BEFORE THE

LOUISIANA PUBLIC SERVICE COMMISSION

***IN RE*: APPLICATION OF ENTERGY LOUISIANA, LLC FOR RECOVERY IN RATES OF COSTS RELATED TO HURRICANES LAURA, DELTA, ZETA, AND WINTER STORM URI AND FOR RELATED RELIEF**	))))))	**DOCKET NO. U-_____**

DIRECT TESTIMONY

OF

MICHELLE P. BOURG

ON BEHALF OF

ENTERGY LOUISIANA, LLC

APRIL 2021

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EXHIBITS

I. INTRODUCTION AND BACKGROUND

Q1. PLEASE STATE YOUR NAME, POSITION, AND BUSINESS ADDRESS.

A. My name is Michelle P. Bourg. I am employed by Entergy Services, LLC ("ESL")[1] as Vice President, Asset Management. My business address is 639 Loyola Avenue, New Orleans, Louisiana.

Q2. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am submitting this Direct Testimony on behalf of Entergy Louisiana, LLC ("ELL" or the "Company").

Q3. PLEASE DESCRIBE BRIEFLY YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I hold a Bachelor of Science in Electrical Engineering from Louisiana State University and subsequently earned a Master of Business Administration from Tulane University. I am a registered professional engineer in the state of Louisiana. In 2002, I began working for ESL's Transmission organization as a planning engineer in the Transmission Operational Planning department and, in April 2006, became the department's Manager, Transmission Planning. In September 2009, I accepted the position of Manager, Performance Management in ESI's Utility Operations department and, in December 2010, assumed the position of Director, Performance Management, where I was responsible for developing, refining, and overseeing the performance reporting processes and benchmarking activities

[1] ESL is a service company to the Entergy Operating Companies ("EOCs"), which are Entergy Arkansas, LLC ("EAL"), Entergy Louisiana, LLC, Entergy Mississippi, LLC ("EML"), Entergy New Orleans, LLC ("ENO"), and Entergy Texas, Inc. ("ETI").

for the Utility and Energy Delivery businesses. In 2014, I accepted the position of Director of Gas Distribution. In this capacity, I oversaw all aspects of the safe, reliable delivery of natural gas service to ENO's and ELL's natural gas customers. My specific responsibilities included, but were not limited to, safety, compliance with applicable pipeline safety regulations, operations, customer service, construction, maintenance, engineering, planning, and gas real-time system monitoring and dispatch for the Company's gas distribution system. I assumed my current role in 2019.

Q4. WHAT ARE YOUR JOB RESPONSIBILITIES?

A. In my current role, I am responsible for all aspects of the safe, efficient, and compliant field operation of ESL's transmission line and substation equipment. This includes the execution of routine transmission line and substation inspections and maintenance in accordance with ESL's procedures, the renewal and replacement of existing transmission facilities, and outage and emergency response. I am also responsible for the execution of the transmission vegetation management program, development of transmission safety programs, and skills training delivery for substation, relay protection, and line professionals.

Q5. WHAT ARE YOUR JOB RESPONSIBILITIES RELATING TO STORM RESTORATION?

A. I serve as the Operations Section Chief for the Entergy System. In this capacity, I am responsible for the safe and efficient restoration of transmission facilities that may experience an outage during a storm event. This includes ensuring that pre-storm activities to prepare the transmission system for the storm event are completed in a timely fashion and proactively identifying resources (including people, materials, and equipment) that may be required for the restoration of transmission facilities. In addition, I am responsible for ensuring that ESL's objectives and strategies for completing the restoration of any transmission facilities impacted by the storm are met, including patrolling transmission facilities following passage of the storm, identifying any damage, efficiently completing any required design modifications and repairs, and returning to "normal or new normal operations" following a storm.

Q6. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION OR ANY OTHER REGULATORY AGENCIES?

A. Yes. A list of my prior testimony is provided in Exhibit MPB-1.

II. PURPOSE AND SUMMARY OF TESTIMONY

A. Purpose of Testimony

Q7. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony presents ELL's reasonable and necessary transmission-related storm costs for Hurricanes Laura, Delta, and Zeta in the total amount of $524.7 million incurred for restoration activities through February 28, 2021. As outlined in my testimony, the Company's transmission-related hurricane storm costs associated with Hurricanes Laura, Delta, and Zeta were necessary to repair, in the most expeditious and safe manner possible, the extensive damage sustained by the Company's transmission system and to restore services associated with electric power outages affecting the Company's customers in

Louisiana. As further discussed in my testimony, these costs were reasonable and necessary under the circumstances, and processes were put in place and followed to manage, control, and verify the costs incurred. My testimony also describes the Company's preparation for and response to the February 2021 winter storms (referred to herein as "Winter Storm Uri") that affected ELL's service area. I also discuss the estimated costs for certain storm-related on-going projects that have not yet been completed but which are necessary to fully restore ELL's transmission system to its pre-hurricane status and to complete the Winter Storm Uri restoration.

In my discussion of the transmission restoration work and costs, I describe the Entergy Transmission Organization, including its structure and function. I also discuss ELL's transmission system, along with the Company's investment, design, and maintenance of its system. Next, I address the Entergy System's storm plan and the manner in which it was implemented during the 2020 hurricane season. I then describe the damage suffered by the Company's transmission system from Hurricanes Laura, Delta, and Zeta, as well as Winter Storm Uri, and the work that was undertaken to restore the system. I also discuss the resources used to restore service. Finally, I present the total transmission-related costs necessary to restore ELL's transmission system following each of the weather events that I address in my testimony.

Q8. DO YOU SPONSOR ANY EXHIBITS?

A. Yes. My exhibits are listed in the table of contents to this testimony.

B. Summary of Transmission Storm Costs

Q9. WHAT WERE THE TRANSMISSION STORM COSTS INCURRED BY ELL RELATED TO HURRICANES LAURA, DELTA, AND ZETA, INCLUDING THE ESTIMATED COSTS, THAT YOU ARE PRESENTING IN THIS PROCEEDING?

A. The transmission-related storm costs incurred as a result of Hurricanes Laura, Delta, and Zeta that are presented in my testimony are summarized in Table 1, below.[2]

Table 1

Storm	Costs Incurred Through February 28, 2021	Estimated Costs to be Incurred After February 28, 2021	Total Transmission Storm Costs
Hurricane Laura	$486,719,729	$4,460,000	$491,179,729
Hurricane Delta	$16,737,429	$0	$16,737,429
Hurricane Zeta	$16,808,349	$0	$16,808,349
Total	$520,265,508	$4,460,000	$524,725,508

These dollar amounts are reflected in Exhibit MPB-2 and in the cost summary presented by Company witness Sarah M. Harcus as Exhibit SMH-1 to her Direct Testimony.

[2] The estimated costs reflected in Exhibits MPB-2 and SMH-1 and SMH-2 and reflected in Table 1 do not include the potential cost to demolish and rebuild a 31 mile 115 kilovolt ("kV") transmission line that was damaged during Hurricane Zeta; ELL is still evaluating potential alternatives to a repair and rebuild of this line to identify the lowest reasonable cost alternative considering risk and reliability. Demolition costs will be incurred under any alternative.

Q10. WHAT WERE THE TRANSMISSION STORM COSTS INCURRED BY ELL RELATED TO WINTER STORM URI, INCLUDING THE ESTIMATED COSTS, THAT YOU ARE PRESENTING IN THIS PROCEEDING?

A. The transmission-related storm costs incurred as a result of Winter Storm Uri that are presented in my testimony are summarized in Table 2, below.

Table 2

Storm	Costs Incurred Through February 28, 2021	Estimated Costs to be Incurred After February 28, 2021	Total Transmission Storm Costs
Winter Storm Uri	$1,686,671	$1,273,329	$2,960,000

These dollar amounts are reflected in Exhibit MPB-3 and in the cost summary presented by Company witness Sarah M. Harcus as Exhibit SMH-2 to her Direct Testimony.

C. Summary of Restoration Challenges

Q11. PLEASE PROVIDE AN OVERVIEW OF THE 2020 HURRICANE SEASON.

A. The 2020 hurricane season was extraordinarily active with 30 named storms and 13 hurricanes, six of which became major hurricanes. The first major threats to the Gulf Coast began in late August as Marco and Laura were active in the Gulf of Mexico simultaneously by August 25. Hurricane Marco weakened as Laura rapidly intensified and struck southwest Louisiana on August 27. About three weeks later, the Gulf of Mexico was threatened by a third significant storm when Hurricane Sally formed. Sally ultimately moved east and impacted the Mobile, Alabama, area on September 15. By September 18, Tropical Storm Beta was in the Gulf of Mexico, and again utilities and their shared resources were forced to plan a response. A few days later, on October 4, Tropical Storm Gamma was threatening the same region, and, just five days after that on October 9, Hurricane Delta struck southwest Louisiana as a Category 2 hurricane approximately 12 miles from the location that Laura had come ashore as a Category 4 hurricane. Less than 3 weeks later, Hurricane Zeta made landfall in Louisiana as a Category 2 hurricane, just 1 mph shy of Category 3 strength. Additional storms impacted other regions of the country requiring utilities in those areas to acquire resources to restore power for their respective regions. In summary, the entire coastal United States was threatened by multiple, successive storms in 2020, with responses planned for dozens of storms and hurricane restorations following a record 12 landfalls in the U.S. in 2020.

