades can accommodate an Evest load of [redacted] and Laidley load of [redacted].

- "PFA Project Beta [redacted]" – steady-state power flow analysis report identifying the need for the proposed transmission upgrades.

- "Project Omega_Stability Report" - stability analysis report confirming system stability with all proposed generation, transmission, and [redacted] load projects.

- "Richland Parish 1 & 2 – SG3 Short Circuit System Analysis" - short circuit analysis with Richland Parish 1&2 along with other transmission and generation projects.

- "Richland Parish 3 and 4 – SG3 Short Circuit System Analysis" - short circuit analysis with Richland Parish 3&4 along with other transmission and generation projects.

ENTERGY LOUISIANA, LLC
LOUISIANA PUBLIC SERVICE COMMISSION
Docket No. U-37882

Response of: Entergy Louisiana, LLC
to the First Set of Data Requests
of Requesting Party: Union of Concerned Scientists

Question No.: UCS 1-3 Part No.: Addendum:

Question:

a. Has the Company developed, or is the Company planning to develop operating parameters which large load customers must abide by? Such parameters may include operational ramp rate, oscillation and harmonic limitations, and voltage and frequency ride-through requirements.

b. If so, please provide a copy of the parameters.

Response:

ELL incorporates in full the General Objections served with these Requests. Subject to and without waiving the objections, the Company responds as follows.

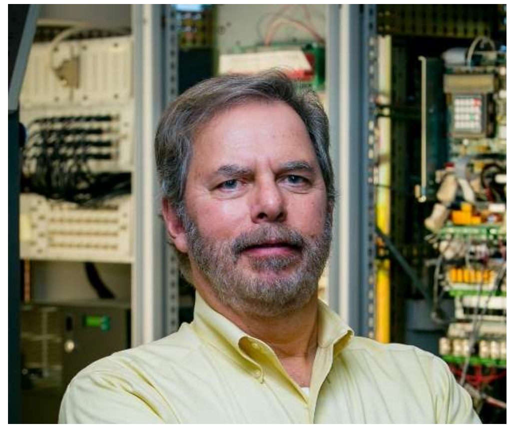
a. The Company has not established a set of operating requirements applicable to all large load customers. Instead, the Company requires each large load customer to provide detailed operational characteristics such as expected ramp rate, oscillatory behavior, and voltage/frequency ride-through capabilities, as part of the load interconnection study process. These customer-provided parameters are evaluated through transmission analyses to determine whether the proposed load behavior could adversely impact the transmission system or other customers. If the studies identify potential reliability concerns, the Company will impose project-specific performance requirements to ensure the load can be reliably served without degrading overall system performance. This process is currently ongoing with the Customer.

b. See the response to subpart (a).

Docket No. U-37882

Exhibit NWM-2

NICHOLAS W. MILLER



Principal
HickoryLedge LLC
*[Retired Senior Technical Director
Energy Consulting, GE Power]*

EDUCATION

B.S. and M.Eng., Electric Power Engineering, Rensselaer Polytechnic Institute, Troy, New York.

EXPERIENCE

Mr. Miller is a Principal with HickoryLedge LLC, a consultancy providing technical services. Nick is an internationally known power system engineer, with specialization in integration of wind and solar power to bulk power systems. He presently provides technical advice to regulatory bodies (including the Public Utility Commission of Hawai'i), renewable project developers, the US Department of Energy, and a variety of renewable research entities. He is currently conducting research on bulk grid stability for the Midwest ISO and DOE. He is leading the newly formed Stability Task Force of Energy Systems Integration Group, with focus on oscillatory behavior of inverter dominant power systems.

Mr. Miller spent 3/8 of a century with GE, finishing his final decade of practice in the role of Senior Technical Director for GE Energy Consulting. In the last 16 years at GE, he led analytical developments for integration of GE Wind Turbine-Generators into power systems, leading efforts to develop new applications, controls and systems for large-scale coordination of wind and solar generation with other system resources. He was the leader of the landmark Western Transient Stability and Frequency Response Study. He was a principal on the New York State Wind study, the US DOE Western Wind and Solar Integration Study, the New England Wind Integration Study, as well as multiple Wind and Solar related projects in Hawaii and the Caribbean. He lectured and provided consultation on wind and solar power integration to governments and institutions in more than three dozen countries. He worked with the North American Electric Reliability Corporation (NERC) on practice for Essential Reliability Services. He led the control design team for the ahead-of-its-time Pioneer BESS project with grid-forming inverters in 1995. He pioneered new techniques for the analysis and control of transient and voltage stability of very large power systems. His pioneering work on voltage stability is cited in his IEEE Fellowship. He led the development of advanced network solution and component modeling techniques for reactive compensation; led research projects on AI in protection of power systems; co-authored the US patent for synthetic inertia in wind turbines.

