Report on Existing and Potential Electric System Constraints and Needs

December, 2011

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1. Executive Summary

The annual Electric System Constraints and Needs report is provided by the Electric Reliability Council of Texas, Inc. (ERCOT) to identify and analyze existing and potential constraints in the transmission system that pose reliability concerns or may increase costs to the electric power market and, ultimately, to Texas consumers. This report satisfies the annual reporting requirements of Public Utility Regulatory Act (PURA) Section 39.155(b) and Public Utility Commission Substantive Rule 25.361(b)(9) and a portion of the requirements of Substantive Rule 25.505(c).

Background

ERCOT prepares this report annually to summarize the continuing efforts to plan a reliable and efficient transmission system. It provides highlights of completed improvements from 2010 through August 2011 and of planned improvements for 2012 through 2016 as well as an analysis of the impact of these cumulative improvements on future congestion.

As the transmission planning authority for the region, ERCOT works with its stakeholders to identify the need for new or upgraded transmission facilities based on engineering analysis of four principal factors:

Operational Results - The results of actual ERCOT operations are analyzed on a continual basis in order to identify areas of recurring congestion and to identify activities that can and should be taken to meet reliability standards while gaining efficiency from the existing network.

Load Forecasting - Load forecasts developed by ERCOT planning staff using econometric modeling techniques, as well as delivery point forecasts developed by Transmission Service Providers (TSPs), are used to study projected system needs due to customer load growth.

Generation Interconnections - ERCOT processes requests to interconnect, change, or decommission generation throughout the ERCOT Region. Studies of these requests enable planning staff to analyze and respond to the impact of the resulting changes in power injection into the system.

Transmission and System Studies - ERCOT planning staff, with input from stakeholders through the Regional Planning Group (RPG), evaluates and endorses transmission improvements required to meet the North American Electric Reliability Corporation (NERC) and the ERCOT Region's reliability criteria and to reduce expected congestion based on ERCOT's economic planning criteria.

Highlights

Since 2010, ERCOT Transmission Service Providers (TSPs) have completed numerous improvement projects affecting approximately 966 miles of transmission and about 5,057 MVA of autotransformer capacity, with an estimated capital cost of over $870 million.

SUMMARY OF MAJOR COMPLETED TRANSMISSION IMPROVEMENTS

Weather Zone	Completed Improvement	In-Service	Voltage	Circuit Miles
Coast	Zenith 345kV Switching Station	Apr-11	345	-
Coast	Oasis - Meadow Ckt.99	Jan-11	345	3.9
Far West	Illinois #4 to Comstock, Rebuild 69 kV as 138 kV	Aug-11	69	63.6
Far West	Odessa EHV Third 345/138 kV autotransformer	Nov-10	345	-
North Central	Willow Creek - Parker 345 kV line	Dec-10	345	44.6
North Central	Krum West Switch - NW Carrollton 345 kV circuit	Mar-11	345	37.2
North Central	Collin to Frisco to Krugerville Rebuild	Feb-11	138	11.7
North Central	Olney to Rice	May-11	138	17.1
North Central	Waco West - Waco Woodway - Waco Atco 138 kV line	Dec-10	138	5.8
South Central	Zorn/Clear Springs-Gilleland Creek-Hutto Switch 345-kV line	Feb-11	345	172.5
South Central	Kirby to Tuttle - 138 kV Circuit	Jun-11	138	6.5
South	Alazan to Nelson Sharpe 138 kV line rebuild	May-11	138	10.1
South	Sioux-Gandy 138kV Line	Mar-11	138	4.5
South	Palo Duro to AEP Dilley SS 138 kV Line	Feb-11	138	9
West	Tonkawa - Sweetwater East 345 kV line	Jun-11	345	63.4
West	Scurry County South Switch (Central A) - Tonkawa 345 kV line	Jun-11	345	30.4
West	Abilene South to Tuscola, Rebuild 69 kV line	Jun-11	69	11.4
All Areas	Total Lines	2010-2011	345/138/69	966
All Areas	Total Autotransformers	2010-2011	345/138	5057 MVA

The planned projects included in this report are estimated to cost almost $8.7 billion over the next five years and are expected to improve or add 6,693 circuit miles of transmission lines and 17,336 MVA of autotransformer capacity to the ERCOT system. These totals include that remaining unbuilt portion of the CREZ additions that are slated to be in service by 2013.

SUMMARY OF MAJOR PLANNED TRANSMISSION IMPROVEMENTS

Weather Zone	Planned Improvement	Voltage	In-Service
Coast	Zenith to Fayetteville 345kV Circuits	345	2016
Coast	Garrott - Midtown - Polk Ckt. 90	138	2012
Coast	South Lane - West Columbia Ckts. 04 & 60	138	2012
East	Trinidad - Tri Corner - Watermill 345 kV line	345	2013
East	Elkton - Athens North Tap 138 kV line	138	2014
Far West	Alamito Creek to Gonzales, Replace existing 69kV line with new 69kV line	69	2012
Far West	Midland East - Stanton East 138 kV line	138	2014
Far West	Odessa - Odessa North 138 kV line	138	2014
Far West	Lamesa - Ackerly Vealmoor 138 kV line	138	2013
North	Matador to Paducah Clare, Rebuild 69 kV line	69	2012
North Central	Denton 138kV System Upgrades	138	2014
South Central	Uvalde to Castroville, build 138 kV line, double circuit capable	138	2012
South Central	Dunlap 138/345kV Autotransformer Project	345	2013
South Central	Zorn Autotransformer Addition	345	2013
South Central	Hill Country - Install Fourth 345/138 kV Autotransformer	345	2012
South Central	Cagnon - Install a Fourth 345kV Autotransformer	345	2014
South Central	Cagnon - Install a Third 345kV Autotransformer	345	2013
South	Lobo to North Edinburg: Construct 345 kV line	345	2016
West	Ballinger to Winters, Rebuild 69 kV line	69	2011
Various	CREZ Facilities	345/138	2012-2013

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2. Transmission Planning Process

The ERCOT transmission planning process integrates requests for transmission service to interconnect new power producers and consumers, as well as supports continued safe and reliable service while accommodating growth for existing customers. In collaboration with Transmission Service Providers (TSPs) and other interested stakeholders, ERCOT staff assesses the electric needs of existing and potential transmission system users, on both an individual and collective basis, to determine whether transmission upgrades are required and to respond to the need. All ERCOT recommendations are supported by a series of detailed technical analyses in accordance with industry-accepted performance criteria and practices and the Regional Planning Group (RPG) Charter and Procedures.

For this planning process, ERCOT seeks input from all market participants and stakeholders about options and possible solutions. The ERCOT-led RPG is a forum for market participants, as well as the general public, to provide input. Participants of the RPG have the opportunity to highlight needs and to propose solutions, which ERCOT staff will evaluate as a part of the overall system plan. The RPG also provides participants a way to review and comment on proposed projects that address transmission constraints and other system needs.

By utilizing the RPG forum, ERCOT is committed to being inclusive - to share proposals openly and to listen to a diverse spectrum of interested entities - in the development of transmission improvement proposals. Potential projects to be reviewed by ERCOT and the RPG can be proposed by ERCOT staff, individual TSPs, other market participants, the Public Utility Commission of Texas (PUC), or the general public. The RPG generally meets monthly, as well as exchanges information via e-mail. Agendas and presentations are available publicly, and project files are posted to a secure web site.

As stated in the RPG Charter and Procedures[1], major projects must be be endorsed by the ERCOT Board of Directors. Following the RPG review, ERCOT staff will complete an independent review of the projects and make recommendations to the ERCOT Board of Directors for approval. The ERCOT Board will be asked to endorse major projects that have met the following criteria:

- ERCOT staff has recommended the proposed transmission project based on its analyses of identified constraints, including proposals from TSPs and any necessary requirements to integrate new generation facilities.
- The project has been reviewed and considered through the open RPG process.
- ERCOT staff has determined the designated provider of the additions.

Following the Board of Directors review, ERCOT will notify the PUC of all ERCOT Board-endorsed transmission facility additions and their designated providers.

[1] The RPG Charter and Procedures document is available at http://www.ercot.com/committees/other/rpg/

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3. Load

Forecasting electrical demand and energy is one of the most significant factors in determining the future infrastructure needs of the ERCOT power system. Should the forecast understate the actual load growth, adequate facilities may not be in place in time to reliably serve the load. On the other hand, if the forecast overstates the actual growth, facilities may be built before they are necessary, resulting in inefficient use of resources and unnecessary costs for consumers.

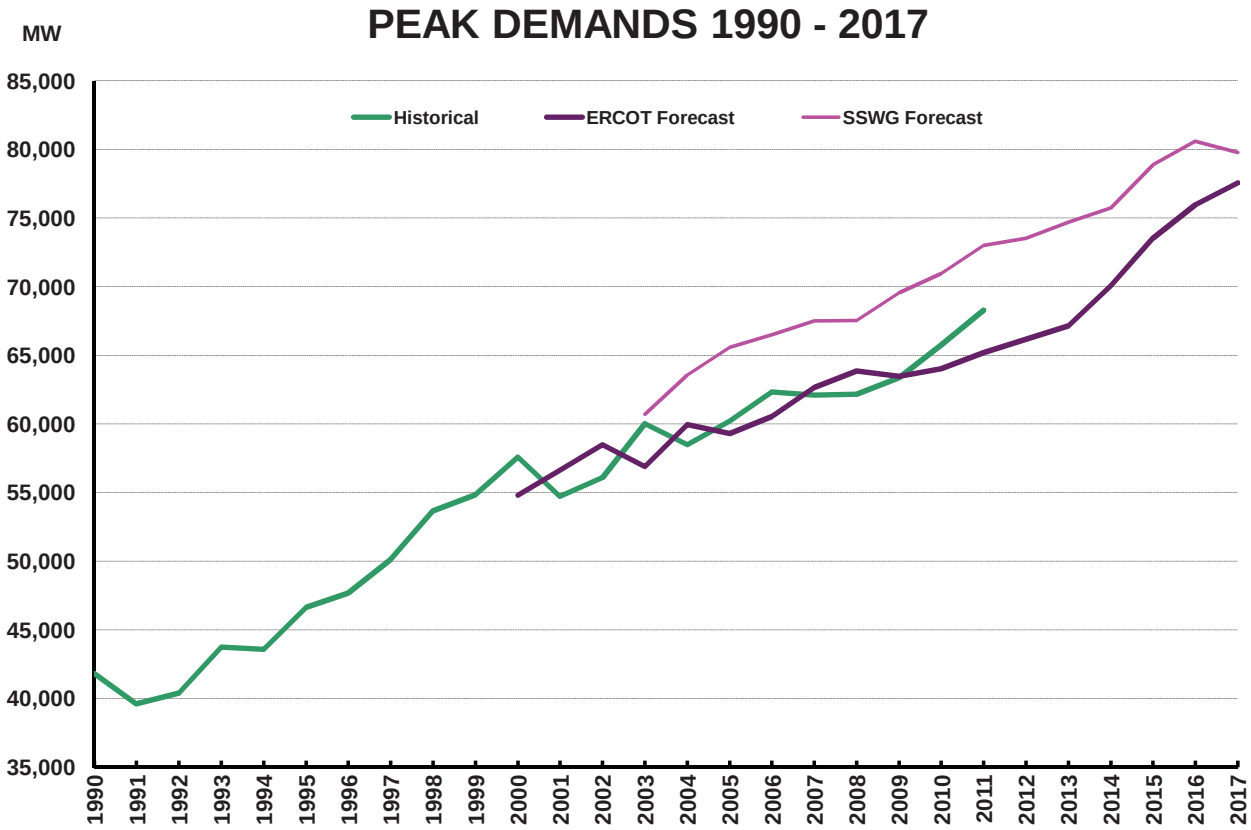
To develop the most reasonable load projections for the system, ERCOT load forecasters consider a wide range of variables such as population, weather, land usage, general business economy, governmental policy, and societal trends in terms of both historical load data and the best predicted future indicators available.

3.1 Peak Demand

The 2012 summer peak demand forecast of 66,195 MW represents a decrease from the 2011 actual peak demand of 68,379 MW, which occurred during a period of sustained, above-normal temperatures.

The key factor driving the peak demands and energy consumption is the overall health of the economy as measured by non-farm employment.

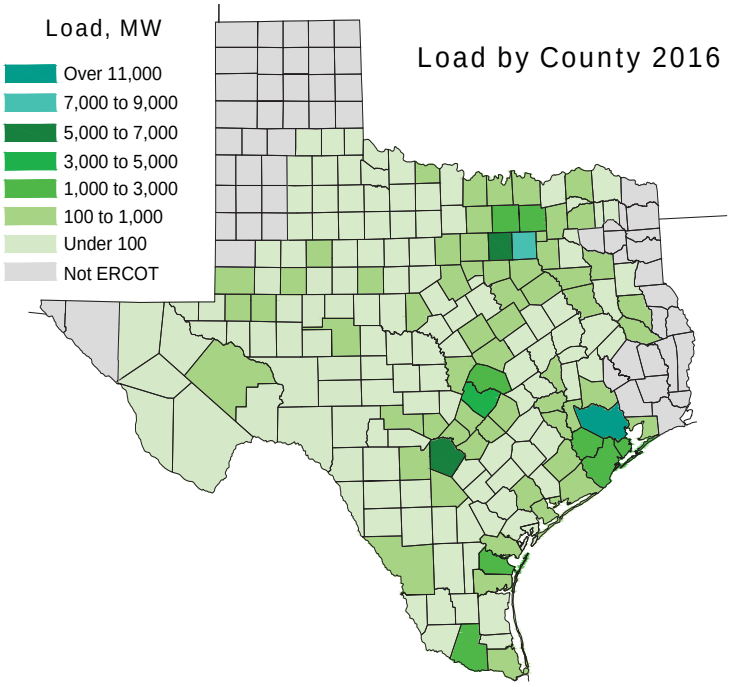
The figure below shows the historical peak demand from 1990 through 2011 and the forecasted peak demand through 2017. The historical compound growth rate for the last five years is 2.4%. This growth rate is significantly higher than reported last year due to the fact that ERCOT set an all-time hourly peak demand of 68,379 MW on August 3, 2011. The new peak demand was due to 2011 being a record hot summer. The forecasted annual growth rate between 2012 and 2016 is 3.5% due to a strong economic recovery after 2012 reflected in the economic forecast.

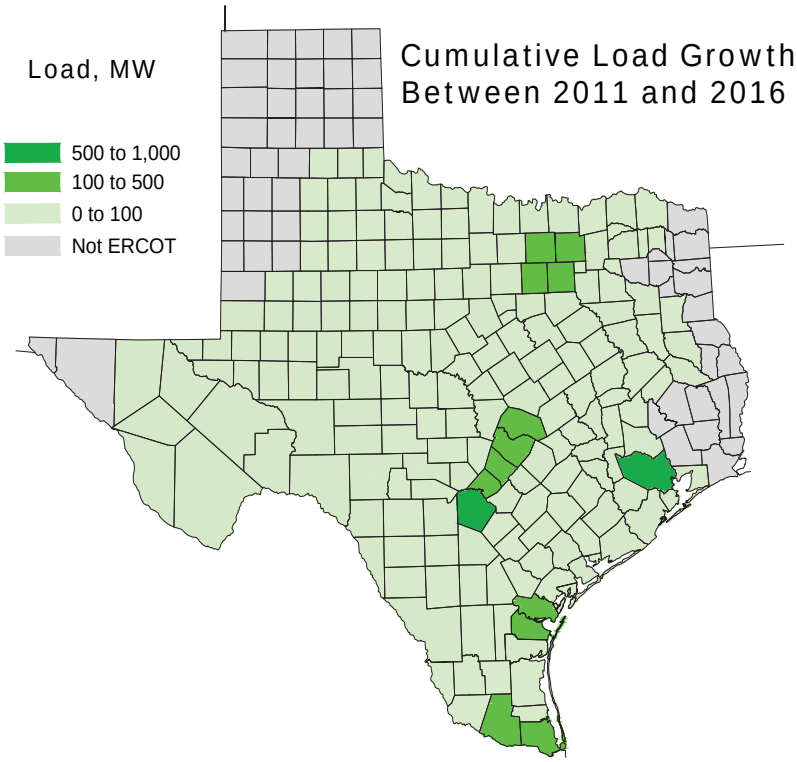


The Steady-State Working Group (SSWG) load forecast is developed by the aggregation of the load forecasts provided by each Transmission and Distribution Service Provider (TDSP). The TDSPs provide their individual forecasts in the Annual Load Demand Request (ALDR) filing to ERCOT by March 1 of each calendar year. The SSWG forecast provided is the non-coincident peak of the individual TDSPs. The SSWG load forecast, depicted above, was modified to remove the Private Use Network (PUN) load that is also excluded from the ERCOT load forecast. The SSWG forecast is used to determine the reliability needs of the ERCOT transmission system.

3.2 Non-coincident Peak by County

The loads by county shown to the right are non-coincident peak demand forecasts provided by the TDSPs in the 2011 ALDR. The counties with the greatest peak demands are Harris, Dallas, Tarrant, and Bexar. These four counties comprise roughly 45% of the load within ERCOT.





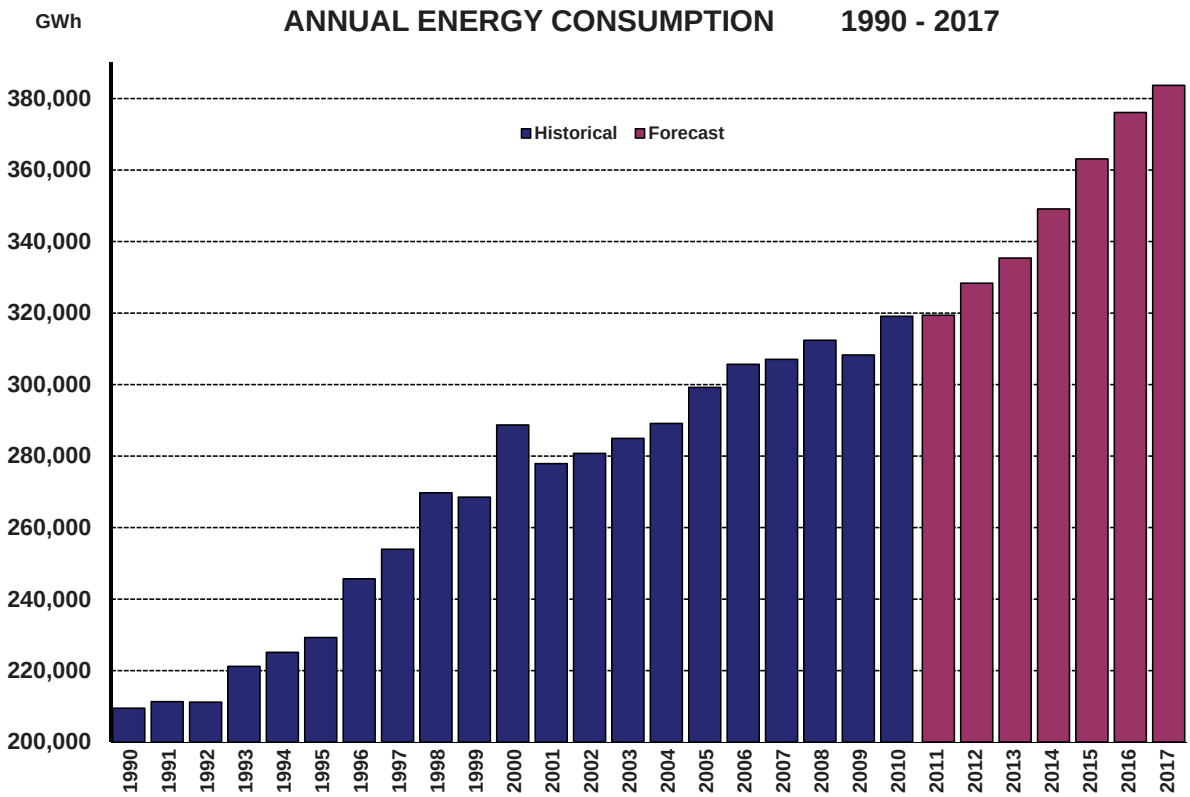
While ERCOT's overall peak demand forecast calls for a 3.5% annual growth rate, some areas within the state are experiencing growth as high as 6% per year. As expected, the greatest growth is around the metropolitan areas. The counties with the greatest expected cumulative load growth are Bexar, Harris, Dallas, and Tarrant. Other areas expected to experience significant load growth include the counties along Interstate 35 between San Antonio and Waco, counties near Dallas, Fort Worth and Houston, and the lower Rio Grande Valley.