Q12. WHAT SIGNIFICANT OBSTACLES DID THE COMPANY ENCOUNTER IN REPAIRING DAMAGE CAUSED BY HURRICANES LAURA, DELTA, AND ZETA?

A. As I described above, other regional utilities also were responding to and recovering from the numerous hurricanes that impacted the U.S. in 2020, which presented a limited supply of, and extreme demand for, personnel, material, and logistical resources required for the massive, wide-spread restoration effort ongoing in Louisiana and Texas. In overcoming these challenges, ELL's transmission function brought in substation, relay, line, and vegetation personnel from mutual-aid utilities and third-party contractors to assist in the restoration. Employees and contractors also worked up to 16-hour shifts to restore service as quickly as possible. Considering the challenges associated with working in a hurricane-devastated area, the extended work days for most restoration workers, and the additional precautions made necessary by the ongoing COVID-19 pandemic, personnel engaged in the restoration demonstrated great levels of stamina, flexibility, and outside-of-the-box maneuvering to restore power in a safe and efficient way.

The magnitude of the damage to the transmission system in southwest Louisiana also brought unique challenges, as I discuss below, including extensive damage on all nine transmission lines that interconnect the transmission system that serves southwest Louisiana to the remainder of the Entergy transmission system and neighboring systems. The city of Lake Charles experienced 13 days with no power, and demand has not yet recovered to pre-storm levels in southwest Louisiana.

In addition, many materials were in short supply due to the extraordinary number and severity of storms that occurred during the 2020 hurricane season. And unlike distribution system components that can be mass produced, transmission structures are unique to the lines they serve. For example, each transmission structure is engineered and custom-manufactured, and, to give a perspective on scale, each 500 kV transmission tower weighs approximately 20 tons, requiring multiple tractor-trailers to transport. In addition, special equipment was required to access damaged transmission lines in wetlands and coastal areas.

Food and lodging was another challenge given the widespread damage and ongoing restoration work in other areas. To overcome this challenge, ELL utilized commercial lodging where available, as well as a variety of logistics contractors to provide alternative lodging sites, both fixed and mobile.

And on top of those challenges, the Hurricane Laura restoration was the first large-scale disaster response that required an EOC to implement COVID-19 safety protocols for travel, logistics, lodging, and work execution, which, in turn, resulted in increased costs associated with those safety measures, including alternative lodging, extended travel, and personal protection equipment.

III. ELL'S TRANSMISSION SYSTEM & OPERATIONS

A. Transmission Organization

Q13. HOW IS THE ENTERGY TRANSMISSION BUSINESS UNIT ORGANIZED?

A. The transmission systems of all EOCs, including ELL's, are planned and operated as a single integrated transmission system. The Entergy Transmission organization is responsible for the planning, operation, maintenance, and construction management of the electric transmission systems of the EOCs, including ELL. Entergy Transmission employees are employees of either ESL, which provides services in a consistent and efficient manner to all of the jurisdictional EOCs, or of one of the EOCs.

Q14. WHAT ARE THE RESPONSIBILITIES OF THE ENTERGY TRANSMISSION ORGANIZATION RELATIVE TO ELL?

A. ELL transmission personnel are responsible for local activities, which include various aspects of field execution, including dispatching, maintenance, and construction. For their part, ESL's transmission personnel generally provide planning, design and project management services, transmission real-time operations, engineering support, safety, training, environmental services, business services, regulatory and litigation support, and emergency preparation for the transmission systems of all EOCs, including ELL. There is no duplication of responsibilities between ELL personnel and ESL personnel.

Q15. PLEASE ELABORATE ON THE FUNCTIONS AND RESPONSIBILITIES OF THE ENTERGY TRANSMISSION ORGANIZATION.

A. Within the Entergy Transmission organization, there are five distinct functions that work closely together: (1) Planning and Strategy, (2) Project Management Construction, and Engineering, (3) Operations, (4) Asset Management, and (5) Transmission Customer Service. These functions are described as follows:

- The Planning and Strategy function performs long-range transmission planning and develops projects and/or operating guides necessary to ensure the EOCs' transmission systems function reliably and efficiently. During storm restorations, the Planning and Strategy function plans for the restoration execution by monitoring system conditions as they change and then developing prioritized restoration plans for facilities that experienced outages during the storm.
- The Project Management, Construction, and Engineering function executes the planned capital projects. This includes managing costs and schedules and overseeing construction activities. During a storm, this function provides scouting, damage assessment, procurement and logistical support, and supports Asset Management in rebuilding facilities destroyed by the storm. In addition, the Engineering function designs replacement facilities, assists in the evaluation of replacement materials, and performs analyses of facilities that were not destroyed to ensure that they continue to meet design specifications post-storm.
- The Operations function encompasses short-term or operational planning functions and real-time operations. During storm restoration, the Operations function

monitors real-time system conditions, including the loading on lines as they are restored, ensuring that no lines become overloaded and that no voltage problems are developing. They also interface extensively with field personnel to coordinate the sequence of switching operations to restore facilities to service following the storm.

- The Asset Management function is responsible for managing the condition of the Company's transmission line and substation assets. During normal operations, this function executes its preventative, corrective and diagnostic substation and transmission line maintenance programs, executes transmission vegetation management programs, and responds to outages and equipment problems when they arise. During a major storm restoration, this function provides personnel to perform damage assessment immediately following passage of the storm, repair and restore facilities, and supervise contractor and mutual-aid personnel.
- Transmission Customer Service is the customer service function for transmission-interconnected customers such as large industrial facilities, electric cooperatives, municipals, etc. During a storm, this function assists the Planning section in ensuring that restoration priorities include customers interconnected to the transmission system, including those not served by the EOCs, to ensure prioritization is fair and equitable.

B. ELL's Transmission System

Q16. PLEASE PROVIDE A GENERAL DESCRIPTION OF THE ENTERGY TRANSMISSION SYSTEMS.

A. The Entergy Transmission Systems span portions of five states (Arkansas, Louisiana, Mississippi, Texas, and Missouri) and are comprised of over 16,100 circuit miles of transmission lines and approximately 1,600 substations. Employees based at various locations throughout the service area plan, design, construct, operate, and maintain the transmission systems.

Q17. WHAT GENERAL FUNCTIONS DO THE ENTERGY TRANSMISSION SYSTEMS PERFORM?

A. The Entergy transmission systems move high-voltage, bulk electric power produced by market participants within the Midcontinent Independent System Operator, Inc. ("MISO") Regional Transmission Organization and neighboring regions across an interconnected system of transmission lines and substations to distribution points for delivery to retail customers of the EOCs, as well as to wholesale customers such as municipalities and cooperatives, or to points of delivery into other transmission systems. The Entergy transmission systems also deliver power directly to large commercial and industrial retail customers of the EOCs. These customers include refineries, chemical plants, oil and gas processing facilities, pumping stations, and large manufacturing sites vital to the region and nation.

Q18. WHO OWNS THE TRANSMISSION ASSETS IN THE SYSTEM?

A. The EOCs own the transmission system assets located in their respective service areas, as well as other assets (such as computer systems) that support the operations of the transmission systems.

Q19. PLEASE DESCRIBE ELL'S TRANSMISSION SYSTEM SPECIFICALLY.

A. The ELL transmission system is comprised of over 5,300 circuit miles of transmission lines. In addition to the lines, there are approximately 517 substations in the system. ELL's transmission system includes transmission lines and substations operating at voltages of 500 kV, 345 kV, 230 kV, 138 kV, 115 kV, and 69 kV. The following table identifies ELL's circuit miles of transmission line by voltage class:

Table 3

ELL's Transmission Circuit Miles by Voltage Class

Voltage Class (kV)	Circuit Miles
500	615
345	16
230	1,424
138	681
115	1,700
69	895
TOTAL	5,331

The ELL transmission system is interconnected with the transmission systems of EAL, ENO, EML, ETI, Lafayette Utilities System, Louisiana Generating LLC, Cleco Power LLC ("Cleco"), Louisiana Electric Power Authority, Mississippi Power Company, and Southwestern Electric Power Company.

Q20. WHY IS ELL'S TRANSMISSION SYSTEM INTERCONNECTED WITH OTHER TRANSMISSION SYSTEMS?

A. ELL's transmission system is interconnected with other transmission systems primarily to promote system reliability. The interconnection of transmission systems also provides access to other power suppliers, some of which may provide more economic sources of power than is available on-system.

Q21. WHAT IS THE ROLE OF THE MIDCONTINENT INDEPENDENT SYSTEM OPERATOR?