Mr. Miller is an elected member of the National Academy of Engineering, an IEEE Life Fellow, a Licensed Professional Engineer in NY, and a Distinguished Member of CIGRE. He authored 20 US patents for wind and solar power, system control, and other technologies. He has published over 180 papers and articles, including many peer reviewed technical papers, with a total of more than 8000 citations.

AWARDS

- In 2024, he was inducted into the US National Academy of Engineering, with citation for distinguished contributions to engineering "for reliable integration of wind and solar plants into electric power systems"
- In 2021, he received the US National CIGRE Philip Sporn Award for "career contributions in advancing electric power systems in theory, design and operation for the benefit of society..."
- In 2018, he received the IEEE Power & Energy Society Ramakumar Renewable Energy award, IEEE's highest award for renewable energy achievements.
- In 2017, Nick was the recipient of the prestigious Edison Award, General Electric's highest award for technical achievement.
- He was recognized by the influential Utility Variable-Generation Integration Group (now ESIG) with the 2017 Lifetime Achievement Award.
- 2009 CIGRÉ Attwood Associate Award.
- 2007 American Wind Energy Association Technical Achievement Award.
- 2005 Utility Wind Integration Group Achievement Award 'for Outstanding Contributions to the Advancement of Utility Compatible Wind Turbine Technology'.
- GE Power Systems Outstanding Young Engineer Award for Technical Contributions (twice).

US PATENTS

1. 8,664,800 B2 System and method for distribution of inverter var support
2. 8,405,247 B2 Method and apparatus for control of fault-induced delayed voltage recovery (FIDVR) with photovoltaic and other inverter-based devices
3. 8,076,789 System and method for controlling wind turbine power output
4. 7,990,743 System and method for decreasing solar collector system losses
5. 7,979,167 System and method for controlling operation of solar power generation system
6. 7,941,246 Automatic generation control augmentation for wind plant integration
7. 7,839,024 System and method for wind turbine control
8. 7,761,190 Wind Inertial control
9. 7,671,481 Wind and Gas Turbine Hybrid Control
10. 7,586,206 B2 Wind Turbine and Method for Operating Same
11. 7,505,833 System, Method, And Article Of Manufacture For Controlling Operation Of An Electrical Power Generation System
12. 7,504,738 System and method for wind turbine control
13. 7,417,333 Methods and apparatus for controlling current in an electrical machine

14. 7,345,373 System and method for utility and wind turbine control
15. 7,271,571 Anti-islanding protection systems for synchronous machine based distributed generators
16. 7,202,638 Anti-islanding protection systems for synchronous machine based distributed generators
17. 6,924,565 Continuous reactive power support for wind turbine generators
18. 5,939,798 Hybrid energy storage system
19. 5,402,057 System and method for coordinating shunt reactance switching
20. 5,166,597 Phase-shifting transformer system

[nb. Many of these patents have been issued in Europe, China, or other countries]

PUBLICATIONS (Papers, Articles and Conference Lectures)

2025

1. *Nicholas. W. Miller;" Process for Diagnosis of Observed Oscillations in IBR-dominant Systems"; CIGRE NRCC Symposium Trondheim, 2025*
2. *N.W. Miller; "Island Power Systems vs. Island Interconnections to Mainland – What's the Future?"; 9th Hybrid Power Plants & Systems Workshop; Aland, June 2, 2025*
3. *"Moving Beyond SCR: Updating Our Stability Screening Methods" Matthew Richwine, Nicholas Miller; ESIG Webinar March 2025*

