# Appendix D1 South 2016

Entergy Arkansas Inc. (EAI) Arkansas Electric Cooperative Corp. (AECC) Entergy Gulf States Louisiana LLC (EGSL) Entergy Louisiana LLC (ELL) Entergy New Orleans Inc. (ENOI) Cleco Power LLC (CLEC) Lafayette Utilities System (LAFA) Entergy Mississippi Inc. (EMI) South Mississippi Electric Power Association (SMEPA) Entergy Texas Inc. (ETI) East Texas Electric Cooperative (ETEC)



### **Appendix D1: South Planning Region**

### Arkansas

### **Regional Information**

MISO-Arkansas is a network of generation resources and major load centers interconnected through an array of 500-115 kV transmission networks. There is also a significant 69 kV network interspersed across its footprint.

MISO-Arkansas consists of a diverse generation profile, such as nuclear, gas, coal and hydro units that fuel major load centers such as the Little Rock, Jonesboro and Pine Bluff regions. Together, these load centers constitute approximately 40 percent of the total power consumption in this region. The remaining load is distributed across the footprint, and is served through several electric cooperatives.

Figure AR-1 illustrates the major generation sources, load centers and generation-to-load powerflow in MISO-Arkansas.



Figure AR-1: MISO-Arkansas – Major generation sources, load centers and major gen-load transmission



The projects proposed in the current MTEP16 cycle are part of a continuing effort to strengthen the existing transmission network. For instance, several projects were proposed to reconfigure substations to avoid breaker or bus events occurring on the 115 or 161 kV system that had the potential to cause load loss. Several projects were also proposed to facilitate new load additions, by either proposing new points of delivery or upgrading existing ones.

### **Transmission Profile**

The transmission network within the footprint of MISO-Arkansas covers approximately 5,000 miles of the 115 kV to 500 kV bulk electric system (BES) network. An additional 1,000 miles is dedicated as the 69 kV network.

Major transmission hubs - such as El Dorado, McNeil, Arklahoma–Hot Springs, Woodward, West Memphis, Arkansas Nuclear, Independence, Little Rock and Dell - interconnected via a network of 500 kV circuits form the backbone of the MISO-Arkansas transmission network.

### Load Profile

According to the 2018 Summer Peak model estimates, load within MISO-Arkansas footprint is held at approximately 8 GW. Around 40 percent of the total load is centered on several major load centers within this footprint. Chief amongst them are: City of Little Rock, Dell, Jonesboro, Pine Bluff, Conway, El Dorado, Hot Springs and West Memphis. The remainder of the load is spread across the footprint.

### **Generation Profile**

The generation portfolio MISO- Arkansas mainly constitutes a mix of nuclear, hydro, coal, Combined Cycle Gas Turbines (CCGT), and legacy gas units. Currently, the system holds about 11.7 GW of generation capacity. The major sources constituting this profile are ANO, Oswald, Magnet Cove, ISES, White Bluff and PUPP generation units. Together, as per the 2018 Summer Peak model estimates, they share a combined generation capacity of 75 percent of the total generation portfolio.

### **Overview of Projects**

For the current MTEP16 cycle, 21 projects were targeted as Appendix A at a combined cost of \$176.3 million. Of these, 12 projects have an estimated cost greater than \$5 million; six projects have a projected cost between \$1 million and \$5 million; and three projects have an estimated price tag lower than \$1 million. Eleven of these 21 projects are labeled as baseline reliability projects, while the eight are designated as Other (Distribution Reliability) projects and two are designated as Generation Interconnection projects. Figure AR-2 illustrates the approximate geographic locations of the projects submitted as Target Appendix A in the current MTEP cycle. Figures AR-3 and AR-4 illustrates the Base Line Reliability, Generation Interconnection and Other projects as either distributed by their estimated costs or the year they're expected to be in service. Some project details, such as estimated cost and inservice dates, may change between the creation of Appendix D1 and the board approval date. Refer to Appendix A of this report for the final approval information.



#### MTEP16 APPENDIX D1



Figure AR-2: Geographical transmission map of MISO-Arkansas with project locations-2



Baseline Reliability = Generator Interconnection = Other (Distribution Reliability)

Figure AR-3: Graph of cost range by project type





Baseline Reliability Generator Interconnection Other (Distribution Reliability)

### Figure AR-4: Graph of estimated in-service date



### **Entergy Arkansas Inc. (EAI)**

This section presents a summary of each project submitted by Entergy Arkansas in the current MTEP16 cycle. Sixteen projects were submitted as Target Appendix A; of these, eleven are Baseline Reliability projects. The remainders are labeled as either Other (Distribution Reliability) – New Delivery Point or Generator Interconnection Project. The combined cost estimate for these projects is about \$139.7 million. They are scheduled to come into service between 2017 and 2019.

### Project 4665: Replace Mabelvale 500-115 kV Autotransformers Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The Mabelvale substation serves as a major source to the load in Little Rock and surrounding area. The 500 kV at Mabelvale provides a strong connection to several large generators in Arkansas; while the 115 kV at Mabelvale provides service the load located in the southwest Little Rock area. The two existing 500-115 kV autotransformers are currently rated at 443 and 447 MVA.

This project proposes to upgrade both Mabelvale 500-115 kV autotransformers to 598 MVA. The projected in-service date for this project is December 1, 2017 and has an estimated cost of \$17.42 million. Figure P4665 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

A breaker fault at Mabelvale 500 kV will result in the loss of one of the 500-115 kV autotransformers and the Mabelvale to Mayflower 500 kV line, which causes the remaining 500-115 kV autotransformer to overload to 103 percent or 106 percent (depending on which breaker is faulted). These violations were observed in the 2026 Summer Peak model.





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Figure P4665: Breaker fault at Mabelvale causes thermal violation on either transformer to 103 percent or 106 percent

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

### Project 7942: Rebuild Mayflower – Morgan 115 kV Line Transmission Owner: Entergy Arkansas Inc. (EAI)

#### **Project Description**

The Mayflower to Morgan 115 kV line is one of the main sources to the load in the Northern Little Rock area. The current Mayflower to Morgan 115 kV line is approximately 4.89 miles long and is rated at 283 MVA.

This project proposes rebuilding Mayflower–Morgan 115 kV line to 390 MVA. The projected in-service date is June 1, 2019, with an estimated cost of \$4.88 million. Figure P7942 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.



### **Project Need**

A breaker fault at Keo 500 kV will result in the loss of the Keo to Wrightsville and Keo to White Bluff 500 kV lines which causes the Mayflower to Morgan 115 kV like to load to 97 percent. This violation was observed in the 2026 Summer Peak model.



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#### **Alternatives Considered**

Build a new 23-mile 500 kV line from Mayflower to Holland Bottom.

#### **Cost Allocation**



## Project 9673: Add 2<sup>nd</sup> 500-115 kV Autotransformer at El Dorado Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The EI Dorado substation serves as a major source to the load in EI Dorado and the surrounding area. The 500 kV at EI Dorado provides a strong connection to several large generators in Arkansas; while the 115 kV at EI Dorado provides service the load located in the EI Dorado area. The existing 500-115 kV autotransformer is currently rated at 443 MVA.

This project proposes installing a second 500-115 kV autotransformer at El Dorado EHV rated at 448 MVA. The projected in-service date is June 1, 2018, with an estimated cost of \$16.45 million. Figure P9673 illustrates the contingency, the resultant violation, and the proposed project to address the identified generation deliverability concerns.

### **Project Need**

The loss of the McNeil 500-115 kV autotransformer causes the El Dorado 500-115 kV autotransformer to overload to 105 percent. Additionally, for bus and breaker faults at McNeil 115 kV that cause the loss of the McNeil 500-115 kV autotransformers and 115 kV lines from McNeil result in the El Dorado 500-115 kV autotransformer to overload to 107 percent. These violations were observed in the 2026 Summer Peak model.



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### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



### Project 9691: Add 20.5 MVAR Capacitor Bank at Lonoke East 115 kV Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The Lonoke East 115 kV substation is one of the several load taps along a 115 kV line between Northern Little Rock and Brinkley that provides service to rural customers.

This project proposes installing a new 20.5 MVAR capacitor bank at Lonoke East 115 kV. The projected in-service date is June 1, 2017, with an estimated cost of \$1.46 million. Figure P9691 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### Project Need

The opening of the line section between Lynch and Northern Little Rock–Galloway 115 kV causes low voltages to be observed from Northern Little Rock–Galloway to Carlisle 115 kV, the lowest voltage observed was 0.90 pu at Northern Little Rock–Galloway. Additionally, for several bus and breaker faults at Lynch 115 kV that cause the loss of the Lynch to Northern Little Rock–Galloway 115 kV, low voltages were also observed from Northern Little Rock–Galloway to Carlisle 115 kV. These violations were observed in the 2018 Summer Peak model.



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## Figure P9691: Open Line section Lynch to NLR Galloway causes voltage violation of 0.90 – 0.91 pu voltage at NLR Galloway through Carlisle

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



## Project 9693: Add 3x30 MVAR Tertiary Reactors at Pleasant Hill Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The Pleasant Hill substation is located in Northwestern Arkansas and is along one of the major outlets for the Arkansas nuclear generation.

This project proposes adding three 30 MVAR reactors on the tertiary windings of the 500-161-13.8 kV transformer at the Pleasant Hill EHV substation to maintain voltages during light loading conditions. The projected in-service date is October 1, 2017, with an estimated cost of \$2.19 million. Figure P9693 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

System intact voltage at Pleasant Hill 161 kV was observed to be 1.052 pu in the 2018 Spring Light Load model. Additionally, for events (bus, breaker and line faults) that result in the loss of Pleasant Hill to Morrilton East 115 kV high voltage were observed at Pleasant Hill 161 kV.



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Figure P9693: With system Intact, voltage violation of 1.052 pu voltage at Pleasant Hill 161 kV

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



### Project 9696: Newport New 161 kV Switching Station Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

This project proposes:

- Building a four-breaker switching station near Newport Industrial
- Terminating the exiting Newport-Swifton 161 kV line into the new switching station
- Building a new 161 kV line between the Newport switching station and Newport Industrial to eliminate the voltage issue

The projected in-service date is June 1, 2018, with an estimated cost of \$15.15 million. Figure P9696 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

A single element contingency loss of Newport–Newport Industrial 161 kV line could cause flicker issues in the Newport area. This issue is heightened during times of reduced generation near the area.



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## Figure P9696: loss of Newport –Newport Industrial 161 kV line could potentially cause flicker issues in the Newport area.