A. MISO has significant roles in planning and operating the Bulk Electric System, in addition to its more well-known planning and market functions. As the Reliability Coordinator for the portion of the Bulk Electric System that includes ELL and the other EOCs, MISO has the ultimate responsibility in determining what actions are necessary to safeguard the reliable operation of the Bulk Electric System. MISO can directly or indirectly, via operating instructions, control the commitment and dispatch of generation, the status of available transmission lines (opening or closing them to improve system reliability), and the demand served by the system. This is achieved through actions such as declaring conservative operations and imposing Maximum Generation restrictions, up to and including (as a last resort) the shedding of firm load. Hurricane Laura was MISO's first experience with operating a system devastated by a major hurricane and the long, complex, and challenging return of the transmission system, line by line, to normal operations. While advanced drills and planning are certainly helpful in preparing for such an event, nothing can completely prepare operators for the exact challenges that will come about as the result of a powerful and damaging hurricane such as Hurricane Laura.

C. Investment, Design, and Maintenance of ELL's Transmission System

Q22. PLEASE DESCRIBE THE COMPANY'S RECENT INVESTMENT IN AND IMPROVEMENT OF ITS TRANSMISSION SYSTEM.

A. I have attached as Exhibit MPB-4 a spreadsheet identifying transmission capital additions and adjustments for the 2017-2019 timeframe, which period obviously precedes the 2020 hurricane season. The total transmission capital additions for ELL during the 2017-2019 timeframe were approximately $1.23 billion. The need for this level of investment was driven by many factors, including reliability planning, load growth, infrastructure maintenance and reliability needs, economic transmission investments (*i.e.*, investments that produce cost savings to customers), and generation interconnection projects.

Q23. CAN YOU DESCRIBE THE COMPANY'S INVESTMENT, INCLUDING ANY PROJECTS COMPLETED, IN THE LAKE CHARLES AREA SPECIFICALLY?

A. Yes. Between 2006 and 2019, the Company built 7 new transmission lines, substantially rebuilt 17 transmission lines, and partially rebuilt numerous other lines in the Lake Charles area. In total, the Company installed or upgraded approximately 3,600 transmission structures (representing approximately 35 percent of the total transmission structures in the Lake Charles area) and approximately 170 miles of conductor (representing approximately 20 percent of the total line mileage in the Lake Charles area). The Company also built 10 new substations and upgraded 4 additional substations. The Company's investment to improve the reliability and resiliency of the transmission system in the Lake Charles area while providing service to new customers totals $788 million over this period.

An example of this investment is the Lake Charles Transmission Project ("LCTP"), a significant portfolio of transmission improvements that was identified by the Company. The Company submitted an application to the Commission for approval of the projects in June of 2015 and explained that the transmission project portfolio was necessary to meet the reliability needs of the Lake Charles area given the effects of the unprecedented economic load growth in the area. In January 2016, the Commission approved the settlement among the parties to the proceeding, finding, among other things, that construction of the portfolio of projects comprising the LCTP would serve the public convenience and necessity and was in the public interest.[3] The LCTP was placed in service in 2018, providing substantial reliability benefits to ELL customers in the Lake Charles area and throughout the state.

The Southwest Louisiana 69 kV Improvement Plan (Phase 1) is another significant project constructed for reliability and to comply with Entergy Transmission Local Planning Guidelines and Criteria for contingencies defined by North American Electric Reliability Corporation ("NERC") Reliability Standards. Phase 1 of this multi-phase project was approved by MISO in December 2016. This project was placed in service in 2019 and is necessary to mitigate overloads and low voltages that could result from certain system contingencies.

[3] LPSC Order No. U-33645 (1/6/16), *In re: Application for Certification of the Lake Charles Transmission Project.*

The new and upgraded infrastructure in the Lake Charles area performed as designed and was largely unaffected by Hurricane Laura. This infrastructure also played a key role in the recovery process, serving as a source to the first generating station online after passage of the storm and also the first interconnection between the Lake Charles area and the rest of the Entergy transmission system.

Q24. WAS THE DAMAGE TO THE COMPANY'S TRANSMISSION SYSTEM FROM HURRICANES LAURA, DELTA, AND ZETA DUE TO INADEQUATE INVESTMENT IN, AND HARDENING OF, THE SYSTEM?

A. No. ELL has made significant investments in its transmission system during the past several years utilizing modern design standards. The Company evaluates hardening strategies from a customer perspective, weighing the benefits of fewer and shorter outages against the increased costs of hardening the system, which our customers ultimately must pay for. Maximizing resiliency everywhere is not cost-effective for customers, but targeted programs that cost-effectively reduce the risks to reliability posed by major storms is good for all stakeholders. In other words, ELL continually searches for ways to improve the resiliency of its transmission system while also managing and balancing rates that are paid by customers. Furthermore, all of the Company's transmission facilities are designed and constructed to meet or exceed the applicable design standards at the time of construction.

Q25. CAN YOU EXPLAIN WHAT YOU MEAN BY APPLICABLE DESIGN STANDARDS?

A. Yes. Referring specifically to the Company's transmission system in the Lake Charles area, that system was designed under two different sets of design standards. Older structures were designed to the Company's predecessor's (Gulf States Utilities "GSU")[4]) standards, which have been grandfathered into ELL's system. Transmission facilities designed and constructed more recently utilize the unified Entergy Design Standard implemented in 1997. These two sets of standards were developed under different versions of the National Electric Safety Code ("NESC"), and, therefore, structures built under each set of standards were designed to withstand different wind loadings.

Specifically, the unified Entergy Design Standard requires all transmission lines built or substantially upgraded in the Lake Charles area to be designed for 140 mph sustained wind, which exceeds current NESC requirements. Older transmission lines located in the Lake Charles area that were designed and constructed before the development of the unified Entergy Design Standard are based on legacy GSU design standards, which I discuss further below.

Q26. CAN YOU PROVIDE SPECIFIC EXAMPLES OF HOW THE COMPANY'S TRANSMISSION SYSTEM FARED DURING HURRICANE LAURA?

A. Yes. To do so, I will use examples from each of the Company's 500 kV, 230 kV, 138 kV, and 69 kV systems.

With respect to the Company's 500 kV system, from the late 1960s through the early 1970s, GSU built an East-West line across southeast Texas and southwest Louisiana, with 45 miles of this line traversing Calcasieu parish. GSU designed its 500 kV lines for 110 mph wind loading, which exceeded NESC requirements at the time of construction.

[4] Entergy Corporation and Gulf States Utilities Company merged in 1994.

In 2018, as part of the LCTP, ELL tapped into that line with a new 500 kV substation, and built a 7-mile 500 kV line south interconnecting to a new 500/230 kV substation. This new Rhodes-Patton 500kV line was built with modern tubular steel H-frame structures and designed for 140 mph wind loading. During Hurricane Laura, approximately 28% of the legacy East-West 500 kV line in Calcasieu parish (designed in the 1960s for 110 mph wind loading) was damaged; however, no structures were damaged on the modern line designed for 140 mph wind.

On the Company's 230 kV system, the three most heavily damaged lines in the Lake Charles area were built by GSU to withstand 110 mph wind – a standard which, again, met or exceeded NESC requirements at the time of construction. And most of the 138 kV facilities in the Lake Charles area that sustained heavy damage during Hurricane Laura were designed and constructed for 95 mph wind loading. Newer-construction 230 kV and 138 kV lines designed for 140 mph performed quite well, with no 230 kV or 138 kV structures destroyed on facilities designed to the new Entergy standard.

Finally, for the Company's 69 kV facilities, the majority of the 69 kV system was built to GSU specifications, which, consistent with NESC requirements, was designed to withstand the equivalent of 95 mph wind. Many structures on the 69 kV system were destroyed during Hurricane Laura, but the newer 69 kV lines designed under the Company's updated standard to withstand 140 mph wind performed well during Hurricane Laura, with only one structure destroyed.

All of this is to say that the catastrophic damages caused by Hurricane Laura were not due to any disregard on the part of the Company of the importance of storm hardening and upgrading its transmission system, but rather due to the unprecedented strength and force of Hurricane Laura. The Company has made great effort to meet and exceed industry standard requirements with respect to the design, construction, and maintenance of its transmission system for the benefit of customers. And, importantly, the vast majority of the transmission projects mentioned above that were completed in the Lake Charles area in recent years, including the LCTP, sustained little or no damages during Hurricane Laura, and any damages that did occur were minimal.

Q27. PLEASE DESCRIBE THE COMPANY'S MAINTENANCE PROGRAMS AND PRACTICES APPLICABLE TO ITS TRANSMISSION SYSTEM.