2024

4. *N.W.Miller (editor); "Diagnosis and Mitigation of Observed Oscillations in IBR-Dominant Power Systems:
A Practical Guide EPRI" A Publication by the Energy Systems Integration Group's Stability Task Force; August 2024*
5. *Technical Brief " An Overview of Grid-Forming Inverter Technologies and the Readiness of Power Systems Worldwide to Deploy the Technology " December 2024 HickoryLedge LLC N. Miller; Power and Energy, Analysis, Consulting and Education, PLLC P. Pourbeik; EPRI D. Ramasubramanian; Walling Energy Systems Consulting LLC R. Walling*
6. *Balarko Chaudhuri, Deepak Ramasubramanian, Julia Matevosyan, Mark O'Malley, Nick Miller, Tim Green, and Xiaoyao Zhou, "Rebalancing Needs and Services for Future Grids", IEEE Power & Energy Magazine, March/April 2024*
7. *Shruti RAO, Jason MACDOWELL, Sheila MANZ, Sebastian ACHILLES, Nicholas MILLER, Nitika MAGO, Weifeng LI, Pengwei DU,Luis HINOJOSA, Shun Hsien (Fred) HUANG; "Evaluation of primary frequency response from inverter-based resources with 1% droop setting"; Paper ID – 10463, CIGRE General Session 2024*
8. *Nicholas W. Miller; "Services from IBRs in Future Power System", Panel Session presentation, IEEE PESGM Settle, July 2024*
9. *Nicholas W. Miller; Scott Harper, Marianne Rogers; "The strange case of Prince Edward Island: A perfect storm for heating electrification" ESIG Forecasting Workshop, Salt Lake, Session 4B: Power System Impacts of Rapid Electrification, June 12, 2024*

2023

10. *Matthew P. Richwine, Nicholas W. Miller, Andrew J. Siler, Tari Jung, Patrick Dalton; "Power System Stability Analysis & Planning Using Impedance-Based Methods", 22nd Wind & Solar Integration Workshop | Copenhagen, Denmark | 26 – 28 September 2023 (Ackermann paper)*
11. *Nicholas W. Miller; "Active Power Control of Wind Generation & Concepts for Export Stability from IBR Dominant Regions", Workshop on New and emerging forms of system stability, CIGRE Symposium Cairns, September 2023*
12. *Nicholas W. Miller ;"History of BESS (and IBRs) in Alaska", Tutorial: Introduction to Hybrid Power Systems and Case Studies; 7th Hybrid Power Plants & Systems Workshop on the Faroe Islands May 22, 2023*

2022

13. *Nicholas W. Miller, Viewpoint - "From the High Plains and Deserts: A new look at getting Renewable Energy from remote sources to load centers" IEEE Electrification Magazine, March 2022*
14. *Matthew RICHWINE, Nicholas MILLER; "Stability with Synchronous Condensers for Power Export from Inverter Dominant Generation Regions", Paper 10234_2022; CIGRE General Meeting Paris, August 2022.*
15. *Nick Miller, Principal, John Simonelli, "The Future Role of Hydropower in the Northeastern US and Beyond", National Hydropower Association, 2022 Northeast Regional Meeting; Baltimore June 27-28*

2021

16. *Debra Lew, Jordan Bakke, Aaron Bloom, Patrick Brown, Jay Caspary, Christopher Clack, Nicholas Miller, Antje Orths, Alison Silverstein, John Simonelli, Robert Zavadil; "Transmission Planning for 100% Clean Electricity", IEEE Power & Energy Magazine, Nov/Dec 2021*

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Lead Contributors/Facilitators: ,Lauren Azar (Azar Law LLC),Jay Caspary (Grid Strategies LLC), Debra Lew (ESIG), Nicholas Miller (HickoryLedge LLC), Alison Silverstein (Alison Silverstein Consulting), John Simonelli (Flashover LLC), Robert Zavadil (EnerNex)*

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161. *Nicholas W. Miller "Advanced Power Control of Wind Turbine-Generators for Improved Power System Dynamic Performance", IX SEPOPE, Salvador, Brazil, May 2004*

162. *Nicholas W. Miller, Winter Zhang "Integration of Wind Farms in Large Geographically Dispersed Electric Power Grids, World Wind Energy Conference World Wind Energy Conference, Beijing 2004*

163. *Nicholas W. Miller "Wind Farm Performance on the Grid: Perception and Reality", American Wind Energy Conference: Global Windpower 2004*

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167. *Nicholas W. Miller "Grid Interconnection Sans Frontières/Without Boundaries" Electricity: Innovation in Transmission and Distribution, 2ndQuébec-New York, Economic Summit, Montréal, May 13, 2004*

