Southwestern Public Service Company:

10-Year Transmission Plan / 20-Year Scenario Assessment

December 2010

This report contains transmission planning data that may be conceptual in nature and is subject to change. The transmission projects listed may change scope or may not be constructed

Purpose and Scope

- **Purpose:**
  - **Document the Southwestern Public Service Company (SPS) transmission system plans looking forward 10 years**
  - **Scenario assessment looking forward 20 years**
- **Scope of work:**
  - **Perform an annual assessment and update of the SPS transmission requirements**
    - **NERC reliability standards compliance requirements**
    - **Load forecast, including wholesale loads (2010)**
    - **Resource plan (2010)**
    - **Applicable TX, NM Renewable Energy Standards**
    - **Sold firm transmission service from generation interconnection requests**
  - **Scenario assessment:**
    - **Export capability from SPS of possible ITP20 EHV transmission additions within SPS**
- **Stakeholder input**
  - **Input on needs and responsive plans are encouraged from stakeholders**
  - **SPS system plan rolls up to Southwest Power Pool (SPP) regional plan and SPP stakeholder process**

Executive Summary

- 10-Year Transmission Plan
  - Core Reliability Projects (2011 – 2015)
  - States Renewable Energy Standards
    - TX standard has been met
    - Xcel Energy is working on complying with NM standard for wind, solar, and other renewables through various initiatives
  - Significant SPP Regional and Sub-Regional Transmission Development Projects Ongoing
    - Balanced Portfolio – Tuco – Woodward, ISD 2014
    - Priority Projects – Hitchland – Woodward, ISD 2014
  - SPS Plan must ultimately be approved through SPP Transmission Expansion Plan (STEP) process

Executive Summary

- **20-Year Transmission Assessment**
  - **Is conceptual**
  - **Based on SPP Integrated Transmission Plans (ITP) Year 20 plans**
  - **Supports 20% renewable generation and a carbon tax**
  - **Support infrastructure not identified**
- **Conclusion**
  - **ITP 20 projects support 20% export capability from SPS**

Key Messages

- **10-Year Plan**
  - Continued load growth
  - Wind/solar development will continue
  - Clarity on balancing area's resource plan could modify and lessen transmission capital requirements from this assessment
- **20-Year Transmission Scenario Assessment**
  - Supports reasonable renewable energy mandates
  - Supports $73/ton CO_2 carbon tax
  - Facilitates export to other parts of SPP

SPS System Statistics

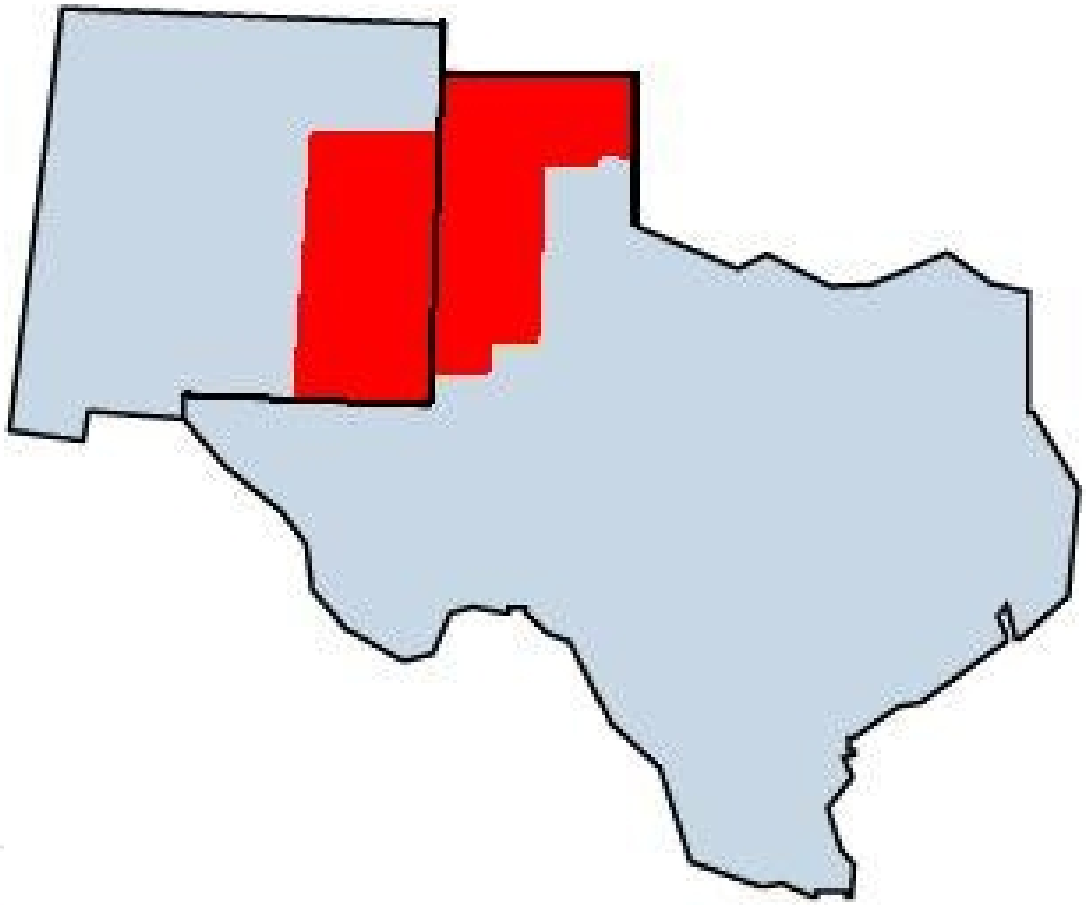
2010

- 7,243 Miles of Transmission (69 kV +)
- 389 SPS Substations Served
- 4,146 MW SPS Owned Generation
- 653 MW Wind
- SPS Balancing Authority All-Time Peak Load 5,575 MW (August 4, 2010)

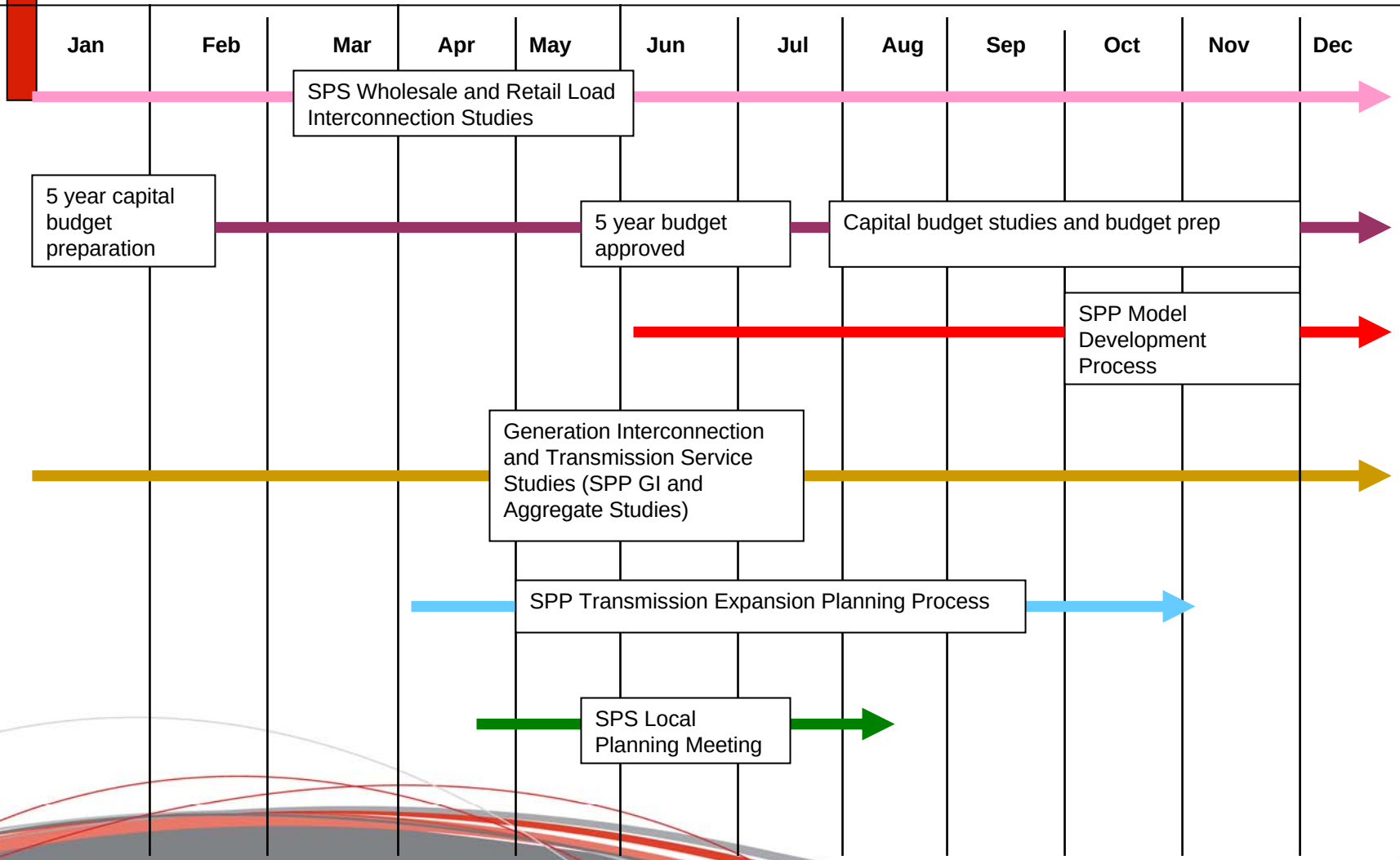
SPS Transmission System

- **SPS's transmission assets are in TX, NM, OK and KS**
  - Under operational control of the Southwest Power Pool (SPP) RTO
- **Major Utility Interconnections**
  - American Electric Power
    - West Texas Utilities
    - Public Service Company of Oklahoma
  - Sunflower Electric Corp.
  - Public Service Company of New Mexico (HVDC)
  - El Paso Electric Company (HVDC)
  - Public Service Company of Colorado (HVDC)