A. The Company utilizes several types of inspections for its transmission line structures, including routine aerial patrol leveraging both helicopters and Unmanned Aerial System ("UAS") technology, wood pole groundline treatment and inspection, climbing inspection (for wood poles), and comprehensive aerial inspection (for concrete and steel poles). Climbing and comprehensive aerial inspections are triggered by the performance of the lines and through conditions found during routine aerial patrols, outage patrols, and groundline inspections. As it relates to the Company's preparation for storms, the Company typically completes at least one cycle of transmission aerial inspections prior to June of each year.

The Company flags corrective maintenance items identified through inspections that are then prioritized for remediation into the following categories:

- Priority 1 – emergency work to begin within 0-24 hours from the time work is identified;
- Priority 2 – urgent work to begin within 14 days from the time work is identified;

- Priority 3 (High) – work identified to be planned, scheduled, and work to begin within 90 days from the time work is identified;
- Priority 3 (Medium) – work identified to be planned, scheduled, and work to begin in the next calendar year; and
- Priority 3 (Low) – work identified to be planned, scheduled, and bundled with other work.

Q28. WAS THE DAMAGE TO THE COMPANY'S TRANSMISSION SYSTEM FROM HURRICANES LAURA, DELTA, AND ZETA DUE TO INADEQUATE MAINTENANCE AND INSPECTION PROGRAMS?

A. No. ELL's maintenance and inspection programs are consistent with industry practices for maintaining transmission systems, and the damage sustained by ELL's transmission system during Hurricanes Laura, Delta, and Zeta is not fairly attributable to any deficiencies in those programs.

Q29. PLEASE DESCRIBE THE COMPANY'S VEGETATION PROGRAMS AND PRACTICES APPLICABLE TO ITS TRANSMISSION SYSTEM.

A. To keep rights-of-way ("ROWs") in proper condition, the Company typically performs at least two aerial patrols of all transmission lines each year to inspect the ROW and identify any areas requiring corrective maintenance. Vegetation is maintained in a manner that keeps it clear from growing into the transmission lines and causing associated electrical interruptions based on proximity. A combination of traditional trimming, helicopter side trimming, and herbicides are used to maintain the ROWs, and the Company implements an inspection program to identify and remove trees located outside of the Company's ROWs that may endanger the conductor zone.

Q30. WAS THE DAMAGE TO THE COMPANY'S TRANSMISSION SYSTEM FROM HURRICANES LAURA, DELTA, AND ZETA DUE TO INADEQUATE VEGETATION MANAGEMENT?

A. No. Our damage assessment observations during Hurricanes Laura, Delta, and Zeta did not indicate that we had inadequate vegetation management in our transmission line ROWs. To the contrary, we experienced a high degree of vegetation related damage to our facilities from trees growing outside of the Company's ROWs. As I noted previously, the Company works to proactively mitigate high risk trees outside of our ROWs with customer permission; however, obtaining customer consent to trim beyond our ROWs is often difficult.

Q31. AFTER HURRICANE LAURA, DID THE COMPANY SEEK ANY THIRD-PARTY REVIEW OF THE STORM AND THE DAMAGE TO ELL'S TRANSMISSION SYSTEM?

A. Yes. The Company engaged Barry D. Keim, Ph.D., and Quanta Technology, LLC ("Quanta"). Dr. Keim is a Professor at Louisiana State University and Louisiana's State Climatologist, and he studies climate extremes, including heavy rainfall and hurricanes. We requested that Dr. Keim estimate the maximum sustained winds and gusts during Hurricane Laura at certain locations on or near ELL's transmission system in the Lake Charles area. Quanta is a third-party technology, consulting, and testing company with broad expertise in the design and operation of electric utility systems. We asked Quanta to assess the performance of ELL's transmission system in the Lake Charles area during Hurricane Laura. I was personally involved throughout Quanta's engagement by the Company, and I participated in the workshops described in Quanta's report, which I discuss further below.

Q32. HOW DID ELL SELECT LOCATIONS FOR THE PURPOSE OF REQUESTING WIND ESTIMATES FROM DR. KEIM?

A. We selected 26 sites of interest throughout the Lake Charles area based on location, voltage (69 kV, 138 kV, 230 kV, or 500 kV), and extent of damage to transmission facilities. Some of the sites were focused on line segments, while others focused on areas near substations (with the damage, or lack thereof, occurring to structures near the substation rather than the substation itself). At many of the sites, a structure at or near the location was highly damaged or destroyed; at others, the structure experienced low or moderate damage, even though it may have been in an area that experienced significant damage. For example, one of the sites (Site 26) was on the new Rhodes-Patton 500kV line that I mentioned previously. The identified structure on that line fared well in the storm, even though it was situated near older 500 kV structures on the Nelson-Rhodes 500kV line that were highly damaged or destroyed (Sites 5 and 7). As another example, the older 500 kV structure at Site 13 on the Nelson-Richard 500kV line experienced low damage, even though other nearby locations on that line experienced a high level of damage. Finally, a site may have been chosen because it demonstrated a type of damage observed after the storm, such as wood poles broken above groundline or instances of cascading damage, where damage to one structure increased load on and contributed to damage to neighboring structures.

Q33. WHAT INFORMATION DID ELL ASSEMBLE AND PROVIDE TO DR. KEIM ABOUT THE SELECTED SITES?

A. For each site, ELL provided latitude and longitude coordinates; identified the facility type (line or area near substation), voltage, and level of damage at the particular site; and noted a structure and its line number at or near the site. For those structures/poles, we provided their above ground heights. For Sites 1 through 15, we also provided the average height of structures on the line section for each identified structure/pole. Comparing this additional information to the height of the identified structure/pole can indicate, for example, that the structure/pole is at a crossing and therefore higher than average. I attach as Exhibit MPB-5 to my testimony a listing of the information that we provided to Dr. Keim about the sites.

Q34. HAVE YOU REVIEWED THE REPORTS PREPARED BY DR. KEIM AND QUANTA?

A. Yes, and I attach Quanta's report as Exhibit MPB-6 to my testimony.[5]

[5] Dr. Keim's Report is attached as Exhibit BDK-2 to his Direct Testimony.

Q35. IS THERE ANYTHING ABOUT THE REPORTS OF DR. KEIM AND QUANTA THAT YOU WISH TO HIGHLIGHT FOR THE COMMISSION?

A. Yes. ELL is not aware of any other hurricane that has done as much damage to an electric transmission system as Hurricane Laura. My strong sense after surveying the damage that Hurricane Laura caused to ELL's transmission system was that the storm brought exceptionally intense winds that exceeded the design standards for much of the damaged infrastructure. The damage did not result from improper or deficient maintenance of the system. The wind speed estimates and pressure calculations provided by Dr. Keim and Quanta are consistent with my observations, opinions, and judgment concerning the cause of the damage.

As Dr. Keim notes, Hurricane Laura was the strongest hurricane on record to affect southwest Louisiana, and it ties with the Last Island Hurricane of 1856 as the strongest hurricane to make landfall in Louisiana. And as Dr. Keim sets forth in his Report and Direct Testimony, among the 26 ELL transmission sites in the Lake Charles area, the estimated maximum wind speeds during Hurricane Laura vary by location and elevation, ranging from 76 to 132 mph for 1-minute sustained winds at top-of-structure elevation, and, at that same elevation, from 98 to 171 mph for 3-second gusts, and 110 to 191 mph for instantaneous gusts.

Quanta performed a wind pressure analysis to estimate the wind pressure exerted by Hurricane Laura on the Company's transmission structures. Quanta's analysis of wind pressures found that Hurricane Laura exerted wind pressures that exceeded the mechanical failure loads of the structures. In other words, upon its own review, Quanta concluded that ELL's standards and programs that I discussed above aligned with the industry and were not contributing causes to the structure damage that occurred during the storm, and that the wind pressure and other impacts of Hurricane Laura alone were sufficient causes of the damage.

IV. HURRICANES LAURA, DELTA, AND ZETA IMPACTS AND STORM PLANS

A. Description of Hurricanes Laura, Delta, and Zeta

Q36. PLEASE DESCRIBE HURRICANE LAURA.

A. Hurricane Laura was an extremely powerful storm that made landfall at Cameron, Louisiana, as a high-end Category 4 hurricane with sustained winds of 150 miles per hour around 1:00 a.m. on August 27, 2020. Hurricane Laura was the strongest storm to make landfall in Louisiana since 1856 and is tied for the fifth strongest to make landfall in the continental United States.