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



## Project 9697: Rebuild Trumann – Trumann West 161 kV Line Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The Trumann to Trumann West 161 kV line is one of the primary 161 kV lines connecting to Jonesboro from the south. The current Trumann to Trumann West 161 kV line is approximately 6.5 miles long and is rated at 148 MVA.

This project proposes rebuilding Trumann–Trumann West 161 kV, 6.5-mile-long line to a minimum rating of 1300A. The projected in-service date is June 1, 2018, with an estimated cost of \$12.12 million. Figure P9697 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**



The Trumann-Trumann West 161 kV line overloads to 102 percent due to the loss of the Sans Souci– Driver 500 kV line. This violation was observed in the 2026 Summer Peak model.

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Figure P9697: Loss of San Souci – Driver 500 kV line causes thermal violation on Trumann – Trumann West 161 kV and overloads to 102 percent

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



### Project 9698: Rebuild El Dorado East – El Dorado Jackson 115 kV Line Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

The El Dorado East to El Dorado Jackson 115 kV line is part of the 115 kV loop providing service to the El Dorado area. The current El Dorado East to El Dorado Jackson 115 kV line is approximately 2.92 miles long and is rated at 159 MVA.

This project proposes upgrading El Dorado East–El Dorado Jackson 115 kV line to a rating of minimum 1300A. The projected in-service date is June 1, 2018, with an estimated cost of \$4.93 million. Figure P9698 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**



The loss of El Dorado EHV to El Dorado Donna causes the El Dorado East to El Dorado Jackson 115 kV line to load to 95.7 percent. This loading was observed in the 2026 Summer Peak model.

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## Figure P9698: Line section opening of El Dorado EHV – El Dorado Donan 115 kV causes thermal violation on El Dorado East – El Dorado Jackson 115 kV and loads to 95.7 percent

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



## Project 9707: Reconfigure Camden Maguire 115 kV Substation Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

This project proposes reconfiguring Camden Maguire 115 kV substation to a double bus/double breaker configuration so that a single bus failure will not open all the elements in the Camden Maguire substation. The projected in-service date is June 1, 2017, with an estimated cost of \$5.77 million. Figure P9707 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

The Camden Maguire 115 kV substation is configured as a single bus, single breaker substation. A bus or breaker fault at Camden Maguire 115 kV will result in the loss of the entire 115 kV substation and cause low voltages northeast of Camden Maguire at Bearden and Fordyce ranging from 0.85 to 0.91 pu. These violations were observed in the 2018 Summer Peak model.



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## Figure P9707: Breaker/Bus fault at Camden Maguire 115 kV causes voltage violation and results 0.85 to 0.91 pu voltages Northeast of Camden Maguire 115 kV

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



## Project 9708: Reconfigure Independence (ISES) 161 kV Substation Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

This project proposes reconfiguring Independence 161 kV to a double bus/double breaker configuration. The projected in-service date is October 1, 2017, with an estimated cost of \$9.10 million. Figure P9708 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

The Independence 161 kV substation is configured as two separate single bus, single breaker substations with a bus tie breaker connecting the two operating buses. A fault on the bus tie breaker at Independence 161 kV results in loss of both the 161 kV operating buses at Independence. This causes low voltages along the 115 kV and 161 kV networks around Independence ranging from 0.88 to 0.91 pu. The bus tie breaker fault also results in overloading the Holland Bottoms to Cabot to Ward 115 kV line to 110 percent. These violations were observed in the 2018 Summer Peak model.



Figure P9708: Breaker/Bus fault at Independence 161 kV causes thermal violation on Holland Bottom–Cabot–Ward 161 kV overloads to 110 percent; and voltage violation of 0.88–0.91 pu voltages Southwest of Independence 161 kV

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**



## Project 9709: Mabelvale 115 kV Substation Reconfigure Transmission Owner: Entergy Arkansas Inc. (EAI)

### **Project Description**

This project proposed to re-configure the Mabelvale 115 kV substation so that a single bus tie breaker failure will not open all the elements in the Mabelvale 115 kV substation. Some potential configurations are double bus double breaker, breaker-and-a-half, and a ring bus. The final configuration will be decided during project scoping.

The projected in-service date is June 1, 2019, with an estimated cost of \$17.45 million. Figure P9709 illustrates the contingency, the resultant violations and the proposed project to address the identified reliability concerns.

### **Project Need**

The Mabelvale 115 kV substation is configured as two separate single bus, single breaker substations with a bus tie breaker connecting the two operating buses. A single internal breaker fault on the bus tie breaker will result in overloading the Mayflower-Natural Steps-Pinnacle 115 kV line to 102 percent to 105 percent (depending on which section). These violations were observed in the 2018 Summer Peak model.



Figure P9709: Breaker/Bus fault at Mabelvale 115 kV causes thermal violation on Pinnacle–Natural Steps–Mayflower 115 kV and overloads to 102 percent-105 percent

### **Alternatives Considered**

No alternatives were considered

### **Cost Allocation**



### **New Load Additions**

These projects are needed in order to serve new loads. The existing distribution system is not sufficient to supply these additions. The most effective way to serve these new loads is to provide a new substation for a new point of delivery. No-harm tests were conducted to make sure no addition baseline reliability issues were caused by the new load additions.

ID	Name	Description	ISD	Cost (\$M)
9703	Bono: New 161 kV Substation	Build new 161 kV substation to support existing load and future growth	10/01/2017	\$9.38
9704	London North: New 161 kV Substation	Build new 161 kV substation to support load growth in area	10/01/2017	\$9.24
11483	Benton Hurricane Lake 115 kV: New point of delivery	Cut-in new delivery point on River Ridge – Mabelvale 115 kV line	05/01/2017	\$1.59

### **Cost Allocation**

These projects are classified as Other (Distribution Reliability) – New Delivery Point projects, which are not eligible for regional cost sharing.

### **Generator Interconnection Projects**

These are projects that are required by generator interconnection agreements.

GI ID	ID	Name	Description	ISD	Cost (\$M)
J348	7944	Stuttgart Ricuskey – Stuttgart Industrial 115 kV line	Upgrade Stuttgart Ricuskey – Stuttgart Industrial 115 kV line to 176 MVA	01/30/2018	\$2.53
J348	10044	Goodwin Road 115 kV: New Substation	Construct a new 115 kV 3 breaker ring bus switching station named Goodwin Road on the Stuttgart Ricuskey – Almyra 115 kV line	01/30/2018	\$10.06

### **Cost Allocation**

These projects are classified as Generation Interconnection projects and are both below 345 kV, which are not eligible for regional cost sharing.



### Arkansas Electric Cooperative Corp. (AECC)

This section presents a summary for each project submitted by Arkansas Electric Cooperative Corporation (AECC) in the current MTEP16 cycle. Five projects, classified as Other Distribution Reliability, were submitted as Target Appendix A. The combined cost estimate of these projects is \$36.6 million, and they are scheduled to come into service from 2017 through 2020.

### Project 10205: New Damascus 161-13.2 kV Substation Transmission Owner: Arkansas Electric Cooperative Corporation (AECC)

### **Project Description**

This project proposes:

- Build 161/13.2 kV Damascus substation, and add 161 kV line breaker
- Build 6.8-mile, 161 kV line from existing AECC Bee Branch substation to the proposed Damascus substation.

The estimated in-service date for this project is February 28, 2017, with an approximate cost of \$8 million. Figure P10205 illustrates the approximate location of Damascus 161/13.2 kV Substation.

### **Project Need**

This project is needed to increase reliability by building a station closer to the load center.



Figure P10205: Geographical representation of Damascus new 161/13.2 kV substation

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**

This project is classified as an Other – Distribution Reliability (New Delivery Point) project, which is not eligible for regional cost sharing.



### Project 10206: New Partain 161-69 kV Substation Transmission Owner: Arkansas Electric Cooperative Corporation (AECC)

### **Project Description**

This project proposes:

- Construction of a new 161/69 kV Partain Substation
- Build 14 mile 161 kV line from the existing Clinton West substation to the proposed Partain 161/69 kV substation.

The estimated in-service date for this project is December 1, 2016, with an approximate cost of \$27 million. Figure P10206 illustrates the approximate location of the Partain Substation.

### **Project Need**

This project is needed to provide voltage support and increased reliability to the existing Clinton West to Heber Springs North 69 kV system.



Figure P10206: Geographical representation of Partain 161/69 kV Substation

### **Alternatives Considered**

No alternatives were considered.

### **Cost Allocation**

This project is classified as an Other – Distribution Reliability project, which is not eligible for regional cost sharing.



### **New Load Additions**

These projects are needed in order to serve new or growing loads. The existing distribution system is not sufficient to supply these additions. The most effective way to serve these new loads is to provide a new substation or additional connections to the Bulk Electric system. No-harm tests were conducted to make sure no additional baseline reliability issues were caused by the new load additions.

ID	Name	Description	ISD	Cost
9662	Harrison South Transformer Upgrade	Upgrade the autotransformer at the Harrison South 161-69 kV substation to support normal load growth	01/01/2017	\$600,000
9663	Newport East New 161 kV Substation	Construct 20 MVA, 161-13.2 kV substation under EAI Newport – Parkin 161 kV line. The load for this substation will be transferred from the Newport and Cherokee Acres distribution delivery points. Once the load is transferred the two distribution delivery points will no longer be needed.	07/01/2017	\$500,000
10204	Hunter North New 161 kV Substation	Construct 161-13.2 kV Hunter North substation. Tap the existing EAI Moses to Bailey 161 kV line	06/01/2018	\$500,000

### **Cost Allocation**

These projects are classified as Other Distribution Reliability (New Delivery Point) projects, which are not eligible for regional cost sharing.



### **Appendix D1: South Planning Region**

### Louisiana

### **Regional Information**

Louisiana contains three load pockets, one of which is nested within another load pocket. The West of the Atchafalaya Basin (WOTAB), Amite South, and Down Stream Gypsy (DSG) load pockets cover the coastal region of Louisiana, and contain many industrial customers in the Lake Charles and New Orleans areas (Figure LA-1).

The WOTAB load pocket is geographically bound by the Gulf of Mexico (South), the Atchafalaya Basin (East), and extends into the eastern portion of Texas. The portion of WOTAB within the Louisiana state boundary contains the industrial customer-laden Lake Charles area and the city of Lafayette. Entergy Gulf States Louisiana, Lafayette Utilities Systems, and Cleco power transmission companies service this area. This load pocket is expected to see considerable industrial load growth over the next three years.