SPS Retail Service Territory



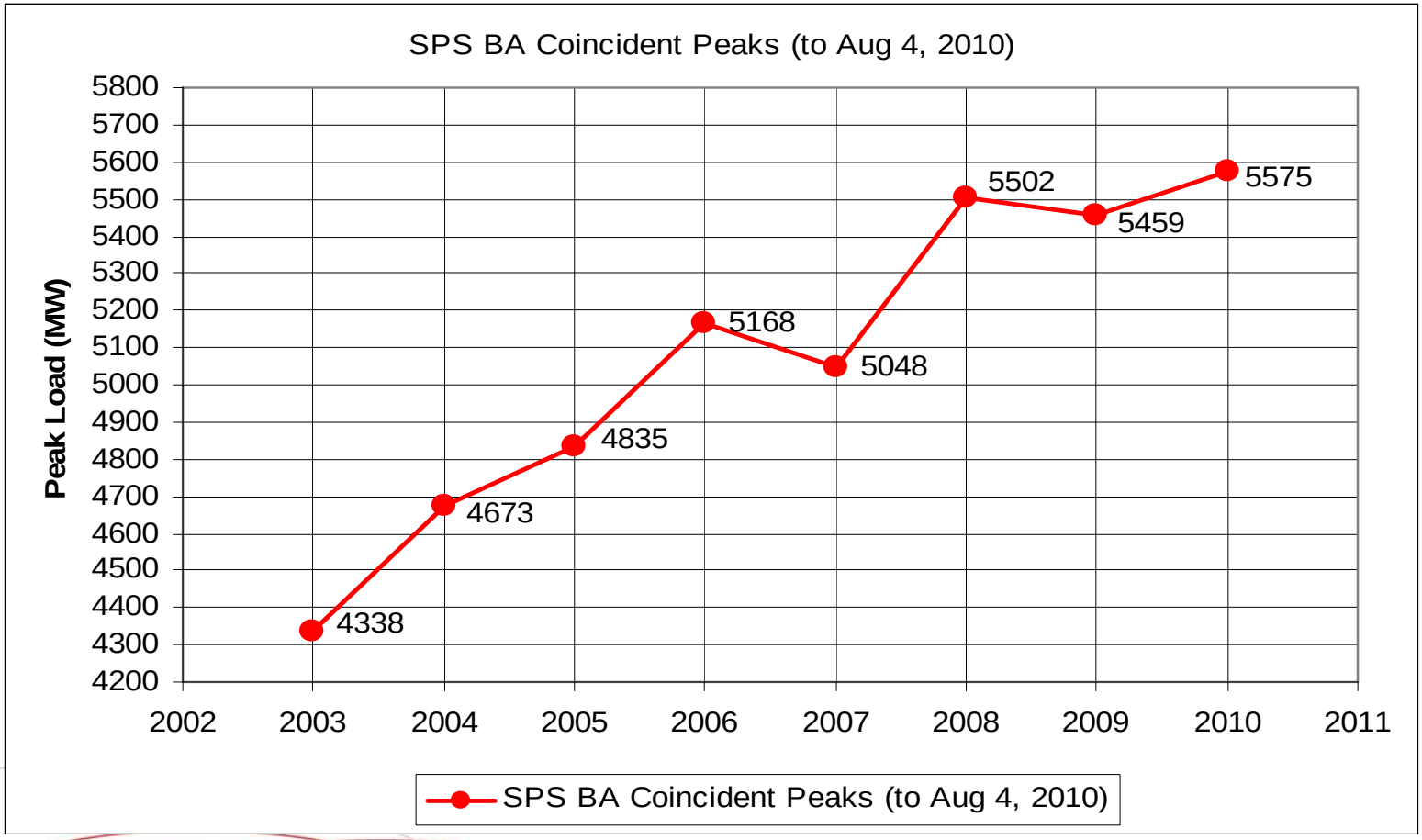
Planning Process Calendar 2010



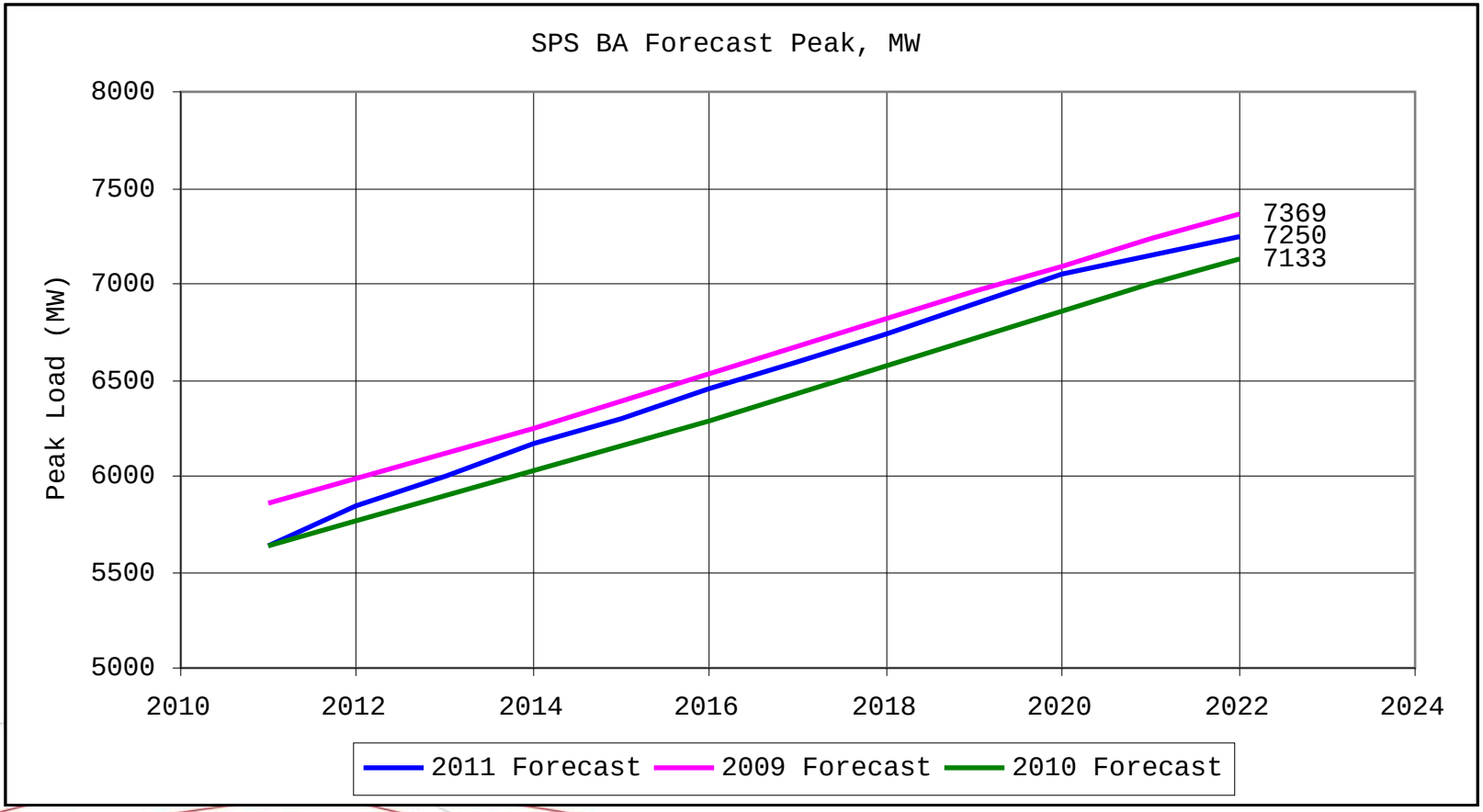
Drivers of Transmission Planning

- Regulatory/Environmental Concerns
  - TX and NM mandates for renewable energy
- SPP Generator Interconnection Requests
  - Large amount of requests
- Transmission Service Requests
  - Internal and thru-transactions
- Wholesale and Retail Load Additions
  - Geographically diverse
  - Economically sensitive
  - Oil and gas commodity price sensitive
- NERC Reliability Standards

SPS BA Coincident Peaks



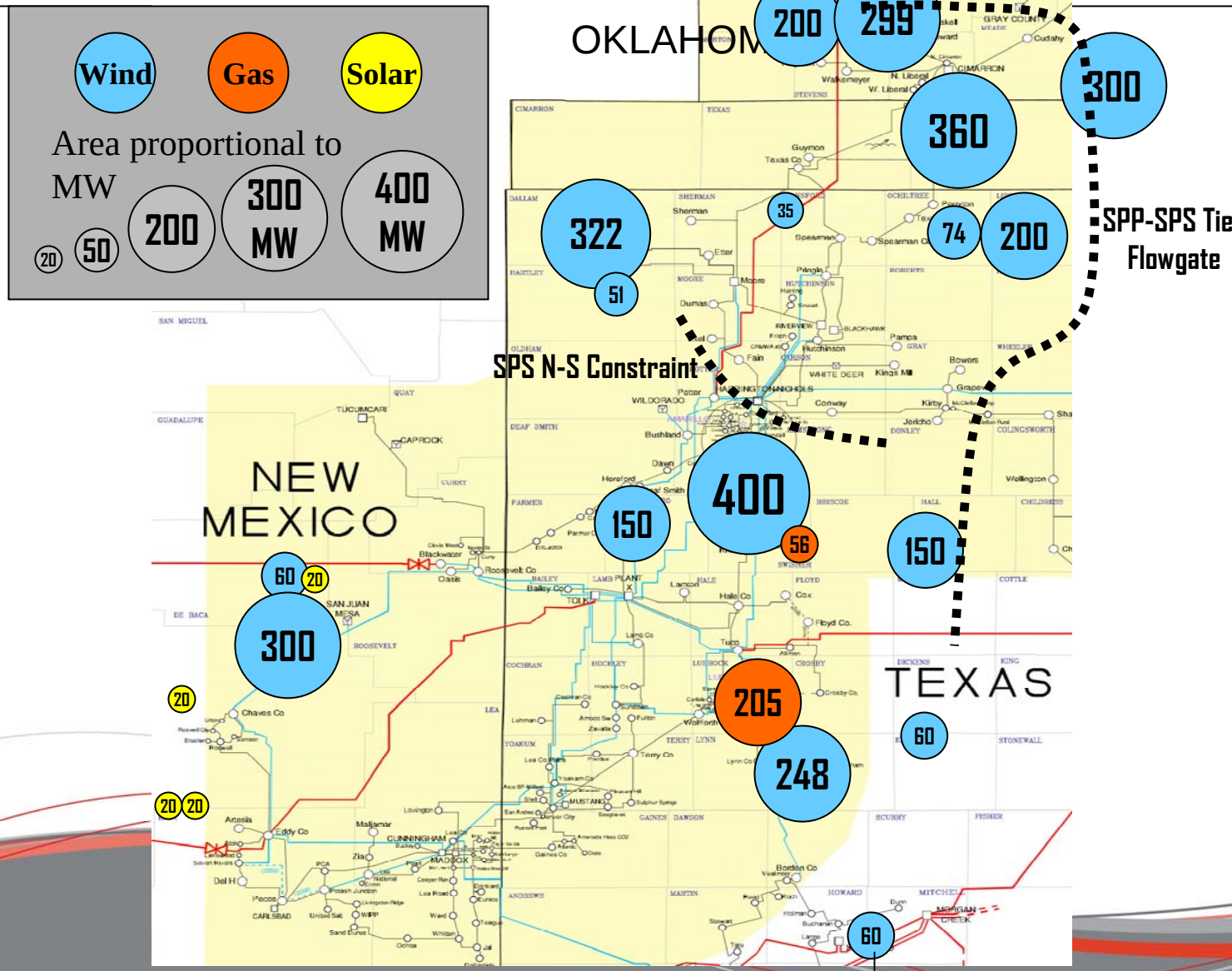
SPS BA Forecast Peak, MW



State Renewable Energy Mandates

- **TX Mandate for SPS Retail Loads**
  - **5,880 MW by 2015, 10,000 MW by 2025. 2010 goal was increased by 2,000 MW. SPS has energy sales ratio share of total.**
    - **SPS has met its allocated goal for 2010**
- **NM Mandate for SPS Retail Loads**
  - **405,766 MWH (10% of NM retail sales) by 2011**
  - **15% of NM retail sales by 2015**
  - **20% of NM retail sales by 2020**
  - **Minimums required**
    - **Greater or equal to 20% wind, 20% solar, 10% biomass/biogas**
    - **Distributed Generation – 1.5% to 3% in 2015, and 48.5% from any category**
  - **SPS has met its 2011 requirements for wind and solar and is currently negotiating with a potential developer to meet its biomass/biogas requirements. SPS has received a variance to extend the time of implementation to 2012.**

Generation Interconnection Requests



Generation Interconnection Requests

- SPP Generation Interconnection queue for SPS area
  - ~ 4,014 MW total study queue
  - ~ 261 MW fossil based requests
  - ~ 3,673 MW wind based requests
  - ~ 80 MW solar based requests
- SPS has 910 MW connected wind generation
  - Approximately 150 MW are on SPS distribution
- SPS has ~ 1,744 MW of projects with signed interconnection agreements and in suspension, not included in above numbers

Transmission Congestion

- SPP Flowgates
  - External – SPPSPSTIES Flowgate
    - Bisects all AC tielines between SPS and SPP
- SPS Internal Flowgates
  - North-South Flowgate
    - Bisects SPS transmission lines south of Amarillo
      - Temporary Flowgates may limit ahead of N-S flowgate
      - Limiting behavior may be due to non-firm energy flows from north of Amarillo