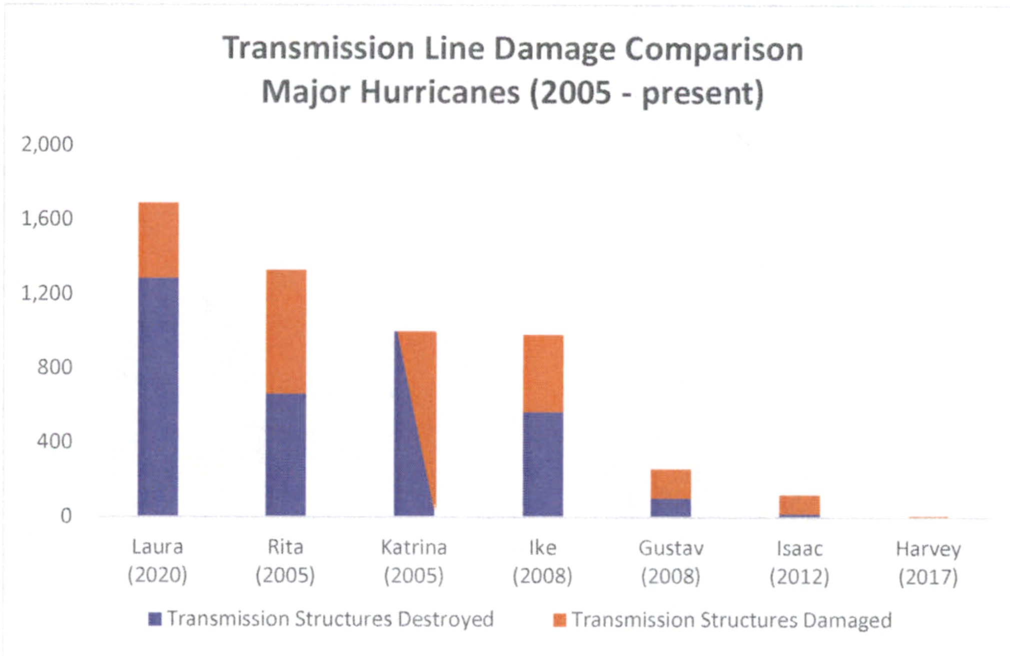
The region of southwest Louisiana in and around Lake Charles took the brunt of the storm's force. The eye wall, which brings the most damaging winds and intense rainfall, passed directly over Lake Charles causing widespread and catastrophic damage to that area and ELL's transmission system. In fact, the eye wall passed right over ELL's Calcasieu Generation Station and continued over the recently completed LCTP. (Thankfully, neither experienced significant damage, and both played key roles in the restoration process as I discuss below.) Ninety-six percent (96%) of transmission structures damaged or destroyed in Louisiana during Hurricane Laura were in the southwest portion of the state. The damages to key transmission facilities were so extensive and so severe that there were no viable paths to bring power into southwest Louisiana from any direction for several days.

The storm continued across ELL's service area, arriving in central and north Louisiana as a Category 2 and Category 1 storm, respectively. The sustained power of the storm as it moved through Louisiana damaged utility infrastructure on a scale not experienced with prior hurricanes.

Q37. HOW DID HURRICANE LAURA COMPARE TO PREVIOUS STORMS THAT AFFECTED THE ENTERGY SYSTEM?

A. The nature and magnitude of the damage inflicted to the transmission system in southwest Louisiana were very different from the experiences with past hurricanes that impacted ELL's service area. In fact, the damage as so severe that it was more consistent with destruction caused by a tornado, but across a much wider path. Figure 1 below compares the damage inflicted to the transmission system by Hurricane Laura to other major hurricanes that have impacted Louisiana since 2005.

Figure 1[6]



Q38. PLEASE DESCRIBE HURRICANE DELTA.

A. Just when it appeared that hurricane season might be winding down, Hurricane Delta made its way into the Gulf with its eye again squarely on the Louisiana coastline. The storm struck Louisiana on the evening of October 9 as a high-end Category 2 storm with sustained winds approaching 100 mph, making landfall in Creole, Louisiana, just 6 weeks after Hurricane Laura and 12 miles to the east of where Hurricane Laura came ashore. Hurricane Delta had a wider footprint than Hurricane Laura, with sweeping outer bands that covered the entire State of Louisiana, and the storm impacted parts of ELL's service area that were

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6 Transmission structure damage information for Hurricane Katrina displayed in Figure 1 reflects total structures impacted (i.e. – sum of damaged and destroyed structures).

still recovering from the devastation of Hurricane Laura. The outer bands also brought significant rainfall and dangerous flooding to several areas in Louisiana, leaving saturated grounds that contributed to downed trees and limbs that fell into powerlines as the storm's winds came through. Although Hurricane Delta moved along quickly, portions of Louisiana saw 15 to 20 inches of rainfall. As it moved inland, the storm weakened to a Category 1 and then to a tropical storm. Despite its weakening, Hurricane Delta still produced damaging wind gusts, heavy rainfall, and lightning well into north Louisiana.

Q39. PLEASE DESCRIBE HURRICANE ZETA.

A. Hurricane Zeta was the fifth named storm to hit Louisiana in 2020. It made landfall at Cocodrie, Louisiana on the afternoon of October 28 as a strong Category 2 hurricane with 110 mph sustained winds, just 1 mph shy of a Category 3 storm. Damage to infrastructure in the coastal parishes of southeast Louisiana, including Jefferson, Lafourche, Plaquemines, St. Bernard, and Terrebonne, was extensive. The storm's center passed directly over Orleans Parish, and its damaging winds brought down trees, limbs, poles, and lines throughout the metropolitan New Orleans area.

B. Damages Caused by Hurricanes Laura, Delta, and Zeta

Q40. PLEASE SUMMARIZE THE DAMAGE TO THE ENTERGY TRANSMISSION SYSTEM CAUSED BY HURRICANE LAURA.

A. By the time the storm subsided, more than 1,400 of the Entergy System's transmission structures had been destroyed and another 450 damaged. In fact, Hurricane Laura destroyed more than double the number of transmission structures as Hurricane Rita.[7]

The transmission system that serves southeast Texas and southwest Louisiana was the hardest hit. This area includes a uniquely dense population of large industrial customers and critical energy infrastructure. Southwest Louisiana became completely isolated from the Bulk Electric System following Hurricane Laura, with all nine transmission lines into that region severed. In southwest Louisiana, approximately 25 percent of all existing transmission structures were either destroyed or sustained damage, necessitating an almost complete rebuild of the transmission system that serves Calcasieu and Cameron parishes.[8] However, despite the damage, recent investments in modern transmission structures paid off, as those assets withstood the storm's impact and remained intact. For example, the LCTP survived, essentially intact, and enabled restoration to proceed much more quickly than if the project had not been in service.

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[7] Prior to Hurricane Laura, Hurricane Rita (a strong Category 3 hurricane that made landfall in Louisiana near its border with Texas in 2005) was the most destructive storm in recent history to impact the Company's facilities in the Lake Charles area.

[8] In Cameron Parish, 30% of existing transmission structures were impacted. In Calcasieu Parish, 23% of existing structures were impacted.

Q41. CAN YOU SUMMARIZE THE DAMAGE TO COMPANY'S TRANSMISSION SYSTEM SPECIFICALLY CAUSED BY HURRICANE LAURA?

A. Yes. The following summary of damage to ELL's transmission system highlights Hurricane Laura's historic intensity:

- 1,822 transmission structures damaged and/or destroyed;
- 188 substations damaged and/or impacted; and
- 152 transmission lines out of service.

Q42. PLEASE SUMMARIZE THE DAMAGE TO THE COMPANY'S TRANSMISSION SYSTEM CAUSED BY HURRICANE DELTA.

A. Hurricane Delta knocked out power to more than 850,000 Entergy System customers, 320,000 of which were in Louisiana, and many of whom still were recovering from Hurricane Laura. Approximately 160 of the Entergy System's transmission lines and 215 substations experienced an outage during Hurricane Delta. For ELL specifically:

- 171 transmission structures were damaged and/or destroyed;
- 142 substations were out of service; and
- 116 transmission lines were out of service.

The Parishes of Acadia and Vermilion sustained the most damage as a result of Hurricane Delta. Twenty percent of the total structures impacted were in Acadia Parish, and 15 percent of the total structures impacted were in Vermilion Parish.

Q43. DID THE IMPACT ON THE COMPANY'S TRANSMISSION SYSTEM AS A RESULT OF HURRICANE DELTA SHED ANY LIGHT ON THE SUCCESS OF THE RESTORATION EFFORT FOLLOWING HURRICANE LAURA?

A. Yes. The grid rebuilt just a month prior in connection with the Hurricane Laura restoration efforts held up well, and complete restoration following Hurricane Delta took a little over a week. Most importantly, none of the transmission structures replaced as a part of the Hurricane Laura restoration effort were destroyed during Hurricane Delta. And thankfully, Hurricane Delta caused minimal impact to the ongoing restoration of facilities that remained out of service following Hurricane Laura aside from weather-related delays.

Q44. PLEASE SUMMARIZE THE DAMAGE TO THE COMPANY'S TRANSMISSION SYSTEM CAUSED BY HURRICANE ZETA.

A. Approximately 40 of the Entergy System's transmission lines and 30 substations experienced an outage during Hurricane Zeta. For ELL specifically:

- 199 transmission structures were damaged and/or destroyed;
- 24 substations experienced an outage; and
- 32 transmission lines were out of service.

The Parish of Lafourche sustained the most transmission damage as a result of Hurricane Zeta. Sixty percent of the total transmission structures impacted were within Lafourche Parish.

