



***Feasibility Study  
PID 250  
50MW Plant***

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# Contents

<b>ENERGY RESOURCE INTERCONNECTION SERVICE .....</b>	<b>3</b>
<b>1. INTRODUCTION .....</b>	<b>3</b>
<b>2. SHORT CIRCUIT ANALYSIS/BREAKER RATING ANALYSIS .....</b>	<b>3</b>
2.1 MODEL INFORMATION .....	3
2.2 SHORT CIRCUIT ANALYSIS .....	3
2.3 ANALYSIS RESULTS .....	4
2.4 PROBLEM RESOLUTION .....	4
<b>3. LOAD FLOW ANALYSIS .....</b>	<b>4</b>
3.1 MODEL INFORMATION .....	4
3.2 LOAD FLOW ANALYSES .....	4
3.3 ANALYSIS RESULTS .....	5
<b>APPENDIX A: APPROVED PROJECTS AND TRANSACTIONS IN STUDY MODE .....</b>	<b>22</b>

# Energy Resource Interconnection Service

## 1. Introduction

This Energy Resource Interconnection Service (ERIS) is based on the Customer's request for 50MW interconnection on Entergy's transmission system between the Woodville and Warren substations located at PID-250 138kV substation. The objective of this study is to assess the reliability impact of the new facility on the Entergy transmission system with respect to the steady state and transient stability performance of the system as well as its effects on the system's existing short circuit current capability. It is also intended to determine whether the transmission system meets standards established by NERC Reliability Standards and Entergy's planning guidelines when the plant is connected to Entergy's transmission system. If not, transmission improvements will be identified.

The Feasibility Study process required a load flow analysis to determine if the existing transmission lines are adequate to handle the full output from the plant for simulated transfers to adjacent control areas. A short circuit analysis was performed to determine if the generation would cause the available fault current to surpass the fault duty of existing equipment within the Entergy transmission system. A transient stability analysis was conducted to determine if the new units would cause a stability problem on the Entergy system.

This ERIS Feasibility Study was based on information provided by the Customer and assumptions made by Entergy's Transmission Technical System Planning group. All supplied information and assumptions are documented in this report. If the actual equipment installed is different from the supplied information or the assumptions made, the results outlined in this report are subject to change.

The load flow results from the ERIS study are for information purposes only. ERIS does not in and of itself convey any transmission service.

## 2. Short circuit Analysis/Breaker Rating Analysis

### 2.1 Model Information

The short circuit analysis was performed on the Entergy system short circuit model using ASPEN software. This model includes all generators interconnected to the Entergy system or interconnected to an adjacent system and having an impact on this interconnection request, IPP's with signed IOAs, and approved future transmission projects on the Entergy transmission system.

### 2.2 Short Circuit Analysis

The method used to determine if any short circuit problems would be caused by the addition of the PID-250 generation is as follows:

Three phase and single phase to ground faults were simulated on the Entergy base case short circuit model and the worst case short circuit level was determined at each station. The PID-250 generator was then modeled in the base case to generate a revised short circuit model. The base case short circuit results were then compared with the results from the revised model to identify any breakers that were under-rated as a result of additional short circuit contribution from PID-250 generation. Any breakers identified to be upgraded through this comparison are mandatory upgrades.

## 2.3 Analysis Results

The results of the short circuit analysis indicated that the additional generation due to PID 250 generation caused no increase in short circuit current such that they exceeded the fault interrupting capability of the high voltage circuit breakers within the vicinity of the PID 250 plant **with and without priors**. Priors included are: 221, 223, 224, 233, 238, 240, and 247.

## 2.4 Problem Resolution

As a result of the short circuit analysis findings, no resolution was required.

## 3. Load Flow Analysis

### 3.1 Model Information

The load flow analysis was performed based on the projected 2014 summer peak load flow model. The loads were scaled based on the forecasted loads for the year. All firm power transactions between Entergy and its neighboring control areas were modeled for the year 2014 excluding short-term firm transactions on the same transmission interface. An economic dispatch was carried out on Entergy generating units after the scaling of load and modeling of transactions. The proposed 50MW generation and the associated facilities were then modeled in the case to build a revised case for the load flow analysis. Transfers were simulated between thirteen (13) control areas and Entergy using requesting generator as the source and adjacent control area as sink.

This study considered the following four scenarios:

Scenario No.	Approved Future Transmission Projects	Pending Transmission Service & Study Requests
1	Not Included	Not Included
2	Not Included	Included
3	Included	Not Included
4	Included	Included

The generator step-up transformers, generators, and interconnecting lines were modeled according to the information provided by the Customer.

### 3.2 Load Flow Analyses

#### 3.2.1 Load Flow Analysis:

With the above assumptions implemented, the First Contingency Incremental Transfer Capability (FCITC) values were calculated. The FCITC depends on various factors – the system load, generation dispatch, scheduled maintenance of equipment, and the configuration of the interconnected system and the power flows in effect among the interconnected systems. The FCITC is also dependent on previously confirmed firm reservations on the interface.