3.3 Energy

While the peak demand forecast provides an indication of the size of electrical facilities that should be constructed to serve the expected peak demand, the energy usage forecast assists in determining the usage of these facilities over all hours of the year.

The historical compound growth rate for the last five years is 2.1%. The forecasted annual growth rate between 2012 and 2017 is 3.5% due to a strong economic recovery after 2012 reflected in the economic forecast.

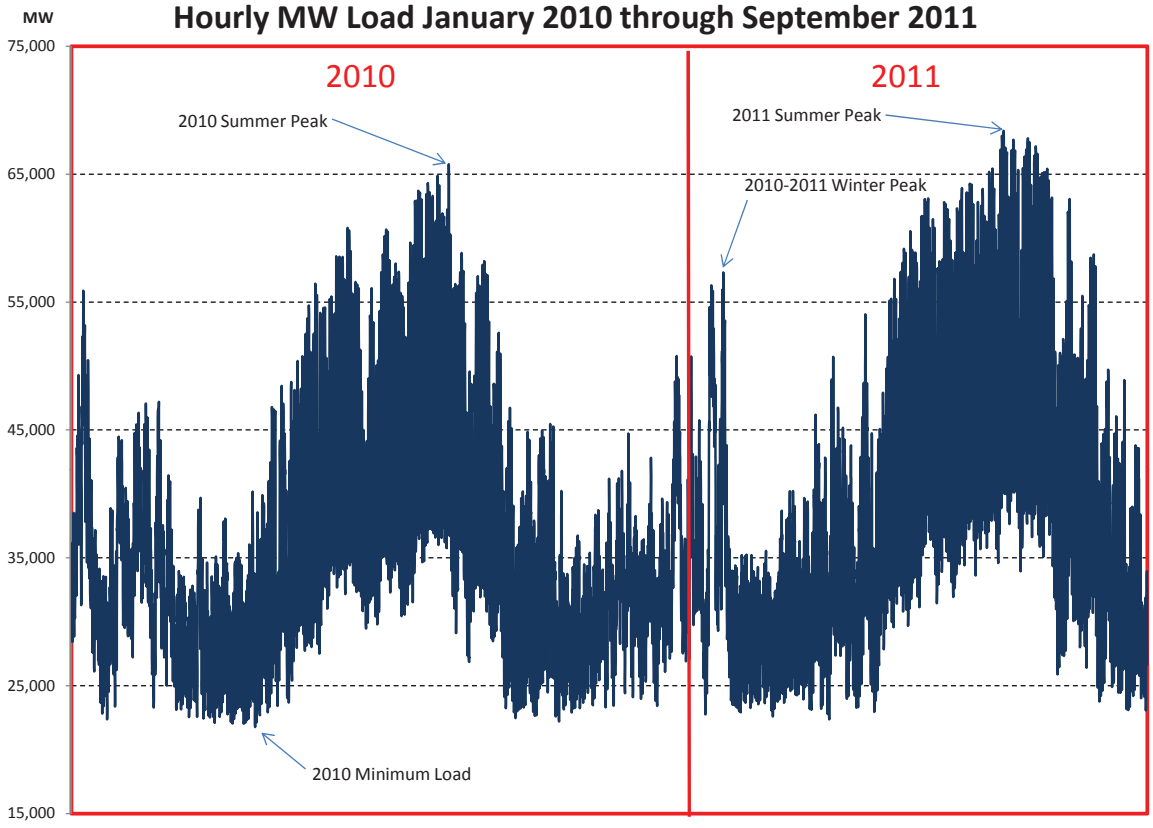
The figure below shows the historical energy consumption from 1990 through 2010 and the forecasted energy consumption through 2017.



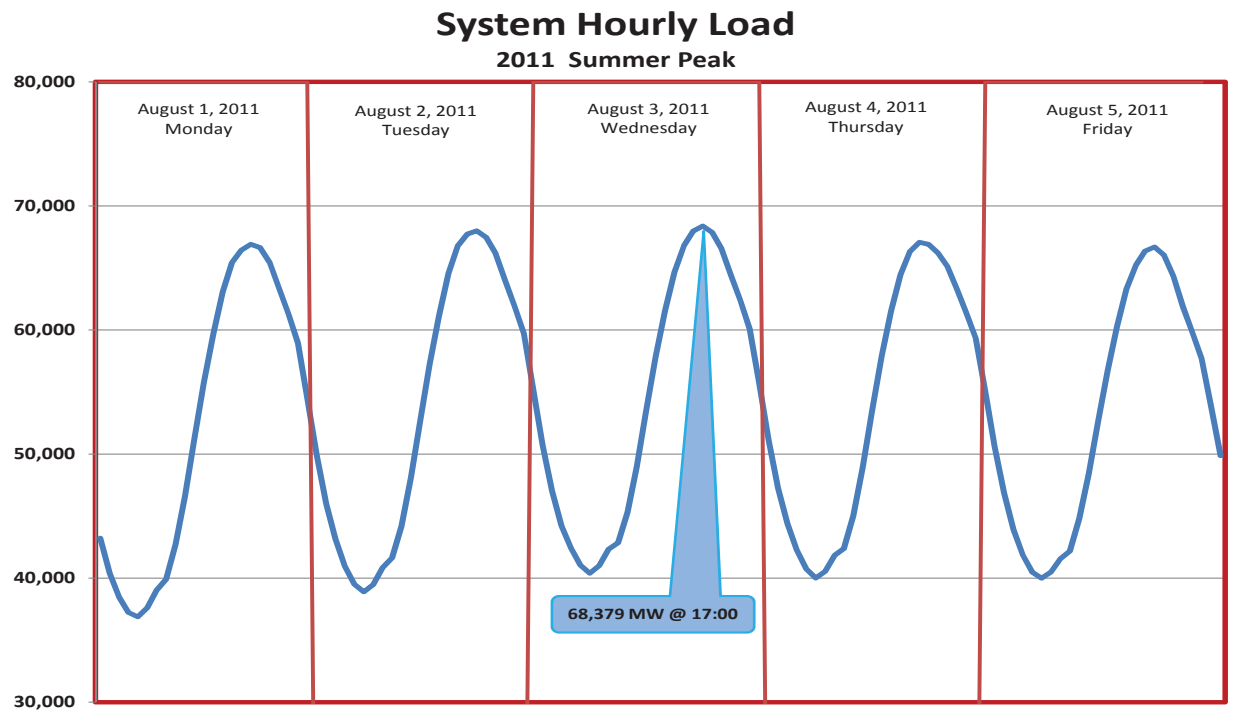
3.4 Hourly Load

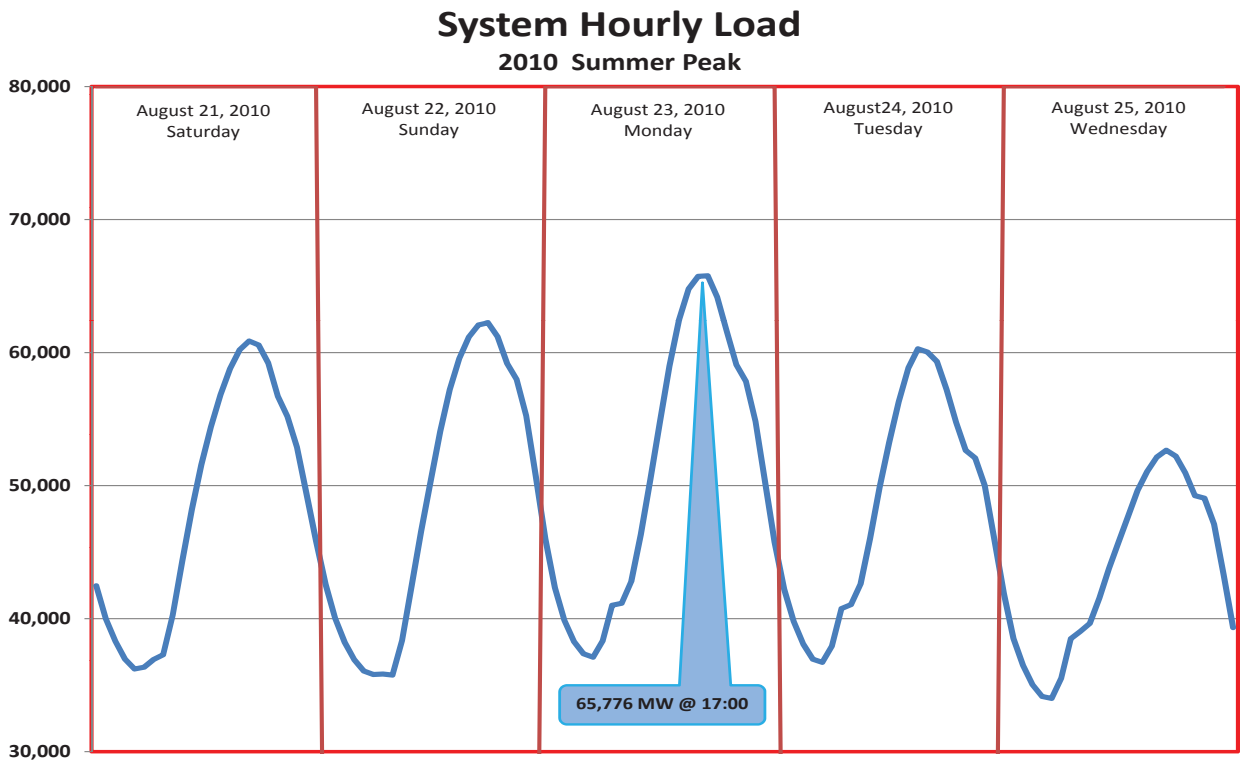
Hourly load is an extremely useful tool for understanding the magnitude of change and the pattern of load being served over a specific time. The following pages illustrate some of the varying load shapes encountered while operating the grid.

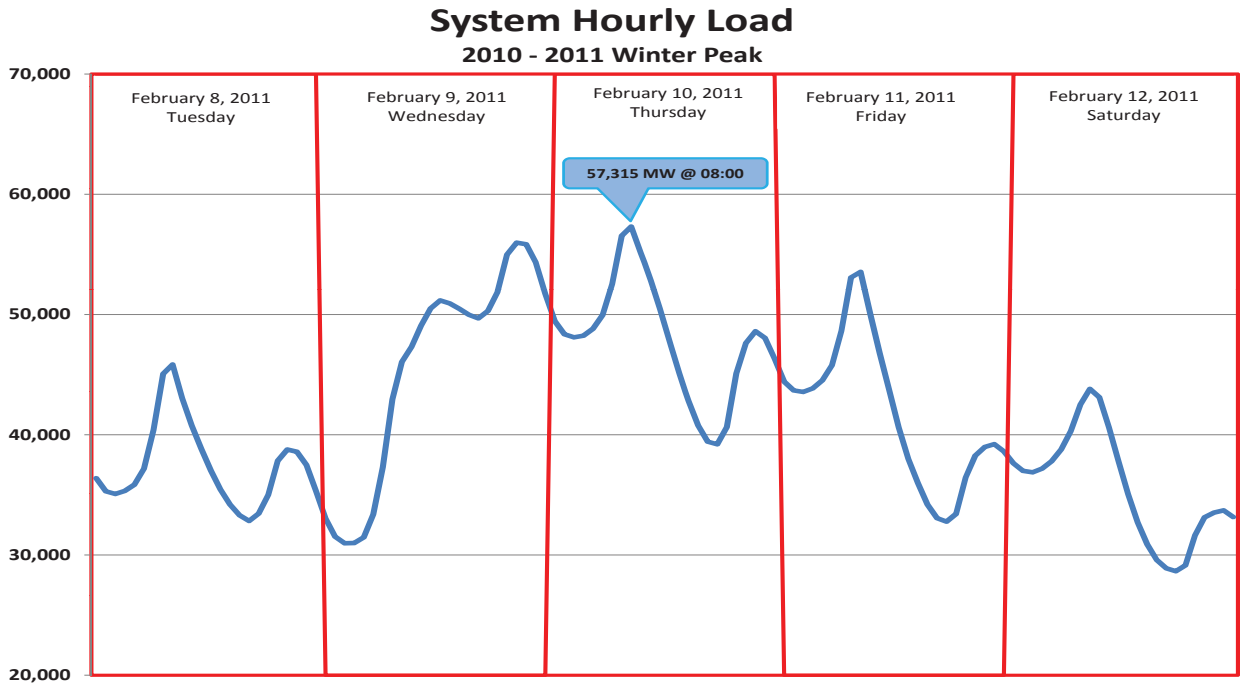
The chart below shows the actual load over the time frame of this report.

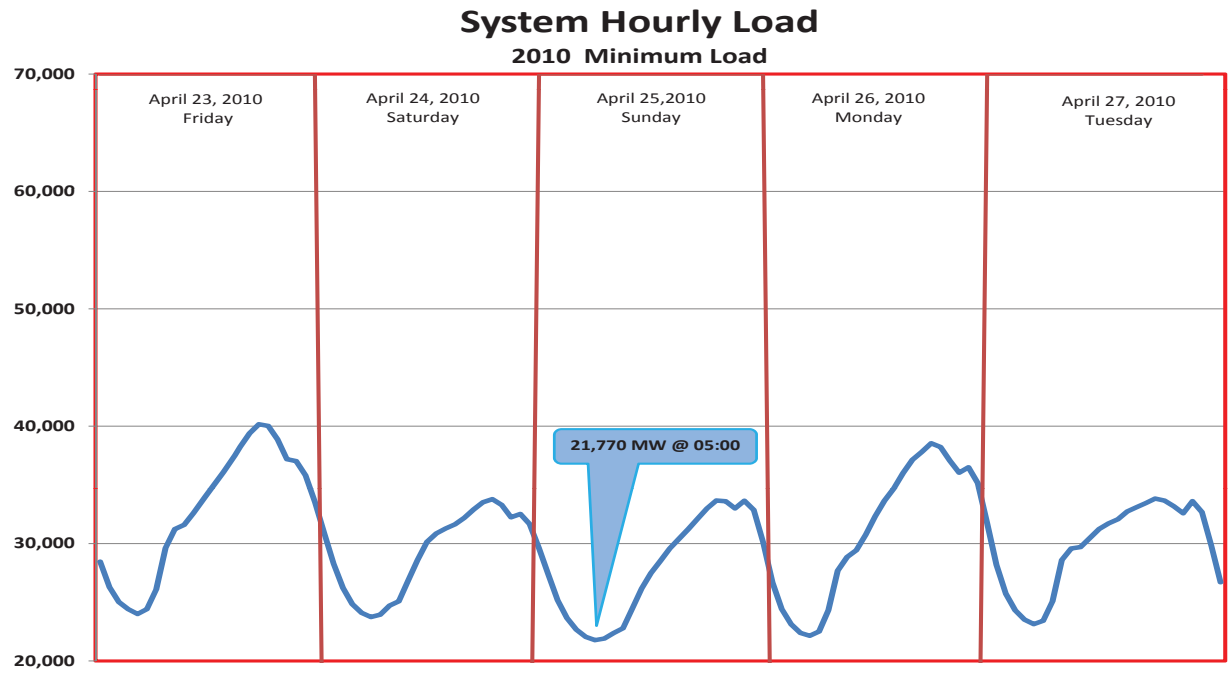


The following four charts are close up views around the minimum load and the seasonal peaks.






System Hourly Load
2010 - 2011 Winter Peak
70,000
60,000
50,000
40,000
30,000
20,000
February 8, 2011
Tuesday
February 9, 2011
Wednesday
February 10, 2011
Thursday
February 11, 2011
Friday
February 12, 2011
Saturday
57,315 MW @ 08:00


System Hourly Load
2010 Minimum Load
70,000
60,000
50,000
40,000
30,000
20,000
April 23, 2010
Friday
April 24, 2010
Saturday
April 25,2010
Sunday
April 26, 2010
Monday
April 27, 2010
Tuesday
21,770 MW @ 05:00

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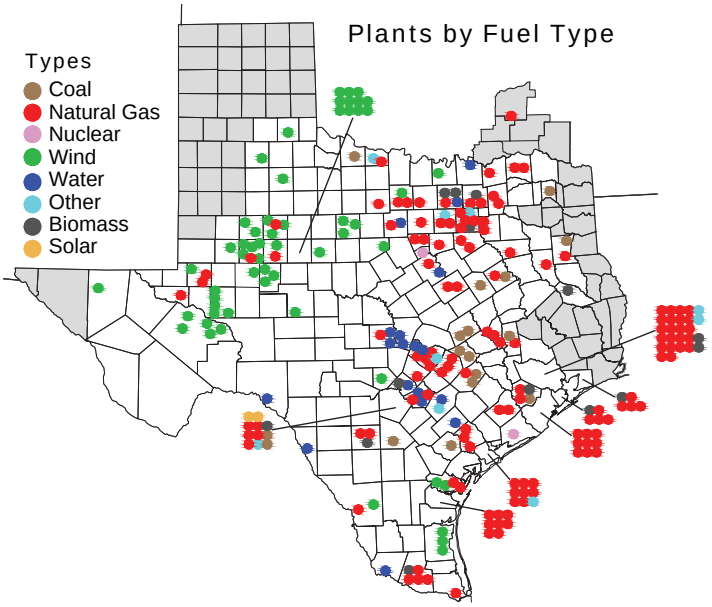
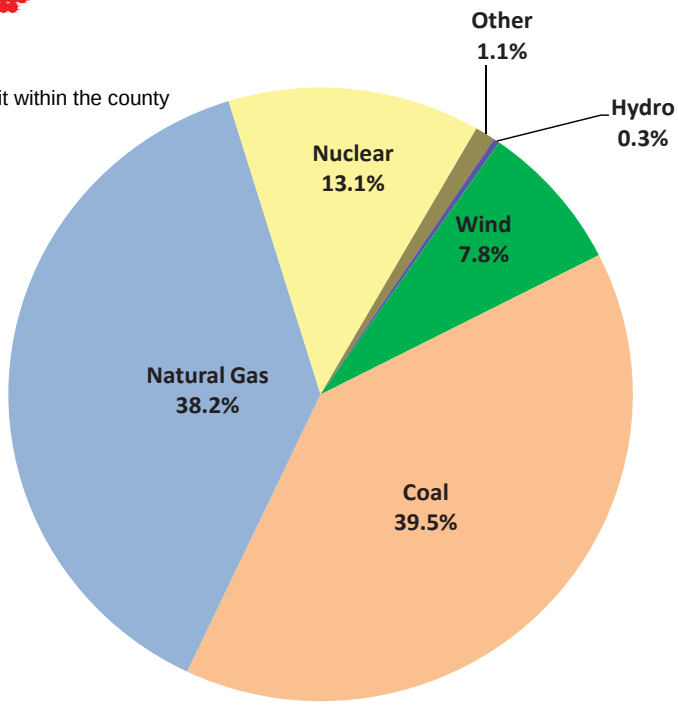
4. Generation

Current installed generation capacity[2] in the ERCOT Region is about 78,000 MW, which includes about 4,300 MW of generation that has suspended operations or been "mothballed".

In terms of energy produced within ERCOT in 2010, approximately 40% was fueled by coal, followed by natural gas at 38%, nuclear at 13% and wind at 8%. The map below is an indicator of generating facilities across the region by fuel type, and the pie chart shows the energy produced by fuel type.