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176. *Reigh Walling, Nicholas W. Miller, "Distributed Generation Islanding - Implications on Power System Dynamic Performance IEEE SPM 02. Panel on DG impacts*

177. *N.W. Miller, "Coordinated Voltage and Reactive Power Control for 345/115kV Substations", Electric Council of New England, PRC Meeting, Vermont, October 2002*

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181. *Nicholas W. Miller , "Impact of Distributed Resources on System Dynamic Performance", IEEE T&D, New Orleans 2001*

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182. W.W. Price, S. Ihara, A. Leirbukt, T. Sasaki, "Dynamic Analysis of Power System Frequency Control", Cigre Paris, 8/00. (USNC award for Noteworthy Technical Paper)

183. Nicholas W. Miller , "Distributed FACTS Options and Planning for Uncertainty", IEEE SPM Panel Session

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186. N.W. Miller , "Innovative Solutions for Transmission in Africa," Africa Power II, Johannesburg, RSA; 4/98

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187. N.W. Miller, J.J. Sanchez-Gasca, K. Clark; "Damping Controller Designs for an SVC and Other FACTS Devices," CIGRÉ SC 14 Colloquium, Capetown, RSA; 7/97

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198. K. Yabe, J. Koda, K. Yoshida – TEPCO, N.W. Miller, K. Chiang, P. Khedkar, D.J. Leonard – GE; "Conceptual Designs of AI-based Systems for Local Prediction of Voltage Collapse," IEEE WPM '95 (WM95-427) 1/95

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201. N.W. Miller, "Application of TCSC Augmented Series Compensation for Improved Voltage Stability," EPRI FACTS III, Baltimore, MD,; 10/94

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204. N.W. Miller, J.J. Paserba, E.V. Larsen, R.J. Piwko ; "A Thyristor Controller Series Compensation Model for Power System Stability Analysis," IEEE SPM '94; 7/94

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213. N.W. Miller, E.V. Larsen – GE, Stan Lindgren, Stig Nilsson – EPRI; "Benefits of GTO-Based Compensations for Electric Utility Applications," IEEE SPM, San Diego, CA ;, 7/92

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214. S. Hirano, T. Michigami, A. Kurita – TEPCO, N.W. Miller, D.B. Klapper, J.J. Sanchez-Gasca, T.D. Younkins – GE ; "Functional Design for a System-Wide Multivariable Damping Controller," IEEE WPM, NYC, 2/91

1989

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1984

218. N.W. Miller, W.W. Price – GE, M.A. Lebow – Con Edison , A.A. Mahmoud – Iowa State; "A Computer Program for Multi-Phase Harmonic Analysis," ICHPS-1, Worchester, MA ; 10/84

PUBLICATION – Significant Public Domain Reports

Technology Capabilities for Fast Frequency Response; report to Australian Energy Market Operator, March 2017. https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/reports/2017/20170310-ge-ffr-advisory-report.pdf

California Energy Commission’s Intermittency Analysis Project Study “Appendix B - Impact of Intermittent Generation on Operation of California Power Grid”
http://www.energy.ca.gov/2007publications/CEC-500-2007-081/CEC-500-2007-081-APB.PDF

New York State Energy Research and Development Authority’s “The Effects of Integrating Wind Power on Transmission System Planning, Reliability, and Operations”
http://www.nyserda.ny.gov/-/media/Files/EERP/Renewables/wind-integration-study.pdf

Ontario Power Authority, Independent Electricity System Operator, Canadian Wind Energy Association’s “Ontario Wind Integration Study”
http://www.powerauthority.on.ca/sites/default/files/news/2321_OPA_Report_final.pdf

Electrical Reliability Council of Texas, “Analysis of Wind Generation Impact on ERCOT Ancillary Services Requirements”:
http://www.ercot.com/news/presentations/2008/Wind_Generation_Impact_on_Ancillary_Services_-_GE_Study.zip

NREL, “Western Wind and Solar Integration Study:
http://www.nrel.gov/docs/fy10osti/47434.pdf
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New England ISO “New England Wind Integration Study “
http://iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/reports/2010/index.html