#### 3.2.2 Performance Criteria

The criteria for overload violations are as follows:

**A) With All Lines in Service**

- The MVA flow in any branch should not exceed Rate A (normal rating).

**B) Under Contingencies**

- The MVA flow through any facility should not exceed Rate A.

**3.2.3 Power Factor Consideration / Criteria**

Entergy, consistent with the FERC Large Generator Interconnection Procedures (LGIP), requires the customer to be capable of supplying at least 0.33 MVAR (*i.e.*, 0.95 lagging power factor) and absorbing at least 0.33 MVAR (*i.e.*, 0.95 leading power factor) for every MW of power injected into the grid. In the event that, under normal operating conditions, the customer facility does not meet the prescribed power factor requirements at the point of interconnection, the customer shall take necessary steps, such as the installation of reactive power compensating devices, to achieve the desired power factor.

**3.3 Analysis Results**

Summary of the analysis results are documented in following table for each scenario.

**Table 3.3.1: Summary of Results for PID 250 ERIIS Load Flow Study**

Interface		Summer Peak Case Used	FCITC Available for Scenario 1	FCITC Available for Scenario 2	FCITC Available for Scenario 3	FCITC Available for Scenario 4
AECI	Associated Electric Cooperative, Inc.	2014	-42	-1420	50	-1905
AMRN	Ameren Transmission	2014	50	-1580	50	-1835
CLEC	CLECO	2014	-138	-1791	50	50
AEP-W	American Electric Power - West	2014	-27	-1869	50	-2403
EES	Entergy	2014	50	-2905	50	-1089
EMDE	Empire District Electric Co	2014	-77	-1682	50	-2007
LAFA	Lafayette Utilities System	2014	-38	-569	50	-61
LAGN	Louisiana Generating, LLC	2014	-1948	-2736	-1589	-3941
LEPA	Louisiana Energy & Power Authority	2014	-3543	-4483	-3795	-4612
OKGE	Oklahoma Gas & Electric Company	2014	-20	-1742	50	-2124
SMEPA	South Mississippi Electric Power Assoc.	2014	-11498	-2206	-417	-1098
SOCO	Southern Company	2014	50	-1390	50	-1501
SPA	Southwest Power Administration	2014	-72	-1681	50	-2000
TVA	Tennessee Valley Authority	2014	50	-1480	50	-1669

**TABLE 3.3.2: DETAILS OF SCENARIO 1 RESULTS: (WITHOUT FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)**

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFa	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Addis - Big Cajun 1 230kV	Included in 2011 ICT Base Plan									X					
Brookhaven - Mallalieu (MEPA) 115kV	Included in 2011 ICT Base Plan											X			
Fancy Point - Port Hudson 230kV ckt 2	Included in 2011 ICT Base Plan									X					
Jackson Forrest Hill - Ray Braswell 115kV	6,550,000											X			
Jackson Forrest Hill - Southwest Jackson 115kV	3,625,000											X			
Lake Conway - Mayflower 115kV	4,937,500													X	
Pleasant Hill 500/161kV transformer	Included in 2011 ICT Base Plan						X							X	
Raceland - Coteau 115kV	15,325,000									X					
Ray Braswell 500/115kV transformer 1	18,000,000											X			
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Committed to by others											2MW			
Richard - Scott1 138kV	Included in 2011 ICT Base Plan				X			X							
Russellville East - Russellville North 161kV	Included in 2011 ICT Base Plan	X	X				X				X			X	
Sterlington 500/115kV transformer 1	18,000,000								X						
Sterlington 500/115kV transformer 2	Committed to by others								X						
Vacherie - Waterford 230kV	32,182,500									X					



Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Port Hudson 230/138 transformer 1	14,812,500									X					
Port Hudson 230/138 transformer 2	9,200,000									X					
Rex Brown W - Rex Brown C 115kV ckt 1	TBD											X			
Richard - Scott1 138kV	Included in 2011 ICT Base Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Semere - Scott2 138kV	Included in 2011 ICT Base Plan							X		X		X	X		X
Sterlington 500/115kV transformer 1	Committed to by others								X						
Sterlington 500/115kV transformer 2	Committed to by others								X						
Vatican - Scott1 138kV	Included in 2011 ICT Base Plan									X					
Willow Glen - Webre 500kV	Included in 2011 ICT Base Plan	X	X	X		X	X		X	X	X	X	X	X	X
Willow Glen - Willow Glen 2 500/138kV transformer 1	Included in 2011 ICT Base Plan					X				X					
Willow Glen 500/230kV Transformer	21,000,000	X		X		X			X	X		X	X		X

**TABLE 3.3.4: DETAILS OF SCENARIO 3 RESULTS: (WITH FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)**

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Fancy Point - Port Hudson 230kV ckt 2	Included in 2011 ICT Base Plan									X					
Jackson Forrest Hill - Ray Braswell 115kV	6,550,000											X			
Raceland - Coteau 115kV	15,325,000									X					
Ray Braswell 500/115kV transformer 1	18,000,000											X			
Sterlington 500/115kV transformer 1	Committed to by others								X						
Sterlington 500/115kV transformer 2	Committed to by others								X						