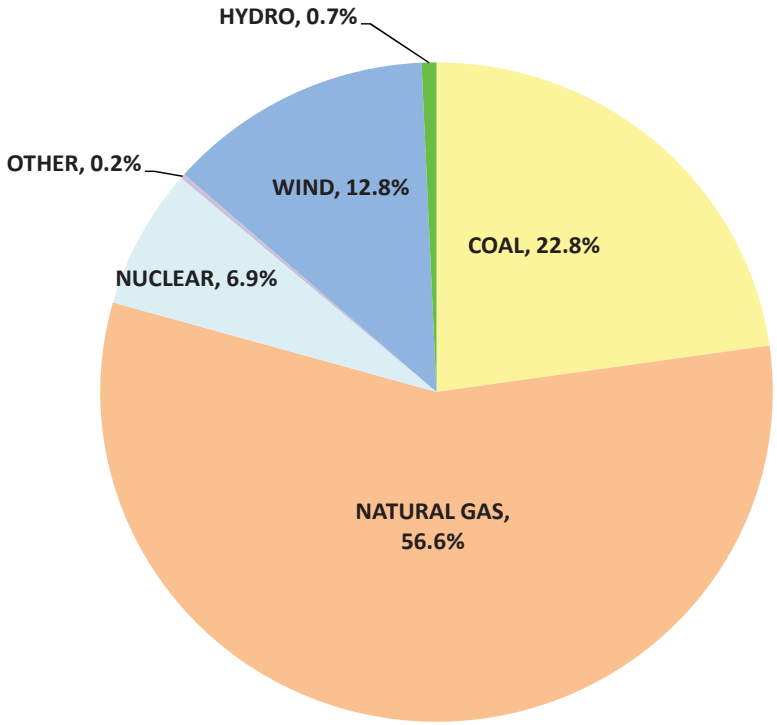


2010 Energy Generated by Fuel Type

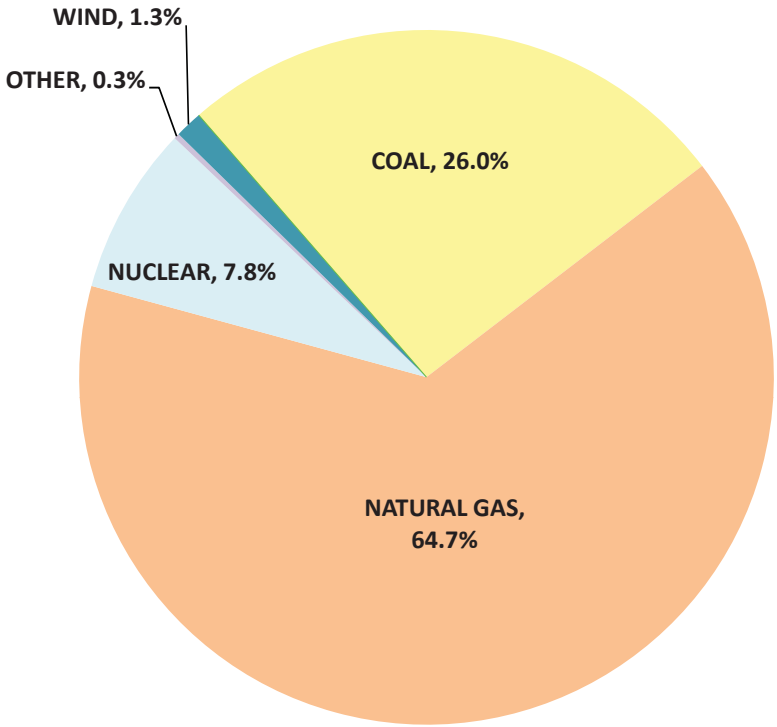
[2] For additional information, please see the Capacity, Demand and Reserve report posted at http://www.ercot.com/news/presentations.

It is important to highlight the distinction between installed capacity and available capacity. Power from some fuel types, such as wind and water, may not be available coincident with system need.

In terms of installed capacity within ERCOT, approximately 57% is fueled by natural gas, followed by coal at 23%, wind at 13%, and nuclear at 7%. The pie chart to the right shows the installed capacity by fuel type.



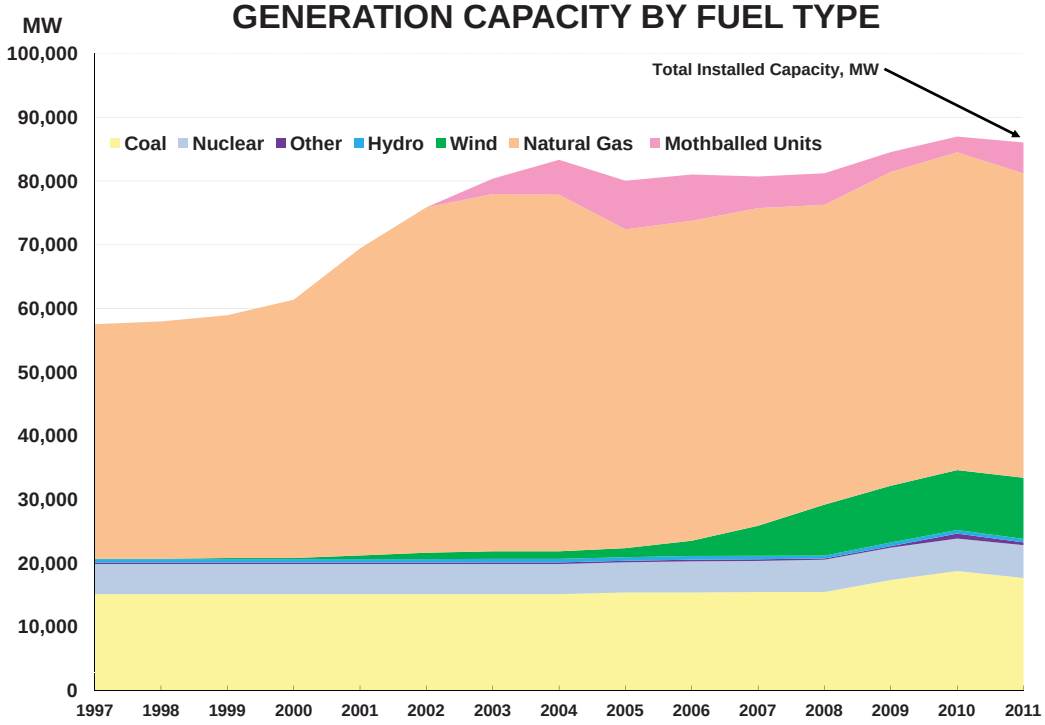
2011 Generation Capacity by Fuel Type



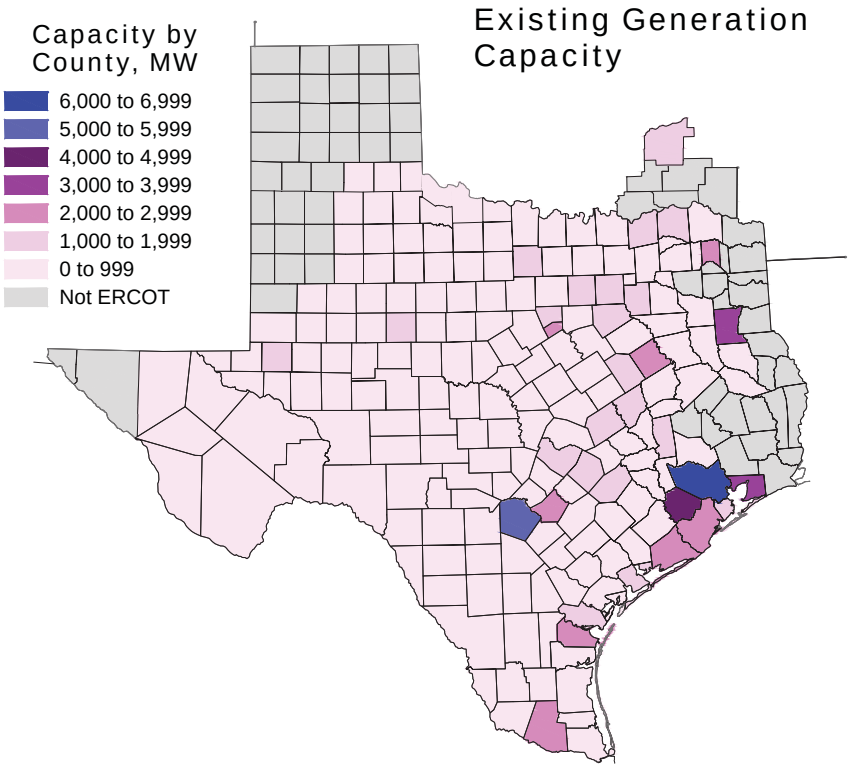
In terms of available generation, the chart to the left illustrates the proportion of generation available after the wind and hydro sources have been discounted using availability factors of 8.7% and 0% respectively, giving a more realistic view of expected generation by fuel during system peak load conditions.

2011 Generation Availability by Fuel Type

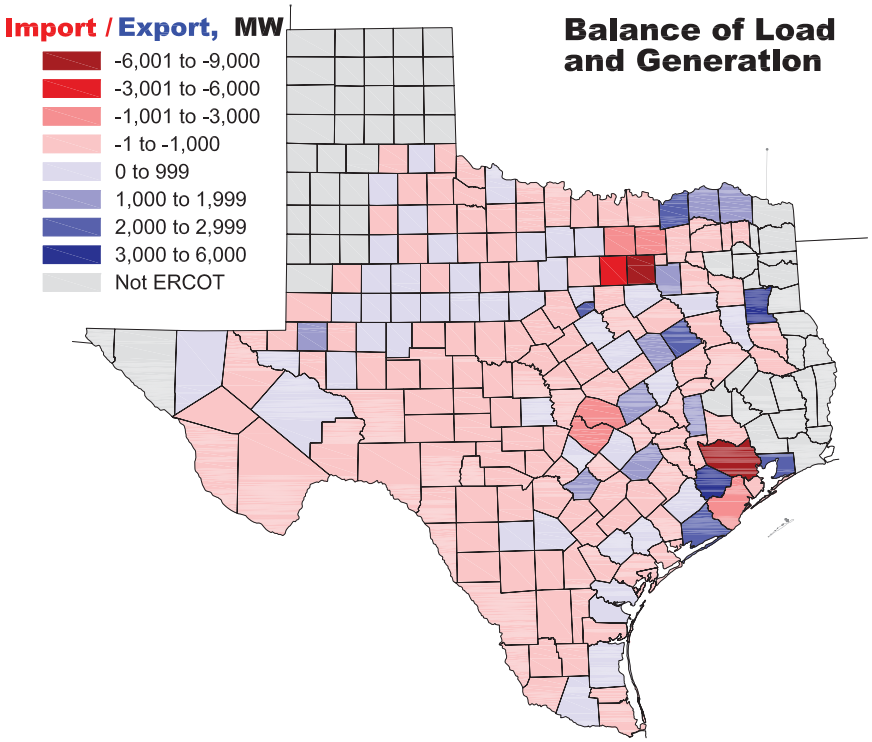
In 2011, generation capacity additions were more than offset by the mothballing or retirement of coal and gas facilities, although new wind and gas fired generators were added. The chart below depicts installed capacity additions by year and fuel type.



The existing generation capacity by county shown on the map to the right is based on information from the generation companies and includes asynchronous ties to other regions, private network generation, distributed generation that is registered with ERCOT, and all Switchable Resources, which are Resources that can be connected to either the ERCOT Transmission Grid or a grid outside the ERCOT Region.

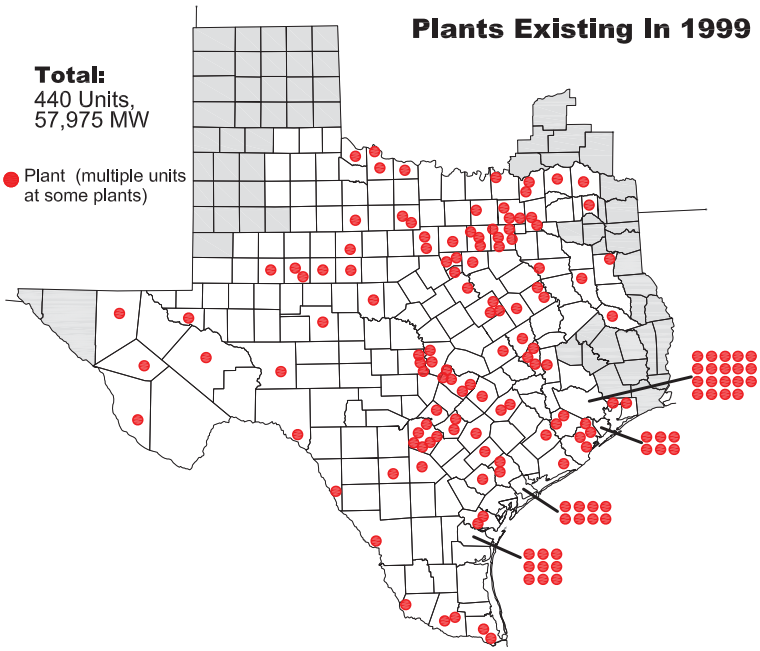


The map below illustrates the balance of load and generation within each county in the ERCOT Region for the summer of 2011. A county with more generation than load will usually export generation to other counties; comparatively, a county with more load than generation will usually import generation from other counties. Please note this map is for general illustrative purposes only, however it clearly shows that the Dallas/Fort Worth area, the Houston area, and the Austin/Round Rock area are importers and dependent on transmission to serve load.

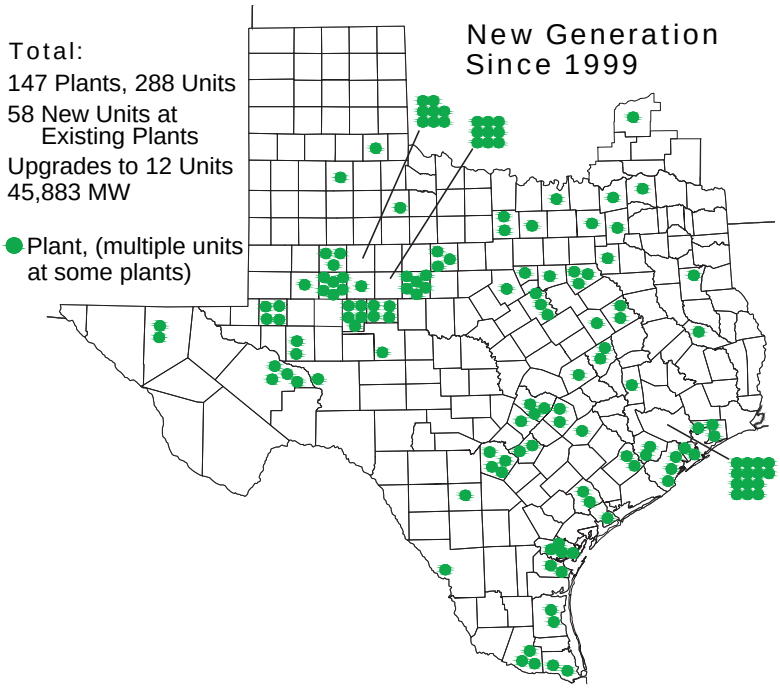


4.1 Historical Generation

In 1999, ERCOT had approximately 58,000 MW of installed generation capacity. Much of that generation was concentrated in the metropolitan areas of Houston, Dallas/Fort Worth, San Antonio, and Corpus Christi. The map to the right shows generation within the ERCOT Region as of 1999.



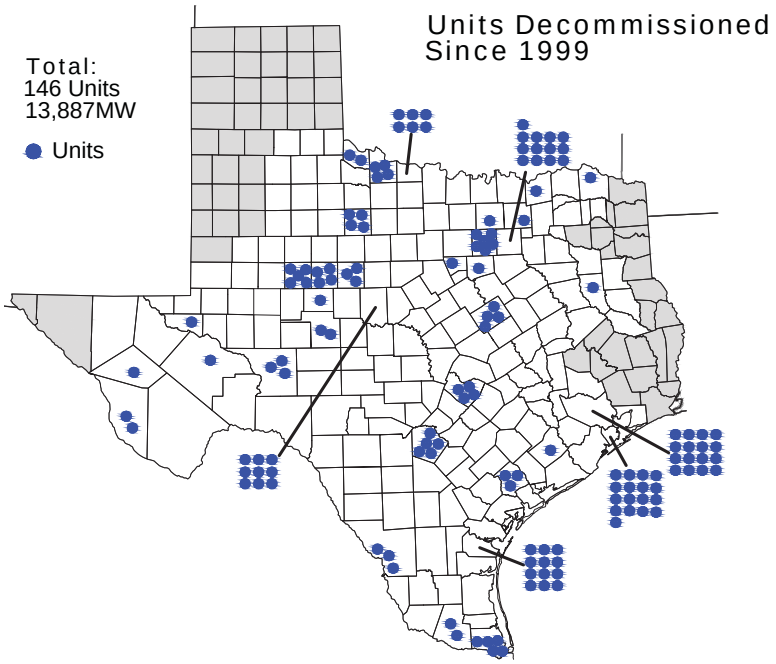
Dots do not reflect actual location of the unit within the county



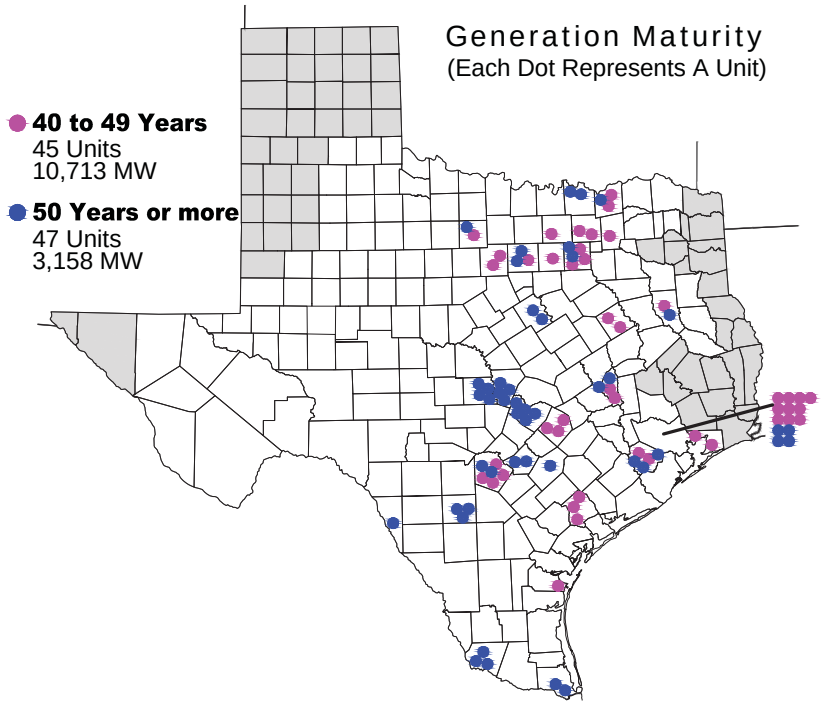
Dots do not reflect actual location of the plants within the county

Since 1999, ERCOT capacity has grown by adding new generation sites, expanding existing sites, and upgrading or repowering existing units. The additional generation totals almost 46,000 MW. Much of the new installed generation capacity added in the last few years is from large wind projects built in West Texas. This significant change in the generation portfolio has placed new challenges on the adequacy and the reliability of the existing transmission system. The map to the left shows generation added within the ERCOT Region between 1999 and September 2011.

Since 1999 a total of 136 units have been decommissioned. The map to the right shows generation within the ERCOT Region that has been decommissioned since of 1999. Decommissioning of older plants near metropolitan areas due to economics or environmental restrictions requires ERCOT to undertake an assessment of system reliability needs and to propose maintaining certain units under Reliability Must-Run (RMR) contracts and any transmission alternatives to these RMR sources.



