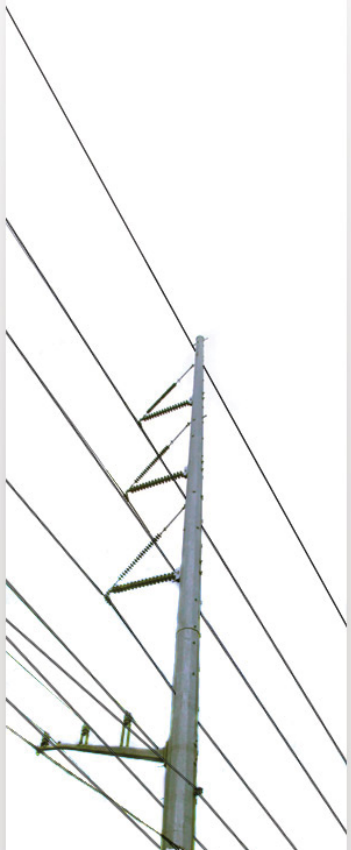
SPP Southwest Power Pool



Helping our members work together

to keep the lights on...

today & in the future

Entergy SPP RTO Regional Planning Process

Final meeting of 2009 ESRPP

Net Conference

March 4, 2010

Joint Planning Committee (JPC)

- **JPC Contacts**
  - **ICT Planning – Eric Burkey**
  - **SPP RTO Planning – Tim McGinnis**
  - **Entergy Technical Services – Paul Simoneaux**
- **JPC Roles and Responsibilities**
  - **Develop Study Scope**
  - **Perform Study Analysis**
  - **Coordinate Regional Stakeholder Communication**

Initial Proposed Projects

- Turk - Fulton - El Dorado 345kV
- 4 GW Wind from SPP to Entergy
- Balanced Portfolio 3e “adjusted” follow-up
- Re-evaluate of Ozarks plan
- Osage Creek – ISES 345 or 500kV
- Turk - McNeill 345kV
- Messick 500/230kV transformer
- Spadra - Russellville 161 kV
- Flint Creek - Chamber Springs - Fort Smith – ANO 345kV
- Flint Creek - Chamber Springs - Fort Smith - NW Texarkana 345kV
- Osage Creek - Cox Creek - Gobbler Knob 345kV

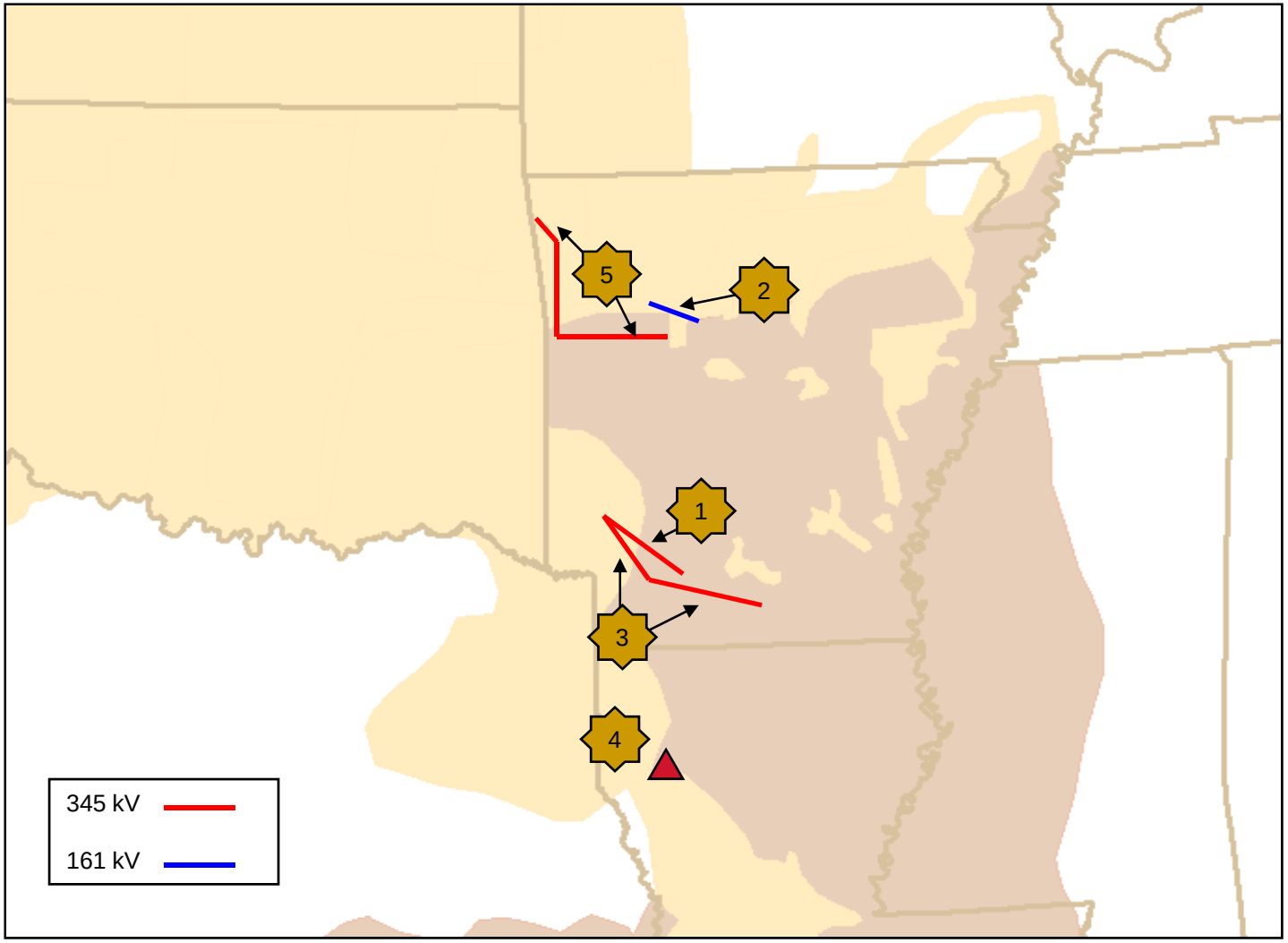
How studies were selected

- **Each Regional Participant was allotted five votes**
- **Voting was reserved for the affected systems to the Entergy and SPP RTO seam**
- **1 vote for each project or all five votes to one project**
- **Because of the extensive scope of projects 2 and 4, each of these studies did count as 3 of the 5 Regional Studies**