**TABLE 3.3.5: DETAILS OF SCENARIO 4 RESULTS: (WITH FUTURE PROJECTS AND WITH PENDING TRANSMISSION SERVICE & STUDY REQUEST)**

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	Lafa	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Addis - Big Cajun 1 230kV	Included in 2011 ICT Base Plan					X				X					
Coly 500/230kV transformer	21,000,000					X				X					
Fancy Point - Port Hudson 230kV ckt 2	Included in 2011 ICT Base Plan									X					
Florence - South Jackson 115kV - Supplemental Upgrade	Committed to by others											5MW			
Jackson Forrest Hill - Ray Braswell 115kV	6,550,000											X			
Jackson Miami - Rex Brown 115kV	Included in 2011 ICT Base Plan											X			
Rex Brown W - Rex Brown C 115kV ckt 1	TBD											X			
Richard - Scott1 138kV	Included in 2011 ICT Base Plan	X	X	X		X	X	X	X	X	X	X	X	X	X
Sterlington 500/115kV transformer 1	Committed to by others								X						
Sterlington 500/115kV transformer 2	Committed to by others								X						
Vatican - Scott1 138kV	Included in 2011 ICT Base Plan									X					
Webre - Bayou Laboutte 500kV ckt1	Included in 2011 ICT Base Plan	X	X	X		X	X		X	X	X	X	X	X	X

### 3.3.1 DETAILS OF SCENARIO 1 – 2014

#### AECI

Limiting Element	Contingency Element	ATC
Russellville East - Russellville North 161kV	ANO - Fort Smith 500kV	-42

#### AEP-W

Limiting Element	Contingency Element	ATC
Russellville East - Russellville North 161kV	ANO - Fort Smith 500kV	-27

#### AMRN

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### CLECO

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Wells 500/230kV transformer	-138

#### EES

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### EMDE

Limiting Element	Contingency Element	ATC
Pleasant Hill 500/161kV transformer	ANO 500/161/22kV transformer	-77
Russellville East - Russellville North 161kV	ANO - Fort Smith 500kV	-21

#### Lafa

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Wells 500/230kV transformer	-38
Richard - Scott1 138kV	North Crowley - Richard 138kV	15

#### LAGN

Limiting Element	Contingency Element	ATC
Sterlington 500/115kV transformer 2	Sterlington 500/115kV transformer 1	-1948
Sterlington 500/115kV transformer 1	Sterlington 500/115kV transformer 2	-1564

#### LEPA

Limiting Element	Contingency Element	ATC
Fancy Point - Port Hudson 230kV ckt 2	Fancy Point - Port Hudson 230kV ckt 1	-3543
Fancy Point - Port Hudson 230kV ckt 2	Coly 500/230kV transformer	-515
Raceland - Coteau 115kV	Terrebonne 230/115kV transformer	-79
Addis - Big Cajun 1 230kV	Enjay - Fancy 230kV	-73
Raceland - Coteau 115kV	Landry - Raceland 230kV	-1

Limiting Element	Contingency Element	ATC
Raceland - Coteau 115kV	Landry - Terrebonne 230kV	38
Vacherie - Waterford 230kV	Raceland - Waterford 230kV	44

#### OKGE

Limiting Element	Contingency Element	ATC
Russellville East - Russellville North 161kV	ANO - Fort Smith 500kV	-20

#### SMEPA

Limiting Element	Contingency Element	ATC
Ray Braswell 500/230kV transformer ckt2	McAdams 500/230kV transformer 1	-11498
Ray Braswell 500/230kV transformer ckt2	McAdams - Pickens 230kV	-10291
Ray Braswell 500/230kV transformer ckt2	Rex Brown - Rex Brown C 230/115kV transformer 1	-9867
Ray Braswell 500/230kV transformer ckt2	Franklin - Ray Braswell 500kV	-9856
Ray Braswell 500/230kV transformer ckt2	Hartburg - Roy S. Nelson 500kV	-9842
Ray Braswell 500/230kV transformer ckt2	Canton - Pickens 230kV	-9835
Ray Braswell 500/230kV transformer ckt2	Lakeover 500/115kV transformer	-9735
Ray Braswell 500/230kV transformer ckt2	Canton South - Canton 230kV	-9576
Ray Braswell 500/230kV transformer ckt2	Big Cajun 2 - Webre 500kV	-9540
Ray Braswell 500/230kV transformer ckt2	Base Case	-9300
Jackson Forrest Hill - Ray Braswell 115kV	South Jackson 230/115kV transformer 1	-1605
Jackson Forrest Hill - Southwest Jackson 115kV	South Jackson 230/115kV transformer 1	-698
Ray Braswell 500/115kV transformer 1	Ray Braswell 500/230kV transformer ckt1 and ckt2 Test Contingency	-609
Brookhaven - Mallalieu (MEPA) 115kV	Bogalusa - Franklin 500kV	-9
Brookhaven - Mallalieu (MEPA) 115kV	Bogalusa - Adams Creek 500/230kV transformer	-9