Transmission Congestion Map

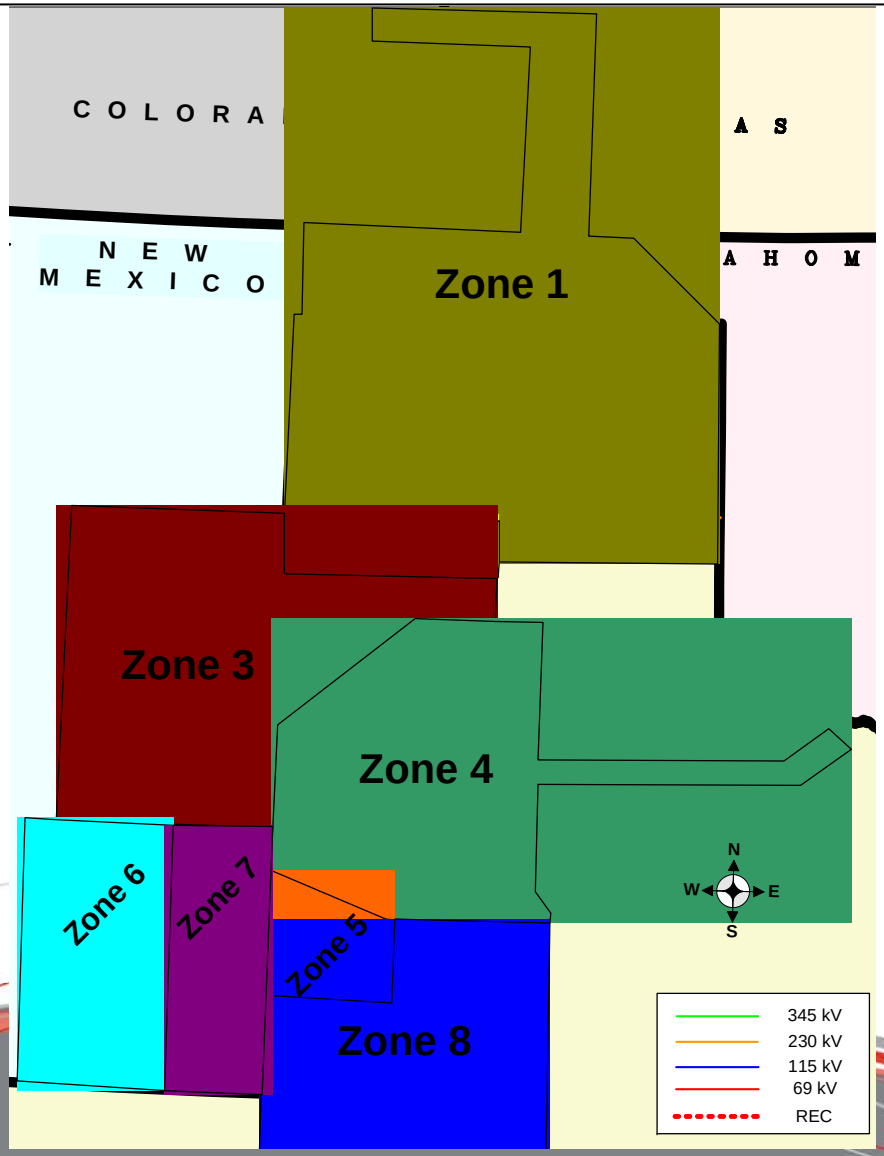
Economic Planning

- SPS reviews studies by others and is actively involved in regional and sub-regional economic planning efforts such as:
  - The Department Energy (DOE) national transmission congestion studies
  - SPP Transmission Expansion Planning (STEP) process
  - Eastern Interconnection Planning Collaborative (EIPC)

Economic Planning

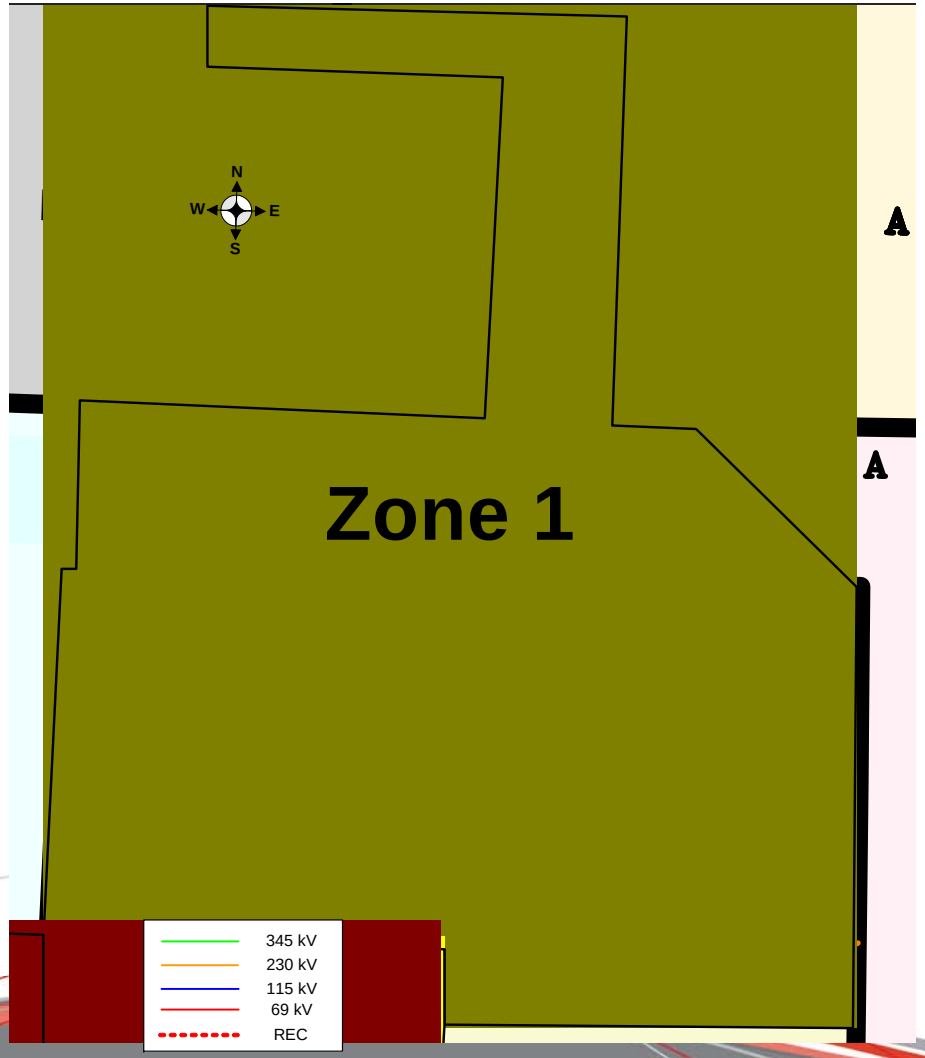
- Economic planning involves
  - Various resource scenario evaluations
  - Economic impact of market congestion on transmission elements
  - Energy and demand loss evaluation on transmission elements
- Economic Benefits coupled with other benefits (reliability, local or regional policy, etc) together enter into transmission alternative evaluation
- SPS relies on SPP's economic planning processes

Planning Zone Map



Zone 1	Western Kansas, Oklahoma Panhandle, & Texas North Area
Zone 2	Amarillo Area: Adrian, Vega, Channing, Amarillo, Groom and McLean.
Zone 3	Clovis, Hereford, and Canyon Area
Zone 4	Central Plains and Lubbock Area
Zone 5	Yoakum and Gaines Area
Zone 6	Pecos Valley
Zone 7	Hobbs/Jal Area
Zone 8	Caprock Area

Zone 1: Western Kansas, Oklahoma Panhandle, & Texas North Areas

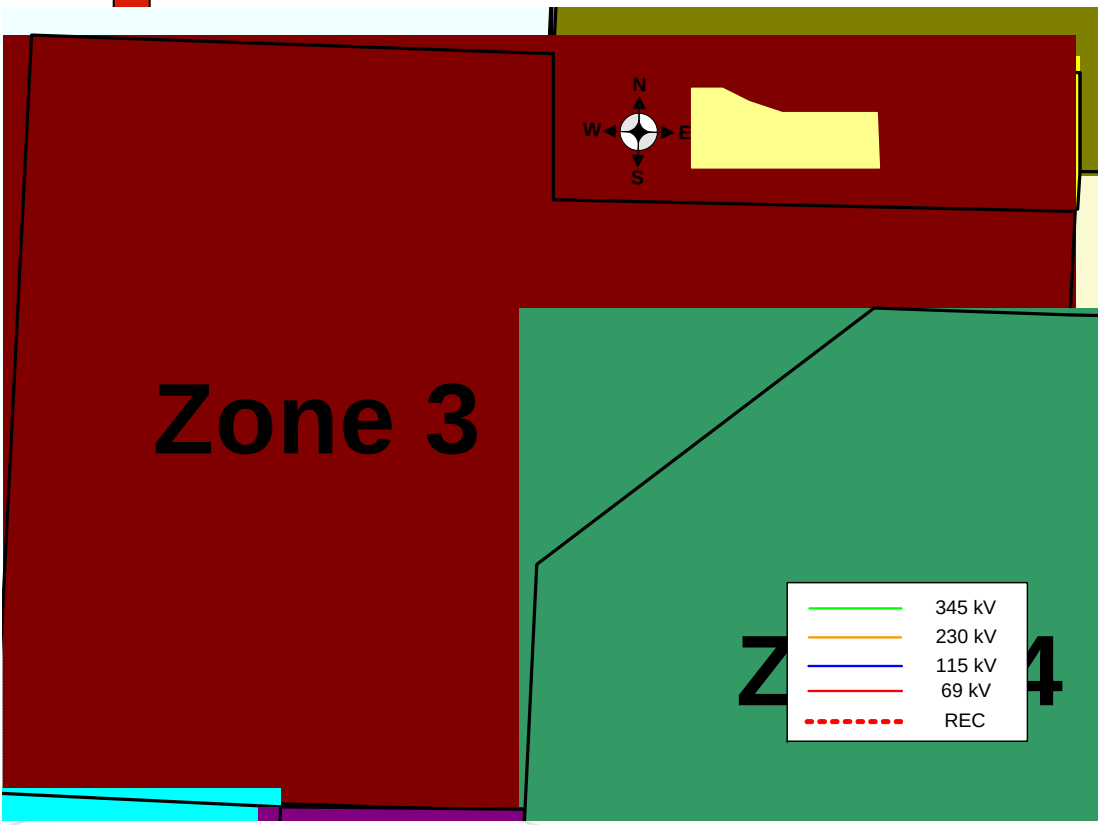


- Agricultural, large industrial, small residential loads
- Includes Oklahoma Panhandle – Tri-County Electric Cooperative is retail provider
- Towns of Guymon, OK, Dalhart, TX, Perryton, TX
- 230 kV , 115 kV, and 69 kV transmission
- High wind energy potential
- Issues - wind generation, load expansion in transmission remote areas, 69 kV capacity

Zone 2: Amarillo Area

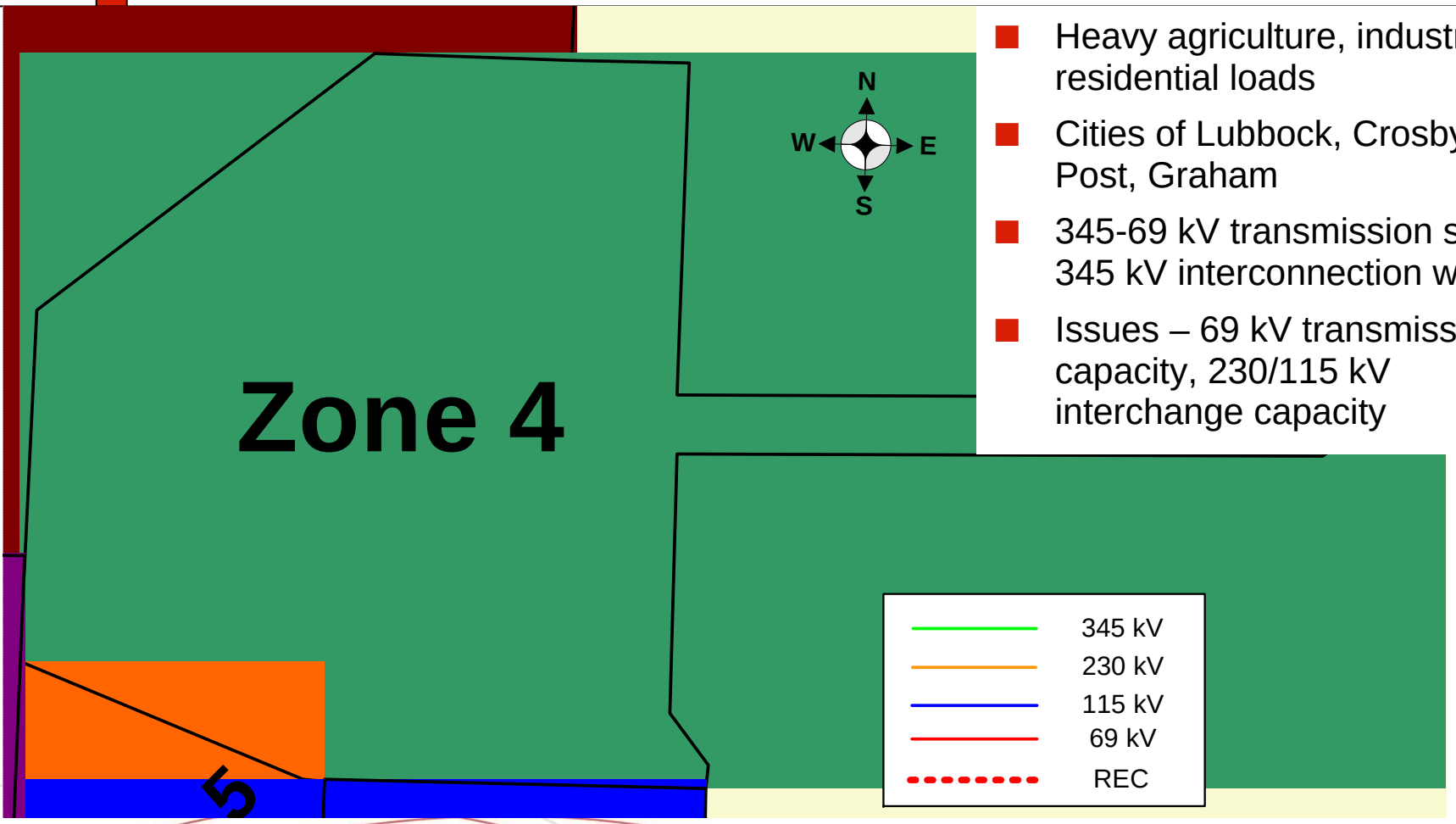
- Industrial, oilfield, agricultural, residential, and commercial loads
- Cities of Amarillo and Channing
- 345-69 kV transmission
- Good growth in past years
- 230 kV interconnection with AEP
- Issues – growth, Amarillo transmission upgrades needed