Local generation within WOTAB meets much of the pocket's demand. Generation sources at Nelson, PPG, and Calcasieu support the Lake Charles area, while Acadia and Bonin provide local resources in the Lafayette area. WOTAB is also supported by 500 kV taps at Nelson (Lake Charles) and Richard (Lafayette). There are also many smaller units on the 138 and 69 kV transmission networks used to serve local demand.

The Amite South load pocket lies to the east of Baton Rouge. This load pocket is bound by the Louisiana eastern border, the Gulf of Mexico, and a narrow corridor of transmission lines between Baton Rouge and New Orleans. This load pocket is split by the Mississippi River, and the densely populated city of New Orleans lies beneath Lake Pontchartrain. These geographic obstacles provide narrow corridors for transmission lines, and the pocket lacks multiple EHV lines to import power deep into load centers.

The Amite South load pocket also utilizes local generation sources to meet local demand. Generation at Waterford, Oxy, Union Carbide, Little Gypsy, St. Gabriel, Michoud and Ninemile provide strong sources for local demand.

Amite South contains three 500 kV taps to import power to the area: Waterford, Bayou Labutte and Bogalusa. However, of these three taps, only the Willow Glen to Waterford transmission line penetrates deep into the pocket and this tap still remains outside of the DSG load pocket. The Bayou Labutte 500 kV tap is located on the load pocket interface near Baton Rouge, and the Bogalusa tap is located on the northern pocket interface.

The DSG load pocket is a subset of the Amite South load pocket. This load pocket contains the city of New Orleans. DSG is densely populated, and the pocket is surrounded by Lake Pontchartrain to the north, and the Gulf of Mexico to the east and south. The Mississippi River also runs through the middle of this pocket. The dense population and surrounding bodies of water provide a limited number of transmission line corridors. There are no EHV lines within the pocket for import, and the local demand is primarily supplied by the Ninemile power plant, as well as 230 kV lines extending out of the Little Gypsy and Waterford power plants.





MISO, using Ventyx Velocity Suite © 2014 Figure LA-1: Geographic transmission map of Louisiana with load pocket and load center locations



### **Overview of Projects:**

There are 52 MTEP16 projects targeted for Appendix A, with a total cost of \$428 million (Figure LA-2). Of these 52 projects, 27 have an estimated cost greater than \$5 million; 11 have an estimated cost between \$1 million and \$5 million; and 14 have an estimated cost lower than \$1 million. The designations of project type are as follows: 27 Baseline Reliability Projects and 25 Other Projects (Figure LA-3).



MISO, using Ventyx Velocity Suite © 2014 Figure LA-2: Geographic transmission map of Louisiana with project locations



Figure LA-3: Graphs of cost range by project type and estimated in-service date



### **Entergy Louisiana LLC**

## Project 4634: Ninemile to Westwego 115 kV Line Upgrade **Transmission Owner:** Entergy Louisiana LLC

### **Project Area Information**

Project 4634 resides in the Down Stream Gypsy (DSG) load pocket (Figure P4634-1). The DSG load pocket contains the greater New Orleans area in Southeast Louisiana. Ninemile power plant contains over 2,000 MW of generation capacity. Ninemile, Westwego and Harvey form a 115 kV loop downstream of the generation at Ninemile.

### **Project Area Need**

Loss of the Ninemile to Harvey circuit (NERC TPL Category P2.1) causes an increase in powerflow to the remaining portion of the 115 kV loop. The resulting powerflow exceeds the thermal limit of the Ninemile to Westwego circuit.



Figure P4634-1: The Ninemile to Westwego 115 kV line will exceed maximum capacity for the loss of Ninemile to Harvey 115 kV line



Project 4634 details the replacement of the Ninemile to Westwego conductor. The new conductor will have a minimum rating of at least 320 MVA. The cost to replace the existing 5.6 miles of conductor is estimated at \$9,030,000. The expected in-service date for this project is June 1, 2018.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

## Project 4639: Ninemile to Harvey 115 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 4639 resides in the Down Stream Gypsy (DSG) load pocket (Figure P4939-1). The DSG load pocket contains the greater New Orleans area in Southeast Louisiana. Ninemile power plant contains over 2,000 MW of generation capacity. Ninemile, Westwego and Harvey form a 115 kV loop downstream of the generation at Ninemile.

### **Project Area Need**

Loss of the Ninemile to Westwego circuit (NERC TPL Category P1.2) causes an increase in powerflow to the remaining portion of the 115 kV loop. The resulting powerflow exceeds the thermal limit of the Ninemile to Harvey circuit.



Figure P4939-1: The Ninemile to Harvey 115 kV line will exceed maximum capacity for the loss of Ninemile to Westwego 115 kV line



Project 4639 details the replacement of the Ninemile to Harvey conductor. The new conductor will have a minimum rating of at least 320 MVA. The cost to replace the existing 9.6 miles of conductor is estimated at \$15,120,000. The expected in-service date for this project is June 1, 2018.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

## Project 9805: Paterson to Pontchartrain Park 115 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 9805 resides in the Down Stream Gypsy (DSG) load pocket (Figure P9805-1). The DSG load pocket contains the greater New Orleans area in Southeast Louisiana. Ninemile power plant in DSG contains more than 2,000 MW of generation capacity, mostly connected to the 230 kV network in the area. Powerflows from the 230 kV to the 115 kV network to serve local needs.

### **Project Area Need**

Loss of the Avenue C to Paris circuit (NERC TPL Category P2.1) removes a 115 kV access point to the 230 kV network. Powerflow increases from the east, out of Paterson, to compensate. The resulting powerflow exceeds the thermal limit of the Paterson to Pontchartrain Park circuit.



MISO, using Ventyx Velocity Suite © 2014

Figure P9805-1: The Paterson to Pontchartrain Park 115 kV line will exceed maximum capacity for the loss of Paris to Avenue C 115 kV line



Project 9805 details the replacement of the Paterson to Pontchartrain Park conductor. The existing conductor runs under a local canal in a heavily populated area of DSG. The cost to replace the existing conductor is estimated at \$11.9 million. The expected in-service date for this project is December 1, 2018.

#### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

Project 9801: North Norco 115 kV Capacitor Bank Addition **Transmission Owner:** Entergy Louisiana LLC

### **Project Area Information**

Project 9805 resides along the interface of the Down Stream Gypsy (DSG) load pocket (Figure P9801-1). Approximately 1,000 MW of generation capacity resides at the Little Gypsy generation plant near the DSG interface. In addition to the 1,000 MW of capacity, the Little Gypsy plant is a strong reactive power support for the 230 and 115 kV networks in the area.

#### **Project Area Need**

Loss of the Little Gypsy to Claytonia circuit (NERC TPL Category P1.2) removes the 115 kV networks access to the Little Gypsy plant. Loss of access to reactive source at Little Gypsy causes depressed voltage in the area. The capacitor bank addition at Norco mitigates the voltage issue.







Install a 31 MVAR capacitor bank at Norco substation. The capacitor bank addition has an estimated cost of \$1,800,000. The expected in-service date for this project is December 1, 2017.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

### Project 10008: Nelson to Menena New 230 kV Line Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 10008 is in the West of the Atchafalaya Basin (WOTAB) load pocket (Figure P10008-1). The WOTAB load pocket includes the Gulf Coast area from east Texas to the Atchafalaya Basin. This load pocket is import limited, containing two EHV lines and serving more than 6,000 MW of load. The load pocket relies primarily on local 138 and 23 0kV networks to serve load.

The Lake Charles area serves approximately 2,000 MW of the WOTAB load pocket demand. This area has a high concentration of industrial customers.

### **Project Area Need**

The Nelson generation plant provides more than 1,200 MW of generation capacity to the area. Nelson output typically flows South to supply the industry-laden Lake Charles area. Loss of the 500 kV circuit from Patton to Sulphur Lane (NERC TPL Category P1.2) removes a strong power source from Carlyss in the South. Loss of the southern source increases North to South flow from Nelson to compensate. The increase in North to South flow causes the Nelson to Michigan 230 kV line to exceed the thermal limit of the circuit.





Figure P10008-1: The Nelson to Michigan 230 kV line will exceed maximum capacity for the loss of the Patton to Sulphur Lane 500 kV line

Project 10008 details the construction of a new 5-mile, 230 kV circuit from Nelson to Menena substations. The new circuit runs parallel to the Nelson to Michigan line, relieving the loading issue caused by the loss of the Patton to Sulphur Lane 500 kV circuit. The estimated cost of the new line is \$15,500,000. The expected in-service date for this project is June 1, 2020.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

### Project 7949: Solac 230/69 kV Autotransformer Upgrades Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 7949 is in the West of the Atchafalaya Basin (WOTAB) load pocket (Figure P7949-1). The WOTAB load pocket includes the Gulf Coast area from east Texas to the Atchafalaya Basin. This load pocket is import limited, containing 2 EHV lines and serving more than 6,000 MW of load. The load pocket relies primarily on local 138 and 230 kV networks to serve load.

The Lake Charles area serves approximately 2,000 MW of the WOTAB load pocket demand. This area has a high concentration of industrial customers.



### **Project Area Need**

High voltage access points at Solac, Lake Charles Bulk, and Carlyss substations supply the 69 kV network in Lake Charles. The Solac substation contains two 230/69 kV autotransformers to supply the low-voltage network. Loss of either transformer (NERC TPL Category P1.3) will cause the remaining Solac unit to exceed its 200 MVA thermal limit.



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Figure 7949-1: The Solac 230/69 kV autotransformer will exceed the thermal limit for the loss of the parallel unit.

### **Project Description**

Project 7949 details the replacement of two 230/69 kV, 200 MVA autotransformers. Both units at the Solac substation are to be replaced with 300 MVA units. The estimated cost to replace both autotransformers is \$8,460,000. The expected in-service date for this project is June 1, 2018.

### **Cost Allocation**



### Project 7950: East Broad to Ford 69 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 7950 is in the West of the Atchafalaya Basin (WOTAB) load pocket (Figure P7950-1). The WOTAB load pocket includes the Gulf Coast area from east Texas to the Atchafalaya Basin. This load pocket is import limited, containing two EHV lines and serving more than 6,000 MW of load. The load pocket relies primarily on local 138 and 230 kV networks to serve load.

The Lake Charles area serves approximately 2,000 MW of the WOTAB load pocket demand. This area has a high concentration of industrial customers.

### **Project Area Need**

High voltage access points at Solac, Lake Charles Bulk, and Carlyss substations supply the 69 kV network in Lake Charles. Loss of the Solac to Contraband 69 kV circuit in the southern area of Lake Charles (NERC TPL Category P1.2) will cause increased flow from Lake Charles Bulk to compensate. The increased North to South flow causes the East Broad to Ford 69 kV circuit to exceed the thermal limit of the conductor.