#### SOCO

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### SPA

Limiting Element	Contingency Element	ATC
Lake Conway - Mayflower 115kV	Pleasant Hill 500/161kV transformer	-72
Pleasant Hill 500/161kV transformer	ANO 500/161/22kV transformer	-35
Russellville East - Russellville North 161kV	ANO - Fort Smith 500kV	-16

#### TVA

Limiting Element	Contingency Element	ATC
NONE	NONE	50

## 2.3.2 DETAILS OF SCENARIO 2 - 2014

### AECI

Limiting Element	Contingency Element	ATC
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-1420
Richard - Scott1 138kV	Richard - Wells 500kV	-1626
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1339
North Crowley - Richard 138kV	Richard - Wells 500kV	-871
Habetz - Richard 138kV	Richard - Wells 500kV	-764
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-746

### AEP-W

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1869
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1539
North Crowley - Richard 138kV	Richard - Wells 500kV	-1001
Habetz - Richard 138kV	Richard - Wells 500kV	-884
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-936

### AMRN

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1580
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-1367
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1301
North Crowley - Richard 138kV	Richard - Wells 500kV	-846
Habetz - Richard 138kV	Richard - Wells 500kV	-742
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-714

### CLECO

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1791
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1474
North Crowley - Richard 138kV	Richard - Wells 500kV	-959
Habetz - Richard 138kV	Richard - Wells 500kV	-797
Richard - Scott1 138kV	Wells 500/230kV transformer	-879
North Crowley - Scott1 138kV	Wells 500/230kV transformer	-550
North Crowley - Richard 138kV	Wells 500/230kV transformer	-15
Habetz - Richard 138kV	Wells 500/230kV transformer	-9

### EES

Limiting Element	Contingency Element	ATC
Willow Glen 500/230kV Transformer	Coly 500/230kV transformer	-2905
Willow Glen 500/230kV Transformer	Willow Glen - Willow Glen 2 500/138kV transformer 1	-2300
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Willow Glen 230kV	-2204
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Polsky Carville 230kV	-2200
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Polsky Carville 230kV	-2194

Limiting Element	Contingency Element	ATC
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Licar 230kV	-2159
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Licar 230kV	-2039
Willow Glen 500/230kV Transformer	Jaguar - Tap Point Esso 230kV	-1785
Addis - Big Cajun 1 230kV	Willow Glen - Webre 500kV	-1634
Richard - Scott1 138kV	Richard - Wells 500kV	-1556
Willow Glen 500/230kV Transformer	Addis - Big Cajun 1 230kV	-1368
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1282
Willow Glen 500/230kV Transformer	Waterford - Willow Glen 500kV	-1260
Willow Glen 500/230kV Transformer	Waterford 500/230 transformer kV	-1260
Willow Glen - Willow Glen 2 500/138kV transformer 1	Willow Glen 500/230kV Transformer	-1172
Coly - Vignes 230kV - Supplemental Upgrade	Waterford - Willow Glen 500kV	-1156
Coly - Vignes 230kV - Supplemental Upgrade	Waterford 500/230 transformer kV	-1156
Willow Glen 500/230kV Transformer	Fancy Point 500/230kV transformer 1	-1128
Jaguar - Tap Point Esso 230kV	Addis - Big Cajun 1 230kV	-1078
North Crowley - Richard 138kV	Richard - Wells 500kV	-832
Willow Glen 500/230kV Transformer	Enjay - Fancy 230kV	-766
Habetz - Richard 138kV	Richard - Wells 500kV	-746
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-712
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-357
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-270
Jaguar - Tap Point Esso 230kV	Willow Glen 500/230kV Transformer	-46
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-24

#### EMDE

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1682
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1385
North Crowley - Richard 138kV	Richard - Wells 500kV	-901
Habetz - Richard 138kV	Richard - Wells 500kV	-792
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-785

#### Lafa

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-569
North Crowley - Scott1 138kV	Richard - Wells 500kV	-469
Richard - Scott1 138kV	North Crowley - Richard 138kV	-424
Semere - Scott2 138kV	Richard - Wells 500kV	-399
Richard - Scott1 138kV	North Crowley - Scott1 138kV	-382
North Crowley - Scott1 138kV	Richard - Scott1 138kV	-354
North Crowley - Richard 138kV	Richard - Wells 500kV	-305
Habetz - Richard 138kV	Richard - Wells 500kV	-302
Richard - Scott1 138kV	Wells 500/230kV transformer	-242
Richard - Scott1 138kV	Colonial Academy - Richard 138kV	-191
North Crowley - Richard 138kV	Richard - Scott1 138kV	-185
North Crowley - Scott1 138kV	Wells 500/230kV transformer	-152
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-106
Semere - Scott2 138kV	Wells 500/230kV transformer	-96