Selected Projects

- **Turk – McNeil 345kV Line**
- **Spadra – Russellville 161kV Line**
- **Turk – Fulton – El Dorado 345kV Line**
- **Messick 500/230 kV Transformer**
- **Flint Creek – Chamber Springs – Fort Smith – ANO 345kV Line**

Regional Study Overview Map



Objectives

- **Improve Regional Transfer Capability**
- **Improve Regional Optimization**
- **Relieve Constraining Flowgates**

General Study Assumptions

- **MUST DC analysis of FCITC**
- **Monitored and Contingent Elements**
  - **115kV and above elements within:**
    1. **Entergy Zones adjacent to SPP**
    2. **SPP Areas adjacent to Entergy**
  - **All elements 345kV and above in SPP and Entergy**
- **N-1 Contingency Scan (no breaker-to-breaker scan)**

Model Assumptions

- **MDWG 2009 Series 2014 Summer Peak Model with STEP Projects**
  - **Modifications to Model**
    1. **Using Entergy's 2008 series 2014 Summer Peak Update 3A**
       A. **Added Current Entergy Generation and Loads**
       B. **Added Entergy Topology updates**
    2. **Added Entergy's Approved Construction Plan Projects (2009 – 2011)**

Study Assumptions

- **Identical POR/POD Transfer Analyses performed for all study projects**
- **FCITC Changes from the Base Case were identified**
- **Performed Transfer analysis using PSS/MUST**
- **Transfer Analysis Validation**
  - **Joint Effort (ICT, RTO, Entergy)**