Zone 3: Clovis, Hereford, and Canyon Area



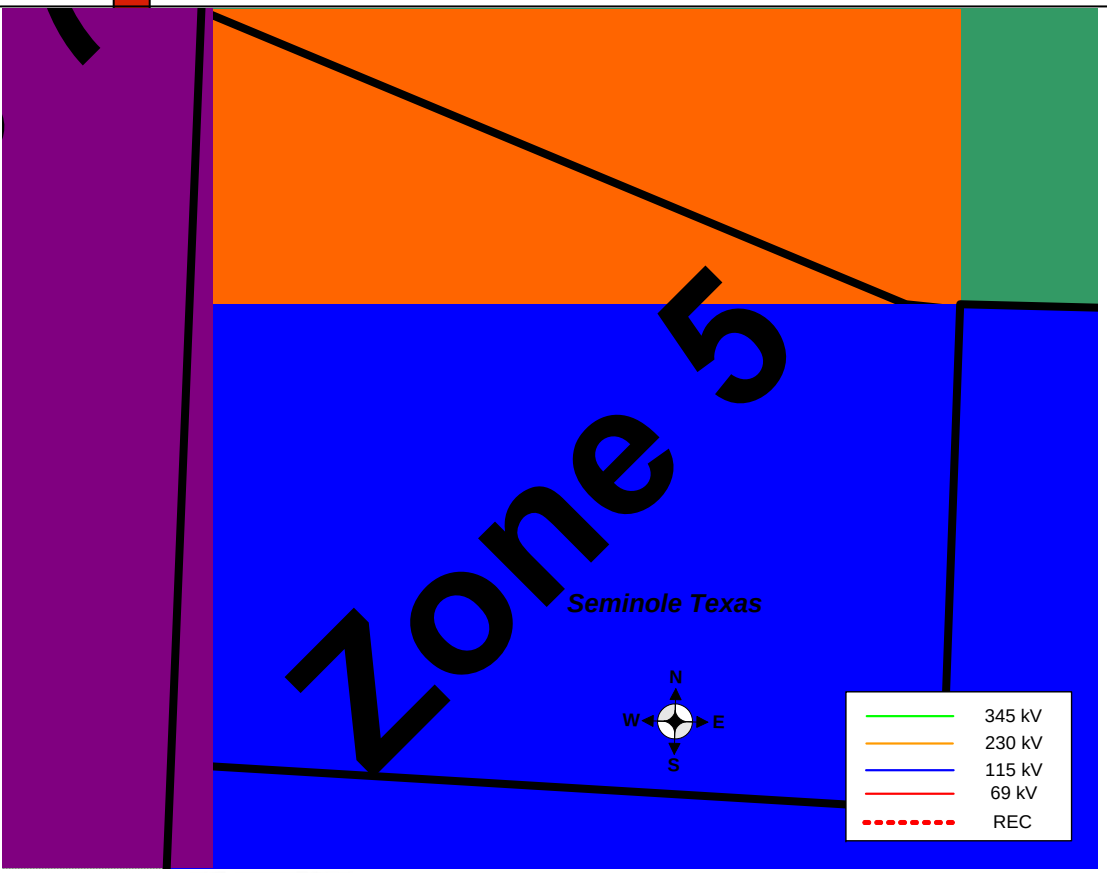
- Heavy agricultural and industrial area
- Cities of Portales, Clovis, Tucumcari, Muleshoe, Friona, Hereford, and Canyon
- 230, 115, and 69 kV transmission, Blackwater HVDC interconnection with PNM
- High wind energy potential
- Issues – Clovis transmission system upgrading, Hereford area transmission loading

Zone 4: Central Plains and Lubbock Area



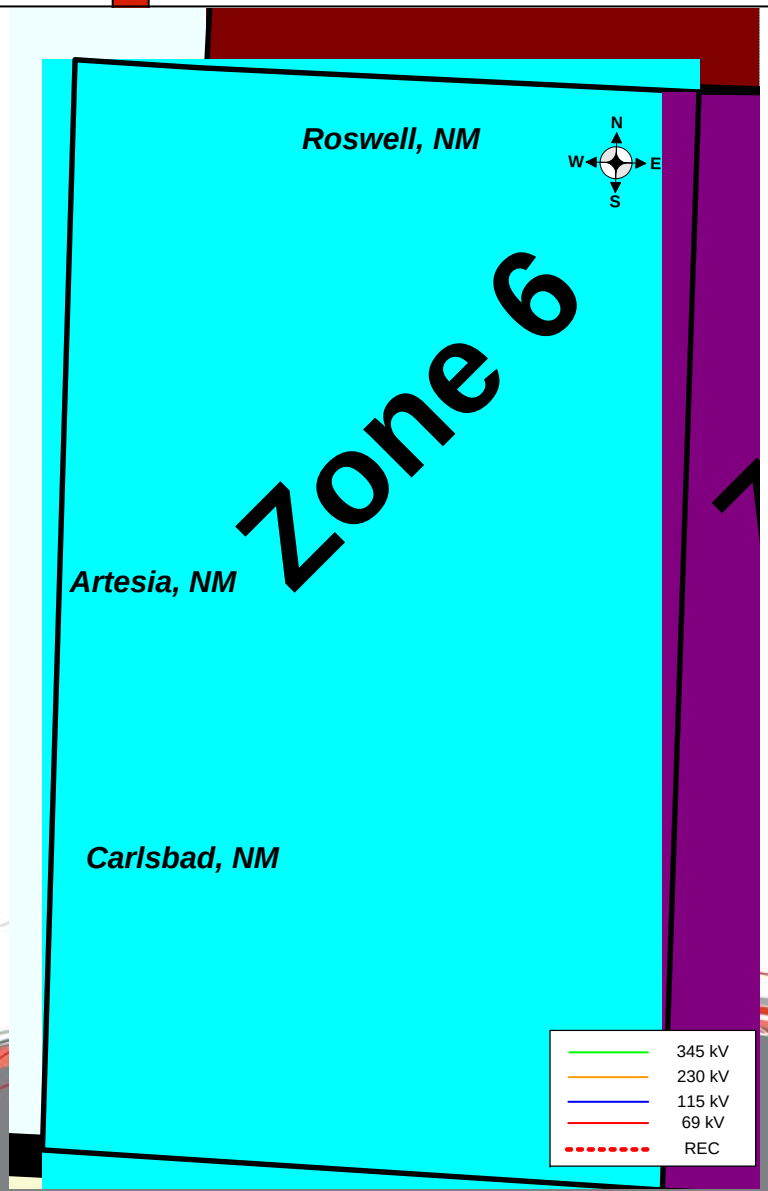
- Heavy agriculture, industrial, and residential loads
- Cities of Lubbock, Crosbyton, Post, Graham
- 345-69 kV transmission system. 345 kV interconnection with AEP
- Issues – 69 kV transmission capacity, 230/115 kV interchange capacity

Zone 5: Yoakum and Gaines Area



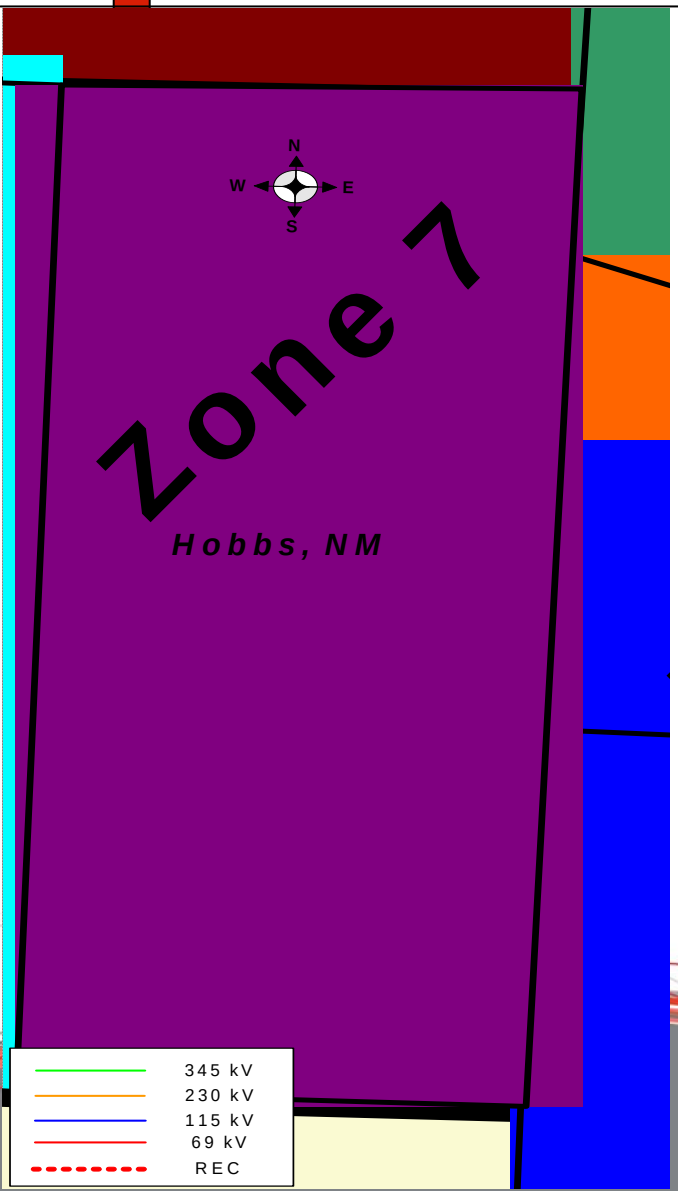
- Heavy industrial and oilfield loads, residential and agricultural loads
- High load factor area
- 230-69 kV transmission system
- Issues – continued industrial and oilfield load development, 69 kV transmission capacity

Zone 6: Pecos Valley



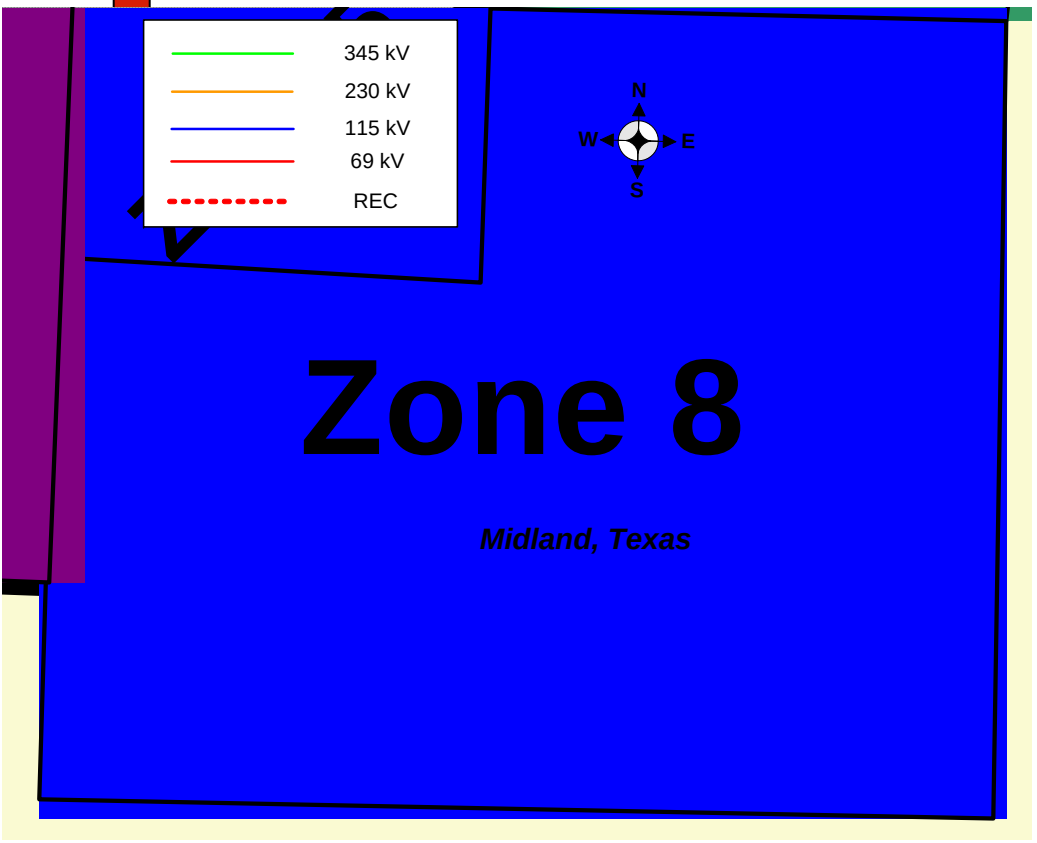
- Agricultural, industrial, oilfield, and residential loads
- Cities of Carlsbad, Roswell, Artesia, and Lovington
- Eddy Co HVDC – interconnection with El Paso Electric
- 345-69 kV transmission system
- Issues – Roswell 69 kV to 115 kV loop conversion, Carlsbad 69 kV capacity