Limiting Element	Contingency Element	ATC
North Crowley - Scott1 138kV	Colonial Academy - Richard 138kV	-67
North Crowley - Scott1 138kV	Acadia GSU - Colonial Academy 138kV	-50
Semere - Scott2 138kV	Richard - Scott1 138kV	-40
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-10
Semere - Scott2 138kV	North Crowley - Richard 138kV	-8
North Crowley - Richard 138kV	Wells 500/230kV transformer	-4
Habetz - Richard 138kV	Wells 500/230kV transformer	-3
Semere - Scott2 138kV	North Crowley - Scott1 138kV	17

## LAGN

Limiting Element	Contingency Element	ATC
Sterlington 500/115kV transformer 2	Sterlington 500/115kV transformer 1	-2736
Sterlington 500/115kV transformer 1	Sterlington 500/115kV transformer 2	-2350
Richard - Scott1 138kV	Richard - Wells 500kV	-1782
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-1522
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1467
Willow Glen 500/230kV Transformer	Fancy Point - Waterloo 230kV	-1042
North Crowley - Richard 138kV	Richard - Wells 500kV	-955
Habetz - Richard 138kV	Richard - Wells 500kV	-823
Willow Glen 500/230kV Transformer	Big Cajun 1 - Waterloo 230kV	-548

## LEPA

Limiting Element	Contingency Element	ATC
Fancy Point - Port Hudson 230kV ckt 2	Fancy Point - Port Hudson 230kV ckt 1	-4483
Addis - Big Cajun 1 230kV	Enjay - Fancy 230kV	-2772
Addis - Big Cajun 1 230kV	Jaguar - Tap Point Esso 230kV	-2594
Addis - Big Cajun 1 230kV	Enjay - Jaguar 230kV	-2498
Addis - Big Cajun 1 230kV	Coly - McKnight 500kV	-2094
Fancy Point - Port Hudson 230kV ckt 2	Coly 500/230kV transformer	-1932
Willow Glen 500/230kV Transformer	Coly 500/230kV transformer	-1891
Richard - Scott1 138kV	North Crowley - Richard 138kV	-1582
Willow Glen 500/230kV Transformer	Willow Glen - Willow Glen 2 500/138kV transformer 1	-1558
Addis - Big Cajun 1 230kV	Willow Glen 500/230kV Transformer	-1515
Richard - Scott1 138kV	North Crowley - Scott1 138kV	-1425
North Crowley - Scott1 138kV	Richard - Scott1 138kV	-1320
Fancy Point - Port Hudson 230kV ckt 2	Coly - McKnight 500kV	-1273
Willow Glen 500/230kV Transformer	Jaguar - Tap Point Esso 230kV	-1218
Addis - Big Cajun 1 230kV	Willow Glen - Webre 500kV	-1168
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Willow Glen 230kV	-1047
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Polsky Carville 230kV	-1045
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Polsky Carville 230kV	-1042
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Licar 230kV	-1025
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Licar 230kV	-963
Willow Glen 500/230kV Transformer	Addis - Big Cajun 1 230kV	-952
Coly - Vignes 230kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	-948
Coly - Vignes 230kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-948

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-898
Willow Glen - Willow Glen 2 500/138kV transformer 1	Willow Glen 500/230kV Transformer	-772
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Woodstock 230kV	-763
Jaguar - Tap Point Esso 230kV	Addis - Big Cajun 1 230kV	-753
North Crowley - Scott1 138kV	Richard - Wells 500kV	-739
Richard - Scott1 138kV	Colonial Academy - Richard 138kV	-703
North Crowley - Richard 138kV	Richard - Scott1 138kV	-691
Willow Glen 500/230kV Transformer	Fancy Point 500/230kV transformer 1	-682
Richard - Scott1 138kV	Acadia GSU - Colonial Academy 138kV	-642
Willow Glen 500/230kV Transformer	Waterford - Willow Glen 500kV	-622
Willow Glen 500/230kV Transformer	Waterford 500/230 transformer kV	-622
Semere - Scott2 138kV	Richard - Wells 500kV	-595
Richard - Scott1 138kV	Acadia GSU - Scanlan 138kV	-594
Willow Glen 500/230kV Transformer	Enjay - Fancy 230kV	-525
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-524
North Crowley - Richard 138kV	Richard - Wells 500kV	-481
Habetz - Richard 138kV	Richard - Wells 500kV	-434
Alchem - Monochem1 138kV	Wintz - Willow Glen 230kV	-264
Alchem - Monochem1 138kV	Wintz - Polsky Carville 230kV	-261
Alchem - Monochem1 138kV	A.A.C. - Polsky Carville 230kV	-257
Port Hudson 230/138 transformer 2	Port Hudson 230/138 transformer 1	-250
Alchem - Monochem1 138kV	A.A.C. - Licar 230kV	-231
Port Hudson 230/138 transformer 1	Port Hudson 230/138 transformer 2	-229
Vatican - Scott1 138kV	Coughlin - Plaisance 138kV (CLECO)	-203
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-180
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-158
Alchem - Monochem1 138kV	Belle Helene - Licar 230kV	-141
North Crowley - Scott1 138kV	Coughlin - Plaisance 138kV (CLECO)	-98
Jaguar - Tap Point Esso 230kV	Willow Glen 500/230kV Transformer	-31
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-14