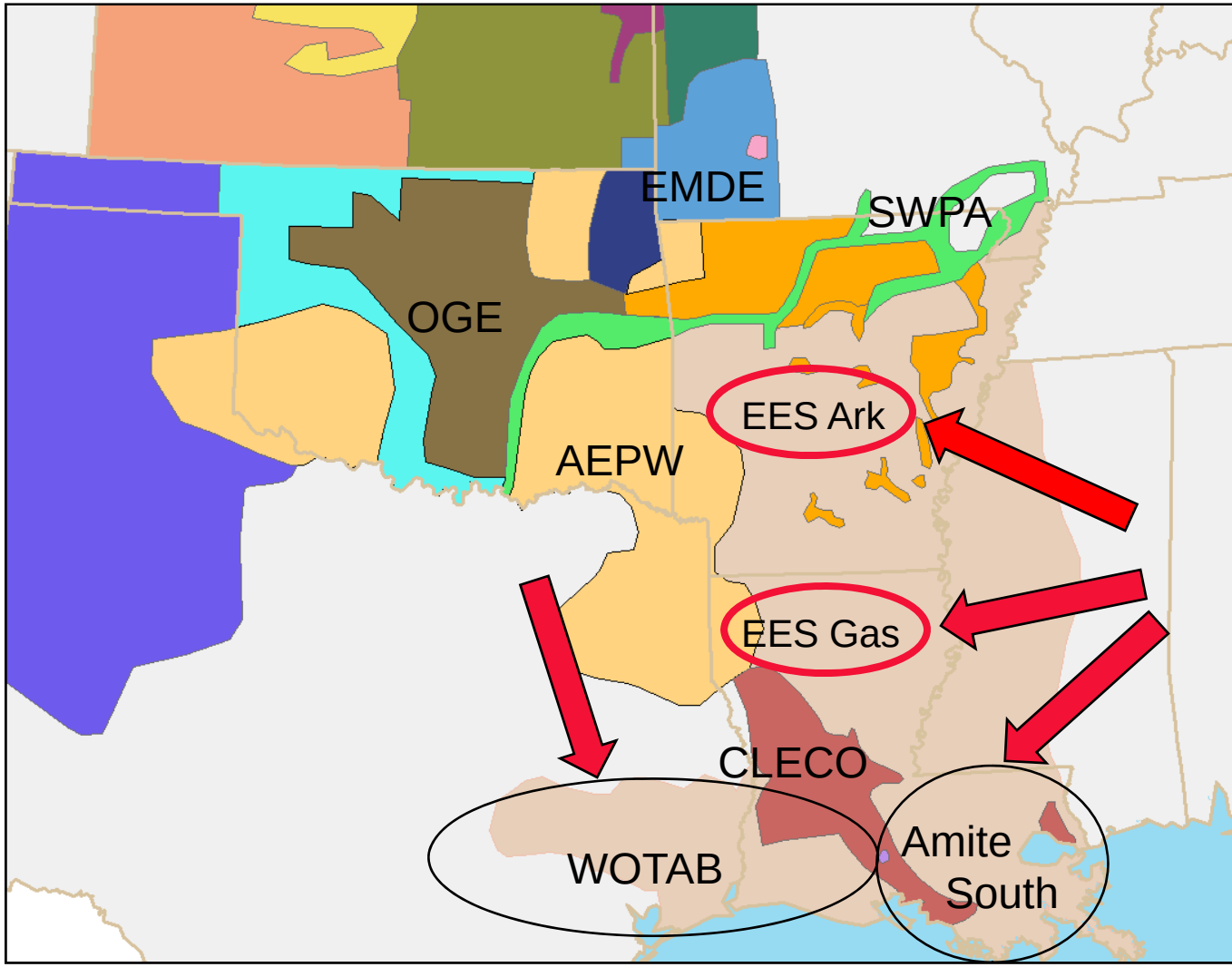
Source/Sink Areas for Transfer Analysis

SPP Areas

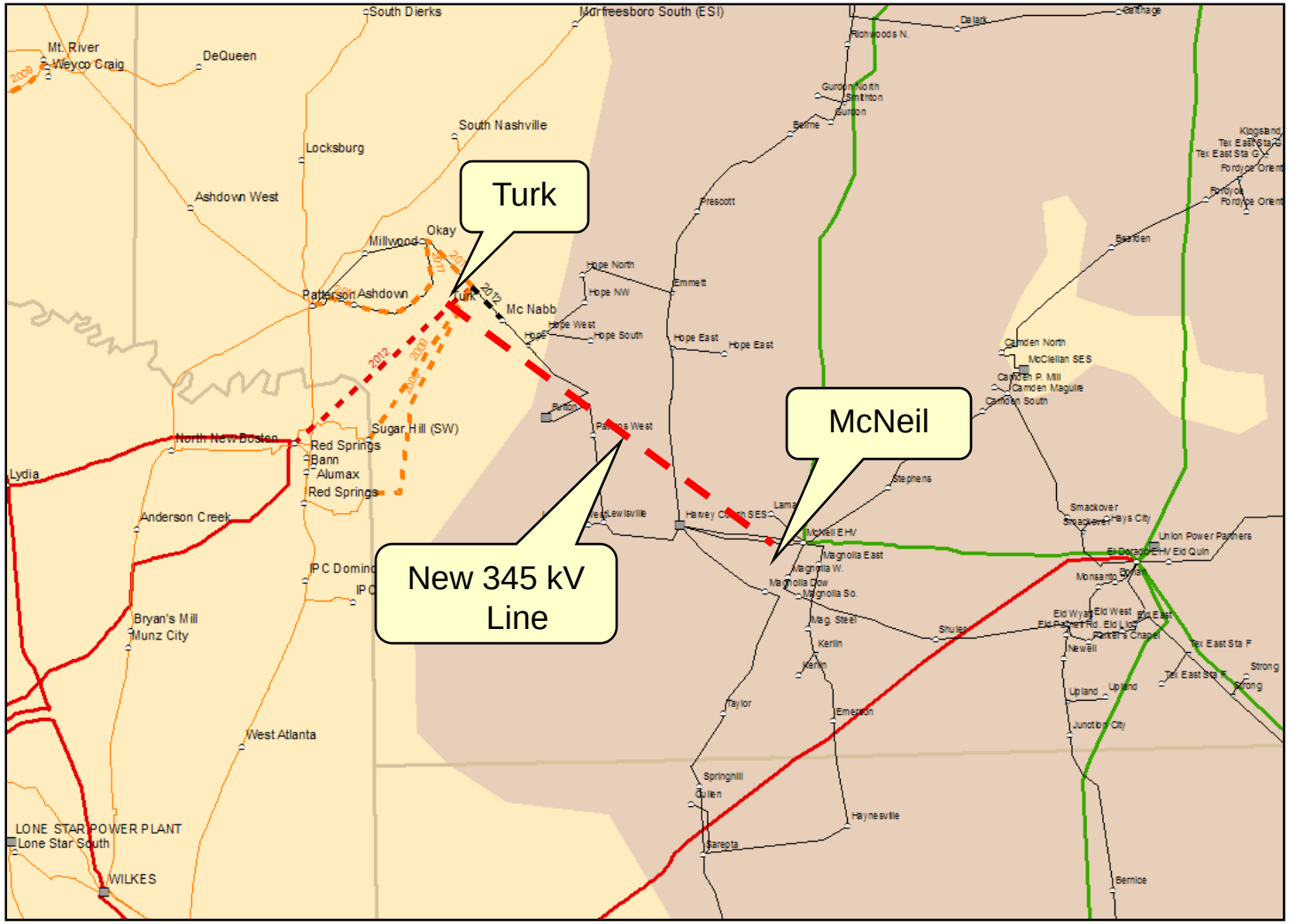
- **SPP (all)**
- **AEP West**
- **CLECO**
- **OG&E**
- **Empire District**
- **SWPA**

Entergy Areas

- **Entergy (all)**
- **Entergy Gas Units (Primarily Louisiana)**
- **Entergy Arkansas**
- **Amite South**
- **WOTAB**



(#1) Turk – McNeil 345 kV



Project Description

- **Transmission Line**
  - **Turk – McNeil 345kV Transmission Line**
    - **Approximately 45 miles direct**
- **Substation Work**
  - **McNeil Substation**
    - **500/345kV Transformer**
    - **New 345kV Switchyard**
  - **Turk Substation**
    - **345kV Terminal Equipment**

High-Level Planning Cost Estimates

Description	Line Rating	Upgrade Description	ICT Cost Estimate
Turk – McNeil 345kV line	(1959MVA) ~1800A	Build new transmission line 45 miles	$60,750,000
McNeil 500/345kV substation	(1959MVA)	New 500/345kV transformer and new 345kV switchyard	$25,000,000
Turk 345kV substation		Build new 345kV bus with breakers and switches	$10,000,000
Total Cost			$95,750,000

FCITC Results (Turk – McNeil 345 kV)