Dots do not reflect actual location of the unit within the county

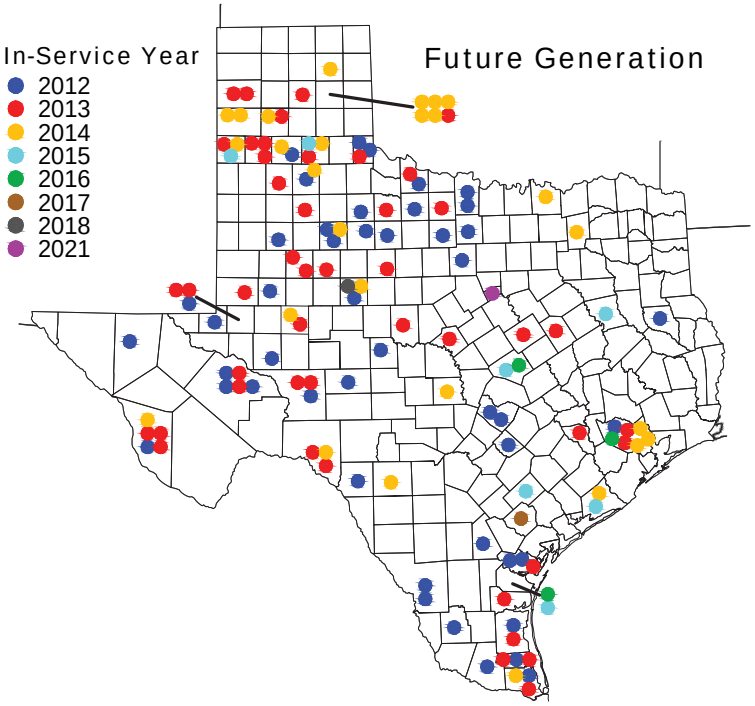


Dots do not reflect actual location of the unit within the county

Many factors, including fuel cost, O&M cost, efficiency, environmental requirements and revenues, influence whether a generating unit will remain in service or be decommissioned. Age, as an indication of the relative efficiency and maintenance cost of a generating unit, has been used to provide some limited insight into some of the factors that are considered in the decommissioning of units. Currently there is almost 14,000 MW of generation within ERCOT that is over 40 years in age. Most of the older capacity is located in and around the larger metropolitan areas of the state. The map to the left shows generation that is over 40 years in age.

4.2 Future Generation

ERCOT has received interconnection requests for proposed generation having aggregate nameplate capacity of over 38,000 MW. Of this capacity, over 32,000 MW is considered public information to some degree and is shown on the map to the right.



Dots do not reflect actual location of the unit within the county

The following table shows the interconnection requests for proposed capacity by fuel type, as of December 1, 2011.

Generation Interconnection Requests
by Fuel Type (MW)

Fuel	Confidential	Limited Public	Public	Total
Gas	560	662		1,222
Gas-CC	1,701	1,527	4,732	7,960
Nuclear			3,200	3,200
Coal		850	2,785	3,635
Wind	3,207	14,854	1,605	19,666
Solar	379	521	90	990
Biomass			100	100
Other		316	1,240	1,556
Total	5,847	18,730	13,752	38,329

* The "Other" category may include generation fueled by petroleum coke, gassified petroleum coke, or batteries.

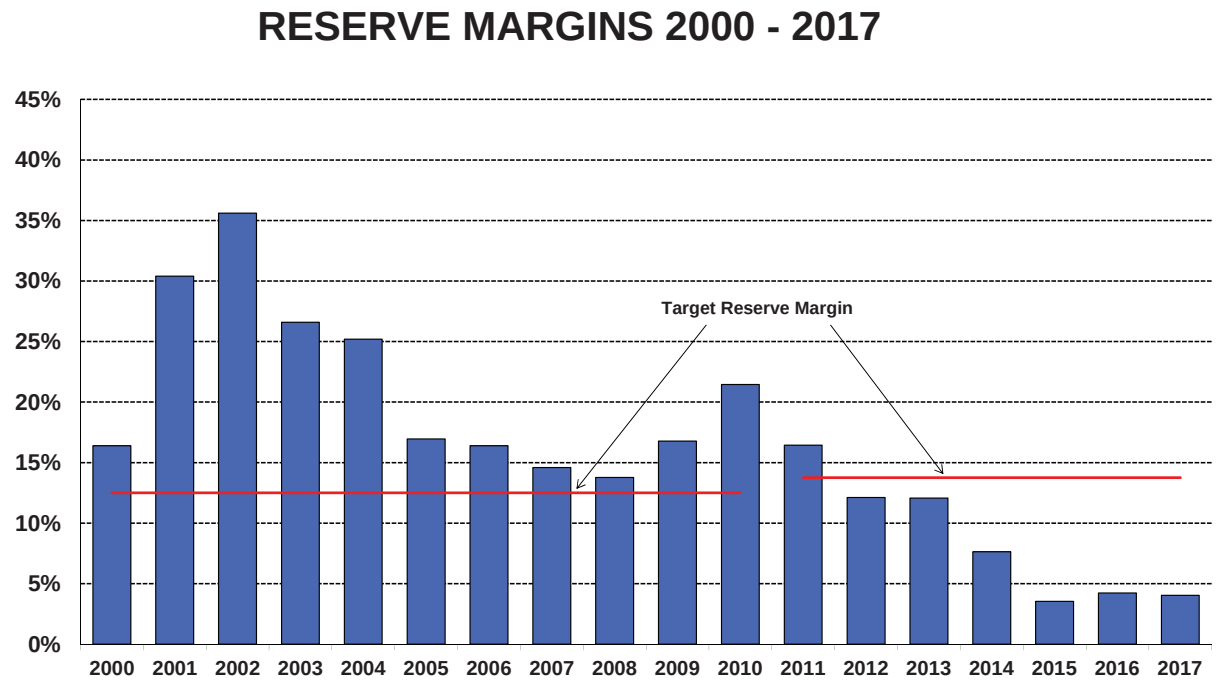
The following table shows the requests for new generation in ERCOT between October 2010 and December 2011.

Generation Interconnection Request Activity in 2011						
FUEL	Screening Studies Requested		Interconnection Studies Requested		Interconnection Agreements Signed	
	Number	MW	Number	MW	Number	MW
Coal						
Gas - Combined Cycle	5	1,982	2	281	1	1,380
Gas - All Other	6	1,233	3	662	1	7
Wind	35	6,906	29	5,720	6	883
Solar	23	983	8	438	2	90
Other	1	36	1	36		
Total	70	11,140	43	7,137	10	2,360
Projects may appear in more than one category						

There is much uncertainty associated with many of the proposed interconnections. One reason is that multiple interconnection requests may be submitted representing alternative sites for one proposed facility. For this and other reasons, it is possible that much of this capacity will not be built.

5. Reserve Margin

Reserve margin[3] is the percentage by which the available generating capacity in a system exceeds the peak demand. The chart below shows the historical and projected (as of December 16, 2010) reserve margins for the ERCOT system from 2000 through 2016, as well as the approved target. Between 1999 and 2004, different methodologies were used to calculate ERCOT's margins, which accounts for some of the wide variation of the margins shown. In 2005, the ERCOT Board of Directors approved a methodology that recognizes a generator's contribution to reserve is determined more by availability than by nameplate capacity. Beginning in 2006, the reserve margins have been calculated using this new methodology, applying a 12.5% target. In 2010, this target was adjusted to 13.75% for years 2011 and beyond by the ERCOT Board of Directors.



[3] Reserve margin is calculated by the following formula: ((generation – demand) / demand). The Capacity, Demand and Reserve report reflects these calculations.

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6. Transmission Improvements

In order to improve grid reliability and power deliverability as well as to reduce congestion and improve grid efficiency, ERCOT and TSPs complete system planning studies of the ERCOT transmission system. Since January of 2010, ERCOT TSPs have completed major projects estimated at over $870 million. The major projects that are being considered through years 2012 – 2016 and beyond are estimated at almost $8.7 billion. This estimate includes the Competitive Renewable Energy Zones (CREZ) projects ordered by the Public Utility Commission of Texas (PUC) in Docket 33672.

Transmission system improvements and expansions are built by transmission owners and paid for by consumers. In addition to load growth and congestion reduction, interconnection of new generation and decommissioning or mothballing of generation may also require upgrades or additions to the transmission system elements in order to maintain reliability.

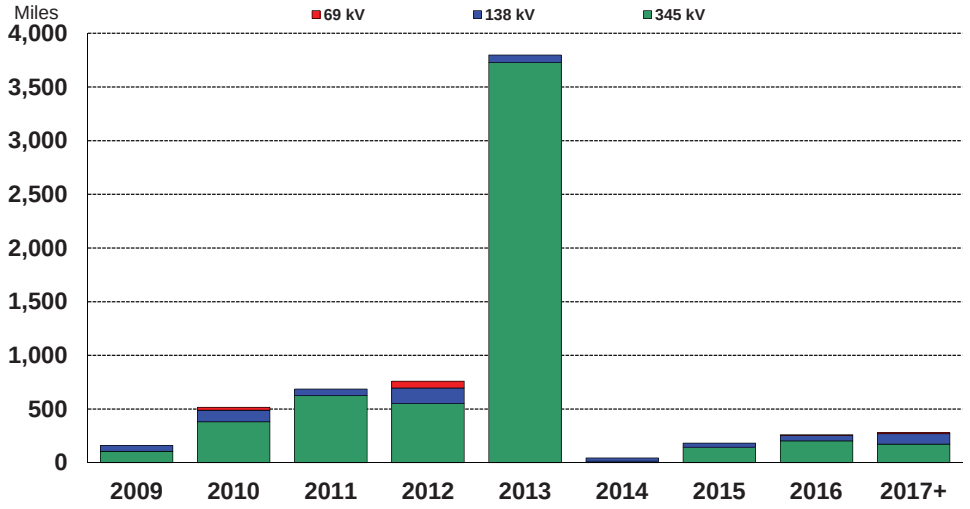
6.1 Improvement Projects

By studying current congestion costs and projected congested elements, ERCOT identifies the portions of the transmission grid prone to persistent congestion and proposes cost effective solutions to resolve those constraints and thus lower the cost of power to consumers. Reliability Must Run (RMR) requirements are also taken into consideration.

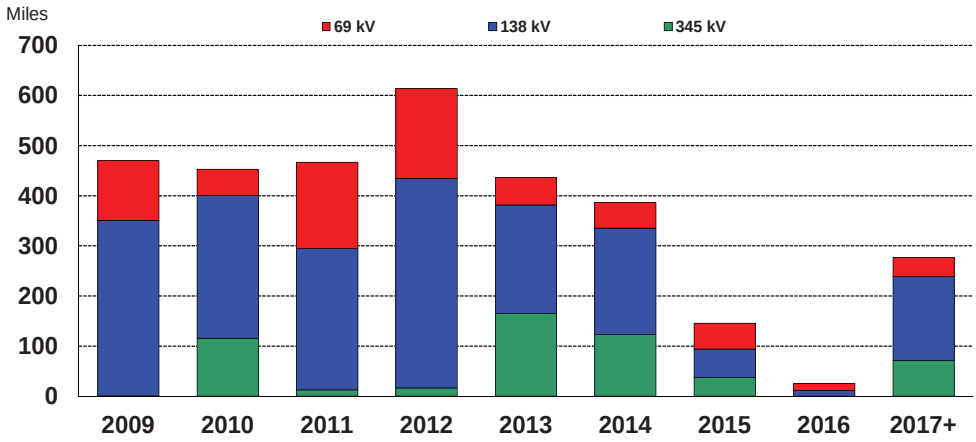
Since 2010, TSPs have completed projects adding or upgrading over 966 miles of circuits, adding over 586 MVar of capacitor support, 75 MVar of reactor support, and installing 5,057 MVA of autotransformer capacity. The projects that are being considered through the years 2012 – 2016 are expected to add over 5,047 miles of new circuits, upgrade or improve over 1,653 circuit miles of transmission lines, adding over 359 MVar of capacitor support, 900 MVar of reactor support and add 17,336 MVA of autotransformer capacity.

The following three charts on the next page provide a breakdown of both completed and recommended projects by new transmission, improved transmission, and autotransformer capacity additions by in-service year. Due to report timing, the figures do not include the incremental transmission projects that resulted from the recently completed five-year transmission plan.

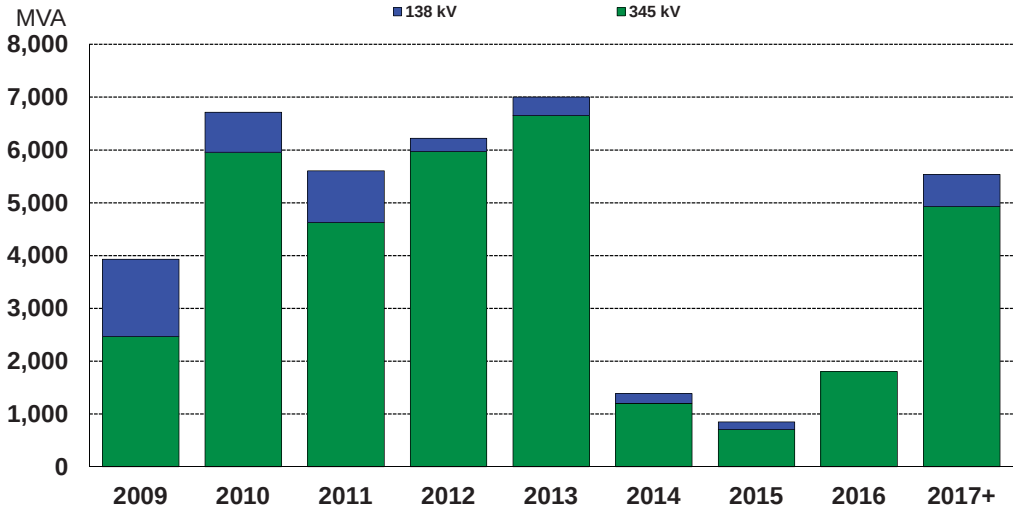
CIRCUIT MILE ADDITIONS



CIRCUIT IMPROVEMENTS



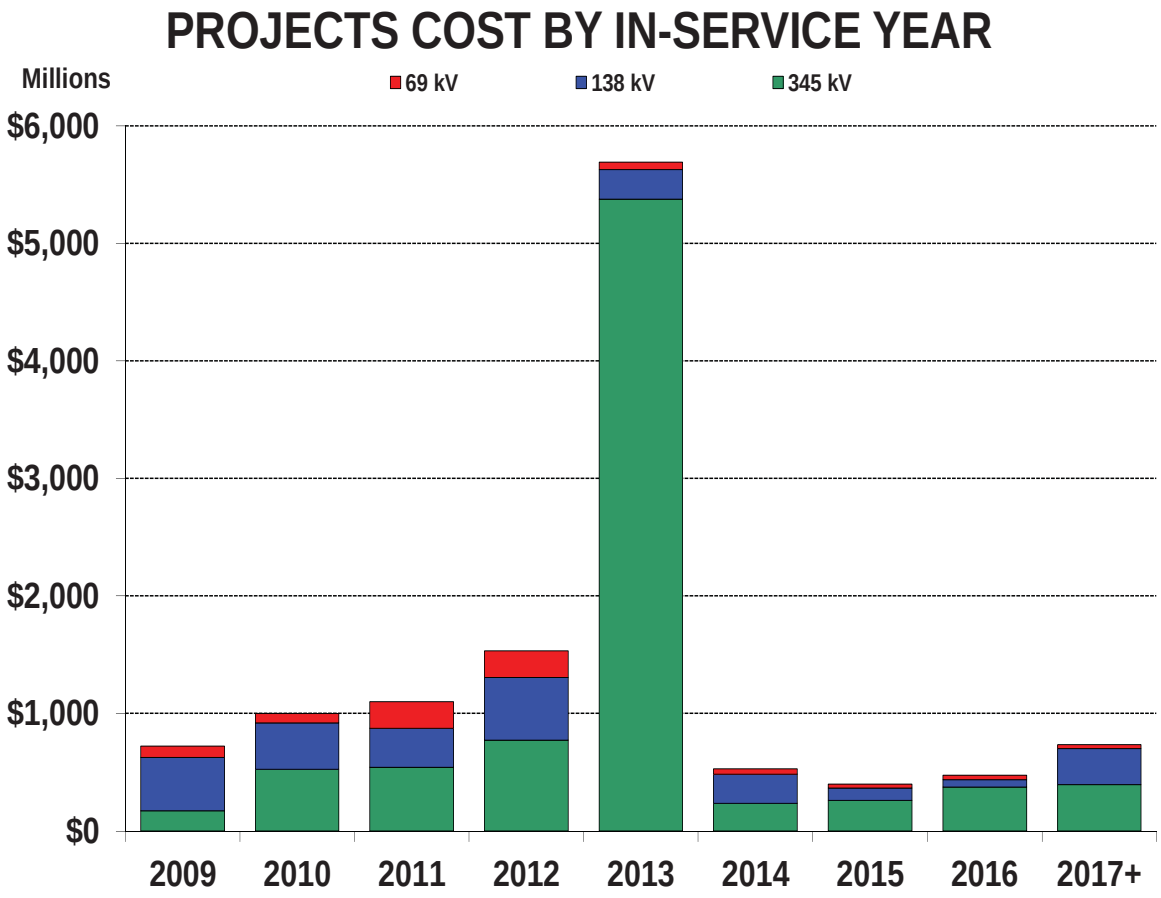
AUTOTRANSFORMER IMPROVEMENTS



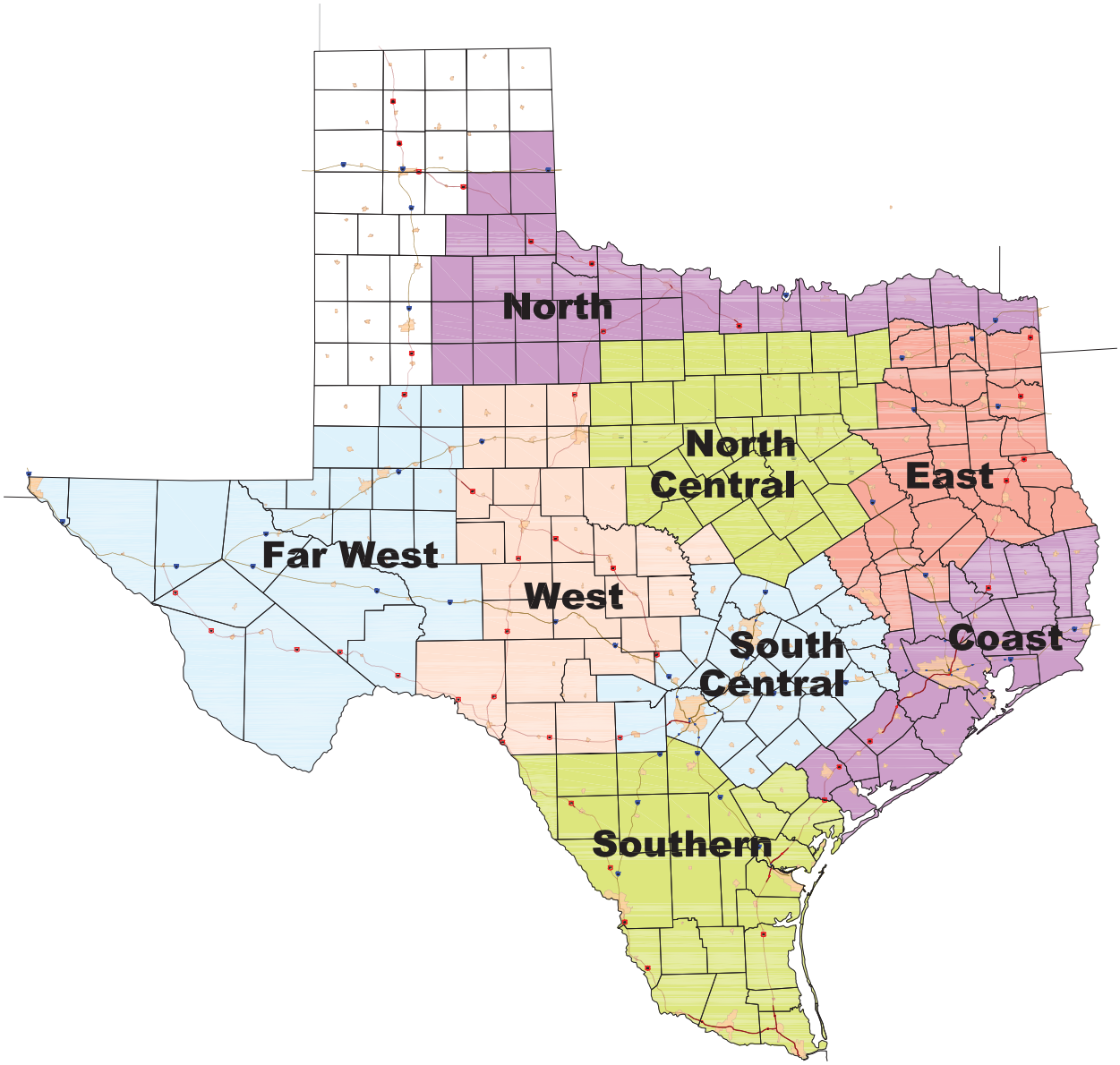
6.2 Improvement Costs

While transmission improvements are often needed to reduce congestion, it is difficult to produce a side-by-side comparison of transmission improvement costs against congestion costs. This is mainly due to the time inconsistencies – improvement costs are spread over many years while congestion costs are paid for on an annual basis. Due to this, there are no direct allocations of project costs to congestion costs, but each is shown separately.