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Figure P7950-1: The East Broad to Ford 69 kV line conductor will exceed thermal limits for the loss of the Solac to Contraband 69 kV circuit.



Project 7950 details the replacement of the East Broad to Ford 69 kV line conductor. The estimated cost to replace the 1.5 miles of conductor is \$1.5 million. The expected in-service date for this project is June 1, 2018.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

## Project 7952: Solac to Contraband 69 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

Project 7952 is in the West of the Atchafalaya Basin (WOTAB) load pocket (Figure 7952-1). The WOTAB load pocket includes the Gulf Coast area from east Texas to the Atchafalaya Basin. This load pocket is import limited, containing two EHV lines and serving more than 6,000 MW of load. The load pocket relies primarily on local 138 and 230 kV networks to serve load.

The Lake Charles area serves approximately 2,000 MW of the WOTAB load pocket demand. This area has a high concentration of industrial customers.

### **Project Area Need**

High voltage access points at Solac, Lake Charles Bulk, and Carlyss substations supply the 69 kV network in Lake Charles. Loss of the East Broad to Ford 69 kV circuit in the central area of Lake Charles (NERC TPL Category P1.2) will cause increased flow from Solac to compensate. The increased South to North flow causes the Solac to Contraband 69 kV circuit to exceed the thermal limit of the conductor.



MISO, using Ventyx Velocity Suite © 2014

Figure P7952-1: The Solac to Contraband 69 kV line conductor will exceed thermal limits for the loss of the East Broad to Ford 69 kV circuit.



Project 7952 details the replacement of the Solac to Contraband 69 kV line conductor. The estimated cost to replace the 4.4 miles of conductor is \$4.1 million. The expected in-service date for this project is June 1, 2018.

### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for cost sharing.

# Projects 9771, 9772, 9773, 9774, 9775, 9776, 9777, 9778, 9779, 9780: Southwest Louisiana Project Transmission Owner: Entergy Louisiana LLC

### **Project Area Information**

The Southwest Louisiana Project describes a group of network upgrades designed to reconfigure the 69 kV network that runs from Lake Charles Bulk to Jennings substations (Figure P9771-9780-1). High voltage taps at Lake Charles Bulk and Jennings supply the heavily loaded 69 kV network from opposite ends.

The 69 kV lines in this area form a double circuit network from Lake Charles to Lafayette, La. The area between Lake Charles Bulk and Jennings spans 30 miles and contains approximately 100 miles of 69 kV conductor.

### **Project Area Need**

Four 138/69 kV autotransformers are the primary feeds for the 69 kV network in this area. Lake Charles Bulk and Jennings substations each contain parallel transformers 100 MVA. The loss of either transformer at Lake Charles Bulk (NERC TPL Category P1.3) will cause the other to exceed maximum capacity. Similarly, loss of either autotransformer at Jennings (NERC TPL Category P1.3) will cause the other to exceed maximum capacity.

Long lines and heavy loading render the line conductor capacity of the low-voltage network insufficient to meet demand. The loss of Chlomal to Iowa (NERC TPL Category P2.1) or Chlomal to Lacassine (NERC TPL Category P1.2) reduce the effective source at Lake Charles Bulk. This severs the supply on the west side of the system and greatly increases flow out of the east. The resulting powerflow through Jennings substation exceeds the capacity of Jennings to Lawtag and Jennings to Compton transmission line conductors.

Contingent conditions on the east side of the network have a similar effect on the Lake Charles Bulk area. The loss of the Jennings to Lawtag (NERC TPL Category P1.2) or the Jennings to Compton (NERC TPL Category P2.1) circuit reduces the effective source at Jennings. The loss of supply on the eastern side of the network greatly increases the flow from the Lake Charles Bulk area. The power flow from Lake Charles Bulk causes multiple conductors, from Lake Charles Bulk to Serpent substations, to exceed their thermal limit.





MISO, using Ventyx Velocity Suite © 2014 Figure P9771-9780-1: Lake Charles to Lafayette low-voltage network thermal constraints

<u>Phase 1</u>: Project ID P9771, 9772, 9773, 9774, 9775, 9776, 9777, 9778 and 9782 detail the construction of a new 138/69 kV substation, Jefferson Davis (Figure P9771-9780-2). This substation will be cut into the 138 kV network near the Colonial Welsh substation. Jefferson Davis will contain two new 138/69 kV autotransformers. These autotransformers will create a new high-voltage tap for the low-voltage network between Lake Charles Bulk and Jennings.

A new 5-mile 69 kV line will be constructed from Jefferson Davis to Carter. The existing Compton to Roanoke line will be extended and looped into the Jefferson Davis substation. The loop-in and new line will create three 69 kV network connections to the Jefferson Davis substation.

Existing 69 kV lines from Derouen to Lacassine and Lawtag to Roanoke will be reconfigured as Normally Open points. The new Normally Open points, coupled with the new access point at Jefferson Davis, will isolate the low-voltage network between Jennings and Lawtag. This will relieve the burden on the Jennings and Lake Charles Bulk substations to supply the region between Lake Charles and Lafayette. Phase one of the Southwest Louisiana project has an estimated cost of \$76.6 million. The expected inservice date of this project is June 1, 2019.





MISO, using Ventyx Velocity Suite © 2014 Figure P9771-9780-2: Southwest Louisiana Project Phase 1

<u>Phase 2</u>: Post phase 1 of the Southwest Louisiana project, a 69 kV loop will be supplied by the Jefferson Davis substation (Figure P9771-9780-3). Loss of one section of the loop causes increased flow from the remaining half to compensate. Loss of the Compton to Elton 69 kV line (NERC TPL Category P1.2) causes the Carter to Serpent 69 kV line conductor to exceed maximum capacity.

Project ID 9779 details the replacement of 15.5 miles of 69 kV conductor from Carter to Serpent substations. Phase 2 of the Southwest Louisiana project has an estimated cost of \$19.2 million. The expected in-service date of this project is December 1, 2018.




MISO, using Ventyx Velocity Suite © 2014 Figure P9771-9780-3: Southwest Louisiana Project Phase 2

#### Phase 3 -

Post phase 1 of the Southwest Louisiana project, a 69 kV loop will be supplied by the Jefferson Davis substation (Figure P9771-9780-4). Loss of one section of the loop causes increased flow from the remaining half to compensate. Loss of the Carter to Serpent 69 kV circuit (NERC TPL Category P1.2) causes the Compton to Elton 69 kV line conductor to exceed maximum capacity.

Project ID 9780 details the replacement of 11.5 miles of 69 kV conductor from Compton to Elton substations. Phase 3 of the Southwest Louisiana project has an estimated cost of \$12,800,000. The expected in-service date of this project is December 1, 2019.





Figure P9771-9780-4: Southwest Louisiana Project Phase 3

#### **Cost Allocation**



# Project 9682: Vienna to Trussell Crossing 115 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

Project 9682 resides on the western edge of the Entergy transmission network in the Minden area (Figure P9682-1). This area is primarily supplied by EHV taps at Sarepta and Mount Olive.

#### **Project Area Need**

The loss of the Sarepta to Minden 115 kV circuit (NERC TPL Category P1.2) forces removes the Sarepta source from the Minden area. The loss of the western source causes increased flow from the east to compensate. Increased powerflow from the east causes the Vienna to Trussell Crossing 115 kV circuit to exceed the thermal limit of the line conductor.



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#### **Project Description**

Project 9682 details the replacement of the Vienna to Trussell Crossing 115 kV line conductor to meet a minimum rating of 260 MVA. The replacement of 4.5 miles of 115 kV conductor has an estimated cost of \$8.8 million. The expected in-service date of the project is June 1, 2020.

#### **Cost Allocation**



#### Project 9763: Baker to Blount 69 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

Project 9763 resides in northern region of the Baton Rouge area (Figure P9763-1). The local 69 kV network of Zachary, Zachary REA, Baker, Blount and Dixie Baker substations are supplied through high-voltage taps at the Port Hudson and Jaguar substations.

#### **Project Area Need**

The loss of the Port Hudson to Zachary 69 kV circuit (NERC TPL Category P1.2) removes the source at Port Hudson from the local 69 kV network. All demand at the Zachary, Zachary REA, Baker, and Dixie Baker substations are supplied through the Blount substation with the loss of the Port Hudson to Zachary circuit. Increased powerflow from the south causes the Blount to Baker 69 kV circuit to exceed the thermal limit of the line conductor.



Figure P9763-1: The Baker to Blount 69 kV line conductor will exceed maximum capacity for the loss of the Port Hudson to Zachary 69 kV circuit.

#### **Project Description**

Project 9682 details the replacement of the Blount to Baker 69 kV line conductor. The replacement of 3.8 miles of 69 kV conductor has an estimated cost of \$5.2 million. The expected in-service date of the project is June 1, 2018.

#### **Cost Allocation**



# Project 9765: Harrelson to Line-369 Tap 69 kV Line Upgrade Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

Project 9765 resides in the Baton Rouge area of Louisiana (Figure P9765-1). The local 69 kV network of Harrelson, Gloria, Flannery, Lively, and Sharp substations form a 69 kV loop supplied by a high-voltage tap at the Harrelson substation.

#### **Project Area Need**

The loss of the Harrelson to Gloria 69 kV circuit (NERC TPL Category P1.2) removes half the electrical path from the 69 kV loop. The powerflow through the remaining portion of the 69 kV loop causes excessive flow on the conductor of the Harrelson to Line 369 tap line segment.



MISO, using Ventyx Velocity Suite © 2014 Figure P9765-1: The Harrelson to Line 369 tap 69 kV line conductor will exceed maximum capacity for the loss of the Harrelson to Gloria 69 kV circuit.

#### **Project Description**

Project 9765 details the replacement of the Harrelson to Gloria 69 kV line segment conductor. The replacement of 3.5 miles of 69 kV conductor has an estimated cost of \$3.2 million. The expected inservice date of the project is December 1, 2018.

#### **Cost Allocation**



#### Project 9788: Port Barre 69 kV Capacitor Bank Addition Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

Project 9788 resides along in south-central Louisiana (Figure P9788-1). The local 69 kV network that includes Port Barre and Champagne 69 kV substations is primarily supplied by a 138 kV tap at the Champagne substation.