Project 1		AEPW	CLECO	EMDE	OGE	SPP	SWPA
Amite South	POR	No Benefit	No Benefit	No Benefit	817 (-435)	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Arkansas	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	347 (2040)	No Benefit	No Benefit	No Benefit	200 (2926)	No Benefit
Entergy Oil & Gas Units	POR	No Benefit	No Benefit	No Benefit	No Benefit	130 (-1172)	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	121 (1660)	No Benefit
Entergy	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	111 (1342)	No Benefit	No Benefit	No Benefit	178 (1962)	No Benefit
WOTAB	POR	161 (256)	No Benefit	No Benefit	No Benefit	126 (209)	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit

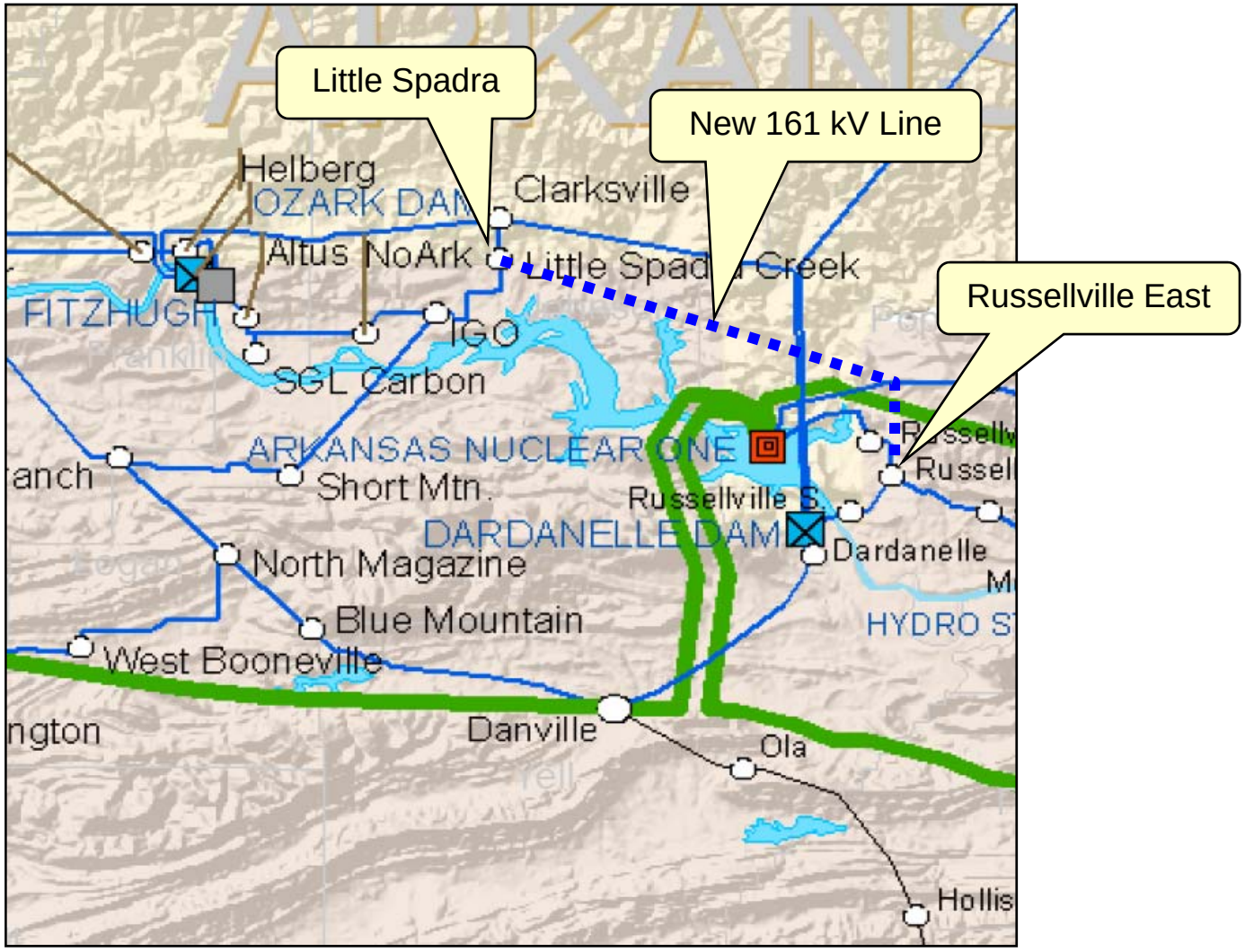
Details (Transfer and 1st LE)

- **Amite South → OGE**
  - **Sterlington 500/115kV transformer FTLO Sterlington – El Dorado 500kV**
- **AEPW → Entergy Arkansas**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**
- **AEPW → Entergy**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**
- **Entergy Oil & Gas Units → SPP**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford 230kV**
- **SPP → Entergy Arkansas**
  - **West Gardner – Stilwell 345kV FTLO Stilwell – Lacygne 345kV**

Details Contd.