## OKGE

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1742
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1434
North Crowley - Richard 138kV	Richard - Wells 500kV	-933
Habetz - Richard 138kV	Richard - Wells 500kV	-821
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-830

## SMEPA

Limiting Element	Contingency Element	ATC
Willow Glen 500/230kV Transformer	Waterford - Willow Glen 500kV	-2206
Willow Glen 500/230kV Transformer	Waterford 500/230 transformer kV	-2206
Jackson Forrest Hill - Ray Braswell 115kV	South Jackson 230/115kV transformer 1	-2154
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Willow Glen 230kV	-2150
Coly - Vignes 230kV - Supplemental Upgrade	Wintz - Polsky Carville 230kV	-2146
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Polsky Carville 230kV	-2140

Limiting Element	Contingency Element	ATC
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Licar 230kV	-2104
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Licar 230kV	-1978
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Woodstock 230kV	-1567
Coly - Vignes 230kV - Supplemental Upgrade	Vulchlor - Woodstock 230kV	-1565
Coly - Vignes 230kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-1445
Jackson Forrest Hill - Southwest Jackson 115kV	South Jackson 230/115kV transformer 1	-1246
Richard - Scott1 138kV	Richard - Wells 500kV	-1223
Brookhaven - Mallalieu (MEPA) 115kV	Bogalusa - Adams Creek 500/230kV transformer	-1109
Brookhaven - Mallalieu (MEPA) 115kV	Bogalusa - Franklin 500kV	-1109
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1007
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-931
Rex Brown W - Rex Brown C 115kV ckt 1	Ray Braswell 500/115kV transformer 1	-919
Semere - Scott2 138kV	Richard - Wells 500kV	-837
Rex Brown W - Rex Brown C 115kV ckt 1	South Jackson 230/115kV transformer 1	-783
Mallalieu (MEPA) - Norfield 115kV	Bogalusa - Adams Creek 500/230kV transformer	-662
Mallalieu (MEPA) - Norfield 115kV	Bogalusa - Franklin 500kV	-662
North Crowley - Richard 138kV	Richard - Wells 500kV	-655
Habetz - Richard 138kV	Richard - Wells 500kV	-572
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-430
Rex Brown W - Rex Brown C 115kV ckt 1	Jackson HICO - North Jackson 115kV	-385
Rex Brown W - Rex Brown C 115kV ckt 1	Jackson HICO - Rex Brown E 115kV	-385
Richard - Scott1 138kV	Webre - Wells 500kV	-281
Jackson Miami - Rex Brown 115kV	South Jackson 230/115kV transformer 1	-231
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-223
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	-36
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-36
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-20
Rex Brown W - Rex Brown C 115kV ckt 1	Klean - Jackson Northeast 115kV	12
Rex Brown W - Rex Brown C 115kV ckt 1	North Jackson - Jackson Canton Road 115kV	50
Willow Glen 500/230kV Transformer	Waterford - Willow Glen 500kV	-2206

## SOCO

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-1390
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-1156
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1144
Semere - Scott2 138kV	Richard - Wells 500kV	-955
North Crowley - Richard 138kV	Richard - Wells 500kV	-745
Habetz - Richard 138kV	Richard - Wells 500kV	-651
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-587
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-254
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-23



**SPA**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
Richard - Scott1 138kV	Richard - Wells 500kV	-1681
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1384
North Crowley - Richard 138kV	Richard - Wells 500kV	-900
Habetz - Richard 138kV	Richard - Wells 500kV	-791
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-782

**TVA**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
Richard - Scott1 138kV	Richard - Wells 500kV	-1480
Willow Glen 500/230kV Transformer	Big Cajun 2 - Fancy Point 500kV	-1255
North Crowley - Scott1 138kV	Richard - Wells 500kV	-1218
Semere - Scott2 138kV	Richard - Wells 500kV	-1017
North Crowley - Richard 138kV	Richard - Wells 500kV	-793
Habetz - Richard 138kV	Richard - Wells 500kV	-694
Willow Glen - Webre 500kV	Coly - McKnight 500kV	-654
Colonial Academy - Richard 138kV	Richard - Wells 500kV	-271
Acadia GSU - Colonial Academy 138kV	Richard - Wells 500kV	-24

### 2.3.3 DETAILS OF SCENARIO 3 - 2014

#### AECI

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### AEP-W

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### AMRN

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### CLECO

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### EES

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### EMDE

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### LAF A

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### LAGN

Limiting Element	Contingency Element	ATC
Sterlington 500/115kV transformer 2	Sterlington 500/115kV transformer 1 and 3 TestContingency	-1589
Sterlington 500/115kV transformer 1	Sterlington 500/115kV transformer 2 and 3 TestContingency	-1179

#### LEPA

Limiting Element	Contingency Element	ATC
Fancy Point - Port Hudson 230kV ckt 2	Fancy Point - Port Hudson 230kV ckt 1	-3795
Fancy Point - Port Hudson 230kV ckt 2	Coly 500/230kV transformer	-645
Fancy Point - Port Hudson 230kV ckt 2	Coly - McKnight 500kV	-88
Raceland - Coteau 115kV	Terrebonne 230/115kV transformer	-39
Raceland - Coteau 115kV	Landry - Raceland 230kV	27