#### **Project Area Need**

Loss of the Champagne 138/69 kV autotransformer (NERC TPL Category P1.3) isolates this area of the low-voltage network from the high-voltage network. Loss of access to the 138 kV source at Champagne causes depressed voltage on the low-voltage network in the area. The capacitor bank addition at Port Barre mitigates the low voltage issue.



Figure P9778-1: The 69 kV network near Champagne substation experiences low voltage for the loss of the Champagne 138/69 kV autotransformer

#### **Project Description**

Install a capacitor bank at the Port Barre substation to mitigate the low voltage issue. The capacitor bank addition has an estimated cost of \$800,000. The expected in-service date for this project is June 1, 2018.

#### **Cost Allocation**



#### Project 9795: Nesser 69 kV Capacitor Bank Addition Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

Project 9795 resides in the Baton Rouge area of Louisiana (Figure P9795-1). The local 69 kV network that includes Nesser and Jones Creek 69 kV substations is primarily supplied by a 230 kV tap at the Harrelson substation.

#### **Project Area Need**

Loss of the Champagne to Jones Creek line segment (NERC TPL Category P2.1) isolates this area of the low-voltage network from the high-voltage network. Loss of access to the 230 kV source at Harrelson causes depressed voltage on the low-voltage network in the area. The capacitor bank addition at Nesser mitigates the low voltage issue.



Figure P9795-1: The 69 kV network near Harrelson substation experiences low voltage for the loss of the Harrelson to Jones Creek line segment

#### **Project Description**

Install a capacitor bank at the Nesser substation to mitigate a low voltage issue. The capacitor bank addition has an estimated cost of \$1,100,000. The expected in-service date for this project is December 1, 2017.

#### **Cost Allocation**



### **Generation Interconnection Projects**

The following projects were identified through the Generation Interconnection process. These projects are needed to maintain reliability with the addition of new firm resource (J396) added to the system. J396 is a 904 MW combined cycle gas plant connecting to Little Gypsy Power Station, with an in-service date of May 2018.

ID	Transmission Facility	Facility Owner	Description	Cost
J396	Circuit Breakers at Little Gypsy substation	Entergy	CB replacement	\$12,300,000
J396	Snake Farm – Labarre 230 kV line	Entergy	Replace existing line bay bus	\$33,000
J396	Midtown – Almonaster 230 kV line	Entergy	Re-conductoring	\$1,206,000
J396	Midtown Substation – Tap Ninemile to Derbigny Line	Entergy	Midtown Substation – Tap Ninemile to Derbigny Line	\$737,000
J396	J396 Interconnection Facility	Entergy	Three new 2-breaker bays for interconnection transmission lines. Iron Man and Belle Point 230 kV lines separated into their own bays to mitigate a breaker failure issue. Relay Settings at Belle Point and Iron Man Switchyards.	\$13,296,000



### **MISO South Market Congestion Planning "Other" Projects**

In the MISO South region, four projects are being recommended as economic "Other projects." Two of the four projects are located in Louisiana area. These projects provide quantifiable economic benefits addressing market competition and efficiency needs with production cost savings in excess of their costs with benefit-to-cost ratios above 1.25. These projects address market efficiency needs because the projects are sub-345 kV projects, but do not qualify for regional cost allocation as MEPs. Costs of these projects are directly assigned to the local Transmission Owner Pricing Zone.

#### Project 12017: Southeast Louisiana Economic Project Transmission Owner: Entergy Louisiana LLC

#### **Project Area Information**

The Southeast Louisiana Economic project connects the Amite South load pocket to the Down Stream Gypsy (DSG) load pocket (Figure P12017-1). The DSG load pocket includes the greater New Orleans area in Southeast Louisiana. Ninemile power plant contains over 2,000 MW of generation capacity to locally supply the area. Ninemile, Westwego, and Harvey form a 115 kV loop downstream of the generation at Ninemile.

#### **Project Need**

The Southeast Louisiana economic project, with an estimated cost of \$87.7 million, provides production cost savings in excess of its cost with benefit-to-cost ratios above 1.25. This project provides an outlet and improves the import capability by 650 MW into the DSG load pocket. Also, it provides operational flexibility in the region during planned transmission and generation outages as well as accommodating the system for any future retirements. The project will also provide enhanced resilience to the area during extreme events such as hurricanes.



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Figure P-12017-1: Southeast Louisiana Project

#### **Project Description**

The Southeast Louisiana economic project, with an estimated cost of \$87.7 million and estimated inservice date of 2022, is compromised of the following facilities:

- Construction of a new 230 kV substation called Churchill
- Construction of approximately 26 miles of new 230 kV transmission line connecting the existing 230 kV Waterford substation to the Churchill 230 kV substation crossing the Down Stream Gypsy load pocket interface
- Re-configuration of the existing Waterford to Ninemile and Ninemile to Estelle 230 kV lines into the Churchill 230 kV substation and out to the existing Ninemile 230 kV substation to provide access to the strong sources at the Ninemile substation
- Add a breaker at the Michoud 115 kV substation to address the findings during the reliability noharm robustness analysis

#### **Cost Allocation**

This is an economic "Other Project" which is not eligible for cost sharing.

Project 12016: Upgrade Minden to Sarepta Terminal Equipment Economic Project **Transmission Owner:** Entergy Louisiana LLC

#### **Project Area Information**



Project 9682 resides on the western edge of the Entergy transmission network in the Minden area (Figure P9682-1). This area is primarily supplied by EHV taps at Sarepta and Mount Olive.

#### Project Need

The Minden to Sarepta Terminal Equipment Upgrade project was shown to provide economic benefit to the region. The weighted benefit-to-cost ratio for future scenarios is 1.83, which is above the 1.25 MISO economic threshold.



Figure P12016-1: Minden to Sarepta 115 kV circuit terminal equipment upgrade

#### **Project Description**

This project details the upgrade of terminal equipment on the Minden to Sarepta 115 kV circuit. Upgrading the terminal equipment will improve the capacity of the circuit to 176 MW. The estimated cost of the Minden to Sarepta terminal upgrade is \$1,900,000. The expected in-service date of the project is December 31, 2020.

#### **Cost Allocation**

This is an Other - Economic Project, which is not eligible for cost sharing.



#### New Load Additions

These projects are needed to serve new load. The existing distribution system is not sufficient to supply the additional load. The most effective way to serve the new load is to construct a new substation.

ID	Name	Description	ISD	Cost
9686	Lake Providence (16-ELN-005): New Distribution Substation	Construct a new radial 115 kV transmission line (approx. 10 mi.) to the Lake Providence area to serve area load	6/1/2020	\$31,800,000
9684	Cadeville (16- ELN-004): New Distribution Substation	Construct a new radial 115 kV transmission line (approx. 15 mi.) to a new 115 kV substation in the Cadeville area to serve area load	6/1/2018	\$41,600,000
9690	Hodge (16-ELN- 010): Replace Existing Substation	Construct a new 230 kV substation to serve area load in the Hodge area.	12/1/2018	\$14,100,000
9790	Swisco (16-EGL- 026): Construct New Substation	Construct a new 138 kV substation to serve area load on the Mossville to Carlyss 138 kV line	6/1/2017	\$8,200,000
9791	Thompson Road (16-EGL-027): Construct New Substation	Construct a new 230 kV substation to serve area load on the Patton to Carlyss 230 kV line	6/1/2018	\$9,200,000
9792	Lowe Grout Road (16-EGL- 028): Construct New Substation	Construct a new 138 kV substation to serve area load on the Lake Charles to Jennings 138 kV line	6/1/2019	\$7,000,000
10223	LAGEN Holly Ridge (16-ELN- 011) Construct New Substation	Construct a new 115/13.8 kV distribution serving substation on the Oak Ridge - Dunn 115 kV transmission line in North Central Louisiana	12/31/2016	\$254,000
10588	Fleur 230 kV Substation: New Substation	Construct a new 230 kV substation on the Oakville to Alliance 230 kV transmission line. This substation will be the primary feed to a customer in the area. Load will move from other substations in the area. Rebuild the Ninemile to Barataria 115 kV line.	12/31/2018	\$42,700,000
10623	Sadie 230 kV: Construct New Substation	Construct a new 230 kV substation on the PPG to Rosebluff 230 kV line.	6/1/2018	\$24,814,742
10624	Big Lake 230 kV: Construct New Substation	Construct a new 230 kV substation on the Vincent to Graywood 230 kV line.	6/1/2019	\$28,000,000



11423	Menena 230 kV: Construct New Substation	Industrial Customer Connection: This is a customer-driven project to install a new 230 kV substation on the PPG to Rose Bluff 230 kV line.	12/1/2017	\$7,290,000
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#### Alternatives Considered:

MISO and Entergy Louisiana considered serving the load from alternative locations, but these solutions are the most cost-effective way to serve the new load.

#### **Cost Allocation**

These are Other designated projects: Distribution Projects, which are not eligible for regional cost sharing.



#### **Underrated Breaker Projects**

These projects are needed in order to increase the short circuit interrupting capability of specific circuit breakers. In Entergy's annual short circuit assessment, Entergy identified and targeted specific circuit breakers throughout the Entergy transmission system to be replaced in order to increase the short circuit capability of the breaker above the projected fault currents. Increased fault currents are due to system configuration changes caused by new projects additions.

ID	Name	Description	ISD	Cost
9847	ELL Underrated Breaker Project (16- EGL-030-1): Mossville 69 kV Breaker 17985	Breaker number 17985 at the Mossville 69 kV substation will be replaced due to the short circuit analysis.	12/1/2017	
9848	ELL Underrated Breaker Project (16- EGL-030-2): Mossville 69 kV Breaker 17995	Breaker 17995 at the Mossville 69 kV substation will be replaced due to the short circuit analysis.	12/1/2017	\$700,000
9849	ELL Underrated Breaker Project (16- EGL-030-3): Carlyss 69 kV Breaker 7840	Breaker number 7840 at the Carlyss 69 kV substation will be replaced due to the short circuit analysis.	12/1/2017	

#### **Cost Allocation**

These are Other designated projects, which are not eligible for regional cost sharing.



#### Substation Equipment Replacement

These projects are needed to increase operational flexibility and to replace substation equipment limiting the capacity of transmission line conductor.