Hawaiian Electric Company, Hawaii Natural Energy Institute, "Oahu Wind Integration Study"
http://www.hnei.hawaii.edu/sites/web41.its.hawaii.edu.www.hnei.hawaii.edu/files/story/2011/03/Oahu_Wind_Integration_Study.pdf

California ISO, "Frequency Response Study" Oct, 2011
http://www.caiso.com/Documents/Report-FrequencyResponseStudy.pdf

Nova Scotia Power, Inc., "Nova Scotia Renewable Energy Study" Jun, 2013
https://www.nspower.ca/site/media/Parent/2013COSS_CA_DR-14_SUPPLEMENTAL_REISFinalReport_REDACTED.pdf

NREL "Eastern Frequency Response Study", June 2013
http://www.nrel.gov/docs/fy13osti/58077.pdf

NREL "Western Wind and Solar Integration Study Phase 3 – Frequency Response and Transient Stability"
http://www.nrel.gov/docs/fy15osti/62906.pdf *(full report)*
http://www.nrel.gov/docs/fy15osti/62906-ES.pdf *(executive summary)*

NREL "Western Wind and Solar Integration Study Phase 3a – Low Levels of Synchronous Generation" December 2015
http://www.nrel.gov/docs/fy16osti/64822.pdf *(full report)*

Large-scale Solar Association, "Integrating Higher Levels of Variable Energy Resources in California", June 2015
https://largescalesolarassociation.com/files/Final-CA-VER-Integration-6-15-15.pdf

GE Advisory Report to Australian Energy Market Operator: "Technology Capabilities for Fast Frequency Response", March 2017.
https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Reports/2017/2017-03-10-GE-FFR-Advisory-Report-Final---2017-3-9.pdf

NREL "CSP Impact on Grid Reliability" 2018
http://www.nrel.gov/docs/fy18osti/70782.pdf *(full report to be published mid 2018)*

ESIG "Transmission Planning for 100% Clean Electricity", Feb 2021
https://www.esig.energy/wp-content/uploads/2021/02/Transmission-Planning-White-Paper.pdf

NREL, "The Future Role of Hydropower in the Northeastern United States", NW Miller & JM Simonelli, http://www.nrel.gov/docs/fy22osti/80168.pdf

CAPACITY BUILDING ENGAGEMENTS

[This is a selected list of some of the various teaching engagements in which I have been the sole or main lecturer. They are listed by date, location, topic and audience/host (in cases where PDH or CEU were awarded to my students, those are noted. These are specifically human capacity building activities, and are separate from conferences and related activities.]

“Future Opportunity and Challenges with High Levels of Inverter-based Resources”, SRP IRP Technical Working Session Webinar; February 24, 2023

US. Western Interconnection Regional Advisory Body (WIRAB), Western Interstate Energy Board, Committee on "Regional Electricity Power Cooperation (CREPC). ; “Overview of Inverter Based Resources and Grid Reliability”; WIRAB Webinar Series – Inverter Based Resources and Grid Reliability, October 17, 2023

US. NARUC, NASEO, and NASUCA Virtual Training on Bulk Power System Issues for State Energy Officials; “Power System Stability” June 2021

Central Asia. (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan) December 2020-January 2021. “Renewable Generation Lectures”. 6 Lectures, USAID.

US. Western Interconnection Regional Advisory Body (WIRAB), Western Interstate Energy Board, Committee on "Regional Electricity Power Cooperation (CREPC). “WIRAB Webinar Series – Grid Reliability and the Changing Resource Mix”. Sequence of 6 on-line lecture to regulatory community in partnership with Debra Lew, LLC. . April-June 2020

Australia. December 2016. “Australia Wind & Solar Integration Workshop”. Melbourne. 1 day.

Indonesia. December 2016. “PLN Renewable Integration and Grid Enhancement Technical Workshop”. 1 day. PLN Indonesia.

Papua New Guinea. November 2015. “Renewable Integration and Grid Enhancement Technical Workshop”. 1 day. PNG Electricity.

Bahamas. August 2015. “Renewable Generation and Grid Operations”. 1 day. CARILEC – Association of Electric Utilities (Caribbean Electric Utility Services Corporation)

Aruba. August 2014. “Renewable Generation and Grid Operations”. 1 day. CARILEC – Association of Electric Utilities (Caribbean Electric Utility Services Corporation).

Kenya. October 2013. “East Africa Wind & Solar Integration and Grid Operations Seminar”, 1 day. KPLC.