The following figures reflect improvements based on project estimates and do not reflect actual transmission cost, including operations and maintenance, in a given year. The actual costs for a single project will be spread over several years to account for engineering, regulatory approvals, material, right-of-way procurement, construction, etc. In addition, the figures do not include the incremental transmission projects that resulted from the recently completed five-year plan. The graph below provides a breakdown of both completed and recommended project costs by in-service year. The significantly higher costs shown below in 2013 are primarily due to the CREZ projects.



ERCOT WEATHER ZONES



7. Area Constraints and Improvements

This section highlights recent constraints, completed improvements, planned improvements, and projected constraints on the ERCOT power system by weather zone, which are depicted on the preceding page. Each section includes a brief discussion of issues along with supporting tables and maps. This chapter does not identify planned CREZ projects, however the CREZ projects were incorporated into the reliability and economic planning studies. The default CREZ projects were included according to the TSP-projected in-service dates. The remaining CREZ projects were included as of 2013.

For each weather zone, four types of information are provided:

- Recent Constraints – the elements that have caused local congestion on the system at some point during 2011, as reported in monthly operations reports.

  The illustrated constraints were not necessarily experienced throughout this period; constraints may change due to generation changes, transmission and generation outages, construction schedules for transmission improvements, and changing load patterns.

- Completed Improvements – the major additions to the transmission system made in 2010 and 2011.

- Planned Improvements – the additions currently underway or being studied in ERCOT and TSP analyses.

  The planned improvements listed in each weather zone section are generally the largest projects in that area. The in-service year is the first year that the improvement will be available for the summer peak. The ERCOT Review designation in the right column of the associated table refers to projects which have been reviewed by the RPG or ERCOT Board of Directors, pursuant to the ERCOT RPG Charter and Procedures.

- Projected Constraints – constraints based on a computer simulation of an hourly security-constrained unit-commitment and economic-dispatch model for a forecasted annual period.

  The computer model determines an optimal unit commitment and dispatch based on the assumption that units will be bid into a nodal market at their variable cost of generation and does not consider transmission outages. Security constraints can cause the model to deviate from the most economic dispatch on an hourly basis. The measure of this deviation is marginal congestion which is defined as the rating of the line multiplied by the shadow price on the limiting transmission element in the hour the congestion occurs.

  The amount of annual marginal congestion for each element is categorized by color. Red represents the most severe congestion. Yellow represents the least congestion. Orange represents a level of severity between Red and Yellow. If color coding is missing, no congestion is expected for that element.

Congestion Color Key	
	None
	Low
	Medium
	High

  Congestion may exist until planned improvements can be put in place to alleviate it. In addition, some level of congestion may acceptably continue to be experienced on some elements of the system where it is uneconomic to construct the improvements that could be required to eliminate the constraints.

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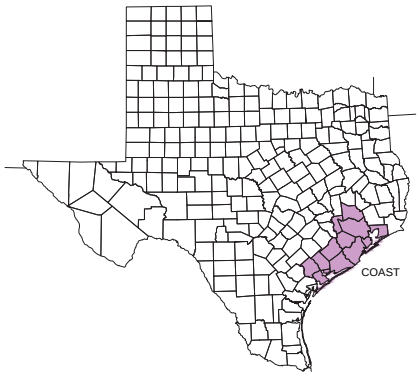
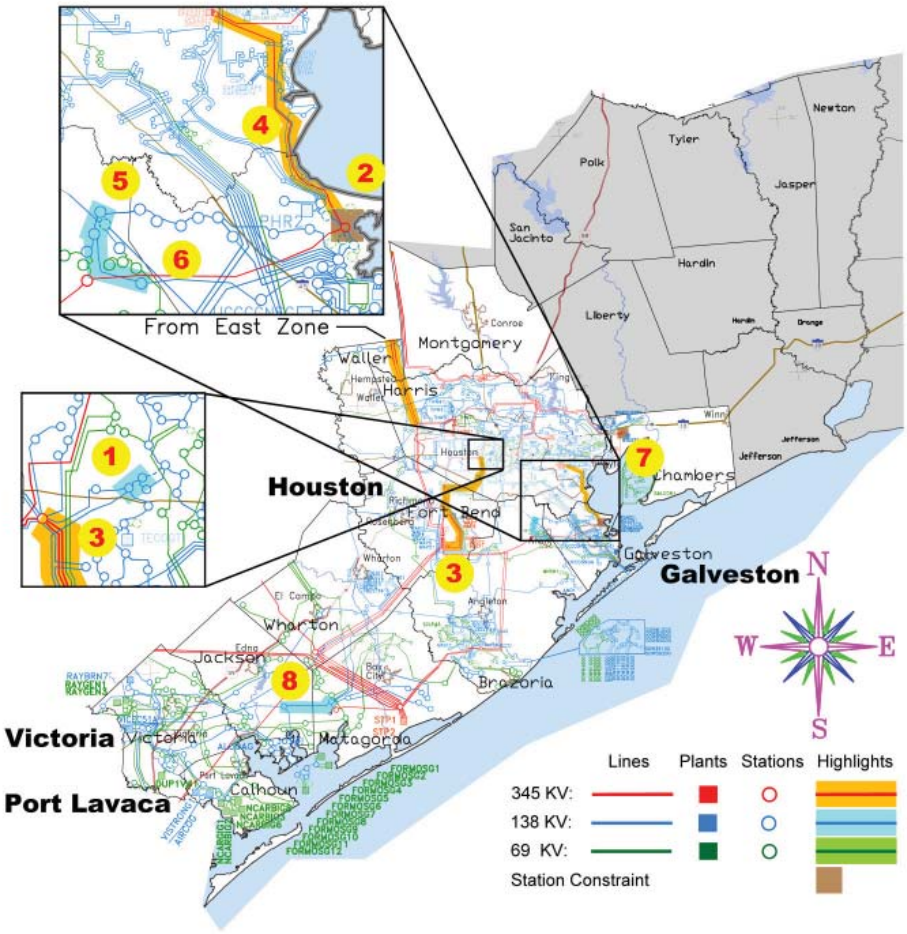
7.1 Area Constraints and Improvements – Coast Weather Zone

The Coast weather zone is primarily composed of the Houston metropolitan area, which is one of ERCOT's largest load centers. The map below highlights the counties included in the Coast weather zone.



7.1.1 Recent Constraints Map – Coast Weather Zone

The map below identifies the location of the recent constraints for the Coast weather zone.



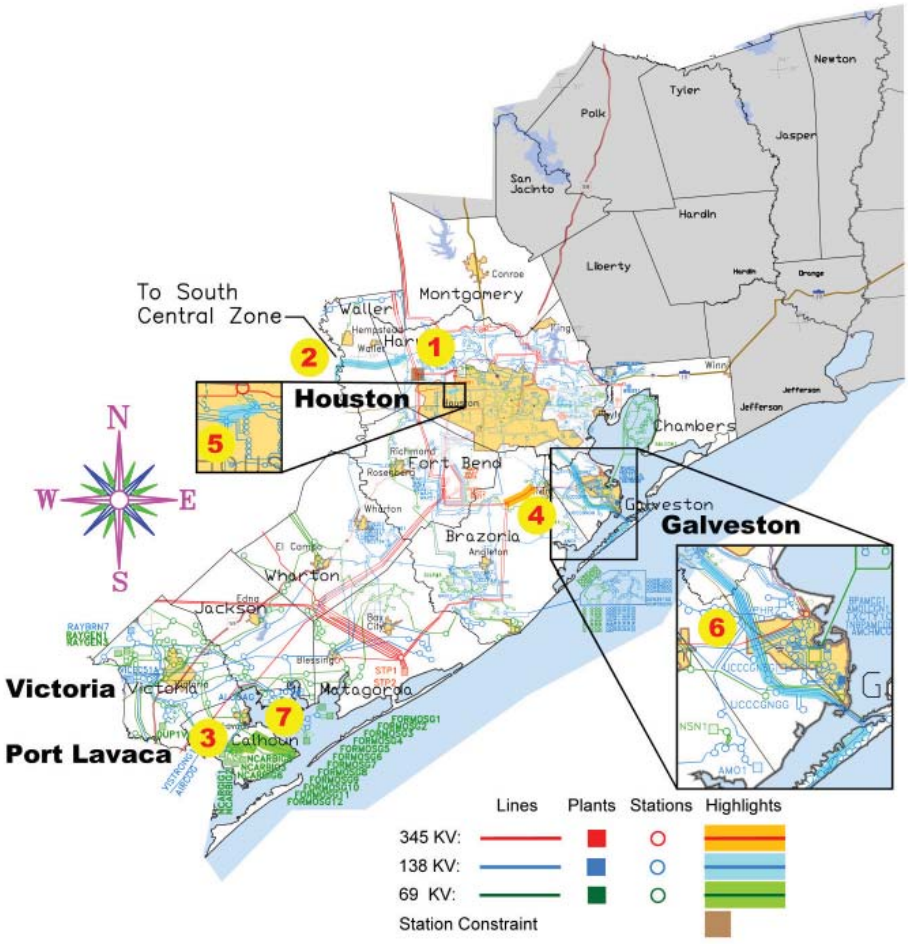
7.1.2 Recent Constraints – Coast Weather Zone

Transmission constraints in the Coast weather zone are primarily due to transmission outages. Congestion occurs when transmission paths into Houston are out of service for project improvements or maintenance. The table below highlights the constraining elements for 2011.

Map Index	Constraining Element	Voltage (kV)
1	Garrott - Midtown	138
2	PH Robinson Autotransformer 1	345/138
3	Smithers - Bellaire	345
4	Center - PH Robinson	345
5	North Alvin Station - Hastings Sub	138
6	North Alvin - Alvin Sub	138
7	Baytown Energy Autotransformer 2	345/138
8	Blessing - Lolita	138

7.1.3 Completed Improvements Map – Coast Weather Zone

The map below identifies the location of the completed improvements for the Coast weather zone.



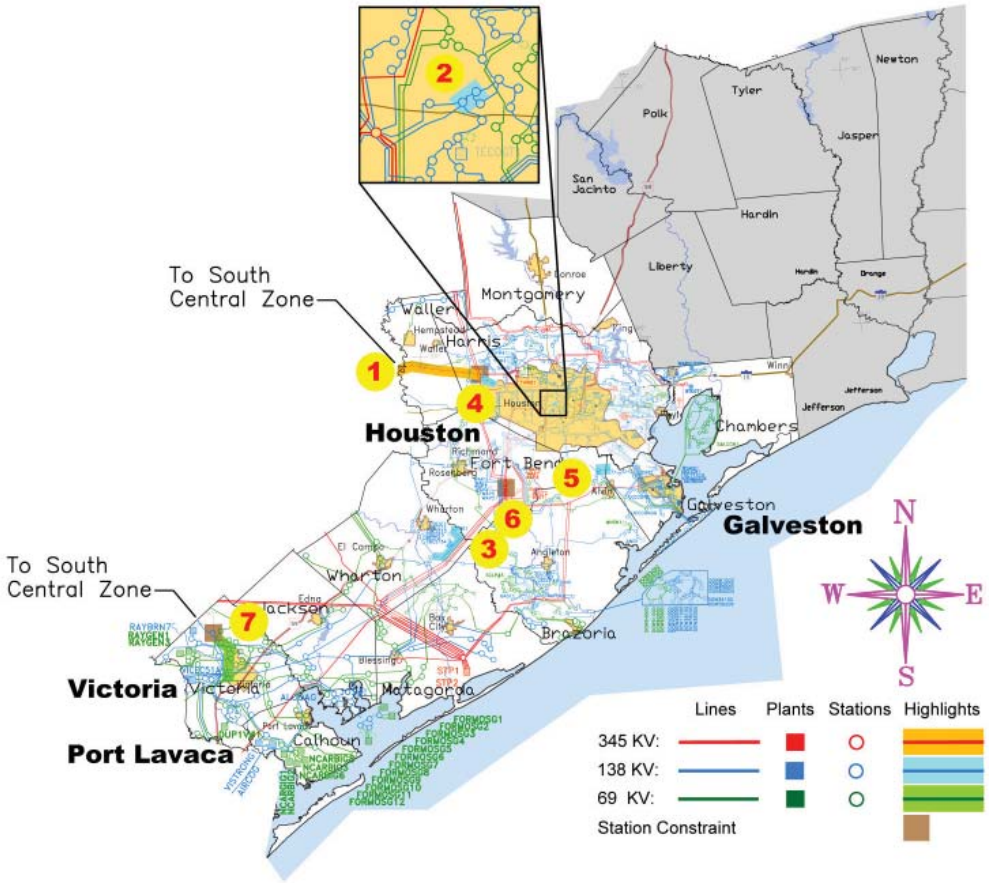
7.1.4 Completed Improvements – Coast Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the Coast weather zone. The elements consisted of one new station in addition to transmission improvements. There were more than 13 miles of new transmission and over 76 miles of upgraded line. Many of these upgrades were accomplished by rebuilding existing lines or constructing new lines. The Zenith switching station is a part of the Houston area constraint mitigation effort.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Zenith 345kV Switching Station	Apr-11	345	1.0	0.0
2	Hockley - Peters Circuit 58	Apr-11	138	0.0	28.5
3	Seadrift to AEP Union Carbide 69 kV line	Sep-10	69	12.4	0.0
4	Oasis - Meadow Circuit 99	Jan-11	345	0.0	3.9
5	Britmore - Addicks Circuit 09 Reconductor	Nov-10	138	0.0	2.0
6	Galveston Area 138kV Circuit Upgrades - Phase Two	Jun-11	138	0.0	21.9
7	Port Lavaca to Port O'Connor	Apr-11	69	0.0	20.1

7.1.5 Planned Improvements Map – Coast Weather Zone

The map below identifies the location of the planned improvements for the Coast weather zone.



7.1.6 Planned Improvements – Coast Weather Zone

The majority of the major planned improvements for the Coast weather zone have to do with increasing the import capability into the Houston area, primarily from north and west of the area.

As part of the North to Houston Constraint Mitigation Project, the new 345 kV double circuit from Fayetteville to Zenith is planned to be in place by 2016 in order to further alleviate congestion on imports into the Houston area. The bus split project in WA Parish is planned to address a reliability need in the Houston area.

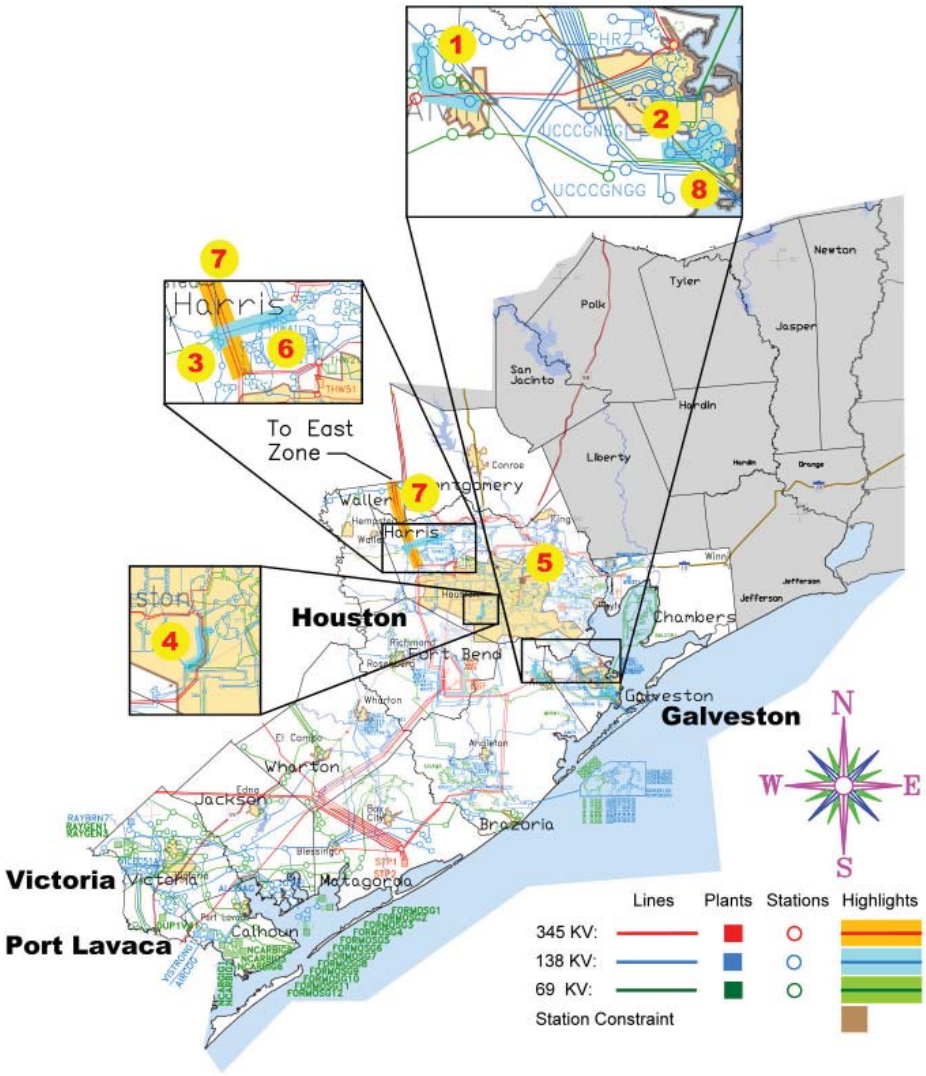
The Garrott to Midtown to Polk 138 kV circuit upgrade is planned to relieve congestion and improve reliability in downtown Houston. In Victoria, a new 138/69 autotransformer is planned to alleviate congestion and enhance reliability in the area.

The South Lane to West Columbia 138 kV upgrade is expected to improve reliability and relieve congestion on the 138 kV systems in the South Lane City area. The Hastings – Friendswood project should relieve area congestion and improve efficiency in the Coast weather zone.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Zenith – Fayetteville and Fayetteville – FPP	345	Dec-16
2	Garrott - Midtown - Polk Ckt. 90	138	Apr-12
3	South Lane - West Columbia Ckts. 04 & 60	138	Jul-12
4	Zenith Autotransformer	345	May-12
5	Rebuild Hastings-Friendswood	138	Aug-14
6	WA Parish Split Bus	345	Dec-13
7	Magruder: Station and Line Upgrades	138	Sep-14

7.1.7 Projected Constraints Map – Coast Weather Zone

The map below identifies the location of the projected constraints for the Coast weather zone.