ID	Project Name	Description	Expected ISD	Cost
9770	Goosport to L673 TP 69 kV; (16-EGL-011): Upgrade Station Equipment	Upgrade the substation equipment at Goosport to increase the rating of the line	11/18/2016	\$145,205
9787	Air Products to Giegy 138 kV; (16-EGL-021): Upgrade Substation Equipment	Upgrade substation equipment on the Air Products and Giegy terminals to increase the rating of the line	6/1/2016	\$300,000
10591	Willow Glen 500/138 kV Auto: Adjust Taps	Changing the position of the de-energized tap changer to 500kV (3/C) from 487.5kV (2/B).	12/1/2016	\$15,027
9794	Port Hudson Station 138 kV Substation Equipment Upgrade (16- EGL-032)	Upgrade substation equipment at Port Hudson 138 kV.	6/1/2018	\$101,000

#### **Cost Allocation**

These are Other designated projects: Reliability Projects which are not eligible for regional cost sharing.

#### Alternatives Considered:

There were no other viable alternatives to replacing the substation equipment.



#### Substation Reconfiguration Projects:

This project is needed to increase operational flexibility and increase reliability of the system in the area by eliminating some contingency events.

ID	Name	Description	ISD	Cost
9786	Nelson 138 kV Breaker Failure Project (16-EGL- 020)	Add L-274, L-654, L-656 and L-698 to the double bus double breaker scheme at Nelson.	6/1/2017	\$1.1 M
10583	Coly 230 kV: Breaker Addition (16-EGL-037)	Add a breaker at the Coly 230 kV substation.	6/1/2018	\$1.7 M
10584	Tiger 230 kV: Breaker Addition (16-EGL-038)	Add a 230 kV breaker at the Tiger substation.	6/1/2018	\$1.7 M
10585	Harelson 230 kV: Breaker Addition (16-EGL-039)	Add a breaker at the Harrelson 230 kV substation.	6/1/2018	\$1.7 M

#### Alternatives Considered:

MISO and Entergy Louisiana considered serving the load from alternative locations, but these solutions are the most cost-effective way to serve the new load.

#### **Cost Allocation**

These are Other designated projects, which are not eligible for regional cost sharing.



# **Cleco Power LLC**

### **Other Projects**

#### **Underrated Breaker Projects**

This project is needed in order to increase the short circuit interrupting capability of specific circuit breakers. In Cleco's annual short circuit assessment, Cleco identified and targeted specific circuit breakers throughout the Cleco transmission system to be replaced in order to increase the short circuit capability of the breaker above the projected fault currents. Increased fault currents are due to system configuration changes caused by new projects additions.

ID	Name	Description	ISD	Cost
9713	Dolet Hills Breaker Replacements	Replace one of the 345 kV Breakers at Dolet Hills	11/1/2016	\$295,000

#### **Cost Allocation**

These are Other designated projects which are not eligible for regional cost sharing.

#### **Substation Equipment Replacement**

This project is needed to increase operational flexibility, and to provide automated control of the capacitor bank at the Wax Lake substation.

ID	Project Name	Description	Expected ISD	Cost
9715	Wax Lake Cap Switcher Replacements	Replace Manually Operated Switches at Wax Lake with Cap Switchers	10/1/2016	\$406,000

#### **Cost Allocation**

These are Other designated projects: Reliability Projects, which are not eligible for regional cost sharing.

#### **Substation Reconfiguration Projects**

This project is needed to increase operational flexibility and increase reliability of the system in the area by eliminating some contingency events.



ID	Name	Description	ISD	Cost
10983	Hopkins Breaker Addition	Add a second Breaker in Series with Hopkins Breaker 8061.	6/1/2016	\$300,000

#### **Cost Allocation**

These are Other designated projects which are not eligible for regional cost sharing.

#### New Load Additions

These projects are needed to serve new load. The existing distribution system is not sufficient to supply the additional load. The most effective way to serve the new load is to construct a new substation.

ID	Name	Description	ISD	Cost
9542	Dolet Hills Mine Line Tap	Tap the existing 230 kV line from Dolet Hills to Mansfield Compressor to serve existing load, which is moving its operations.	12/1/2016	\$5,000,000

#### Alternatives Considered

MISO and Cleco Power LLC considered serving the load from alternative locations, but these solutions are the most cost-effective way to serve the new load.

#### **Cost Allocation**

These are Other designated projects, which are not eligible for regional cost sharing.



# Lafayette Utilities System

### **Baseline Reliability Projects**

#### Project 8821: Northeast to Peck 69 kV line Transmission Owner: Lafayette Utilities System

#### **Project Area Information**

The Lafayette Utilities System network, which includes 230 and 69 kV substations, is located in Lafayette, La. (Figure P8821-1) The area contains more than 200 MW of local generation capacity and low voltage taps to the 230 kV network at Pontes Des Mouton and Bonin substations.

#### **Project Area Need**

Loss of Bonin generation, connected to the 69 kV network, coupled with the loss of one of the 230/69 kV autotransformers at Bonin (NERC TPL Category P3.3) causes the remaining autotransformer to exceed the thermal limit of the unit.



Figure P8821-1: Either Bonin 230/69 kV autotransformer will exceed the thermal limit of the unit for the loss of the parallel transformer coupled with a generation unit at Bonin.

#### **Project Description**

Project 8821 details the construction of a new 5 mile line from Northeast to Peck 69 kV substations. The 5 mile long line will create a new circuit path supplying the Lafayette area. The support provided by the new line mitigates the thermal issues on the Bonin autotransformers.

#### **Cost Allocation**



# **City of Alexandria**

### **Other Projects**

#### Age Related Replacement Projects

These projects are needed to replace existing conductor that has exceeded its expected life span or condition of the line requires replacement to maintain reliability of the system.

ID	Name	Description	ISD	Cost
10122	Hunter to Downtown 138 kV Line Upgrade	Re-conductor the existing Hunter - Downtown 138 kV transmission line.	7/1/2019	\$340,000
10123	Prescott to Sterx 138 kV Line Upgrade	Re-conductor the existing Hunter - Downtown 138 kV transmission line.	7/1/2019	\$490,000



# **Appendix D1: South Planning Region**

# Mississippi

### **Mississippi Regional Information**

Mississippi largely consists of rural loads throughout the area. Some of the larger load centers include the cities of Jackson, Hattiesburg, Natchez, Vicksburg, and Greenville. The last three mentioned are located near the Mississippi River and have lines that cross over the river and into Louisiana or Arkansas. There are four congested flowgates within MISO Mississippi. They include Elliot to South Grenada 115 kV and Horn Lake to Allen 161kV lines, also the Lakeover 500/115 kV and McAdams 500/230 kV transformers (Figure MS-1).



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#### **Overview of Projects**

There are a total of 15 projects in Mississippi that are seeking approval for the MTEP16 cycle. The projects designations are as follows: six Baseline Reliability, three Other, four New Load Additions, and two Generation Interconnection Projects. Project designation and approximate locations are in figure MS-2.



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Figure MS-2: Geographic transmission map of Mississippi with project locations

Total cost for all projects in Mississippi is \$70.48 million. The breakdown by costs ranging from less than \$1 million, between \$1 and \$5 million, and projects greater than \$5 million are as follows: three projects have an estimated cost of less than \$1 million; five projects are in the cost range of \$1 to \$5 million, and seven have cost estimates greater than \$5 million. Project breakdown by estimated in-service date and cost range can be seen in figures MS-3.



#### MTEP16 APPENDIX D1



Figure MS-3: Graphs of cost range by project type and estimated in-service date



# Entergy Mississippi Inc. (EMI)

### **Baseline Reliability Projects**

Project 9833: Greenville North 115 kV Capacitor Bank

Transmission Owners: Entergy Mississippi Inc.

#### **Project Area Information**

The 115 kV loop around Greenville consists of four substations that serve their own load (Figure P9833-1). These substations are Greenville, Greenville East, Greenville Midtown and North Greenville. The area is mainly supplied from Gerald Andrus to Greenville lines 115 kV.

#### **Project Need**

A breaker fault event at the Greenville substation can cause loss of access to the Gerald Andrus source and voltage support. This loss causes depressed voltage in the Greenville area. The addition of a second 20.5 MVAR capacitor bank does mitigate the issue.



Figure P9833-1: Image of contingency and overload for Reenville area



#### **Project Description**

The project consists of installing a second 20.5 MVAR capacitor bank at the Greenville North substation. The total estimated cost of this project is \$1.2 million. The expected in service date for this project is June 2018.

#### **Cost Allocation**

This is a Baseline Reliability Project, which is not eligible for regional cost sharing.

#### Project 10863: Conehoma to Attala 115 kV

Transmission Owners: Entergy Mississippi Inc.

#### **Project Area Information**

This area is the eastern edge of Entergy Mississippi's system. Attala is a source to the 115 kV system that runs north and south from Attala (Figure P10863-1). Conehoma to Attala is the first line segment of a long stretch of 115 kV line circuit that provides flow south from Attala to Pelahatchie substations. The other source into Pelahatchie is the Rankin to Pelahatchie 115 kV line. Flow out of Pelahatchie goes from Pelahatchie to Morton 115 kV toward the seam with Southern Company.

#### **Project Need**

When the Rankin to Pelahatchie line is lost, Attala is the single source into the area. The increase of flow on the lines causes overloads on the Attala to Conehoma 115 kV line. Overloads are also seen for breaker faults or complete loss of the Rankin 115 kV substation. With the loss of Rankin to Pelahatchie and the Ratcliff Units the overload increases to 120 percent.



Figure P10863-1: Image of contingency and overload for Conehoma to Attala 115 kV.



#### **Project Description**

This project consists of upgrading the line rating of Attala to Conehoma Creek to a minimum of 1303A. The total estimated cost of this project is \$2.45 million. The expected in-service date for this project is June 2017.

#### Alternatives Considered

Submitted alternative of installing 2nd Rankin 230/115 kV autotransformer and rebuilding South Grenada to Elliott 115 kV led to a decrease in reliability to customer along the Attala to Winona and Attala to Pelahatchie 115 kV lines.

#### **Cost Allocation**

This is a Baseline Reliability Project which is not eligible for regional cost sharing.

#### Project 10864 and 10865: Pelahatchie to Morton and Morton to Forest Ind 115 kV

Transmission Owners: Entergy Mississippi Inc.

#### **Project Area Information**

This area is the eastern edge of Entergy Mississippi's system (Figure P10864-1). Flow provided to the Pelahatchie substation from the north and west, and flow out the Pelahatchie to Morton 115 kV toward the Morton to Forest Ind 115 kV tie line with Southern Company.

#### **Project Need**

With the loss of Southern Company's Ratcliff Units and the loss of the Tennessee Valley Authority's Choctaw to Clay 500 kV line flows across the Pelahatchie to Morton to Forest Ind 115 kV lines increases to 108 percent and 103 percent, respectively.