**OKGE**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
NONE	NONE	50

**SMEPA**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
Jackson Forrest Hill - Ray Braswell 115kV	South Jackson 230/115kV transformer 1	-417
Ray Braswell 500/115kV transformer 1	Ray Braswell 500/230kV transformer ckt1 and ckt2 Test Contingency	-207

**SOCO**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
NONE	NONE	50

**SPA**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
NONE	NONE	50

**TVA**

<b>Limiting Element</b>	<b>Contingency Element</b>	<b>ATC</b>
NONE	NONE	50

### 2.3.4 DETAILS OF SCENARIO 4 - 2014

#### AECI

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-1905
Richard - Scott1 138kV	Richard - Wells 500kV	-160

#### AEP-W

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-2403
Richard - Scott1 138kV	Richard - Wells 500kV	-185

#### AMRN

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-1835
Richard - Scott1 138kV	Richard - Wells 500kV	-156

#### CLECO

Limiting Element	Contingency Element	ATC
NONE	NONE	50

#### EES

Limiting Element	Contingency Element	ATC
Addis - Big Cajun 1 230kV	Webre - Bayou Laboutte 500kV ckt1	-1089
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-923
Coly 500/230kV transformer	Coly - Willow Glen 500kV	-578
Richard - Scott1 138kV	Richard - Wells 500kV	-154

#### EMDE

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-2007
Richard - Scott1 138kV	Richard - Wells 500kV	-165

#### Lafa

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-61

#### LAGN

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-3941
Sterlington 500/115kV transformer 2	Sterlington 500/115kV transformer 1 and 3 TestContingency	-2421
Sterlington 500/115kV transformer 1	Sterlington 500/115kV transformer 2 and 3 TestContingency	-2009

Limiting Element	Contingency Element	ATC
Richard - Scott1 138kV	Richard - Wells 500kV	-178

#### LEPA

Limiting Element	Contingency Element	ATC
Fancy Point - Port Hudson 230kV ckt 2	Fancy Point - Port Hudson 230kV ckt 1	-4612
Fancy Point - Port Hudson 230kV ckt 2	Coly 500/230kV transformer	-1863
Fancy Point - Port Hudson 230kV ckt 2	Coly - McKnight 500kV	-1350
Addis - Big Cajun 1 230kV	Webre - Bayou Laboutte 500kV ckt1	-797
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-483
Vatican - Scott1 138kV	Coughlin - Plaisance 138kV (CLECO)	-478
Coly 500/230kV transformer	Coly - Willow Glen 500kV	-174
Richard - Scott1 138kV	Richard - Wells 500kV	-90

#### OKGE

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-2124
Richard - Scott1 138kV	Richard - Wells 500kV	-172

#### SMEPA

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-1098
Jackson Forrest Hill - Ray Braswell 115kV	South Jackson 230/115kV transformer 1	-755
Rex Brown W - Rex Brown C 115kV ckt 1	Ray Braswell 500/115kV transformer 1	-695
Rex Brown W - Rex Brown C 115kV ckt 1	South Jackson 230/115kV transformer 1	-590
Richard - Scott1 138kV	Richard - Wells 500kV	-120
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	-74
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-74
Jackson Miami - Rex Brown 115kV	South Jackson 230/115kV transformer 1	-4

#### SOCO

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-1501
Richard - Scott1 138kV	Richard - Wells 500kV	-136

#### SPA

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-2000
Richard - Scott1 138kV	Richard - Wells 500kV	-165

#### TVA

Limiting Element	Contingency Element	ATC
Webre - Bayou Laboutte 500kV ckt1	Coly - McKnight 500kV	-1669
Richard - Scott1 138kV	Richard - Wells 500kV	-145