7.1.8 Projected Constraints – Coast Weather Zone

The import of power into the Houston area is projected to be constrained throughout the four-year period of this assessment. The Houston Import Project, which is planned for 2016, is anticipated to lessen this congestion, but constraints are anticipated to remain in the future.

In Harris County, one of the 345/138 kV autotransformers at Greens Bayou Plant Substation will be congested throughout the four-year assessment period.

In order to maintain reliability and to improve economic benefits in the Alvin area, a few 138-kV line upgrades will be implemented in later years. These 138-kV lines will be congested until the 138-kV line improvements are completed.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Alvin Tie - Alvin Substation	138				
2	Amoco Oil Cogen - Greenbelt	138				
3	Betka - Hockley	138				
4	Brays - Hiram O Clarke Plant	138				
5	Greens Bayou Autotransformer A2	345/138				
6	Hockley - Tomball	138				
7	Singleton - Zenith	345				
8	Tejas - Greenbelt Switching Substation	138				

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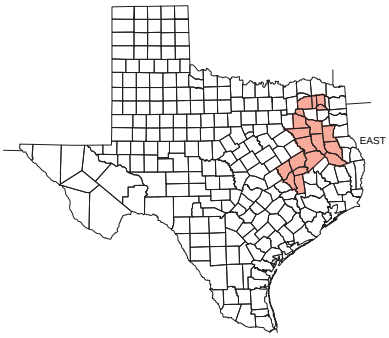
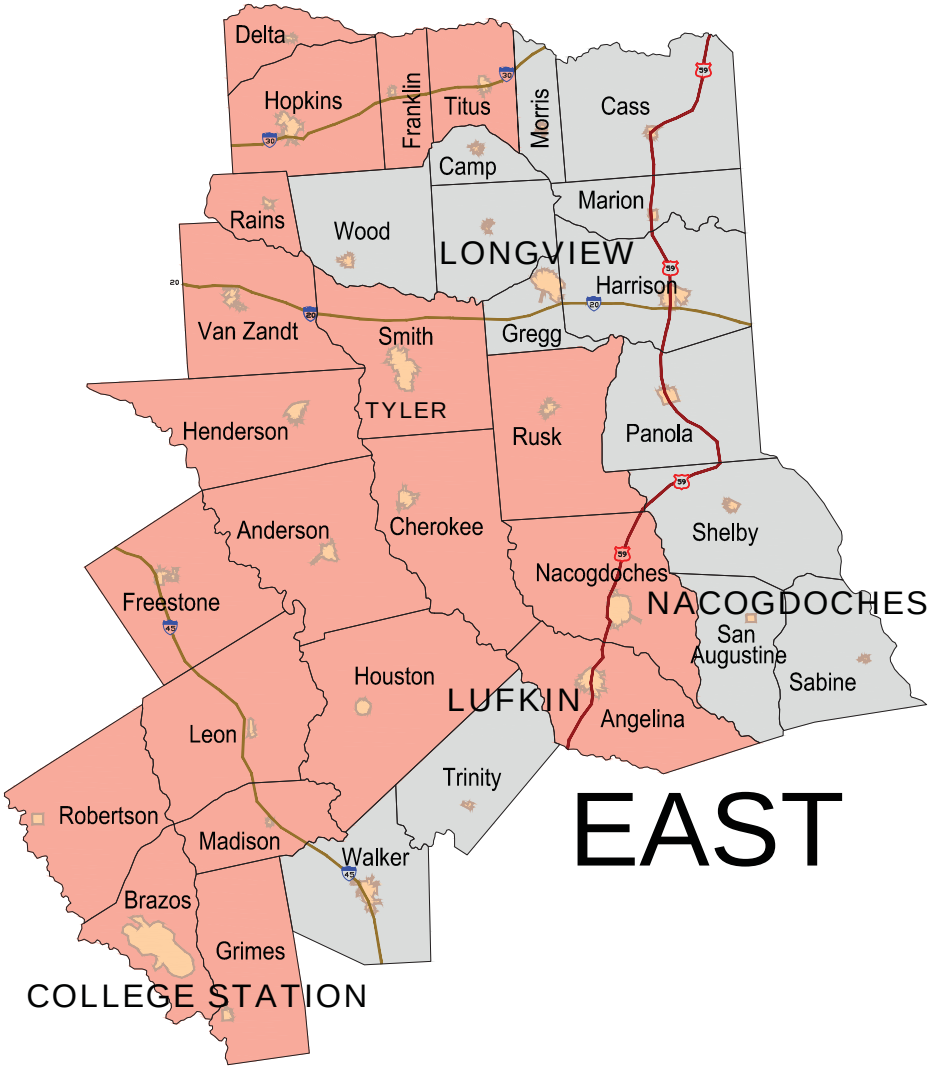
7.2 Area Constraints and Improvements – East Weather Zone

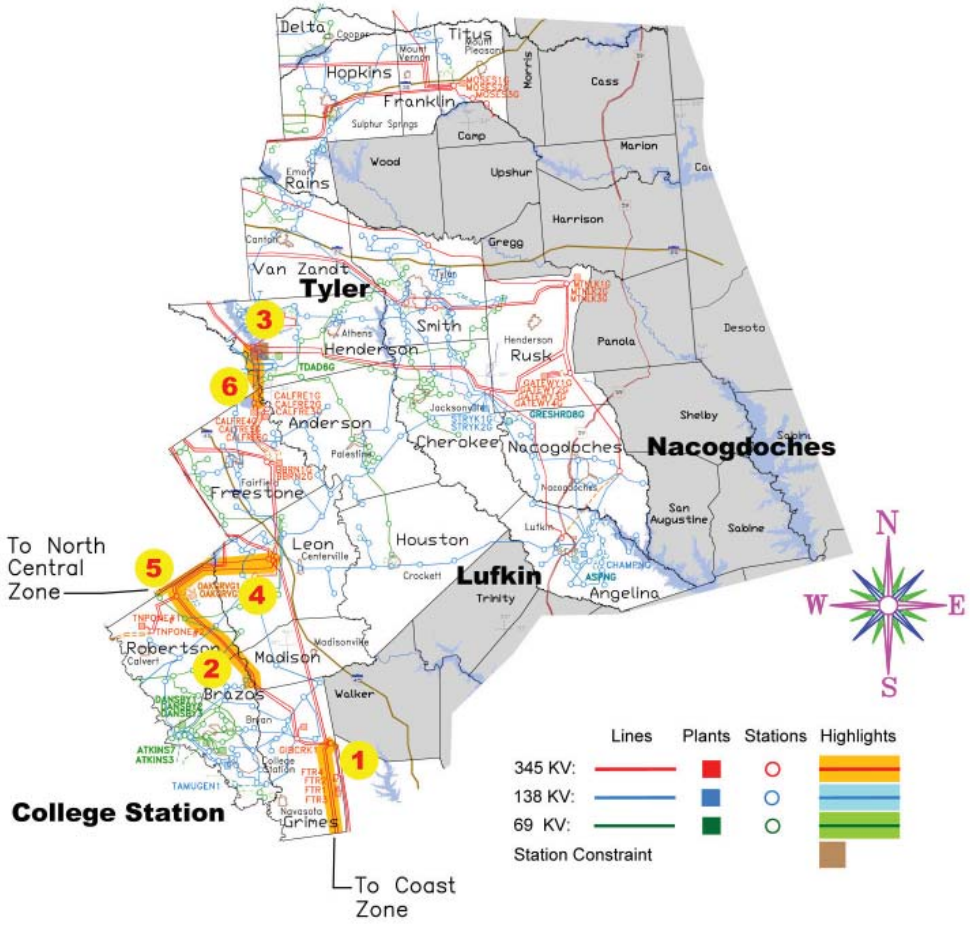


The East weather zone includes the cities of Bryan, College Station, Tyler, Nacogdoches, and Lufkin. The map below highlights the counties included in the East weather zone.



7.2.1 Recent Constraints Map – East Weather Zone

The map below identifies the location of the recent constraints for the East weather zone.



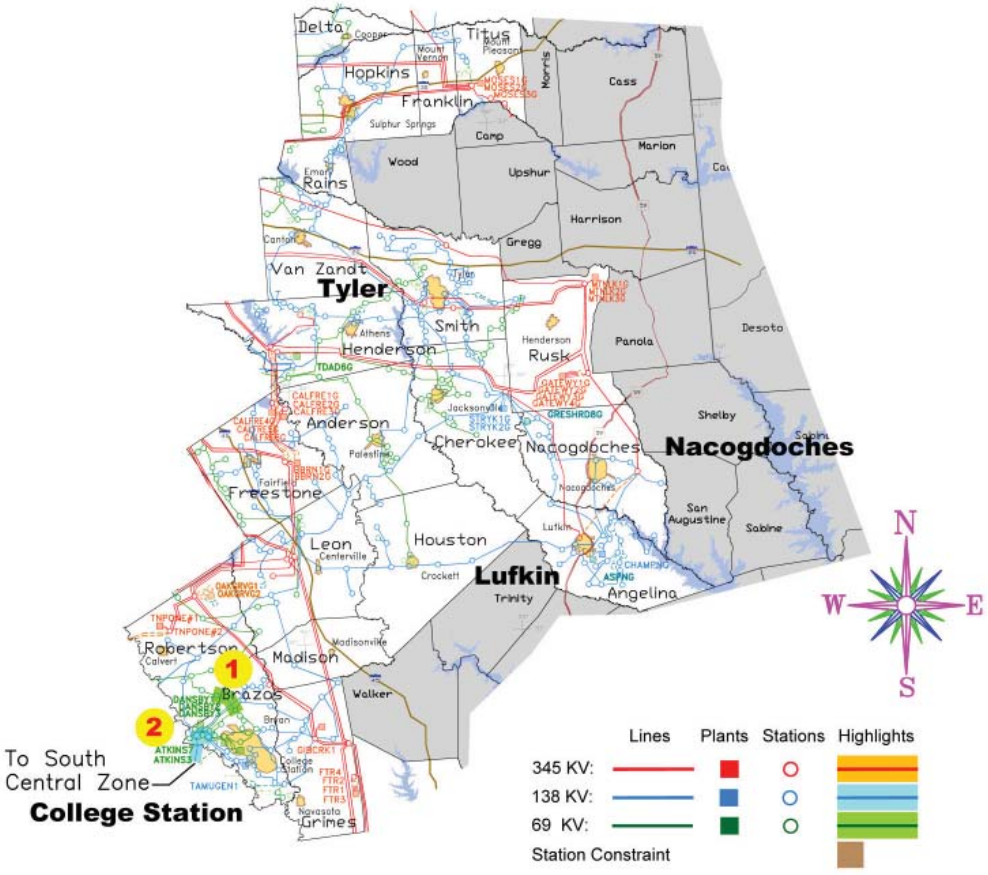
7.2.2 Recent Constraints – East Weather Zone

Transmission constraints in the East weather zone are primarily due to transmission construction outages for maintenance and transmission improvements.

Map Index	Constraining Element	Voltage (kV)
1	Singleton - Zenith	345
2	Twin Oak Switch - Jack Creek	345
3	Trinidad SES Autotransformer	345/138
4	Twin Oak Switch - Jewett	345
5	Jewett - Rattlesnake Road Switch	345
6	Richland Chambers - Trinidad SES	345

7.2.3 Completed Improvements Map – East Weather Zone

The map below identifies the location of the completed improvements for the East weather zone.



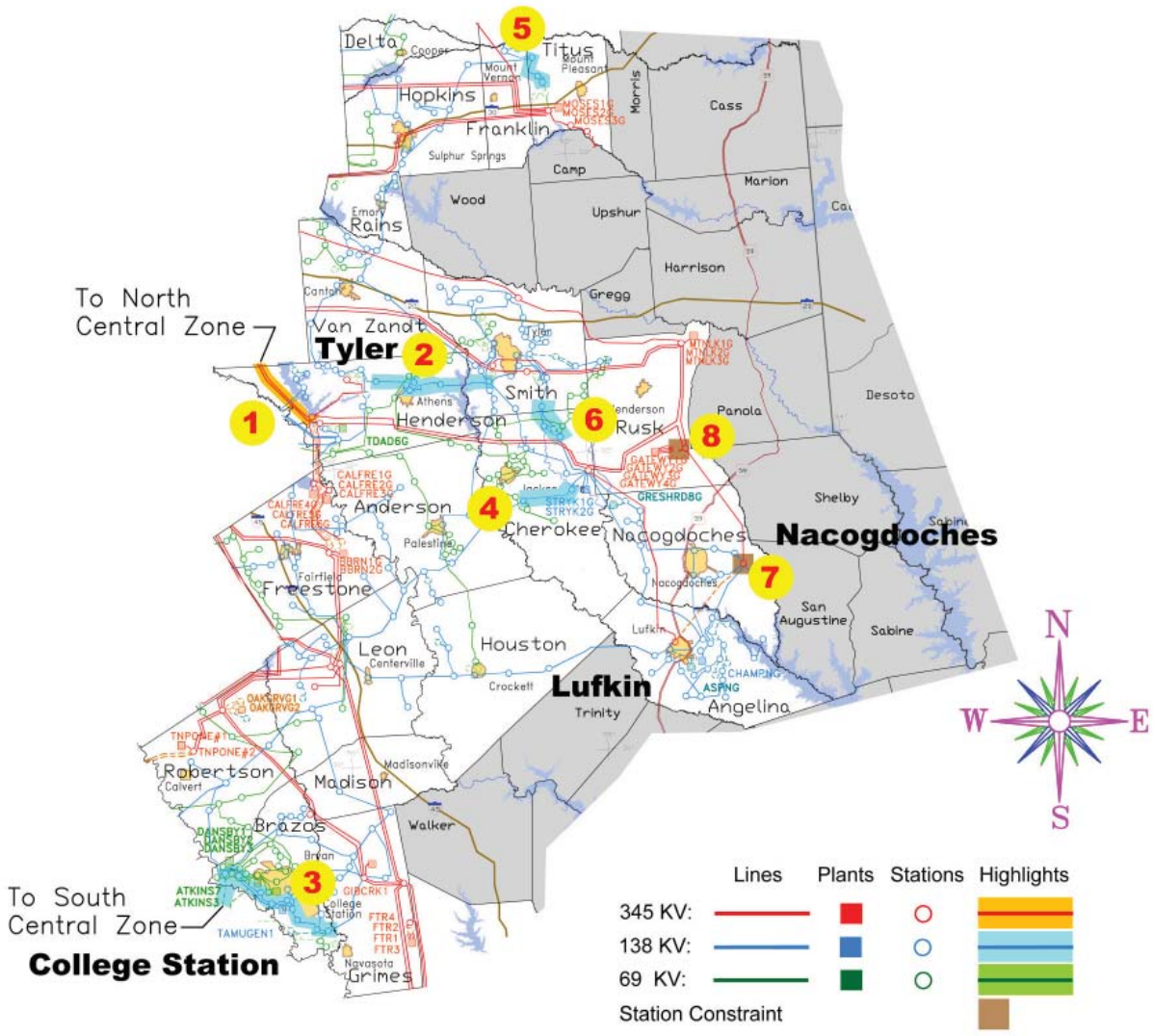
7.2.4 Completed Improvements – East Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the East weather zone. The elements consist of approximately 32 miles of transmission and one new substation. All upgrades were accomplished by upgrading the line or building a new line.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Booneville to Hearne Southwest Rebuild	Jul-11	69	0.0	22.2
2	Thompson Creek Substation and new 138 kV line to Dansby	Jun-11	138	10.2	0.0

7.2.5 Planned Improvements Map – East Weather Zone

The map below identifies the location of the planned improvements for the East weather zone.



7.2.6 Planned Improvements – East Weather Zone

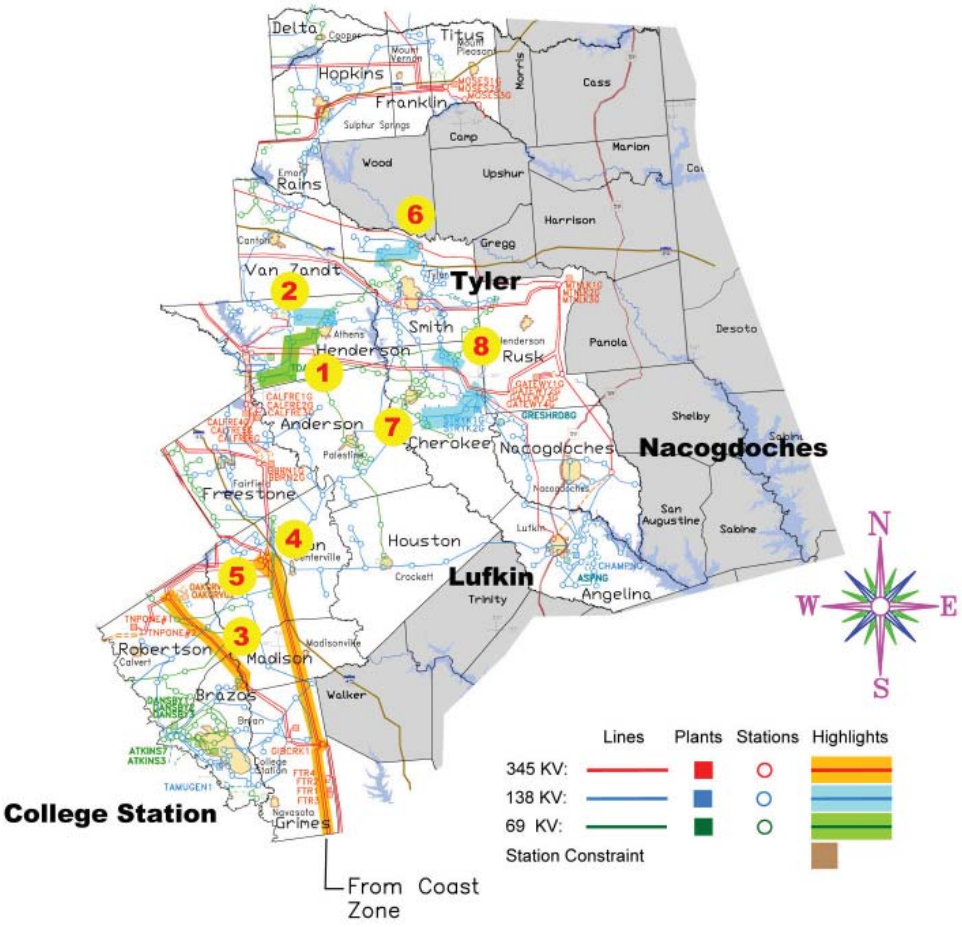
The Trinidad switching station to Watermill switching station 345 kV line upgrade will allow for greater imports into the Dallas/Fort Worth area. Also, the Troup substation to Walnut Grove to Tyler Grande 138 kV line upgrades will relieve overloads south of the Tyler area.

The Elkton to Athens North Tap 138 kV line upgrade will relieve area congestion. Additionally, the Thompson Creek to Koppe Bridge 138 kV transmission building and upgrades will enhance reliability in the area.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Trinidad - Tri Corner - Watermill 345 kV line	345	Dec-13
2	Elkton - Athens North Tap 138 kV line	138	May-14
3	Thompson Creek to Koppe Bridge Transmission Line	138	Mar-12
4	Stryker Creek - Dialville 138 kV line	138	May-14
5	Monticello SES - Monticello Tap 138 kV line	138	May-15
6	Troup - Walnut Grove - Whitehouse - Tyler Grande 138 kV line	138	Dec-12
7	Southeast Nacogdoches 345/138 kV Autotransformer	345	May-12
8	Mount Enterprise Switching Station and Line	345	Dec-12

7.2.7 Projected Constraints Map – East Weather Zone

The map below identifies the location of the projected constraints for the East weather zone.



7.2.8 Projected Constraints – East Weather Zone

The recent addition of several new coal-fired plants will cause congestion on the 345 kV system between Central Texas and the Houston area. This congestion is expected to persist throughout the four-year assessment period.