MISO, using Ventyx Velocity Suite © 2014

Figure 10863: Image of contingency and overload for Pelahatchie to Morton 115 kV.

#### **Project Description**

This project consists of upgrading the line rating of Attala to Conehoma Creek to a minimum of 1303A. The total estimated cost of this project is \$2.45 million. The expected in-service date for this project is June 2017.

#### **Alternatives Considered**

Pelahatchie Reactor project no longer sufficiently addresses thermal overloading. Sizing a large reactor will put added transmission flows on other highly loaded lines as well as reduce voltage profile into Southern Company system.

#### **Cost Allocation**



#### Substation Upgrade Projects

These projects are for substation reconfigure and upgrades that address baseline reliability drivers.

Prj ID	Project Name	Description	Project Need	Estimated Cost (\$M)	Expected ISD
9839	Reconfigure Gerald Andrus 230 kV line terminals	Re-terminate Ray Braswell 230 kV line circuit into Bagby line bay.	Single element contingency causes outages. Reconfigure will eliminate the possible event.	\$ 0.35	3/1/2018
11783	McAdams Upgrades	Upgrade equipment and transformer at McAdams substation	TSR-negotiated upgrade	\$ 12.6	6/1/2020

#### **Cost Allocation**

This is a Baseline Reliability Project which is not eligible for regional cost sharing.

#### Other Reliability Projects

These are areas with long 115 kV line circuits. Installation of breakers along these lines is necessary to improve customer reliability by reducing transmission line exposure.

Prj ID	Project Name	Description	Estimated Cost (\$M)	Expected ISD
9822	Harper 115 kV Breaker Station	Construct a new 115 kV breaker switching station.	\$ 5.30	12/1/2018
11623	Gallman 115 kV	Install transmission breakers at Gallman 115 kV substation	\$ 2.99	12/31/2016

#### **Cost Allocation**

These are designated as Other Projects which are not eligible for regional cost sharing.



### **MISO South Market Congestion Planning "Other" Projects**

In MISO South region, four economic projects are being recommended as "Other" projects. One of the four projects is located in the Mississippi area. The project provides quantifiable economic benefits addressing market competition and efficiency needs with production cost savings in excess of their costs with benefit-to-cost ratios above 1.25.

#### Project 12015: Lakeover 500/230 kV Transformer

Transmission Owners: Entergy Mississippi Inc.

#### **Project Area Information**

Lakeover EHV is located north-northwest of Jackson, and is a source for the 230 kV and 115 kV transmission circuits. Hinds units supply generation to the 230 kV transmission circuit, while the 500kV source at Lakeover is electrically connected to the 115 kV transmission circuit.

#### **Project Need**

The Lakeover 500/115 kV transformer is one of the four congested flowgates in Mississippi. This project will alleviate congestion. Lakeover 500/230 kV transformer economic project provides cost savings in excess of its cost with benefit-to-cost ratios above 1.25.



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#### **Project Description**

This project consists of relocating and installing a 500/230 kV transformer from the McAdams substation to Lake over EHV substation. The total estimated cost of this project is \$6.7 million. The expected in-service date for this project is June 2020.



#### **Cost Allocation**

While this project addresses market efficiency needs, because the projects are sub-345 kV projects, these do not qualify for regional cost allocation as MEPs. Costs of these projects are directly assigned to the local Transmission Owner Pricing Zone.

#### **New Load Additions**

These projects are needed to serve new load. The existing distribution system is not sufficient to supply the additional load. The most effective way to serve the new load is to construct a new substation.

Prj ID	Project Name	Description	Estimated Cost (\$M)	Expected ISD
10943	Norrel Road	Construct new 230 kV substation	\$ 8.10	12/1/2018
11705	Wynndale 115 kV	Install 2x115/13.8 kV distribution transformers in the Wynndale substation	\$ 7.79	12/31/2016



# South Mississippi Electric Power Association (SMEPA)

#### **Generation Interconnection Projects 9957 and 9969**

The following projects were identified through the Generation Interconnection process. The Generation Interconnection study id for these projects is J473. The projects are needed to maintain reliability with the addition of new firm resource added to the system. J473 is a 52MW solar power plant that will tap SMEPA's Sumrall to Rawls 69 kV line.

Project Number	Transmission Facility / Constraint	Transmission Facility Owner	Mitigation / Type of Upgrade	Cost (\$ M)
J473	69 kV line from J473 substation to Rawl SP.	SMEPA	All pole structures on Line 42 (Rawls Springs to J473_Sub) will be replaced resulting in a final conductor rating of 71MVA (100°C). Optical ground wire will be installed on Line 42 for communication purposes. The existing 336 ACSR conductor will not be replaced.	1.147
	69 kV line from J473 Substation to Sumrall	SMEPA	All pole structures on Line 42A (Sumrall to J473_Sub) will be replaced resulting in a final conductor rating of 71MVA (100°C). The existing 336 ACSR conductor will not be replaced.	1.027
	69 kV line from Sumrall and Columbia	SMEPA	All pole structures on Line 43 (Columbia to Sumrall) will be replaced resulting in a final conductor rating of 71MVA (100°C). The existing 336 ACSR conductor will not be replaced.	2.532
	Replacement of 1312 Mosell Breaker - as per SC study	SMEPA	Breaker replacement	0.075
	J473 Interconnecting Facility	SMEPA	Transmission Owner's 69kV switching Station with 2-69kV breakers & Transmission Owner's Interconnection Facilities at the 69/26.4kV Interconnection Substation	1.59

#### **New Load Additions**

These projects are needed to serve new load. The existing distribution system is not sufficient to supply the additional load. The most effective way to serve the new load is to construct a new substation.

Prj ID	Project Name	Description	Estimated Cost (\$M)	Expected ISD
9955	Steiner	The Steiner DP will be located approximately 1.6 miles northeast of the existing Shaw Switching Station and will be served from Entergy's existing 115 kV Cleveland to Shaw transmission line via a looped transmission feed. This DP will require installation of a new switching station with motor operated	\$ 0.81	12/1/2017



		switches and other miscellaneous upgrades to accommodate the new 115 kV looped service.		
9949	Cloverdale	The Cloverdale DP will be served from the existing Entergy IP to Johns Manville 115 kV transmission line via a looped transmission feed into a new switching station to be constructed at the DP site.	\$ 0.90	12/1/2017

#### **Cost Allocation**

These are designated as Other Projects which are not eligible for regional cost sharing.



# **South Planning Region**

### Texas

#### **Regional Information**

MISO Texas is primarily the Texas portion of the West of the Achafalaya Basin (WOTAB) load pocket with the entire Western load pocket embedded inside WOTAB. There is a major 500 kV feed in the eastern portion that feeds into the Hartburg 500 kV substation and there is a major 345 kV line feeding into the Grimes 345 kV substation in the west. Major generation sources are the Sabine units in WOTAB and the Frontier and Lewis Creek units in Western. These generators are typically dispatched for voltage and local reliability issues.



Figure TX-1: Geographic transmission map of MISO Texas





Figure TX-2: This map shows the geographical location of the projects and identified drivers.

For the MTEP16 cycle there were 15 projects targeted for Appendix A with a total cost of \$172 million. Of these 15 projects: 11 have an estimated cost greater than \$5 M, 4 have an estimated cost between \$1M-\$5 M, and 0 have an estimated cost lower than \$1 M. The designations of project type are as follows: 13 Baseline Reliability and 2 Other.





Figure TX-3: Graphs of cost range by project type and estimated in-service date by project type



# **Entergy Texas Inc. (ETI)**

#### Project 9812, 9813, 9814 Port Arthur Reliability Improvement Plan

Transmission Owners: Entergy Texas Inc. (ETI)

#### **Project Area Information**

The Port Arthur Texas area has many industrial loads. The bulk electric system in the area includes a 230 kV and 138 kV network. These networks are fed from the Sabine generating units.

#### **Project Need**

During multiple N-2 scenarios in the area, there are thermal overloads on the 138 kV system. These scenarios allow for load shed as a mitigation, but to relieve the overloads requires large amounts of industrial load. To solve the thermal issues and to not require load shed, Entergy is building 2 new substations on the 230 kV system, called Garden and Legend, and building a new 230 kV line between them.



Figure TX-4: Multiple line contingency of Sabine to Nederland 230 kV and Kolbs to Gulfway 230 kV causes an overload on Port Neches to Flatland 138 kV. This is seen in the MTEP16 2021 Summer Model.


This project comes in 3 parts. Part 1, project 9812, is to Cut the Sabine to China 230 kV line and the Nederland to Mid County 230 kV line into a new 230 kV substation named Garden. Part 2, project 9813, is to Construct a new substation and cut one of the Port Acres to Keith Lake 230 kV lines (L-829). The new substation will be named Legend The final part, project 9814, is to construct a new line from the new Garden substation to the new Legend substation. The estimated cost is \$65.8M. The estimated in-service date is June 1st, 2019.

### **Cost Allocation**

This is a Baseline Reliability Project which is not eligible for regional cost sharing.

## Project 9809: Hull to Sour Lake 69 kV Reconductor Line

#### Transmission Owners: Entergy Texas Inc. (ETI)

#### **Project Area Information**

This project is close to the center of the Miso portion of Texas. The 69 kV system in this area is fed from the Raywood Substation and the Amelia Substation. The 69 kV line from Raywood to Amelia passes through the Hull, Quality Mills, Transco, and Sour Lake substations, all serving their own load.

#### **Project Need**

During the single contingency at Raywood, either line or transformer, one of the feeds to the 69 kV system is lost. To serve the load, the 69 kV line from Raywood to Amelia now pulls all the power needed from the Amelia 138 kV Substation. This overloads the line in the MTEP16 2021 Summer Model. Re-conductoring the line in by June 1<sup>st</sup> 2019 will increase the rating to 105 MVA and correct the issue before the need arises.





Figure TX-5: Single contingency at Raywood will cause an overload and low voltage issues from Hull to Sour Lake. This is seen in the MTEP16 2021 Summer Model.



This project is to re-conductor the 69 kV line and upgrade terminal equipment from Hull to Sour Lake to reach an emergency rating of 105 MVA. The estimated cost is \$30M. The estimated in-service date is June 1<sup>st</sup>, 2019.

### **Cost Allocation**

This is a Baseline Reliability Project which is not eligible for regional cost sharing.

## Project 9818: Stowell to Himex 69 kV Convert to 138 kV

#### Transmission Owners: Entergy Texas Inc. (ETI)

#### **Project Area Information**

Stowell is near the South Beaumont Load center. The 69 kV system in this area is fed from the South Beaumont Substation and the Stowell Substation. The 69 kV line from South Beaumont to Winshire passes through the Texas Hill, Lovels Lake, Byfanta, Pansy, and Craigen substations, all serving their own load.