Zone 7: Hobbs/Jal Area



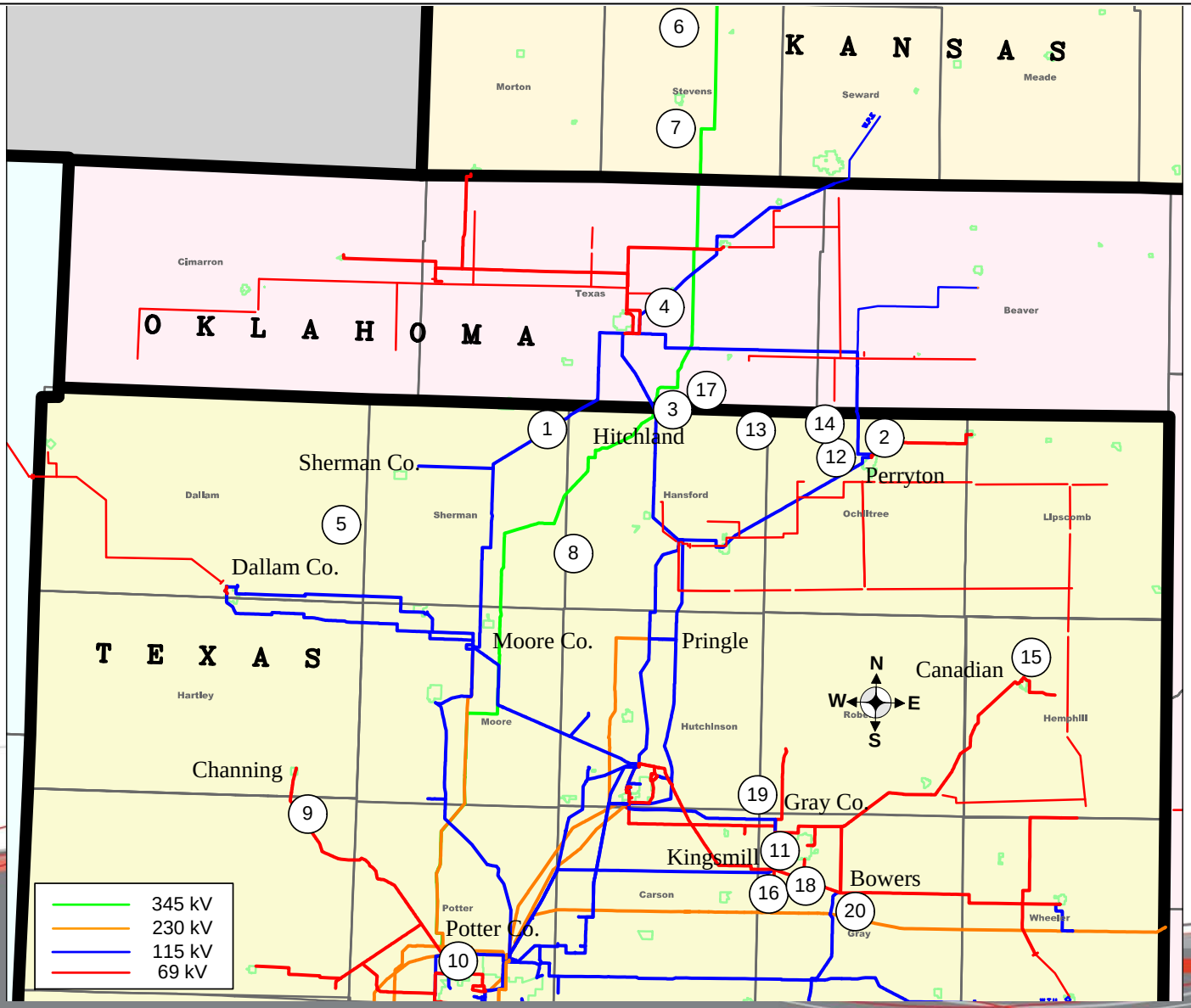
- Industrial and oilfield, with residential loads
- Cities of Hobbs, Jal, and Eunice
- 230 and 115 kV transmission
- Issues - upgrading the 115 kV system around Hobbs, variable generation dispatch

Zone 8: *Caprock Area*



- Industrial, oilfield, and residential load
- Sharyland Utilities bought Caprock Electric's entire system
- Sharyland Utilities is the only customer on this system
- Sharyland Utilities' 138 kV transmission system overlays ERCOT
- This area has experienced rapid growth, voltage issues in lighter load periods
- SPS's settlement agreement with Sharyland Utilities limits Sharyland Utilities load to 150 MW or less.

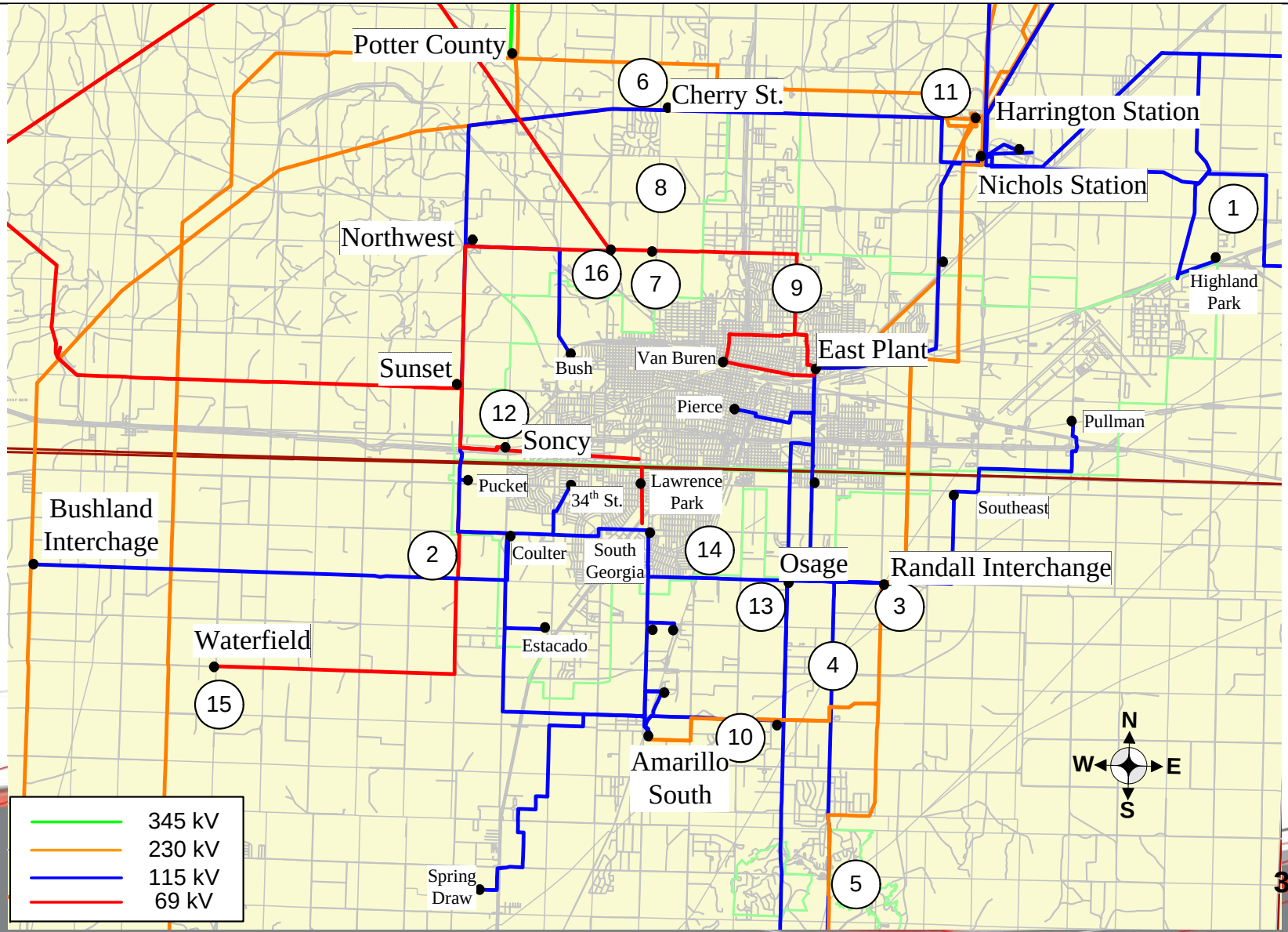
Current and Proposed Transmission Projects
Zone 1:



Current and Proposed Transmission Projects Zone 1:

No.	Project Name	Est. ISD	Status	Drivers
1	DWS Frisco Wind Farm (18.9 MW)	12/2010	Current	IA
2	Perryton Cap Bank	12/2010	Current	Reliability
3	Hitchland 115 kV line terminations	01/2011	Current	Reliability
4	SPS Invenergy (150 MW)	03/2011	Current	IA
5	Dallam to Sherman 115 kV line	3/2011	Current	Reliability
6	Flying Cloud Wind (140 MW)	09/2011	Current	IA
7	Conestoga Wind (400 MW)	11/2011	Current	IA
8	Hitchland to Moore Co. 230 kV line.	12/2011	Current	Reliability
9	Potter Co to Channing to Dallam 115 kV line	12/2011	Current	Reliability
10	230/115 kV 112/128 MVA TF at Potter Co.	12/2011	Current	Reliability
11	Celanese (160 MW Coal)	12/2011	Current	IA
12	Ochiltree Co. 115 kV line terminations	06/2012	Current	Reliability
13	Hitchland to Ochiltree Co. 230 kV line	06/2012	Current	Reliability
14	230/115 kV 172.5 MVA TF at Ochiltree	06/2012	Current	Reliability
15	Device - Canadian 69 kV	12/2012	Current	Reliability
16	XFR - Kingsmill 115/69 kV Ckt 2	06/2013	Current	Reliability
17	Novus II (400 MW)	05/2014	Current	IA
18	McCullough Substation Conversion to 115 kV service	06/2019	Proposed	Reliability
19	XFR - Gray Co. 115/69 kV Ckt 2	12/2021	Proposed	Reliability
20	XFR - Bowers 115/69 kV Ckt 3	12/2021	Proposed	Reliability