Barbados. Spring 2013. “Renewable Integration and Island Power Systems”. BLP/Emera (part of study contract).

Ghana. July 2012. “Renewable Integration and Grid Enhancement Technical Workshop”. 2 days. GridCo Ghana.

South Africa. September 2011. “ESKOM “Renewable Integration and Grid Operations Seminar” 1 day. ESKOM.

Kazakhstan. November 2011. “Integration of Renewable Generation into the KEGOK Grid”. 1 day. KEGOK

Thailand. October 2010. "EGAT Wind Integration Seminar" 1 day. EGAT.

Montenegro. September 2010. "Wind Integration Seminar". 1 day. GE.

China. September 2008 "Wind Power Interconnection". 1 day. Asian Development Bank

Romania. May 2008. "Wind Integration Seminar". 1 day. Electricity Romania.

Turkey. May 2008. "Wind Generation and Grid Operations". 1 day. TEAIS.

China. October 2005. "Wind Farm University". 1 day. State Grid/CEPRI.

Schenectady NY. November 2017 (and 10 preceding years). "Renewable Energy Systems – Power Systems Engineering Course"; 4 days. 32 PDHs

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PROFESSIONAL ACTIVITES

IEEE ACTIVITIES - Awards, offices held, committee memberships.

IEEE Subcommittee on Renewable Generation — *Chairman (past)*
IEEE Task Force on Dynamic Performance of Wind Generation — *Founding Chairman*
IEEE PES Working Group on Harmonics in Power Systems — *Member*
IEEE PES Working Group on Voltage Stability and Long Term Dynamics (now part of:)
IEEE PES Power System Stability Subcommittee
IEEE PES Working Group on Specification of Thyristor Controlled Series Capacitors Past Member

Contributor to the following IEEE documents:

IEEE Special Publication, "Voltage Stability Assessment, Procedures and Guides," P. Kundar (editor) — *1997*
IEEE TF Paper, "Harmonics Modeling and Simulation," S. Ranade (editor) — 1995
IEEE Special Publication, "Specification of Harmonic Filters for HVDC Stations," 93 THO 609-8PWR, — *1993*
IEEE Special Publication, "Suggested Techniques for Voltage Stability Analysis," 93 THO 620-5-PWR, Y. Mansour (editor) — 1993
IEEE Special Publications, "System Protection and Voltage Stability," 93 THO 596-7-PWR, C. Henville (chairman) — *1992*

CIGRE ACTIVITIES –

.

CIGRE A1/C4 Convener of Joint WG A1/C4.52 on Frequency Responsive Controls for Wind Turbines — *2015-present*

CIGRE C4.601 Brochure "Modeling and Dynamic Behavior of Wind Generation as it Relates to Power System Control and Dynamic Performance P. Pourbiek (conv) — *2007*

CIGRÉ TF 38.01.08 "Modeling of Power Electronics Equipment (FACTS) in Load Flow and Stability Programs," P. Therond (conv)

1998

CIGRÉ WG 14.19 "STATCOM," I.A. Erinmez (conv)

1998

CIGRÉ TF 38.02.12, "Modeling of Voltage Collapse Including Dynamic Phenomena," C. Taylor (conv)

1994

CIGRÉ TF 38.02.10, "Criteria and Countermeasures for Voltage Collapse," C. Taylor (conv)

1993

IEC ACTIVITIES –

.

TF27 WG88 Wind Turbines – electrical Simulation models for wind power generation – Wind Turbines. US representative. 2009 to 2018

NERC Activities –

DERTF (Distributed Energy Resources Task Force) 2016-2019. Invited member.

ERSWG (Essential Reliability Services Working Group) 2016 – present. Invited member.

ERSTF (Essential Reliablity Services Task Force). c2014-2015. Contributor; member Frequency Response subgroup.

IVGTF (Integrating Variable Generation Task Force). c2010-2015. Contributor (to Modeling and Operations tasks)

Energy Systems Integrtion Group (ESIG) –

Member Board of Directors. Elected April 2015 by membership, thru March 2018.

Elected Life Member, 2018
Convener Stability Task Force, 2022-present

Global Power Systems Transformation (GPST) Consortium

Pillar Research Advisory Group. 2020--
Task Leader: Tools for Inverter-based Resource dominant systems.