- **SPP → Entergy Oil & Gas Units**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**
- **SPP → Entergy**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**
- **WOTAB → AEPW**
  - **Russellville East – Russellville North 161kV FTLO ANO – Ft. Smith 500kV**
- **WOTAB → SPP**
  - **Russellville East – Russellville North 161kV FTLO ANO – Ft. Smith 500kV**

(#2) Spadra – Russellville 161kV



Project Description

- **Transmission Line**
  - **Little Spadra – Russellville East 345kV Transmission Line**
    - **Approximately 45 miles direct**
- **Substation Work**
  - **Little Spadra Substation**
    - **Terminal Equipment**
  - **Russellville East Substation**
    - **Terminal Equipment**

High-Level Planning Cost Estimates

Description	Line Rating	Upgrade Description	ICT Cost Estimate
Little Spadra-Russellville East 161kV line	(448MVA) ~1570A	Build new 161kV transmission line 30 miles	$39,000,000
Little Spadra 161kV substation		Build new 161kV bus with breakers and switches	$5,000,000
Russellville East 161kV substation		Build new 161kV bus with breakers and switches	$5,000,000
Total Cost			$49,000,000

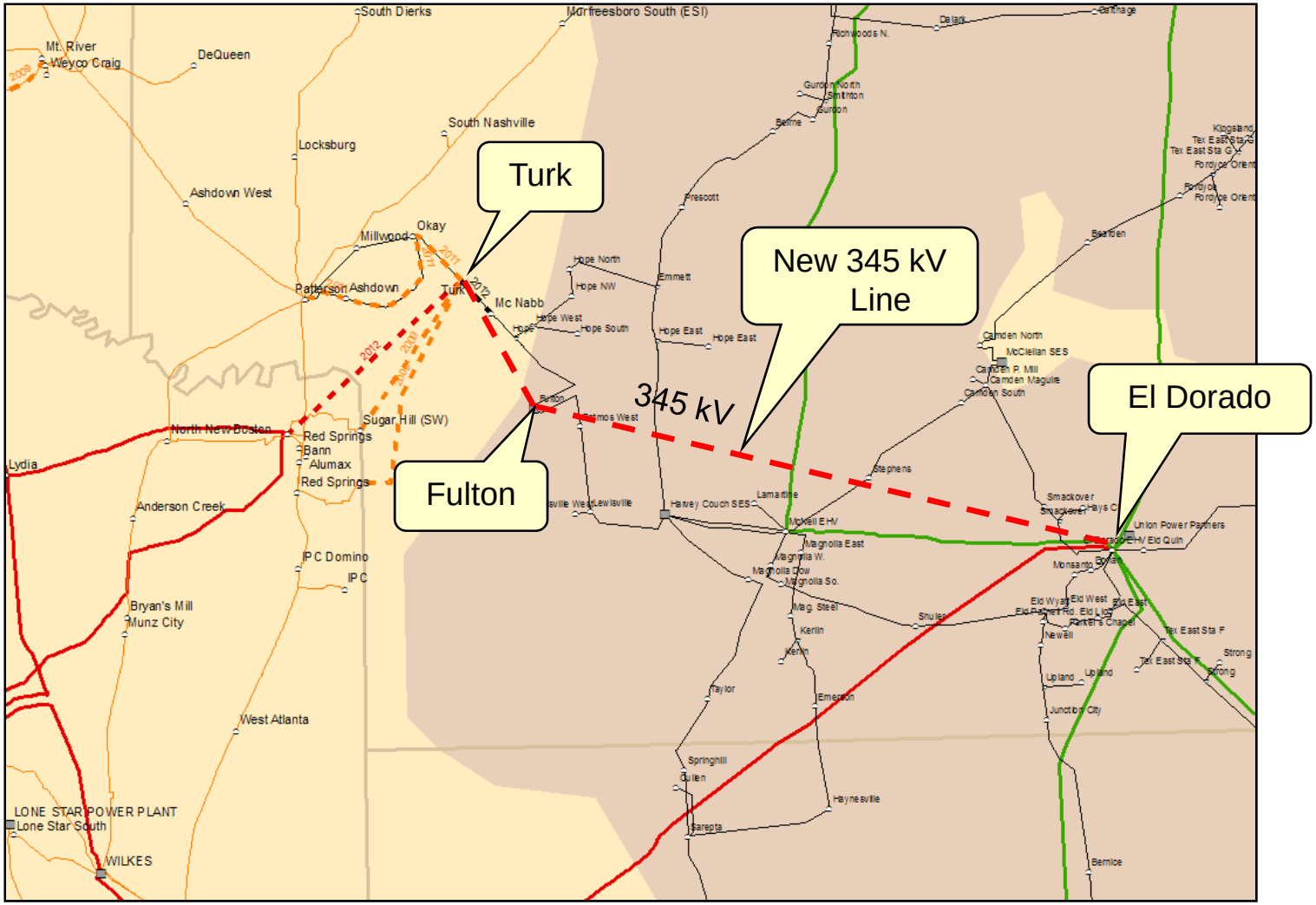
FCITC Results (Spadra – Russellville 161kV)

Project 2		AEPW	CLECO	EMDE	OGE	SPP	SWPA
Amite South	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Arkansas	POR	No Benefit	No Benefit	330 (-763)	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Oil & Gas Units	POR	No Benefit	No Benefit	125 (-919)	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy	POR	No Benefit	No Benefit	118 (-914)	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
WOTAB	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit

Details (Transfer and 1st LE)

- **Entergy Arkansas → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES – Dell 500kV**
- **Entergy Oil & Gas Units → EMDE**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford 230kV**
- **Entergy → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES – Dell 500kV**

(#3) Turk – Fulton – El Dorado 345 kV



Project Description

- **Transmission Lines**
  - **Turk – Fulton 345kV Transmission Line**
    - **Approximately 15 miles direct**
  - **Fulton – El Dorado 345kV Transmission Line**
    - **Approximately 65 miles direct**
- **Substation Work**
  - **Fulton Substation**
    - **345kV Breaker Station**
    - **345/115kV Transformer**

Project Description Contd.