Q45. HAVE YOU ATTACHED ANY PHOTOS OF THE TRANSMISSION DAMAGE?

A. Yes. Exhibit MPB-7 is a collection of photographs of transmission line and substation damage that are representative of the destruction caused by Hurricane Laura.

C. The Company's Restoration Plan and Implementation

1. The Company's Transmission Incident Response Plan

Q46. PLEASE DESCRIBE ENTERGY TRANSMISSION'S PLANNING TO ADDRESS MAJOR STORMS.

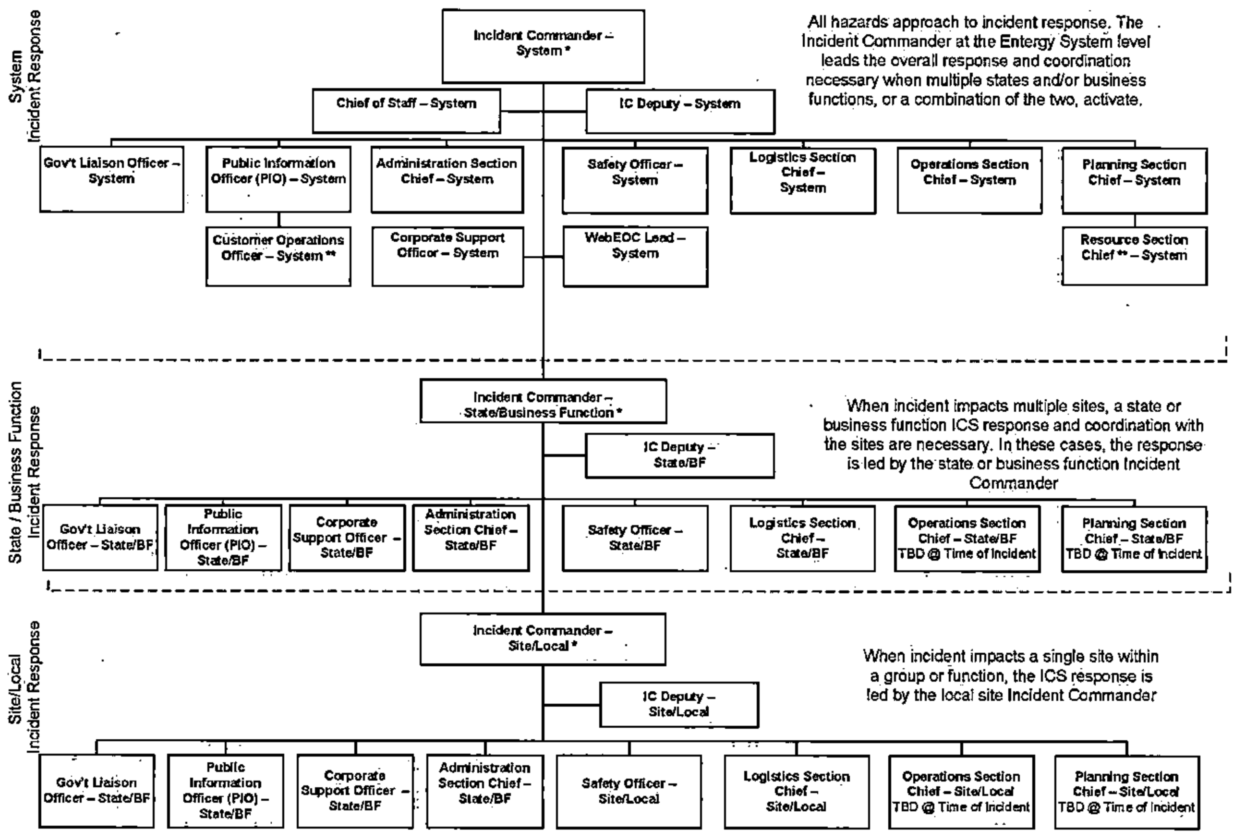
A. Entergy Transmission maintains a thorough and comprehensive storm plan, the Transmission Incident Response Plan ("Transmission IRP"), and conducts refresher training primarily in conjunction with an annual System-level drill to test processes and abilities. The overall Entergy storm plan is comprised of smaller, but well-coordinated, incident response plans at the department, business unit, state, and overall system levels. These plans, including the Transmission IRP, are updated on an ongoing basis. The Transmission IRP is accessible by all transmission employees via an internal company website.

Q47. PLEASE DESCRIBE THE INCIDENT RESPONSE ORGANIZATIONAL STRUCTURE.

A. The Transmission IRP establishes an Incident Command System ("ICS") structure with individuals assigned to fill key incident preparedness and response positions, along with defining their roles and responsibilities. All business functions, including Transmission activities, are completely integrated within this command structure. The ICS structure established in the Transmission IRP is shown in Figure 2.

Figure 2

ICS Structure - Incident Response Plans



* The Incident Commander who is leading the overall incident response will interface with the EIRT (when activated)

** For Storm incident response, this role will report directly to the System Incident Commander

The Transmission IRP includes definitions of the roles and responsibilities of the key positions in our leadership structure and thorough checklists (see my Exhibit MPB-8) that are executed in staged time intervals in advance of the storm. Detailed contact information is included in the plan for employees and contractors.

The System Incident Commander is responsible for coordinating the response among all applicable organizations and functions, including ensuring communications with customers, as well as key governmental, regulatory and emergency management contacts. I serve as the System Operations Section Chief and had the same responsibilities for that role during Hurricanes Laura, Delta, and Zeta. In my storm role, I report to the System Incident Commander, who facilitates overall internal and external resource procurement and allocation among the EOCs and oversees prioritization decisions at the System level to ensure the success of the overall storm response and restoration effort.

The State Command Centers, including the Louisiana Command Center under the leadership of ELL President and CEO Phillip May, direct prioritization and restoration efforts within their respective EOCs.

2. Implementation of the Transmission Incident Response Plan

Q48. DID THE COMPANY ACT CONSISTENTLY WITH ITS STORM PLAN IN PLANNING FOR, AND RESPONDING TO, HURRICANES LAURA, DELTA, AND ZETA?

A. Yes. Company witness John W. Hawkins describes the Company's preparation for Hurricanes Laura, Delta, and Zeta, and the actions taken by the Company after the hurricanes made landfall, including the Company's efforts to ensure that enough workers were available to carry out the tasks that were necessary to restore the Company's transmission and distribution systems. I would add to that discussion by stating that, in restoring service to all of the customers who could take service, the Entergy System employees, with the assistance of third-party contractors and mutual-assistance personnel from across the country, have demonstrated why the Entergy System is recognized as an industry leader in storm restoration. From the Power Generation function quickly bringing plants back on-line, to the Transmission function replacing destroyed structures and repairing substations in hard-to-access areas, to the Distribution function's repairing miles of ravaged facilities, to the logistics and administrative support groups tending to the vast army of work crews, the tireless and selfless efforts of thousands of men and women in the Entergy System's restoration effort restored service to customers and helped bring some sense of normalcy back to a region that had been devastated by the most active storm season ever for the State of Louisiana.

The Company's response to the storms followed the various steps of the respective storm plans: to alert and proactively ramp up the organization; to acquire and deploy resources, including coordination with mutual-assistance utilities, vendors and third-party contractors; to predict and assess post-landfall damage; to prioritize restoration activities; and to continuously communicate with customers and government officials regarding the status of restoration. ELL was able to restore service to the customers who were able to accept service by October 1 following Hurricane Laura (35 days after landfall), by October 17 following Hurricane Delta (8 days after landfall), and by November 12 following Hurricane Zeta (15 days after landfall). The Company's restoration efforts would be considered exceptional for one storm alone, given the amount and nature of damages; however, the restorations following Hurricanes Laura, Delta, and Zeta were accomplished through the proactive actions of the Company with the additional challenges and difficulties caused by:

- Back-to-back strong hurricanes resulting in material shortages and exhausted workers, many of whom had to put aside concerns about the safety and well-being of their own families all the while working up to 16-hour days and sleeping in alternate lodging;
- Competition with other affected entities for logistical support;

- The coordination required with governmental agencies; and
- The challenges brought about by the ongoing COVID-19 pandemic.

Additionally, the Entergy System's communication with the public was continuous and included multiple daily updates to customers; the media; and local, state and federal agencies. The Entergy System's accomplishments in restoring service as quickly and as safely as possible under the circumstances and challenges of Hurricane Laura, Hurricane Delta, then Hurricane Zeta, were a testament to the Entergy System, its employees, and the thousands of personnel from mutual-assistance utilities and contractors who executed a well-prepared plan with precision.

Q49. HAS ENTERGY RECEIVED RECOGNITION FOR ITS STORM RESPONSE EFFORTS DURING THE 2020 HURRICANE SEASON?