A few 138 kV line upgrades in the Tyler area have been planned for the later years to meet reliability needs. Congestion in the Tyler area will persist until these 138 kV line improvements are implemented.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Athens - Trinidad	69				
2	Athens Tap - Athens Northwest	138				
3	Jack Creek - Twin Oak	345				
4	Jewett North - Singleton	345				
5	Jewett South - Singleton	345				
6	Shamburger - Tyler Northwest	138				
7	Stryker Creek - Dialville	138				
8	Troup Switching Station - Walnut Grove	138				

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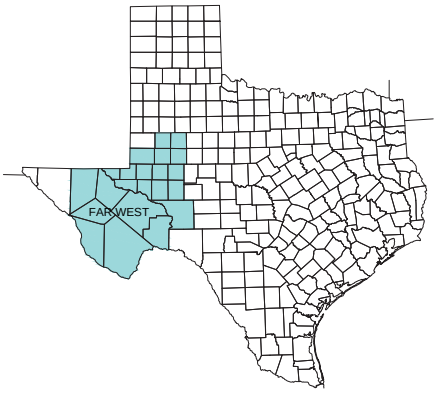
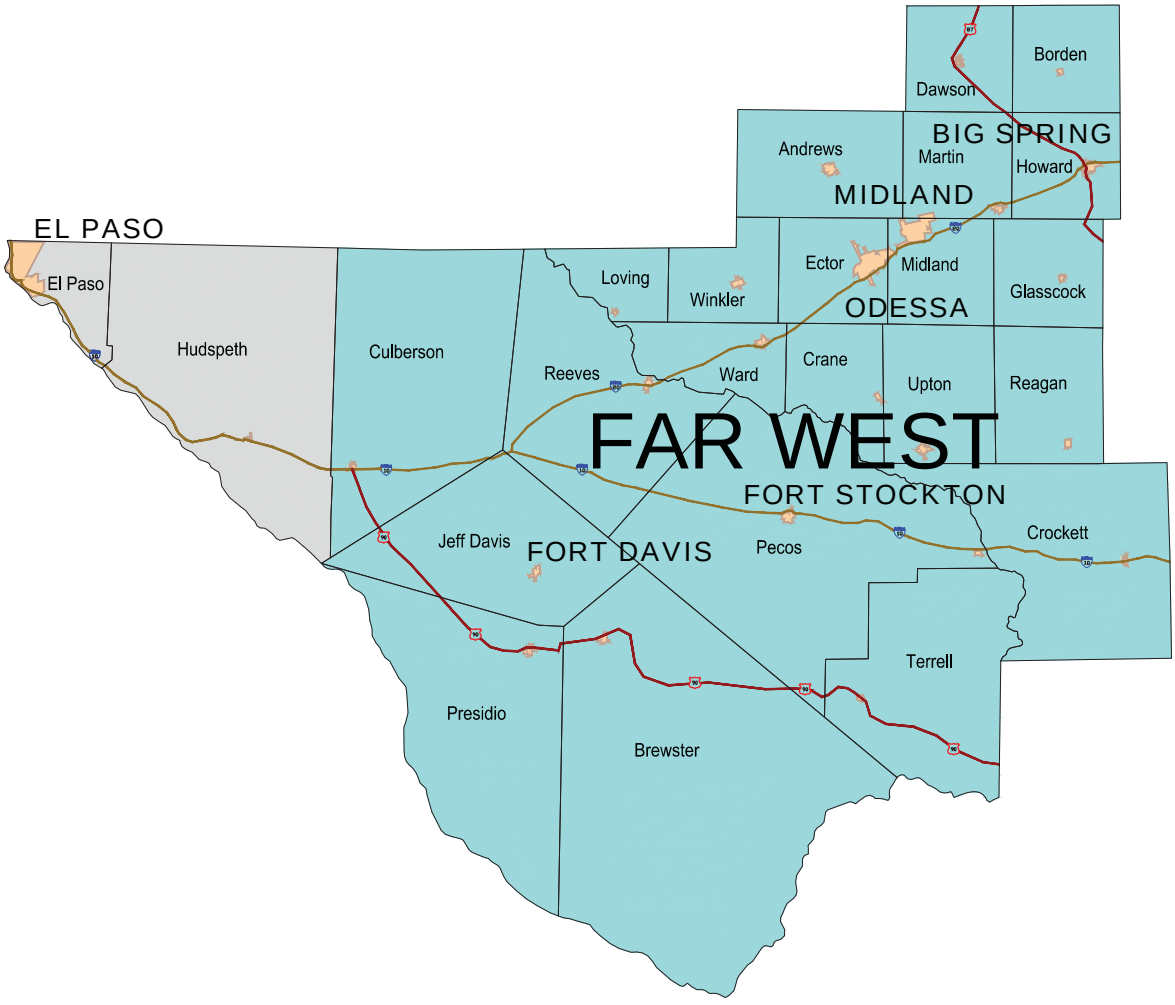
7.3 Area Constraints and Improvements – Far West Weather Zone

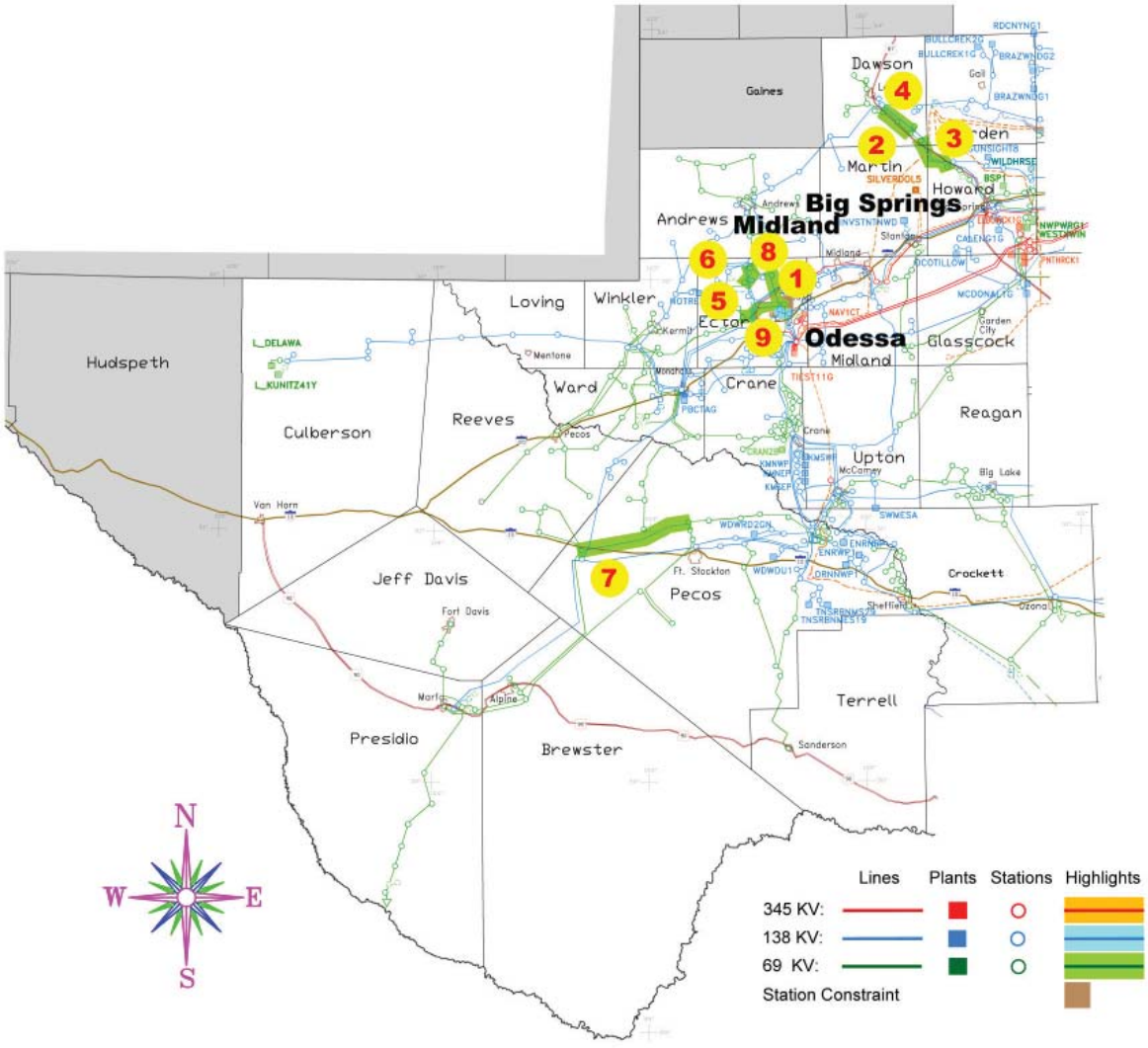
The main cities in the Far West weather zone include Midland and Odessa. This zone stretches to include Big Bend and the McCamey area. The map below highlights the counties included in the Far West weather zone.





7.3.1 Recent Constraints Map – Far West Weather Zone

The map below identifies the location of the recent constraints for the Far West weather zone.



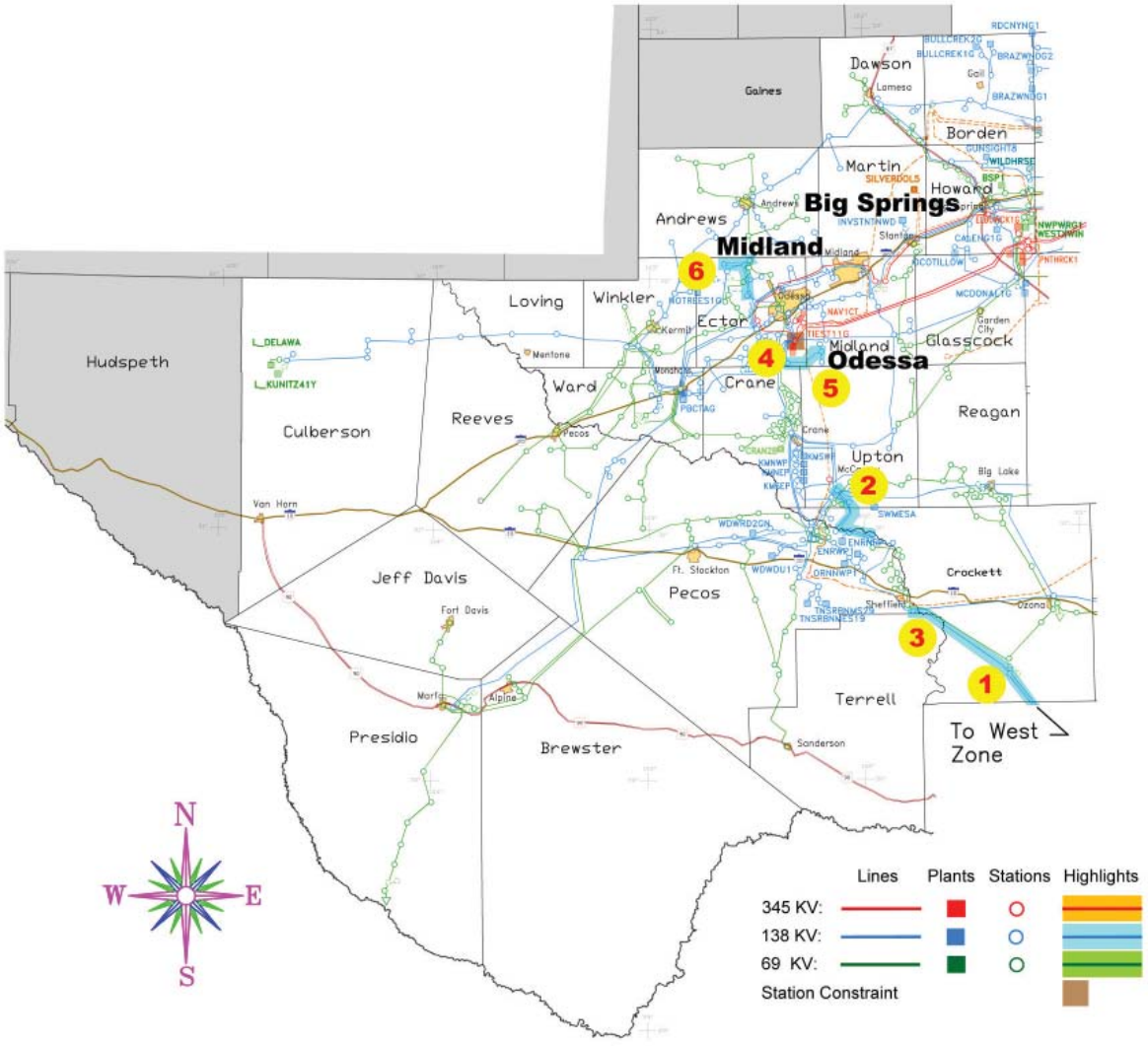
7.3.2 Recent Constraints – Far West Weather Zone

The Far West weather zone constraints are due, in part, to moderate load growth. Some congestion is due to the increase of wind generation in the area and the limited ability to export the power to load centers to the east.

Map Index	Constraining Element	Voltage (kV)
1	Odessa North Autotransformer	138/69
2	Ackerly Lyntegar - Sparenburg	69
3	Ackerly Vealmoor Switch - Ackerly	69
4	Sparenburg - Lamesa	69
5	Odessa North - Odessa Basin Switch	69
6	Holt Switch - Ector Shell Tap	69
7	Fort Stockton Switch - Barilla	69
8	Odessa North - North Cowden	69
9	Odessa - Odessa North	138

7.3.3 Completed Improvements Map – Far West Weather Zone

The map below identifies the location of the completed improvements for the Far West weather zone.



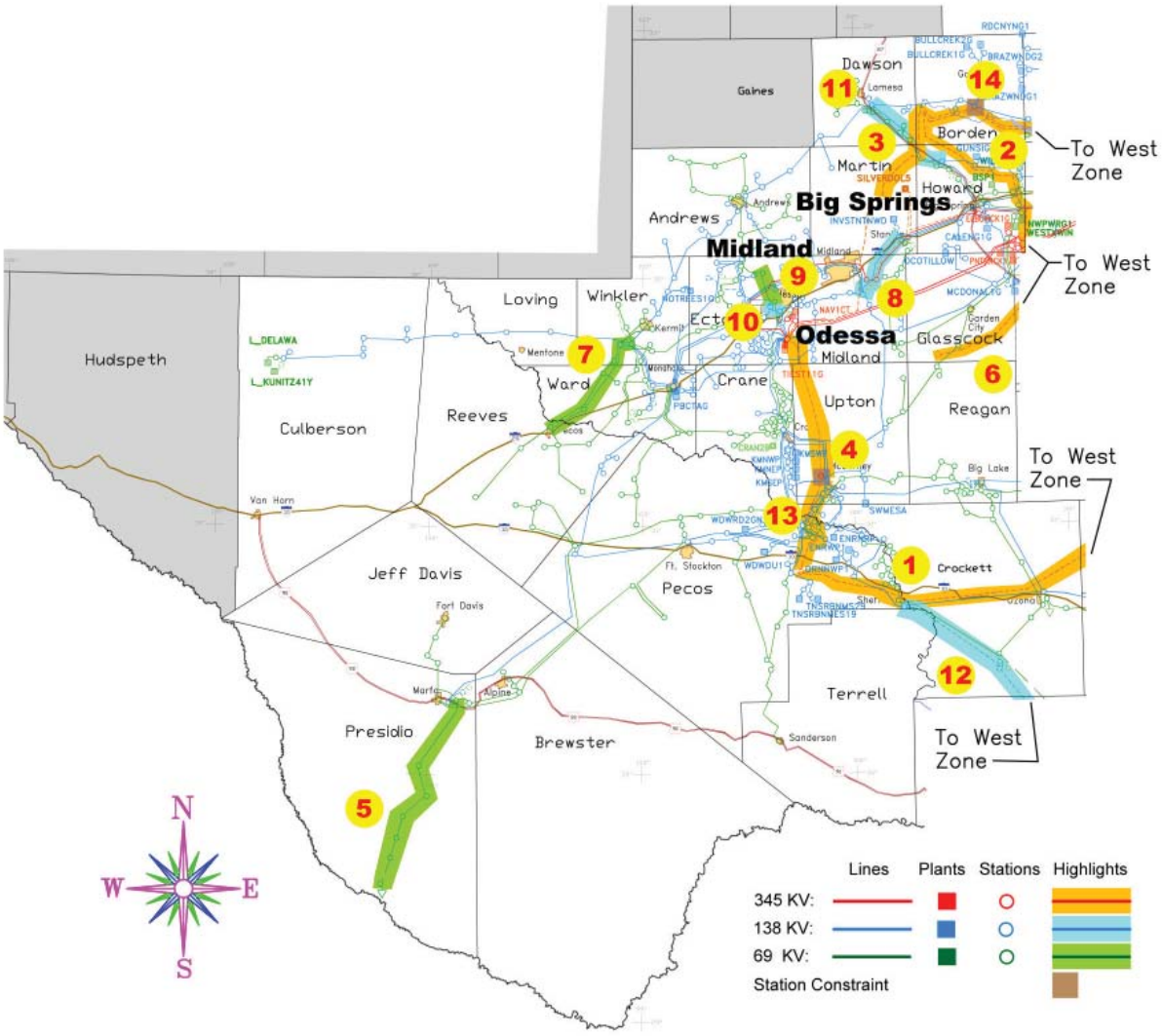
7.3.4 Completed Improvements – Far West Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the Far West weather zone. The elements consist of almost 114 miles of transmission and a new autotransformer. There were over 18 miles of new 138 kV transmission and 96 miles of upgraded 138 kV lines.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Illinois #4 to Comstock, Rebuild 69 kV as 138 kV, energize at 69 kV	Aug-11	69	0.0	63.6
2	Tippett to North McCamey	Oct-10	138	15.0	0.0
3	Ft. Lancaster to Illinois #4, Rebuild 69 kV as 138 kV, energize at 69 kV	Mar-11	69	0.0	17.2
4	Odessa EHV Third 345/138 kV autotransformer	Nov-10	345	0.0	0.0
5	Pegasus 138 kV Tap and Point of Interconnection	Jun-11	138	0.0	11.4
6	Goldsmith Tap - Goldsmith 138 kV Line	Jun-11	138	3.3	3.3

7.3.5 Planned Improvements Map – Far West Weather Zone

The map below identifies the location of the planned improvements for the Far West weather zone.



7.3.6 Planned Improvements – Far West Weather Zone

The largest planned improvements in the Far West weather zone are the CREZ projects: the new Bakersfield to Big Hill 345 kV line, the Sand Bluff to Long Draw to Scurry County South 345 kV lines and other new 345 kV lines. All these new transmission projects are designated to serve the CREZ zones and to move generation, primarily wind, from west Texas to the population centers such as Dallas/Fort Worth, Austin and San Antonio. The Midland East to Stanton East line upgrade will mitigate wind generation related congestion.