- **Substation Work**
  - **El Dorado Substation**
    - **2nd 500/345kV Breaker Station**
    - **345kV Terminal Equipment**
  - **Turk Substation**
    - **345kV Terminal Equipment**

High-Level Planning Cost Estimates

Description	Line Rating	Upgrade Description	ICT Cost Estimate
Turk – McNeil 345kV line	(1959MVA) ~1800A	Build new transmission line 45 miles	$60,750,000
Fulton-El Dorado 345kV line	(1959MVA) ~1800A	Build new transmission line 65 miles	$87,750,000
McNeil 500/345kV substation	(1959MVA)	New 500/345kV transformer and new 345 kV switchyard	$25,000,000
El Dorado 500/345kV substation	(1959MVA)	New 500/345kV transformer and new 345 kV switchyard	$25,000,000
Turk 345kV substation		Build new 345kV bus with breakers and switches	$10,000,000
Total Cost			$208,500,000

FCITC Results (Turk – Fulton – El Dorado 345 kV)

Project 3		AEPW	CLECO	EMDE	OGE	SPP	SWPA
Amite South	POR	No Benefit	No Benefit	No Benefit	810 (-442)	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Arkansas	POR	1416 (190)	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	211 (1929)	No Benefit	No Benefit	No Benefit	134 (2859)	No Benefit
Entergy Oil & Gas Units	POR	No Benefit	No Benefit	No Benefit	No Benefit	347 (-905)	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy	POR	113 (199)	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	142 (1984)	No Benefit
WOTAB	POR	122 (217)	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit

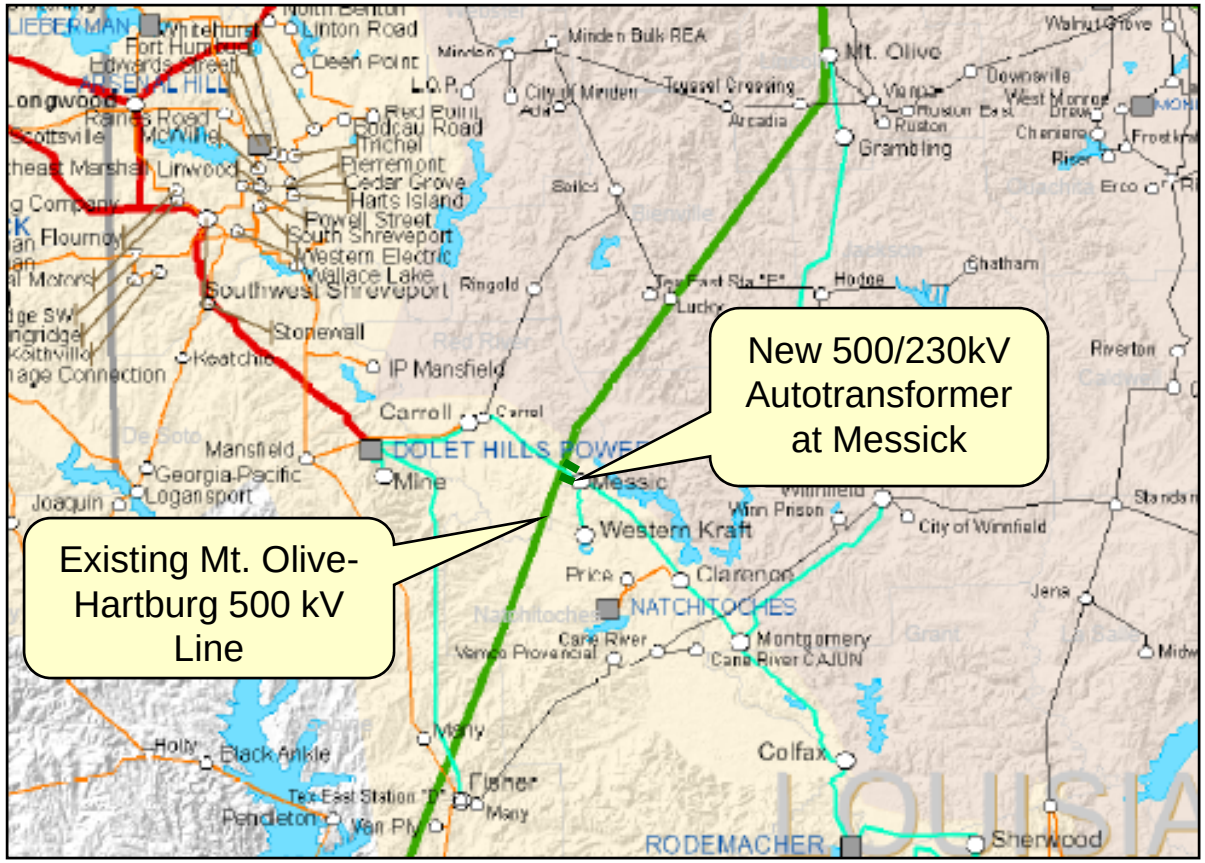
Details (Transfer and 1st LE)

- **Amite South → OGE**
  - **Sterlington 500/115kV transformer FTLO Sterlington – El Dorado 500kV**
- **AEPW → Entergy Arkansas**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**
- **Entergy Arkansas → AEPW**
  - **Russellville East – Russellville North 161kV FTLO ANO – Ft Smith 500kV**
- **Entergy Oil & Gas Units → SPP**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford 230kV**
- **Entergy → AEPW**
  - **Russellville East – Russellville North 161kV FTLO ANO – Ft Smith 500kV**
- **SPP → Entergy**
  - **Grimes – Mt. Zion 138kV FTLO Grimes – Walden 138kV**

Details Contd. (Transfer and 1st LE)

- **SPP → Entergy Arkansas**
  - **West Gardner – Stilwell 345kV FTLO Stilwell – Lacygne 345kV**
- **WOTAB → AEPW**
  - **Russellville East – Russellville North 161kV FTLO ANO – Ft. Smith 500kV**