A. Yes. Entergy has received numerous awards for its storm restoration efforts. The Entergy System is the only utility group to receive awards from the Edison Electric Institute ("EEI") for response excellence every year since the Institute established the award. In January 2020, Entergy Corporation was honored with five Emergency Responses Awards, including recovery awards for Hurricane Laura and severe thunderstorms in April 2020, and assistance awards for Hurricanes Sally, Isaias and Hanna. In addition, this summer, Entergy will be presented with the 2021 Southeastern Electric Exchange ("SEE") Industry Excellence Award (Transmission-Line Category) for its Hurricane Laura restoration. The SEE Industry Excellence Awards program recognizes member companies for successfully implementing projects that demonstrate innovation, improvement, and technical complexity.

V. RESTORATION OF THE TRANSMISSION SYSTEM FOLLOWING THE HURRICANES

A. Description of Restoration Efforts

Q50. WHAT WERE THE TIME FRAMES FOR RESTORATION OF SERVICE FOLLOWING HURRICANES LAURA, DELTA, AND ZETA?

A. ELL was able to restore service to 75% of Louisiana customers affected by Hurricane Laura within 2 weeks, and 90% of customers within 3 weeks. Power to all customers who were able to accept service (*i.e.*, customers who did not require reconstruction of their personal property) was restored by October 1 (35 days after Hurricane Laura made landfall).

ELL restored service to more than 90% of customers in Louisiana within 3 days following Hurricane Delta. Power to all customers who were able to accept service was restored by October 17 (8 days after Hurricane Delta made landfall).

And ELL restored service to nearly 90% of customers in Louisiana within 4 days following Hurricane Zeta, with power to all customers who were able to accept service restored by November 12 (15 days after Hurricane Zeta made landfall).

Q51. WHAT WERE THE COMPANY'S PRIORITIES IN RESTORING THE TRANSMISSION SYSTEM AFTER HURRICANES LAURA, DELTA, AND ZETA?

A. In each case, the highest priorities were the safety of the public, the safety of the restoration workers, and the restoration of critical services to all of the affected communities in the parishes in which ELL provides service.

The restoration of the transmission system post-landfall is generally prioritized to facilitate:

(1) Generation availability and stability, which may include facilities necessary for fuel, water, auxiliary power needs, etc., and could include off-site power needs critical to nuclear safety.

(2) Bulk Electric System and local transmission stability by establishing generation to load interconnectivity, capacity, security, and redundancy.

(3) Matters of national security, including national fuel supply, industrial customers with strategic national importance, and military defense support.

(4) State and local government disaster recovery services such as fire, police, military, governmental, and medical transportation/treatment facilities.

(5) National, state and local command center facilities and emergency services facilities, national disaster response facilities, FEMA, Homeland Security, etc.

(6) Critical community support services such as pumping stations, food/water supply to communities and evacuation centers, etc.

(7) Distribution general area load restoration, including individual life support needs in non-evacuation areas, backbone circuits, street lighting, traffic control, etc.

Q52. WHAT WERE THE SPECIFIC TASKS REQUIRED TO RESTORE THE COMPANY'S TRANSMISSION FACILITIES?

A. The tasks required to restore the transmission facilities used to serve ELL are listed in the attached Exhibit MPB-8.

Q53. HOW WAS THE HURRICANE LAURA RESTORATION EFFORT DIFFERENT FROM PRIOR HURRICANE RESTORATIONS?

A. Every storm restoration brings unique challenges, but given the severity and scale of the transmission damage caused by Hurricane Laura, the Company had to modify its restoration organizational structure to resemble a large-scale capital project effort, which was needed to align resources effectively and to streamline stakeholder engagement. It took creative thinking and flexibility to successfully rebuild the decimated transmission and distribution systems in southwest Louisiana and restore power to nearly all affected customers in just over three weeks. A cross-functional team focused on:

- Managing the load pocket in Lake Charles and keeping a delicate balance of load and generation with one transmission source connecting the region to the rest of the Eastern Interconnection, which I discuss in greater detail below.
- Project management pulled resources and material from projects across the Entergy System, combining work and focus into one single effort.
- Supply chain and logistics quickly worked to request materials and set-up staging sites. Logistics and material management teams established 14 temporary laydown yards focused on voltage level and material movement to the field, minimizing delivery times.

- Distribution quickly deployed emergency generators to temporarily feed critical loads.
- Power Generation worked to develop a plan to black-start one unit at the Calcasieu Plant using on-site generators and reliably ran generators inside of the load pocket, including Lake Charles Power Station, and outside of the load pocket to ensure system stability.

The Company also faced unique challenges with respect to access issues, safety, and logistics. Hampering progress in Lake Charles specifically was a chemical fire at a plant in the city of Westlake on August 27,[9] forcing road closures and increased drive times for some crews who were instructed to avoid the area for safety. And as discussed by Company witness Mr. Hawkins, special equipment was needed to access much of the damaged areas.

In addition, as also discussed by Mr. Hawkins, the Company had to ensure the safety of its workforce in the face of COVID-19. The additional measures that had to be taken because of the ongoing COVID-19 pandemic (including crews' traveling separately when possible, adjusting crew staging locations, cutting staging centers to half capacity, and increasing the use of drones), also impacted the speed with which the Company was able to safely assess the damage to its facilities and restore service to customers.

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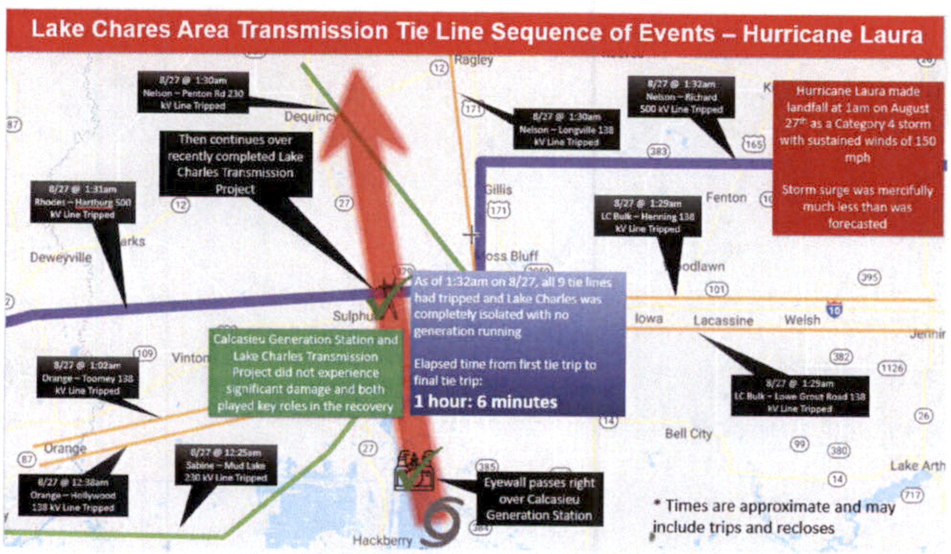
[9] Plant managers were trying to contain a chlorine leak.

Q54. PLEASE DESCRIBE HOW THE COMPANY WAS ABLE TO RESTORE TRANSMISSION SERVICE TO THE LAKE CHARLES AREA FOLLOWING HURRICANE LAURA.

A. As I discussed above, Hurricane Laura resulted in southwest Louisiana's complete isolation from the bulk electric system, with all nine transmission lines into that region severed as a result of Hurricane Laura's devastating impact as shown in Figure 3.

Figure 3



It took almost 11 days, until very late in the day on September 7, 2020 for the first transmission tie into the region from Cleco and the Eastern Interconnection[10] to be established, and the next day, September 8, 2020, for the first lights in this electrically isolated area to come on. Cleco also had been devastated by Hurricane Laura, and a single tie was insufficient to serve the entire region. This first tie, coupled with a path to the

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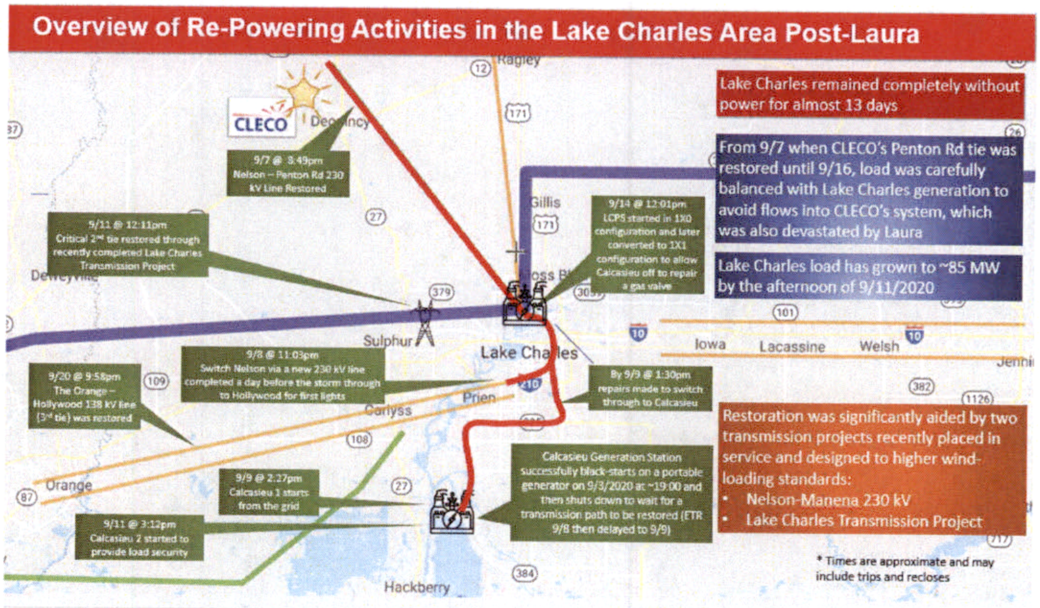
[10] The power system in the contiguous United States is made up of three main interconnections, which operate largely independently from each other with limited transfers of power between them. The Eastern Interconnection encompasses the area east of the Rocky Mountains and a portion of northern Texas.