## APPENDIX A: Approved Projects and Transactions in Study Mode

Year	Approved Future Projects
2009 – 2013	2009F EAI Danville 161 kV Substation Rev 0.idv
	2009S EAI Blythville POD - AECC Rev 1.idv
	2009S EAI Conway West - Donaghey 161 kV Line Reconductor.idv
	2009S EAI Gillette 115 kV Substation.idv
	2009S EAI Hamlet 161 kV Substation Rev 1.idv
	2009S EAI Sarepta Project Rev 0.idv
	2009W EAI Harrison East to Everton Road 161 kV Line Rev 1.idv
	2010S EAI AECC Avilla POD Rev 2.idv
	2010S EAI Coffeeville POD - AECC Rev 0.idv
	2010S EAI Melbourn - Sage 161 kV Line Upgrade Line Rev 0.idv
	2010S EAI Parkin to Twist 161 kV Line Trap Rev 0.idv
	2010S EAI Transmission Service (OG&E) Rev 0.idv
	2010S EAI Warren East 115 kV Substation Install Capacitor Bank Rev 1.idv
	2010Z EAI Beebe 115 kV Substation - Install Capacitor Bank Rev 0.idv
	2010Z EAI Donaghey - Conway South 161 kV Rev 1.idv
	2010Z EAI SMEPA (Plum Point) Rev 1.idv
	2011S EAI Osage Creek-Grandview New Line Rev 2.idv
	2012S EAI Albright (HS Hamilton) Substation 2014 Load.idv
	2012S EAI Cofer Road (Crawford) Substation 2014 Load Rev 0.idv
	2011W EAI Transmission Service (Aquila) Rev 0.idv
	2012S EAI Westar Transmission Service Rev 0.idv
	2009S EGSL Acadia 138 kV Substation capbank.idv
	2010Z EGSL Addis to Cajun 230kV line upgrade.idv
	2011S EGSL Acadiana Area Improvement Project Phase 1 Rev 1.idv
	2011S EGSL Alchem - Monochem 138 kV line upgrade.idv
	2011S EGSL Construct New Youngsville 138 kV Sub (run AAIP 1 first).idv
	2012S EGSL Acadiana Area Improvement Project Phase 2 (run AAIP 1 first).idv
	2012S EGSL Construct new Nelson to Moss Bluff 230 kV line.idv
	2012S EGSL Tejac to Marydale Upgrade 69 kV line.idv
	2012S EGSELL Loblolly-Hammond Build 230kV Line.idv
	2014S Gulf Oxygen Load Correction.idv
	2009W ELLN Delhi 115 kV Substation - Add Cap Bank.idv
	2010W ELLN Delhi 115 kV Substation - Add series reactor.idv
	2010Z ELLS Bogalusa to Adams Creek 230 kV No 2.idv
	2010Z ELLS Snakefarm to Kenner 115 kV line upgrade.idv
	2011S ELLN Sarepta Project.idv
	2012S ELLS Bayou LaBoutte Construct new 500-230 kV Substation.idv
	2012 ELLN Ouachita Project Set 2 Run Second.idv
	2013S ELLN Ouachita Projects Set 1 Run First.idv
	2009W EMI Grenada-Winona-Greenwood Area Improvement Phase I.idv
	2010S EMI Grand Gulf Uprate Project.idv
	2010S EMI Indianola-Greenwood 115 kV Line Upgrade.idv
	2010S EMI Magee 115 kV substation - Replace switches.idv
	2010Z EMI TVA Affected System Upgrades.idv
	2011S EMI Church Road Substation (2014 load).idv
	2011S EMI Sunnybrook-only-2011.idv
	2011S EMI Waterways - Vicksburg East 115 kV Line Upgrade.idv
	2011Z EMI Florence - Florence SS - Star 115 kV Line Upgrade.idv
	2011Z EMI Grand Gulf Uprate add vars.idv
	2012S EMI Grenada-Winona-Greenwood Area Improvement Phase II.idv
	2012S EMI Ridgeland-Madison Reliability Improvement (Sunnybrook-2014).idv
	2009F ETI Gulfway 230kV Substation.idv
	2009S ETI Beaumont 69 kV Improvement Plan Option 2.idv
	2009S ETI Newton Bulk Replace Re-tap CT to Increase Rating on Holly Springs Line.idv
	2009S ETI Porter-Tamina Replace Breaker & Switches.idv
	2009W ETI Fawil Upgrade 138-69 kV Auto.idv

Year	Approved Future Projects
	2010S ETI Temco and Shepherd 138kV Substations.idv
	2010S ETI Western Region Reliability Improvement Plan Phase 3 Interim (Part 1).idv
	2010W ETI Western Region Reliability Improvement Plan Phase 3 Interim (Part 3).idv
	2011S ETI Grand Gulf Uprate Project.idv
	2011S ETI Western Region Reliability Improvement Plan Phase 3 Interim (Part 2).idv
	2011W ETI Tamina to Cedar Hill 138 kV line.idv

Prior Generation Interconnection NRIS requests that were included in this study:

PID	Substation	MW	In Service Date
PID 221	Wolfcreek	875	In Service
PID 223	PID-223 Tap	125	10/1/2010
PID 224	PID-224 Tap	100	12/1/2009
PID 233	PID-233	150	4/30/2011
PID 238	Hinds	550	9/1/2010
PID 240	Hot Springs	650	9/1/2010
PID 247	Stowell	180	12/31/2013

Prior transmission service requests that were included in this study:

OASIS #	PSE	MW	Begin	End
1668165	Entergy Services (SPO)	600	1/1/2013	1/1/2043
74597193	NRG Power Marketing	300	1/1/2013	1/1/2018
74597198	NRG Power Marketing	300	1/1/2013	1/1/2018
74598251	NRG Power Marketing	15	1/1/2013	1/1/2018
74598429	NRG Power Marketing	10	1/1/2013	1/1/2018
74691007	NRG Power Marketing	60	1/1/2013	1/1/2018
74728324	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728369	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728376	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728382	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728386	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728388	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728393	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728395	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728400	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728402	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728406	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728408	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728415	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74728420	Brazos Electric Cooperative	100	1/1/2012	1/1/2017
74789476	Entergy Services (SPO)	74	1/1/2012	1/1/2016