(#4) Messick 500/230kV Autotransformer



Project Description

- **Substation Work**
  - **Messick Substation**
    - **500kV Switching Station**
    - **500/230kV Transformer**

High-Level Planning Cost Estimates

Description	Line Rating	Upgrade Description	ICT Cost Estimate
Messick 500/230kV substation	(855MVA)	New 500/230kV transformer and new 500/230kV switching station	$25,000,000
Total Cost			$25,000,000

FCITC Results (Messick 500/230kV transformer)

Project 4		AEPW	CLECO	EMDE	OGE	SPP	SWPA
Amite South	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	145 (135)	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Arkansas	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	109 (118)	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Oil & Gas Units	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	132 (123)	No Benefit	No Benefit	No Benefit	No Benefit
Entergy	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	127 (118)	No Benefit	No Benefit	No Benefit	No Benefit
WOTAB	POR	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
	POD	No Benefit	172 (160)	No Benefit	No Benefit	No Benefit	No Benefit

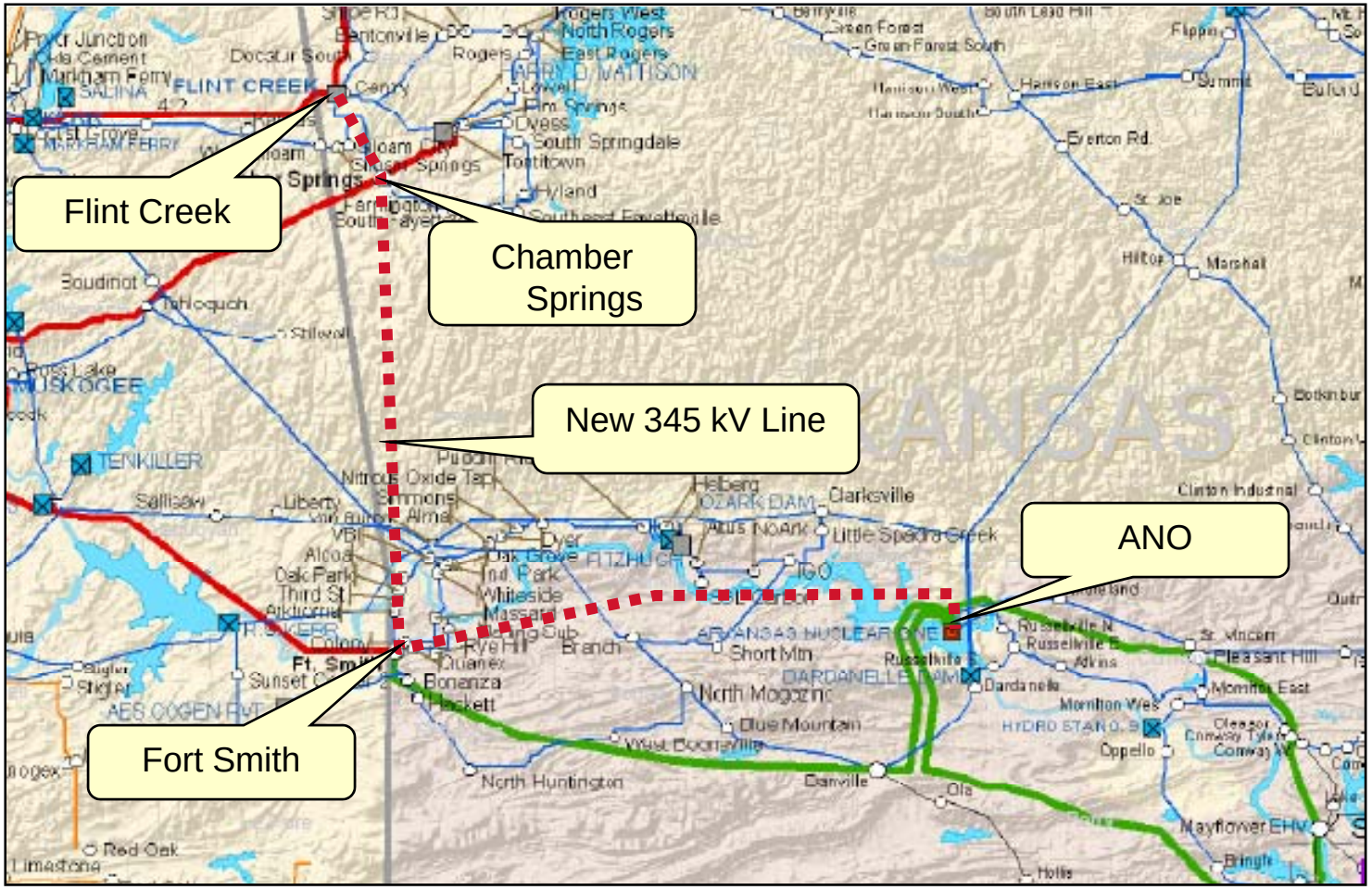
Details (Transfer and 1st LE)

- **Cleco → Amite South**
  - **Beaver Creek – Jena 115kV FTLO Colfax – Rodemacher 230kV**
- **Cleco → Entergy Arkansas**
  - **Beaver Creek – Jena 115kV FTLO Colfax – Rodemacher 230kV**
- **Cleco → Entergy Oil & Gas Units**
  - **Beaver Creek – Jena 115kV FTLO Colfax – Rodemacher 230kV**
- **Cleco → Entergy**
  - **Beaver Creek – Jena 115kV FTLO Colfax – Rodemacher 230kV**
- **Cleco → WOTAB**
  - **Beaver Creek – Jena 115kV FTLO Colfax – Rodemacher 230kV**

Flowgate Relief

- **Hartburg - Mt. Olive 500 FTLO Webre - Wells 500**
  - **Stability limited at 1050MW due to Voltage**
  - **Could be looked at in a detailed step 2 Analysis**

(#5) Flint Creek – Chamber Springs – Fort Smith – ANO 345kV Line



Project Description

- **Transmission Line**
  - **Flint Creek – Chamber Springs 345kV Transmission Line**
    - **Approximately 12 miles direct**
  - **Chamber Springs – Fort Smith 345kV Transmission Line**
    - **Approximately 60 miles direct**
  - **Fort Smith – ANO 345kV Transmission Line**
    - **Approximately 65 miles direct**

Project Description Contd.