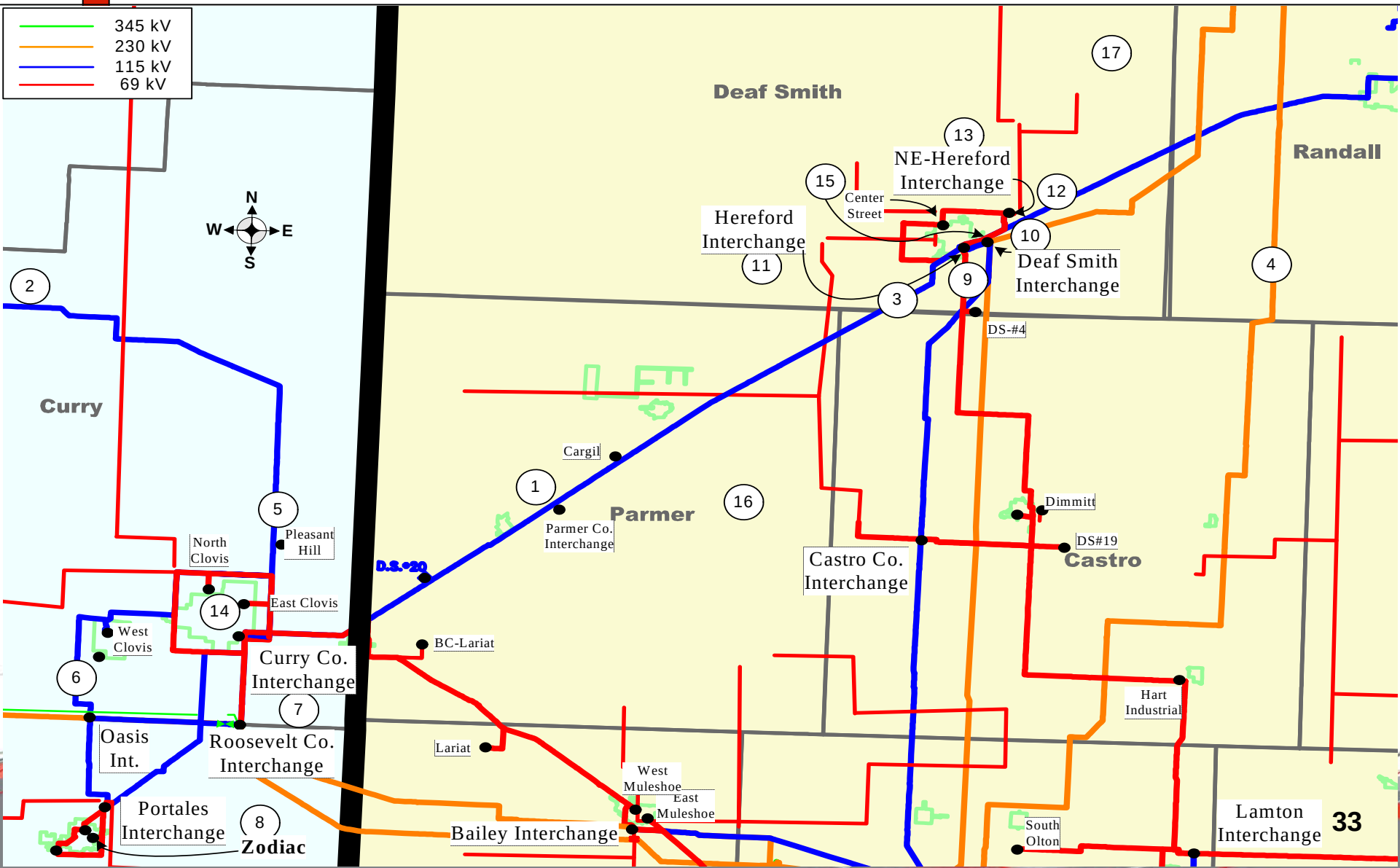
Current and Proposed Transmission Projects Zone 2:



Current and Proposed Transmission Projects Zone 2:

#	Project Name	Est. ISD	Status	Drivers
1	Tyson Foods (V2 reconstruction)	04/2011	Current	Reliability
2	Hillside Substation	06/2012	Current	Reliability
3	2nd Randall 230/115 kV transformer	04/2013	Current	Reliability
4	Reconductor Randall Co - Palo Duro Sub 115 kV line	04/2013	Current	Zonal
5	Reconductor Palo Duro Sub - Happy Interchange 115 kV Line	04/2013	Current	Zonal
6	230/115 kV 252 MVA TF at Cherry St Interchange	06/2013	Current	Reliability
7	Convert Hastings Sub to 115 kV service	06/2013	Current	Reliability
8	Cherry St. to Hastings 115 kV line	06/2013	NTC Pending	Reliability
9	East Plant to Hastings 115 kV line.	06/2013	Current	Reliability
10	Randall to Amarillo South 230 kV line	04/2014	Current	Reliability
11	Upgrade terminal equipment on the Harrington - Randall County 230 kV line	04/2014	Current	Reliability
12	Convert Soncy Sub to 115 kV	06/2015	NTC Pending	Reliability
13	Osage Station and Line retermintations	06/2016	NTC Pending	Reliability
14	Reconductor Randal Co. (Osage) to South Georgia 115kV Line	06/2017	Proposed	Reliability
15	Convert Waterfield Sub to 115 kV	06/2018	Proposed	Reliability
16	Cherry St to Northwest 115 kV line #2	06/2021	Proposed	Reliability

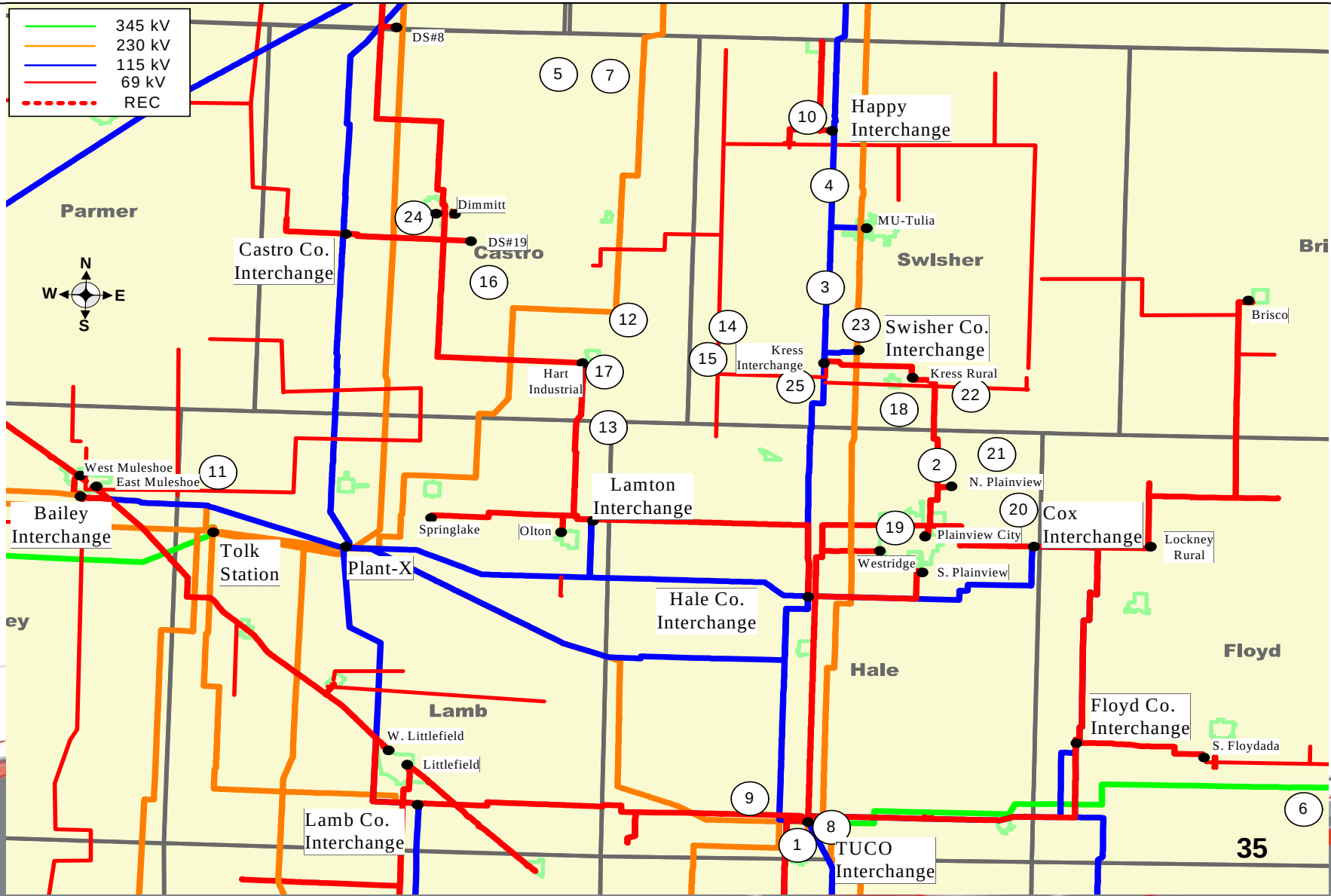
Current and Proposed Transmission Projects Zone 3:



Current and Proposed Transmission Projects Zone 3:

#	Project Name	Est. ISD	Status	Drivers
1	Parmer Co. Cap Bank	12/2010	Current	Reliability
2	Norton Reactor 115 kV	06/2012	Current	Zonal
3	Deaf Smith 24 GSEC	06/2012	Current	IA
4	Clipper Wind (400 MW)	10/2012	Current	IA
5	Pleasant Hill 230/115 kV interchange	05/2013	Current	Reliability
6	Pleasant Hill to Oasis Intg 230 kV line	05/2013	Current	Reliability
7	Pleasant Hill to Roosevelt Co. 230 kV line	05/2013	Current	Reliability
8	Convert Zodiac Substation to 115 kV	06/2013	Current	Reliability
9	Reconductor 69 kV line from Hereford to NE-Hereford (Z72)	06/2013	Current	Reliability
10	Reterminate T3 in&out of Deaf Smith Interchange (Reconductor from Deaf Smith to Hereford 115 kV line)	06/2013	Current	Reliability
11	Upgrade both Hereford 115/69 kV transformers to 84 MVA	06/2013	Current	Reliability
12	Deaf Smith #1 GSEC	06/2013	Current	IA
13	2nd 115/69 kV 84 MVA TF at NE-Hereford	06/2014	NTC Pending	Reliability
14	Convert East Clovis Sub to 115 kV	06/2014	Current	Reliability
15	115 kV line from Hereford to NE-Herford	06/2019	Proposed	Reliability
16	115 kV line from Castro Co. to Cargill Sub	06/2019	Proposed	Reliability
17	115 kV line from Bushland Interchange to NE-Hereford Interchange	06/2019	Proposed	Reliability

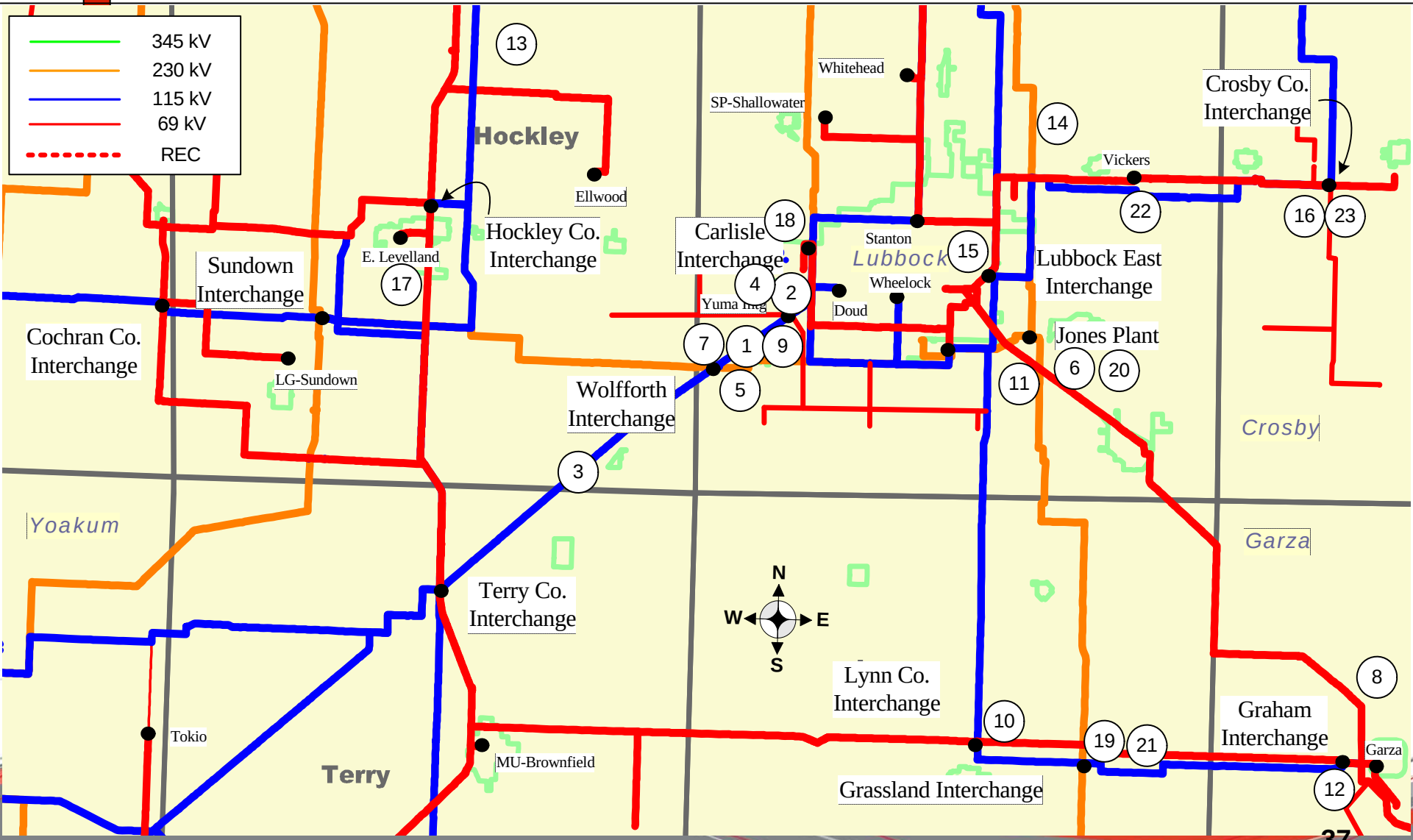
Current and Proposed Transmission Projects
Zone 4:



Current and Proposed Transmission Projects Zone 4:

#	Project Name	Est. ISD	Status	Drivers
1	GSEC-Antelope (170 MW Gas)	12/2010	Current	IA
2	69 kV switch between Plainview North and LH-REC load	06/2011	NTC Pending	Reliability
3	Reconductor 115 kV line from Tulia Tap to Kress Interchange	04/2013	Current	Zonal
4	Reconductor 115 kV line from Happy Interchange to Tulia Tap 115 kV	04/2013	Current	Zonal
5	Happy Whiteface West Wind (240 MW)	09/2013	Current	IA
6	Cedar Cap Wind (150 MW)	09/2013	Current	IA
7	Happy Whiteface Wind (240 MW)	10/2013	Current	IA
8	2nd 345/230 kV 560 MVA TF at TUCO Interchange	05/2014	Current	Balanced Portfolio
9	Convert SP-Abernathy to 115 kV	06/2014	NTC Pending	Reliability
10	Upgrade both Happy County 115/69 kV transformers to 84/96 MVA.	06/2014	NTC Pending	Reliability
11	Muleshoe East 115 kV conversion	06/2014	Current	Reliability
12	230 kV lines in&out of Newhart Interchange	12/2014	Current	Reliability
13	Newhart to Lamton 115 kV line (with Hart Ind. Tap)	12/2014	Current	Reliability
14	Newhart to Swisher Co. 230 kV line	12/2014	Current	Reliability
15	Newhart to Kress 115 kV line	12/2014	Current	Reliability
16	Newhart to Castro Co 115 kV line	12/2014	Current	Reliability
17	Convert Hart Industrial Sub to 115 kV	06/2015	Current	Reliability
18	Kress to Plainview City 115 kV line	06/2015	Current	Reliability
19	Plainview City 115/69 kV Interchange.	06/2015	Current	Reliability
20	Plainview City to Cox Interchange 115 kV line	06/2015	Current	Reliability
21	Convert Plainview North to 115 kV	06/2015	Current	Reliability
22	Convert Kress Rural to 115 kV	06/2015	Current	Reliability
23	Upgrade Swisher Co. 230/115 kV TF to 252 MVA	06/2016	NTC Pending	Reliability
24	Convert Dimmit Substation to 115 kV	06/2016	Proposed	Reliability
25	Upgrade terminal equipment on the 115 kV line from Kress to Swisher Co.	06/2021	Proposed	Reliability

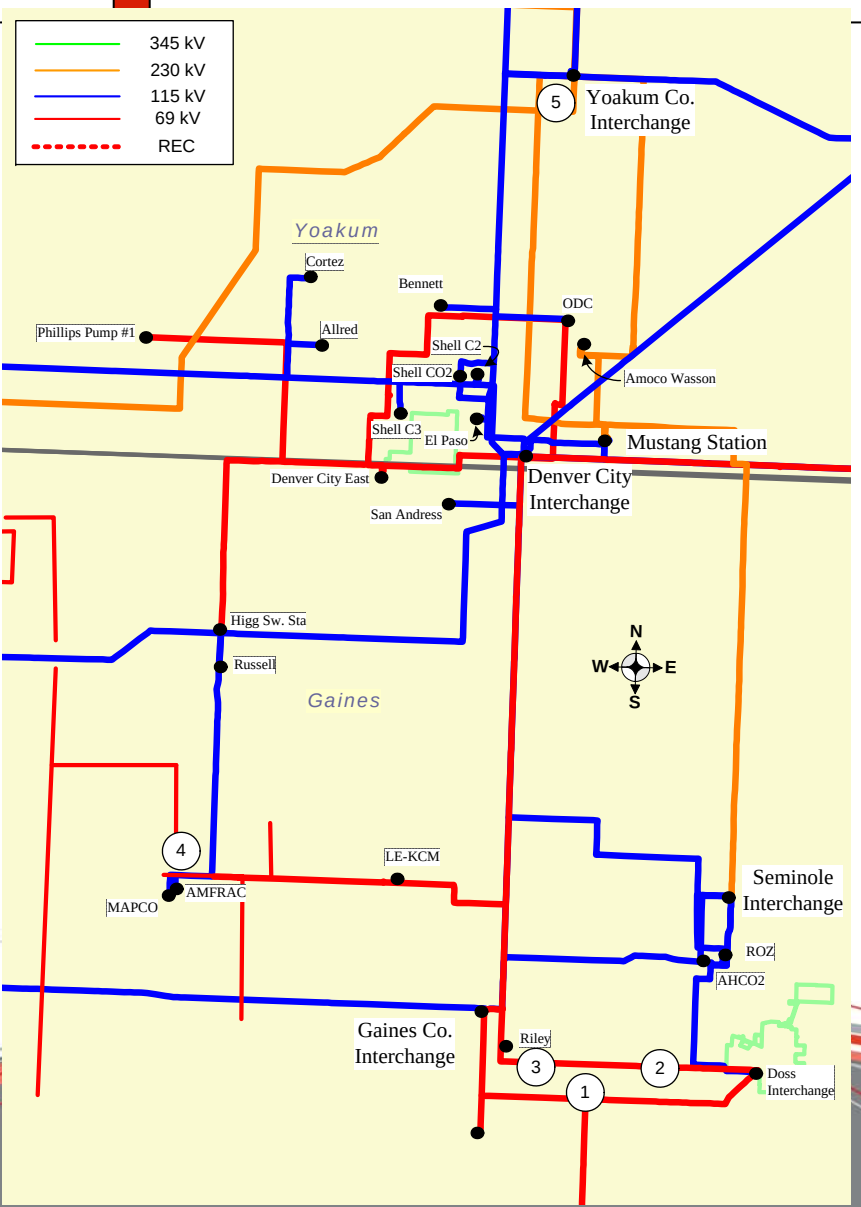
Current and Proposed Transmission Projects Zone 4 (cont.):



Current and Proposed Transmission Projects Zone 4 (cont.):

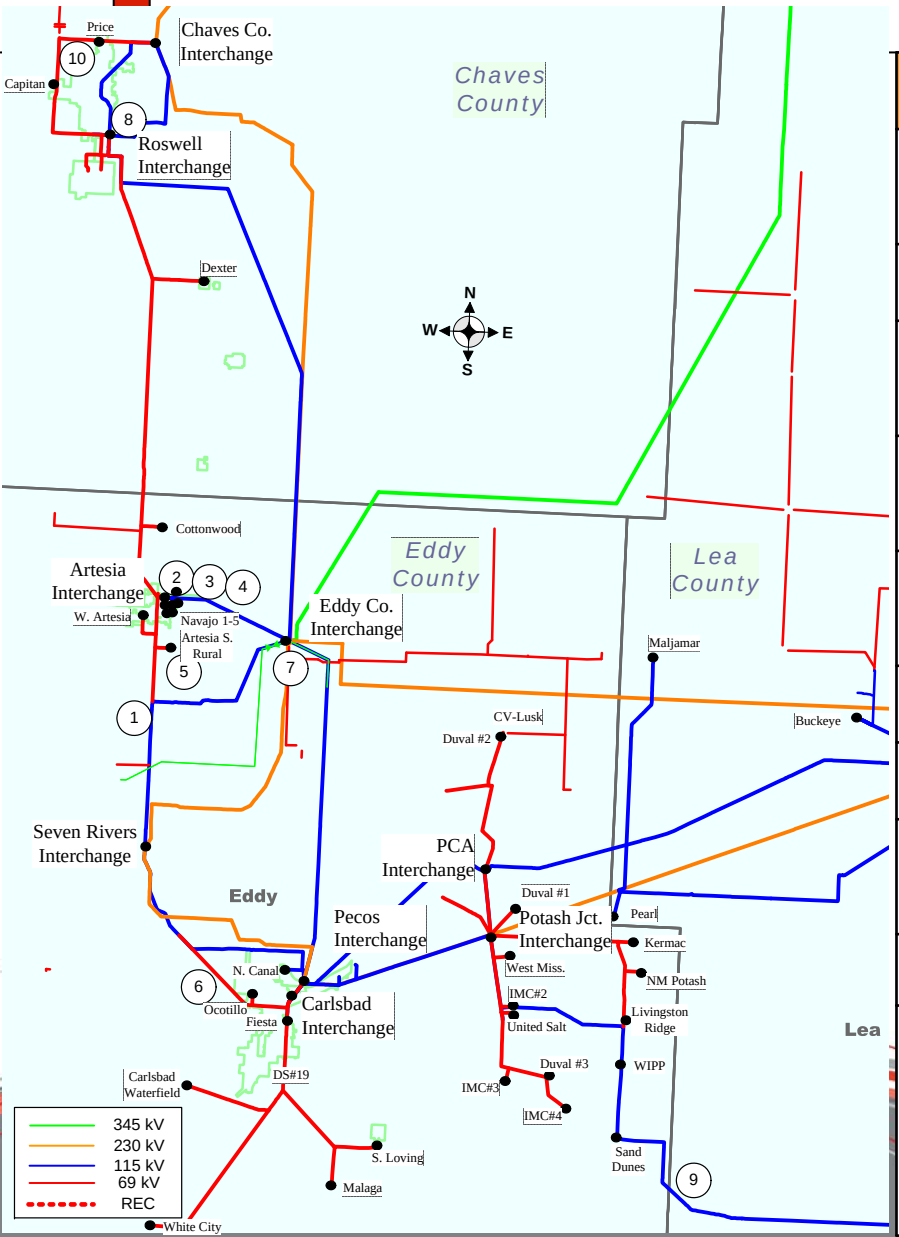
#	Project Name	Est. ISD	Status	Drivers
1	SPS T72 Reconductor (Yuma to Wolfforth 115 kV)	12/2010	Current	Reliability
2	SPS T71 Reconductor (Yuma to Carlisle 115 kV)	12/2010	Current	Reliability
3	SPS V24 Reconductor (Wolfforth to Terry Co 115 kV line)	12/2010	Current	Reliability
4	GSEC-SP Alcove Interconnection	06/2011	Current	IA
5	GSEC-SP Wolfforth Interconnection	06/2011	Current	IA
6	Jones Plant Repowering	12/2011	Current	Reliability
7	Upgrade 115 kV line from Wolfforth to Yuma terminal equipment	06/2012	NTC Pending	Reliability
8	Relocate normal open on 69 kV between Graham Co & Lubbock East	06/2012	Proposed	Reliability
9	GSEC-SP Milwaukee Interconnection	03/2013	Current	IA
10	Convert Lynn Co. Substation load to 115 kV	06/2013	NTC Pending	Reliability
11	Jones Plant Bus	06/2013	Current	Reliability
12	Upgrade Graham 115/69 kV transformer to 84/96 MVA	06/2016	Proposed	Reliability
13	LC-Littlefield 115 kV conversion	06/2018	Proposed	Reliability
14	Tuco to Jones Plant 345 kV line with Jones 345/230 kV TF	06/2018	Proposed	Reliability
15	Reconductor 69 kV line from Lubbock East to Planters Sub	06/2019	Proposed	Reliability
16	Upgrade Both Crosby Co 115/69 kV transformers to 84 MVA	06/2019	Proposed	Reliability
17	East Levelland 115 kV conversion	06/2019	Proposed	Reliability
18	Install 2nd 230/115 kV TF at Carlisle Intg. (168 MVA)	06/2020	Proposed	Reliability
19	Upgrade Grassland Interchange 230/115 kV TF to 150 MVA	06/2021	Proposed	Reliability
20	Upgrade terminal equipment on 230 kV Line from Jones Bus #2 to Lubbock South	06/2021	Proposed	Reliability
21	28.8 MVAR Cap Bank at Grassland Interchange	06/2021	Proposed	Reliability
22	Convert Vickers to 115 kV	06/2021	Proposed	Reliability
23	2nd Cap Bank at Crosby Co. Interchange	06/2021	Proposed	Reliability

Current and Proposed Transmission Projects Zone 5:



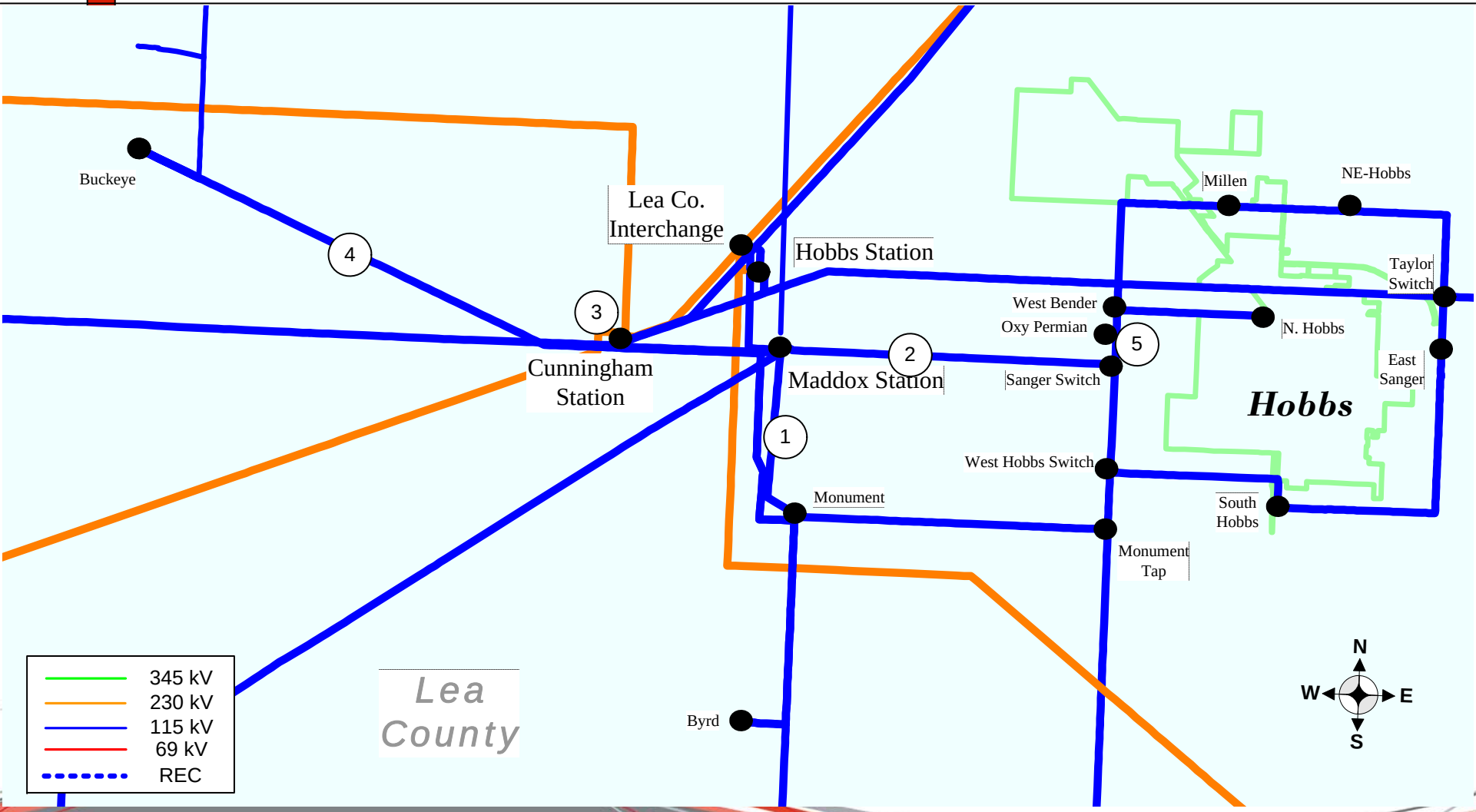
#	Project Name	Est. ISD	Status	Drivers
1	115/69 kV Legacy Interchange (75 MVA)	06/2011	Current	Reliability
2	115 kV line from Legacy Interchange to Doss Interchange	06/2011	Current	Reliability
3	115 kV line from Legacy Interchange to Gaines Co. Interchange	06/2011	Current	Reliability
4	Johnson Draw Project 115 kV	06/2012	Current	Reliability
5	Yoakum Co. Breaker Failure Relaying	06/2012	Current	Reliability

Current and Proposed Transmission Projects Zone 6:



#	Project Name	Est. ISD	Status	Drivers
1	115 kV line from Eagle Creek to Seven Rivers Interchange	04/2011	Current	Zonal
2	115/69 kV Eagle Creek Project	04/2011	Current	Reliability
3	115 kV line from new Navajo No. 5 substation - Navajo No. 4 substation	04/2011	Current	Reliability
4	115 kV line from new Navajo No. 5 substation - Navajo No. 3 substation	04/2011	Current	Reliability
5	69 kV line from Artesia Town - Artesia South Rural	04/2011	Current	Reliability
6	Convert Ocotillo Substation to 115 kV	06/2011	Current	Reliability
7	Eddy County Breaker Failure Relaying	6/1/2012	Current	Reliability
8	Reconductor 115 kV line from Brasher Tap - Roswell Interchange	06/2012	Current	Reliability
9	Sand Hill Wind (160 MW)	10/2012	Current	IA
10	Convert 69 kV line to 115 kV from Chaves Co. Interchange to Roswell Interchange (Convert Capitan & Price substations to 115 kV)	12/2012	Current	Reliability

Current and Proposed Transmission Projects Zone 7:



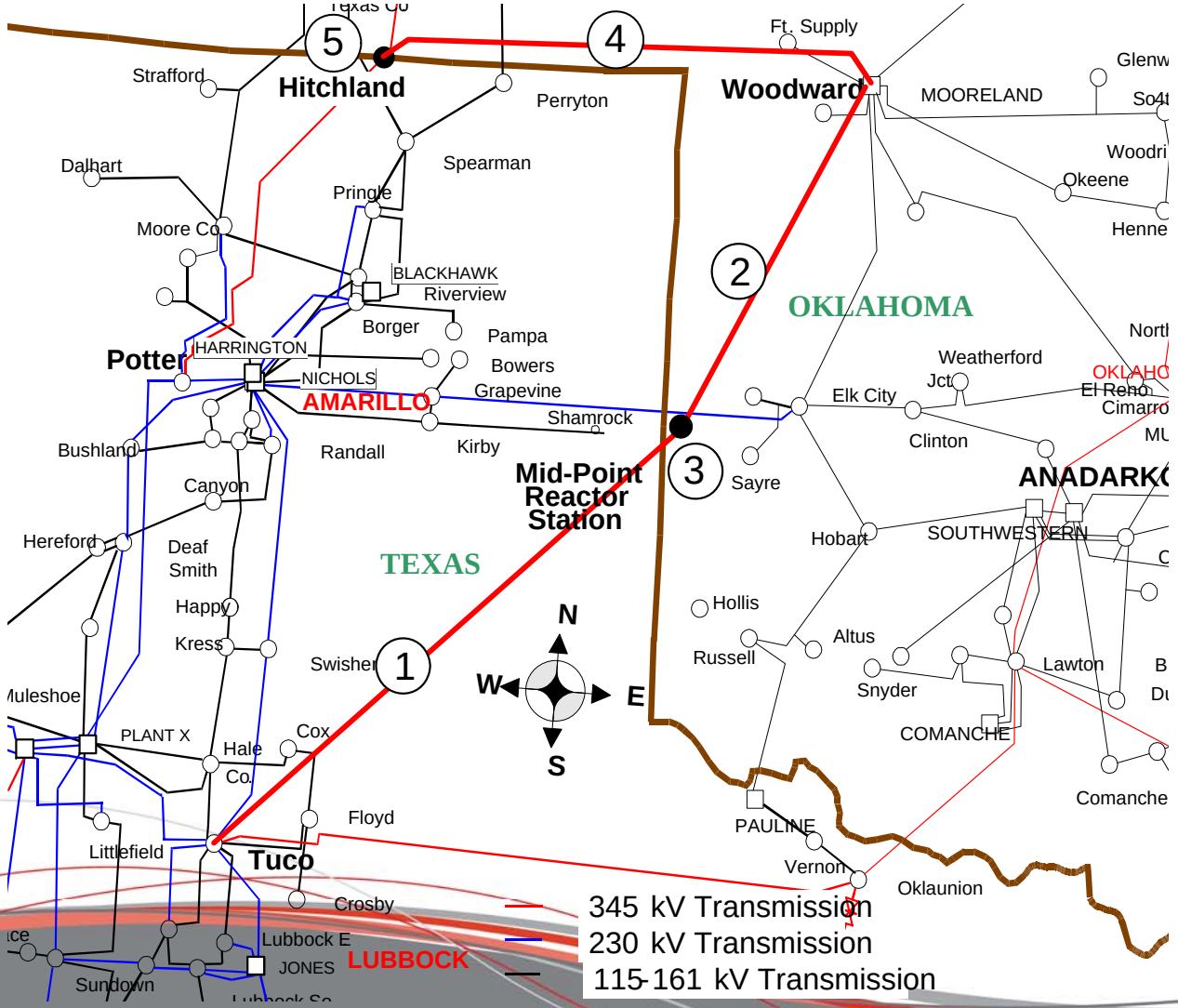
Current and Proposed Transmission Projects Zone 7:

#	Project Name	Est. ISD	Status	Drivers
1	Reconductor 115 kV line from Maddox Station to Monument (T42)	05/2012	Current	Reliability
2	Reconductor 115 kV line from Maddox Station to Sanger SW (T14)	05/2012	Current	Reliability
3	Cunningham Station Breaker Failure Relaying	6/1/2012	Current	Reliability
4	Reconductor 115 kV line from Cunningham Station to Buckeye Tap (V98)	06/2013	NTC Pending	Reliability
5	Reconductor 115 kV line from Sanger SW to OXY Permian Sub (T14)	06/2016	NTC Pending	Reliability

Current and Proposed Transmission Projects Zone 8:

There are no current projects scheduled for this zone. All previous projects have been put on hold pending Caprock's stated intent to transfer part or all of Caprock load back to the ERCOT system. The study to determine how to move the load back to ERCOT is being conducted by ERCOT staff.

SPS Tielines - Current and Proposed Transmission Projects



SPS Ties - Current and Proposed Transmission Projects

#	Project Name	Est. ISD	Status	Reviewed By
1	Tuco – Mid-Point Reactor Station 345 kV line 2nd Tuco 345/230 kV Auto Transformer	06/2014	Current	SPP-Balanced-Portfolio
2	Mid-Point Reactor Station - Woodward 345 kV line	06/2014	Current	SPP-Balanced-Portfolio
3	345 kV Mid-Point Reactor Station	06/2014	Current	SPP-Balanced-Portfolio
4	Hitchland to Woodward double-circuit 345 kV line	06/2014	Current	SPP EHV
5	XFR - Hitchland 345/230 kV ckt 2	06/2014	Current	SPP Priority Projects

20-Year Scenario Assessment

- **Purpose:**
  - **Assess export capability of SPP 2010 ITP20 projects in the SPS footprint**
  - **Note: Import assessment not made**
- **Problem:**
  - **This report is due December 2010**
  - **ITP20 projects will not be approved until first quarter 2011**
- **Solution:**
  - **Assess projects likely to be in final recommendation from Least Cost Plans 1 and 2**
  - **Assessment and Plans as of September 30, 2010**

20-Year Scenario Assessment

- **The assessment included the Tolk to Potter County to Hitchland lines**
- **These lines are included in the current leading SPP plan: Robust Plan 1**

20-Year Scenario Assessment

- **Methodology:**
  - **Calculate First Contingency Incremental Transfer Capability (FCITC).**
  - **The FCITC measures the maximum increase in power transfer that can take place between two selected subsystems without violating branch ratings or interface limits under a single contingency.**

20-Year Scenario Assessment

- **Results:**
  - **For all cases studied, export transfer can be greater than:**
    - **20% (1,191 MW) of SPS generation**
    - **37% (2,610 MW) of SPS generation if transfer is not to remote regions of SPP**

20-Year Scenario Assessment

- **Observations:**
  - **Additional static reactive support (capacitive) may be needed with the Tolk to Potter County to Hitchland lines.**
  - **Should any of the ITP20 345 kV projects be built in SPS, some reinforcement of the underlying network might be needed.**
  - **Selectively reinforcing the underlying network will likely increase the transfer capacity under single contingency.**
  - **Export capability is dependent on several factors including pre-contingency loading and the EHV network changes.**

Links to additional information on transmission Plans

- The Southwest Power Pool (SPP)
  - www.spp.org
- SPS Study Plans and Results
  - www.xcelenergy.com/Texas/Company/Transmission/SPSLocalPlanning/Pages/StudyPlansandResults.aspx
- SPS Transmission Planning Points of Contact
  - www.xcelenergy.com/Texas/Company/Transmission/SPSLocalPlanning/Pages/Pointsofcontact.aspx