#### **Project Need**

During a bus section fault at Stowell, the connection to the 69 kV system is lost which forces it to be fed from the other end which draws a lot of power. This causes an overload on the line in the MTEP16 2021 summer models. To correct the issue, Entergy will convert the Stowell to Himex 69 kV Line to 138 kV. In fact, the line is already built to that standard. This will reconfigure the bus so that the bus section fault will not occur. Also, the project requires a 138/34 kV transformer installed at the Himex Substation.





Figure TX-6: The Substation fault at Stowell causes thermal issues on the South Beaumont to Windshire 69 kV line. This issue is seen in the MTEP16 2021 Summer.



The project will convert the Stowell to Himex 69 kV line to 138 kV and install a 138/34 kV transformer at Himex The estimated cost is \$13.6M. The estimated in-service date for all projects is June 1<sup>st</sup>, 2018.

### **Cost Allocation**

These are Baseline Reliability Projects which are not eligible for regional cost sharing.

### Project 9807: Pintail 138 kV Construct new Switching Substation

Transmission Owners: Entergy Texas Inc. (ETI)

#### **Project Area Information**

This is another project near the Raywood Substation. There is a long 138 kV line heading south from there which typically has a normally open point. This line runs along the bottom of the Western and WOTAB load pockets and is normally open in the middle for stability issues.

#### **Project Need**

An open breaker issue at Raywood would cause low voltage issues near the normally open point, which is now cut off from Raywood due to the open breaker. This is seen in the MTEP16 2021 models. As a correction, Entergy will install a new switching station, called Pintail, on the line. This will allow the normally open point to close and correct the low voltage issue.





Figure TX-7: Open breaker at Raywood causes low voltage issues at Magnolia Ames. This is seen in the MTEP16 2021 Summer Model.

This project will construct a new switching station south of Raywood called Pintail and close the normally open point between Gordon and Magnolia Ames. The estimated cost to upgrade one line is \$9.5M. The estimated in-service date for both projects is June 1st, 2018, with the upgrade to Line 1 complete by June 1st 2018.

#### **Cost Allocation**



## Project 9810: Raywood to Daisetta 69 kV Re-conductor Line

### Transmission Owners: Entergy Texas Inc. (ETI)

#### **Project Area Information**

This project is close to the center of the Miso portion of Texas. The 69 kV system in this area is fed from the Raywood Substation and the Amelia Substation. The 69 kV line from Raywood to Amelia passes through the Daisetta, Hull, Quality Mills, Transco, and Sour Lake substations, all serving their own load.

#### **Project Need**

The single line outage of Sour Lake to Amelia 69 kV will cause an overload from Raywood to Daisetta, since the power for the entire line must now be fed from that end. This overloads the line in the MTEP16 2021 Summer Model. Re-conductoring the line in by June 1st 2018 will increase the rating to 105 MVA and correct the issue before the need arises.





Figure TX-8: The loss of one of the Sour Lake to Amelia 69 kV line will overload the Raywood to Daisetta 69 kV line. This is seen in the MTEP16 2021 Summer Model.

Project upgrade: approximately 6 mile line and corresponding equipment to increase the rating to 105 MVA. The estimated cost to upgrade the transformers is \$8,655,000. The estimated in-service date for this project is June 1st, 2018.

### **Cost Allocation**



## Project 9806: Bryan 138/69 kV Replace Autos and Reconfigure 69 kV

### Transmission Owners: Entergy Texas Inc. (ETI)

### **Project Area Information**

The Bryan-College station is located in the eastern edge of the Western Load Pocket. It is fed from the 138 kV system which is connected to the Frontier generation at Grimes.

#### **Project Need**

Open breaker contingencies at the Bryan substation cause thermal and voltage violations on the 69 kV system. This is seen in the MTEP16 and 2021 Summer Model. Reconfiguring the Bryan 138 kV and 69 kV substation by June 1st, 2019 will correct the issue.





Figure TX-9: During a breaker failure at the Bryan Substation, thermal overloads and low voltage violations are seen on the 69 kV system. This is seen in the MTEP16 2021 Summer Model.

This project will reconfigure the 138 kV bus to a ring bus and reconfigure the 69 kV bus. Also, it will replace the 2 138/69 kV transformers at that substation. The estimated cost to upgrade the transformers is \$8,268,000. The estimated in-service date for this project is June 1st, 2019.

#### **Cost Allocation**



## Project 9817: Helbig 230 kV Reconfigure Bus

Transmission Owners: Entergy Texas Inc. (ETI)

### **Project Area Information**

Beaumont Texas is a large load center. The Helbig substation is a major connection between the 230 kV and the 69 kV substation with two transformers located at that station.

### **Project Need**

In the current configuration, the loss of one of the 230/69 kV transformers will also cause the loss of the 230 kV line from Helbig to Amelia. These outages will cause an overload on the other transformer. To correct the issue, Entergy will reconfigure the bus to a ring bus so they will not lose more than one element for a single outage.



Figure TX-10: Losing one of the transformers at the Helbig substation also causes the loss of the Helbig to Amelia 230 kV line. This causes an overload on the 2<sup>nd</sup> transformer. This is seen in the MTEP16 2021 Models.

### **Project Description**

Entergy will reconfigure the Helbig 230 kV substation to a ring bus. This will also upgrade the terminal equipment on the Helbig to Georgetown 230 kV Line The estimated cost is \$7,196,000. The estimated inservice date is June 1st, 2018.

### **Cost Allocation**



## Project 4620: Kolbs 230 kV - Add capacitor bank

Transmission Owners: Entergy Texas Inc. (ETI)

### **Project Area Information**

In the east portion of MISO Texas, the generation source is primarily Sabine. The area around Sabine is supported by a network of 230 kV lines. This is an area known for serving large industrial loads.

### **Project Need**

During the outage of one of the Sabine units coinciding with the outage of Kolbs to Gulfway 230 kV line, we see low voltage issues on the 230 kV system around Kolbs. This is seen in the MTEP16 2021 cases.



Figure TX-10: A line plus generator outage causes low voltage issues on the 230 kV system near Kolbs. This is seen in the MTEP16 2021 Summer Model.

### **Project Description**

Entergy will add a 86.4 Mvar capacitor at the Kolbs substation. The estimated cost is \$3.0M. The estimated in-service date is June 1st, 2018.

#### **Cost Allocation**



## Project 9852: Grimes 345/138 kV Install Breakers on Low Side of AT2

Transmission Owners: Entergy Texas Inc. (ETI)

### **Project Area Information**

Grimes is a major 345 kV connection in the Western load pocket. In its current configuration, there is no breaker protection on the low side of one of the 345/138 kV transformers.

#### **Project Need**

A single breaker fault can currently results in the outage of both Grimes 345/138 kV transformers. The loss of both transformers causes a thermal issue down the 138 kV system. The proposed solution is to install a breaker on the low side of the transformer so single event taking out both transformers is not possible.



Figure TX-11: The loss both transformers at Grimes will results in thermal issues on the Fish Creek to Ponderosa 138 kV line. This is seen in the MTEP16 2021 Model.

### **Project Description**

Entergy will install breakers on the low side of autotransformer number 2 at the Grimes 345/138 kV substation. The estimated cost is \$1,142,000. The estimated in-service date is June 1st, 2017.

#### **Cost Allocation**



## Project 9808: Kirbyville 69 kV Add Cap Bank

Transmission Owners: Entergy Texas Inc. (ETI)

### **Project Area Information**

North of Baumont, the bulk electric system is a 138 kV Loop, connecting the Woodville and Sam Rayburn generators down to the 500kV line between Cypress and Hartburg. One side of the loop has a 69 kV system connecting one of the load pocket import lines. This 69 kV line is connected between the Fawil and Kirbyville substations

### **Project Need**

A single transformer contingency at Fawil can cause low voltage issues at the Kirbyville 69 kV Substation. The proposed solution is to install a Capacitor at the 69 kV substation to correct the violation.



Figure TX-12: The outage of the transformer at Fawil will cause a low voltage violation at the Kirbyville 69 kV Substation. This is seen in the MTEP16 2021 Model.



Entergy will install a 7.2 Mvar capacitor bank at the Kirbyville 69 kV substation. The estimated cost is \$1,000,000. The estimated in-service date is June 1<sup>st</sup>, 2018.

### **Cost Allocation**

This is a Baseline Reliability Project which is not eligible for regional cost sharing.

### **New Load Additions**

These projects are needed in order to serve new loads. The existing distribution system is not sufficient to supply these additions. The most effective way to serve these new loads is to provide a new substation. No harm test was conducted to make sure no addition baseline reliability issues were caused by the new load additions.

ID	Name	Description	ISD	Cost
7930	Heights: Construct new 138 kV substation	Construct new 230 kV substation for load growth in the Woodlands area to offload the New Caney 138 kV substation. New substation will be tapped into 230 kV line between China and Porter.	6/01/2019	\$14,208,000
10823	Moscow: Construct new 138 kV substation	Construct a new 138 kV substation on L-411 Corrigan Bulk to Kickapoo 138 kV line to serve an industrial customer.	6/01/2017	\$7,004,002

## **Alternatives Considered**

MISO and ETI considered serving the load from alternative locations but as these solutions provide the least amount of new facilities and costs; they are the most cost-effective way to serve this new load obligation.

### **Cost Allocation**

These are Other: Distribution Projects which are not eligible for regional cost sharing.

### **Projects Driven by Attachment Y studies**

This project's need was determined in a confidential Attachment Y study.

ID	Name	Description	ISD	Cost
11363	Hartburg 500 kV: Reconfigure Line Bays	Re-position the line bays of line L-800 (Hartburg- Cottonwood 500 kV Circuit 1) and line L-547 (Hartburg- Cypress 500 kV line) at Hartburg 500 kV substation.	6/01/2017	\$2,000,000

### **Cost Allocation**



# Transmission Owner: East Texas Electric Cooperative (ETEC)

## **Baseline Reliability Projects**

There are no Baseline Reliability Projects moving to Appendix A in this MTEP cycle for ETEC.

## **Other Reliability Projects**

Projects that are not defined as Baseline Reliability, Generation Interconnection or Transmission Delivery Service Planning per Attachment FF transmission project definitions but are still needed for system reliability for various reasons are categorized as Other projects. There are no Other-type projects moving to Appendix A for ETEC in this MTEP cycle.