- **Substation Work**
  - **ANO Substation**
    - **New 345kV Switchyard**
    - **500/345kV Transformer**
  - **Flint Creek Substation**
    - **345kV Terminal Equipment**
  - **Chamber Springs Substation**
    - **345kV Terminal Equipment**
  - **Fort Smith Substation**
    - **345kV Terminal Equipment**

High-Level Planning Cost Estimates

Description	Line Rating	Upgrade Description	ICT Cost Estimate
Flint Creek - Chamber Springs 345kV line	(1959MVA) ~1800A	Build new transmission line 12 miles	$16,200,000
Chamber Springs - Fort Smith 345kV line	(1959MVA) ~1800A	Build new transmission line 60 miles	$81,000,000
Fort Smith - ANO 345kV line	(1959MVA) ~1800A	Build new transmission line 65 miles	$87,750,000
ANO 500/345kV substation	(1959MVA)	New 500/345kV transformer and new 345 kV switchyard	$25,000,000
Fort Smith 345kV substation		Build new 345kV bus with breakers and switches	$10,000,000
Chamber Springs 345kV substation		Build new 345kV bus with breakers and switches	$10,000,000
Flint Creek 345kV substation		Build new 345kV bus with breakers and switches	$10,000,000
Total Cost			$239,950,000

Project Description Contd.

- **Special Notice:**

  Entergy's ANO substation does not contain any 345kV bus work or lines. Since Oklahoma Gas & Electric's Fort Smith substation is configured to 500kV, we propose that line ANO – Ft Smith be configured at the 500kV level. The new line would run parallel to the existing 500kV Line that is currently in place between these 2 substations. The change from 345kV to 500kV should have minimal effect on the analysis that has been performed. The change from 345kV to 500kV will increase the high level planning cost estimates listed by at least $83M.

FCITC Results (Flint Creek – Chamber Springs – Fort Smith – ANO 345kV)

Project 5		AEPW	CLECO	EMDE	OGE	SPP	SWPA
Amite South	POR	No Benefit	No Benefit	166 (-876)	771 (-481)	No Benefit	155 (-601)
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Arkansas	POR	1632 (406)	No Benefit	417 (-676)	186 (-981)	182 (-959)	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy Oil & Gas Units	POR	No Benefit	No Benefit	124 (-920)	251 (-910)	345 (-907)	No Benefit
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
Entergy	POR	225 (225)	No Benefit	211 (-820)	226 (-914)	2228 (1000)	147 (-574)
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit
WOTAB	POR	133 (228)	No Benefit	135 (-867)	274 (335)	291 (374)	154 (-597)
	POD	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit	No Benefit

Details (Transfer and 1st LE)

- **Amite South → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES - Dell**
- **Amite South → OGE**
  - **Sterlington 500/115kV transformer FTLO Sterlington – El Dorado 500kV**
- **Amite South → SWPA**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**
- **Entergy Arkansas → AEPW**
  - **International Paper – Mansfield 138kV FTLO Dolet Hills – SW Shreveport 345kV**
- **Entergy Arkansas → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**

Details Contd. (Transfer and 1st LE)

- **Entergy Arkansas → OGE**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**
- **Entergy Arkansas → SPP**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**
- **Entergy Oil & Gas Units → EMDE**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford**
- **Entergy Oil & Gas Units → OGE**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford**
- **Entergy Oil & Gas Units → SPP**
  - **Belle Point – Little Gypsy 230kV FTLO Tezcuco – Waterford**
- **Entergy → AEPW**
  - **International Paper – Mansfield 138kV FTLO Dolet Hills – SW Shreveport 345kV**

Details Contd. (Transfer and 1st LE)

- **Entergy → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES - Dell**
- **Entergy → OGE**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**
- **Entergy → SPP**
  - **Melbourne – Sage 161kV FTLO ISES - Dell**
- **Entergy → SWPA**
  - **Melbourne – Sage 161kV FTLO ISES – Dell**
- **WOTAB → AEPW**
  - **International Paper – Mansfield 138kV FTLO Dolet Hills – SW Shreveport 345kV**
- **WOTAB → EMDE**
  - **Melbourne – Sage 161kV FTLO ISES - Dell**

Details Contd. (Transfer and 1st LE)

- **WOTAB → OGE**
  - **International Paper – Mansfield 138kV FTLO Dolet Hills – SW Shreveport 345kV**
- **WOTAB → SPP**
  - **International Paper – Mansfield 138kV FTLO Dolet Hills – SW Shreveport 345kV**
- **WOTAB → SWPA**
  - **Melbourne – Sage 161kV FTLO ISES - Dell**

Summary

- **ESRPP 2009 Report is posed on Entergy's OASIS:**

  http://www.oatioasis.com/EES/EESDocs/2009_ESRPP_Step_1_Report_2-19-2010_Final.pdf

- **2010 ESRPP Study**
  - **Any projects from the 2009 cycle can be selected for a Detailed Step 2 Analysis**

Questions

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