Calcasieu generating plant restored on September 9, 2020, provided the off-site power required[11] for the Company to start one unit at the facility, synchronize it to the grid, and enable the next step in the process of restoring customers. Because the Cleco tie line along with the path to the generator sustained structural damage that was less devastating than other tie lines, it was the best option to start with to begin bringing power back to the area.

From September 8 until September 16, System Planning Section personnel carefully balanced load with generation internal to Lake Charles to avoid putting additional stress on Cleco's transmission system as our neighbors continued with their own recovery effort. During that time frame, the critical second tie line, syncing southwest Louisiana to Texas and the Eastern Interconnection was restored (on September 11) through the LCTP after replacing 11 destroyed structures on a portion of the critical East-West tie between Texas and Louisiana. Restoration was significantly aided by the LCTP, a project that was designed to higher wind-loading standards. Figure 4 summarizes the complexity of the process that was required to return the severed tie lines to service and restore power to customers in the Lake Charles area.

[11] In parallel, Power Generation personnel developed and tested plans to enable a black-start operation on Calcasieu Unit #2 from generators acquired and brought to the site immediately following passage of Hurricane Laura. Ultimately, the use of the Cleco tie line was determined to be the quickest and lowest risk option to start the unit.

Figure 4



Q55. PLEASE ELABORATE ON THE COMPANY'S PROCESS FOR RESTORING DAMAGED TRANSMISSION FACILITIES AFTER HURRICANES LAURA, DELTA, AND ZETA.

A. The process of replacing destroyed transmission structures following Hurricanes Laura, Delta and Zeta required careful planning and coordination. Once damages to the transmission system were confirmed, Transmission design engineering personnel worked closely with field construction leaders and Supply Chain personnel to develop a design for the restoration, identify suitable replacement materials, and begin mobilization of required replacement materials and equipment to the site. The logistics of moving large transmission structures, some more than 150 feet tall and weighing 20 tons, was a particular challenge. For example, three eighteen-wheel trucks were required to transport each 500 kV replacement structure utilized in the restoration effort. Many of the transmission structures requiring replacement were located in areas not accessible by road. In these cases, matting was laid to provide access to the location of the failed structure, or other special equipment was procured. In certain situations, a heavy lift helicopter was used to move transmission structures from a laydown yard to the construction location to expedite the replacement process.

Once required replacement materials and equipment were moved to the location of the destroyed structure, transmission crews then began the replacement process by installing the foundation for the new transmission structure. For some structure designs, this process involved drilling new foundation holes using an excavator mounted drill and then lowering a combination of reinforcing steel and anchor bolts into place with a large crane. Concrete was then poured to establish the new foundation, with time allotted for the concrete to cure and set the foundation. This process was repeated for each footing of the replacement structure. For other structure designs, steel piles or pre-cast concrete piles were installed to establish the foundation for the new structure. Once the foundations were installed, transmission line crews then erected the new structure, including all required hardware. Conductor was either re-used, if possible, or new conductor pulled and tensioned to achieve the desired line sag. Finally, clean up and post-construction restoration was often required considering the heavy equipment utilized in the response and the challenges faced with accessing the site.

By contrast, the time and effort required to replace a distribution pole is much less than that of a transmission structure. The logistics of transporting one distribution pole is much less intensive as compared to a transmission structure, with fifty to one hundred distribution class poles fitting in one eighteen-wheel truck. Distribution facilities are typically accessible by road and require less special equipment and access built to support the restoration. Finally, the process of setting a distribution pole is less time consuming and less labor intensive than that of a transmission structure. Distribution linemen operate a digger derrick truck to excavate the location where the new pole is to be set and then utilize a hydraulic crane to carefully and safely maneuver the replacement pole into position. After backfilling the hole, a tamping tool is used to set the pole in place.

Q56. HOW DID THE COMPANY COMMUNICATE WITH LARGE INDUSTRIAL CUSTOMERS DURING THE HURRICANE LAURA RESTORATION PROCESS AND WHY WAS THIS COMMUNICATION IMPORTANT?

A. Hurricane Laura's area of impact included a large industrial complex with energy infrastructure that is critical to the welfare and security of Louisiana and the United States. In order to restore service safely, the Company had to understand its industrial customers' ramp and power requirements, as well as prioritize to ensure that the transmission system could meet customer reliability requirements for safety and environmental protection. Stated differently, with limited transmission and generation in the area, ELL had to closely coordinate with industrial customers to ensure that load that was picked up was matched or balanced with available generation. Failure to do so could potentially result in the loss of all generation and load within the fragile load pocket and the need to start over in the recovery effort.

To accomplish this coordination, the Company's industrial account executives were working one-on-one with petroleum refineries, chemical manufacturers, major pipelines, liquefied natural gas exporters, and other large-load customers that make up the enormous industrial complex that spans the Gulf Coast region. We needed them to receive power as it was added to the energy grid. They needed electricity, but many had specific ramp-up and power-quality requirements. Keeping load and generation in balance required constant communication and coordination by electrical experts from both the Company and the Company's customers.

Q57. WHAT LESSONS WERE LEARNED DURING THE HURRICANES LAURA, DELTA, AND ZETA RESTORATIONS?

A. The success of the Company's restoration efforts following Hurricanes Laura, Delta, and Zeta affirmed the importance of the Company's storm restoration plan and the steps taken by the Company to implement that plan, as discussed by Company witness Mr. Hawkins. Based on the lessons learned process that Mr. Hawkins describes, the Company has concluded that the following practices, procedures, and relationships worked well:

- The Entergy System's incident response structure;
- The Company's mutual assistance partnerships supplying workers, material, and support;
- Coordination with neighbors to conduct damage assessment and establish restoration priorities;
- Relationships and communications with industrial customers that are necessary to ensure that the transmission system can meet customer reliability requirements;
- COVID-19 prevention protocols;

- Supply chain and minimizing delivery times, including the establishment of laydown yards with third-party management, organized around voltage level and material movement to the field; and
- Supplier performance, including suppliers of poles, conductor, and hardware.

There are always opportunities for improvement, however, and the Company identified the following areas of focus:

- Develop and enhance regional transmission organization emergency and transitional market procedures, including real-time stability study capabilities;
- Review opportunities to enhance the current transmission damage assessment process and reporting by leveraging technology; and
- Review and refine transmission black-start processes, with a careful focus on regional reliability and resiliency.

B. Restoration Resources

Q58. PLEASE SUMMARIZE THE TOTAL TRANSMISSION-RELATED PERSONNEL RESOURCES EMPLOYED TO RESTORE ELL'S SYSTEM FOLLOWING HURRICANES LAURA, DELTA, AND ZETA..

A. The transmission-related restoration workers are summarized in Table 4 below:

Table 4

Transmission Line Workers and Support Resources

	Laura	Delta	Zeta
Entergy Employees[12]	166	48	63
Mutual Assistance	314	17	0
Third-Party Contractors	2,471	386	146
Total	2,951	451	209

Substation Technicians and Support Resources

	Laura	Delta	Zeta
Substation Entergy Employees	172	158	143
Substation Mutual Assistance	0	0	0
Substation Third-Party Contractors	317	33	7
Substation Total	489	191	150

Vegetation Workers and Support Resources

	Laura	Delta	Zeta
Vegetation Entergy Employees[13]	10	6	6
Vegetation Third-Party Contractors (Transm. Only)	155	136	96
Vegetation Total	165	142	102

Many of the off-system resources were acquired through our memberships and contacts with national and regional mutual-assistance groups, including EEI and the Southeastern Electric Exchange ("SEE"). Through these associations, Entergy received the benefit of its mutual-assistance utility agreements, which provided for labor and materials at the assisting utility's cost with no mark-up, which is the same arrangement when Entergy assists other utilities in restoration.

[12] All transmission line work was performed by contractors under the supervision of Entergy employees. Safety support resources are included in this category.

[13] All vegetation work was performed by contractors under the supervision of Entergy employees.