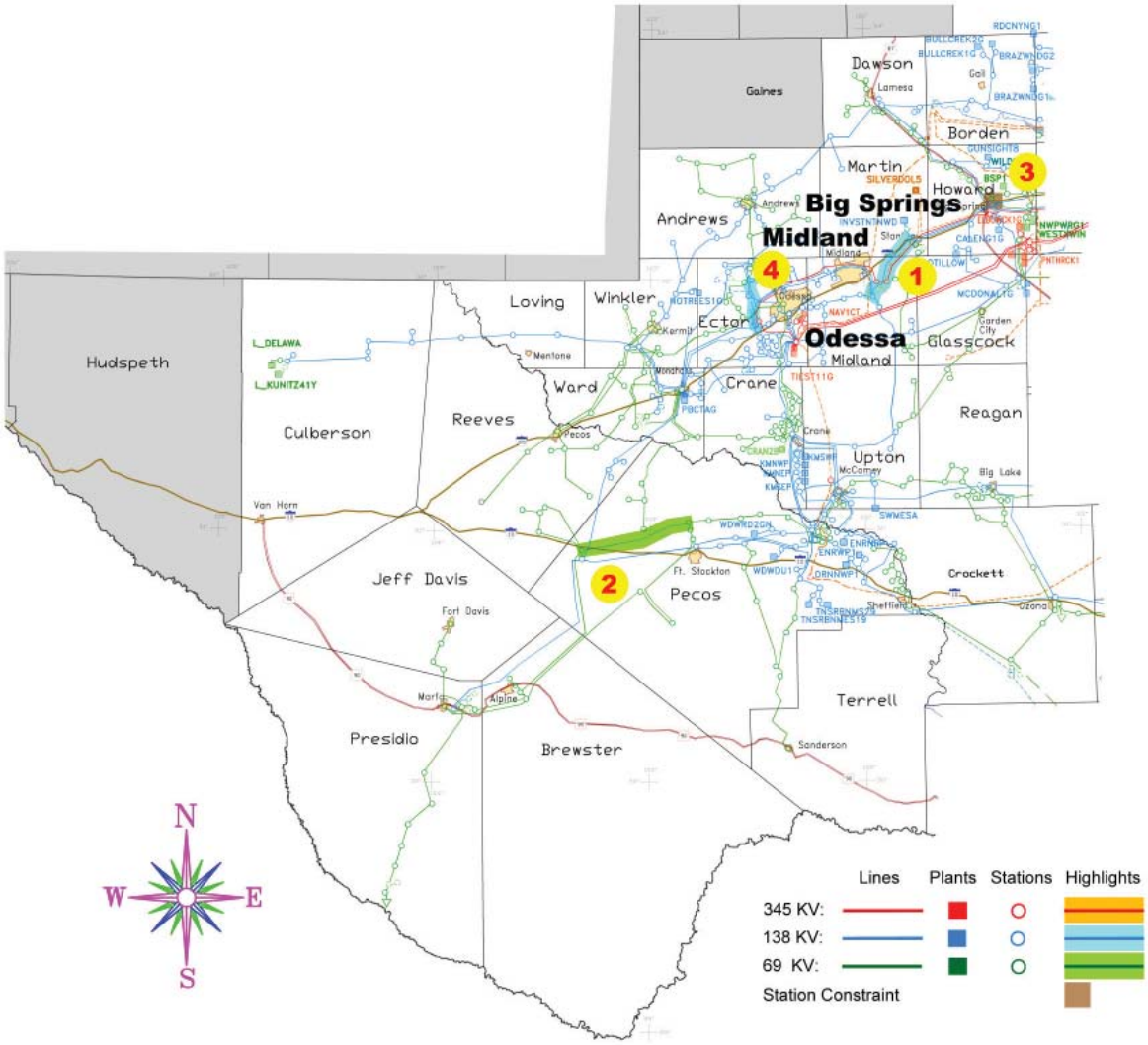
Additionally, there are several transmission improvements that involve upgrading existing 138 kV and 69 kV circuits. This is primarily driven by load growth in an around the Odessa area. These upgrades are designed to meet reliability needs now and into the future.

The Alamito Creek to Gonzales 69 kV addition will conclude the Presidio Area Reliability Improvements Project, increasing the reliability of service for customers by this line and will prevent pre-contingency and post-contingency voltage violations.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	McCamey C to McCamey D (Bakersfield to Big Hill)	345	Aug-13
2	Sand Bluff - Long Draw - Scurry County South 345 kV lines	345	May-13
3	Grelton to Long Draw and Odessa 345 kV lines	345	Feb-13
4	North McCamey to Odessa EHV and Autotransformer	345	Dec-13
5	Alamito Creek to Gonzales, Reconductor existing 69kV line	69	May-12
6	Bearkat 345 kV Station and Bearkat to Sand Bluff 345 kV line	345	May-13
7	Rebuild Wink-Cochise-Pecos 69kV	69	May-14
8	Midland East - Stanton East 138 kV line	138	May-14
9	Odessa North - North Cowden 69 kV line	69	May-20
10	Odessa - Odessa North 138 kV line	138	May-14
11	Lamesa - Ackerly Vealmoor 138 kV line	138	Dec-13
12	Illinois #4 to Hamilton Rd., Convert 69 kV to 138 kV	138	Feb-12
13	North McCamey to Bakersfield	345	Dec-13
14	Willow Valley Autotransformer	345	Dec-13

7.3.7 Projected Constraints Map – Far West Weather Zone

The map below identifies the location of the projected constraints for the Far West weather zone.



7.3.8 Projected Constraints – Far West Weather Zone

Most of the congestion that is projected in the Far West weather zone is primarily attributed to the large growth in wind generation in west Texas. A majority of these projected constraints will be relieved with the implementation of the CREZ transmission upgrades. The congestion on the Fort Stockton Switching Station to Barrilla Junction 69 kV line will be alleviated with the CREZ upgrades coming into service in the McCamey area, thus facilitating power export from the area. Congestion on the Ackerly Vealmoor autotransformer is expected to be relieved with the Lamesa area upgrades, which include a new 138 kV double circuit between the existing Ackerly Vealmoor and Lamesa switching stations and a 345/138 kV autotransformer at Willow Valley Switching Station.. Congestion is also expected on the Midland East to Stanton East 138 kV line and the Moss to Amoco North Cowden Tap 138 kV line.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Midland East – Stanton East	138				
2	Ft Stockton Switching Station – Barrilla Junction	69				
3	Ackerly Vealmoor autotransformer	138/69				
4	Moss – Amoco North Cowden Tap	138				

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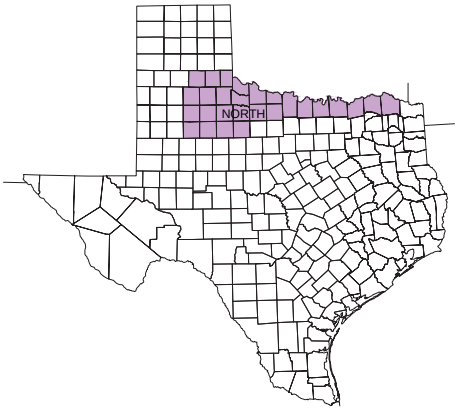
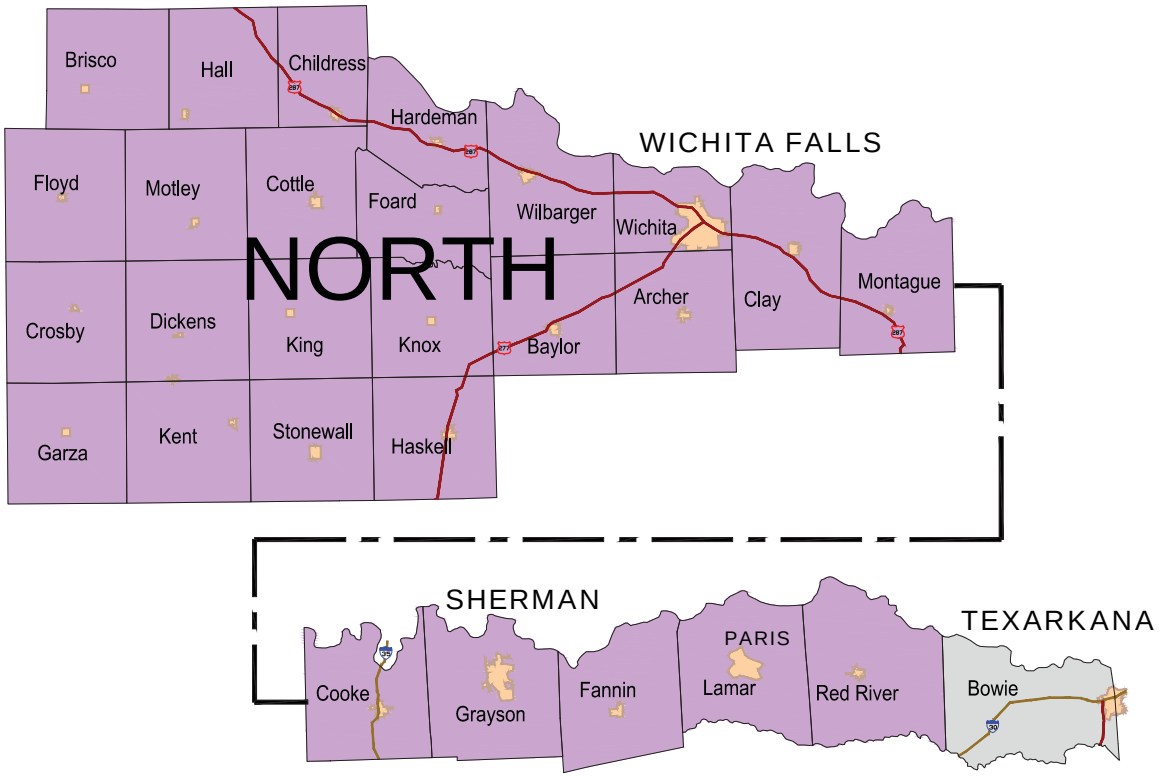
7.4 Area Constraints and Improvements – North Weather Zone

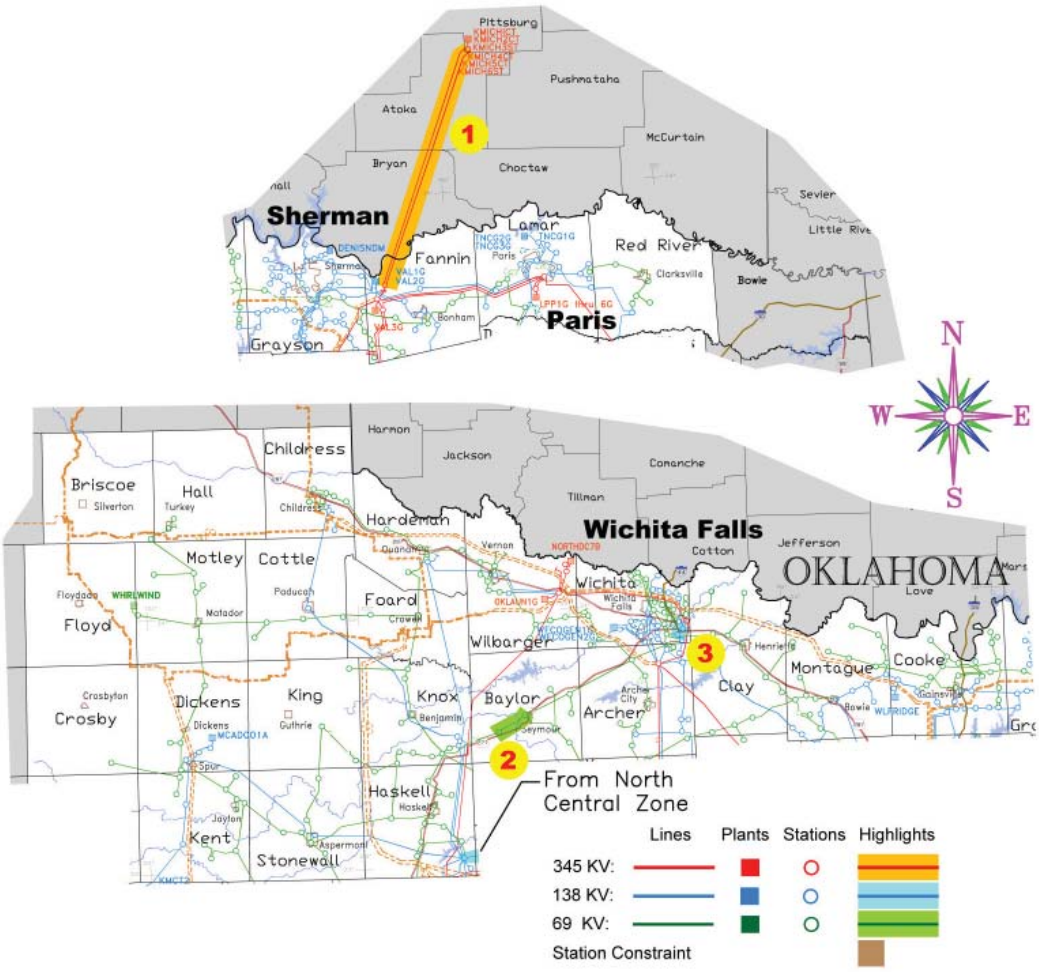


The North weather zone covers the northern counties of ERCOT's territory, including the cities of Wichita Falls and Paris. The map below highlights the counties included in the North weather zone.



7.4.1 Recent Constraints Map – North Weather Zone

The map below identifies the location of the recent constraints for the North weather zone.



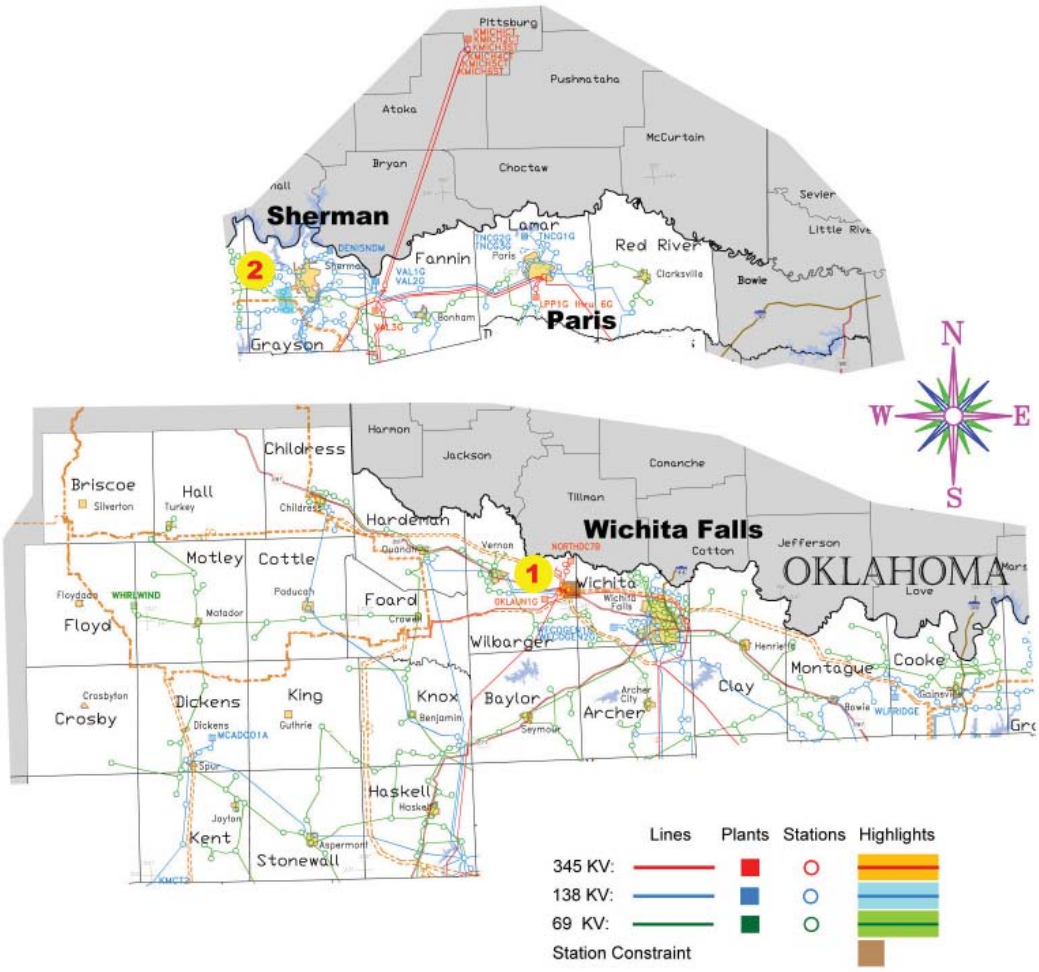
7.4.2 Recent Constraints – North Weather Zone

Transmission outages have caused the congestion in the North weather zone. Additionally, congestion in this zone is also the result of the extremely cold weather in early February.

Map Index	Constraining Element	Voltage (kV)
1	Kiowa Switch - Kiamichi	345
2	Bomarton - Seymour	69
3	Fisher Road Switch - Wichita Falls	138

7.4.3 Completed Improvements Map – North Weather Zone

The map below identifies the location of the completed improvements for the North weather zone.



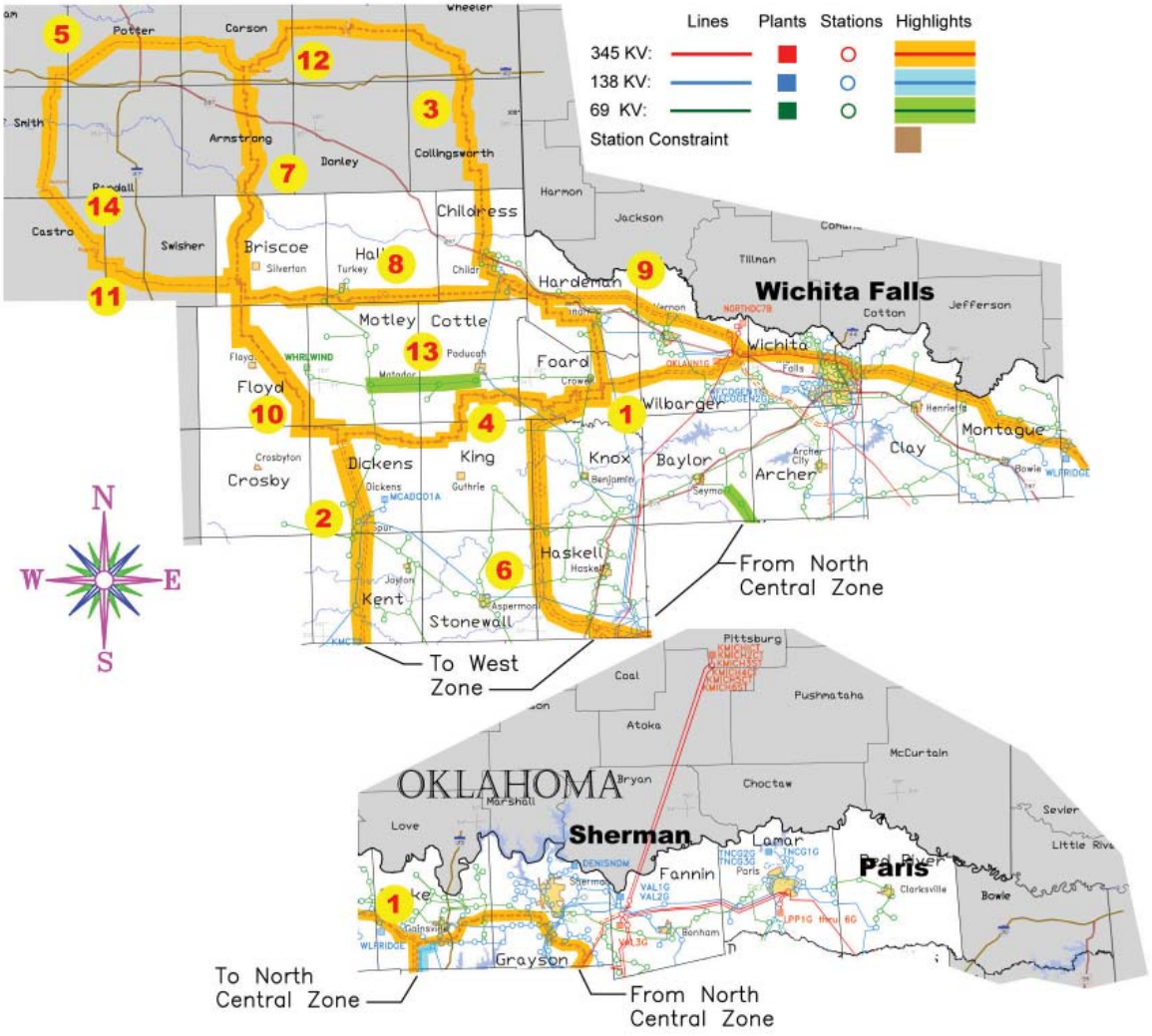
7.4.4 Completed Improvements – North Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the North weather zone. The elements consist of a switching stating addition and almost nine miles of transmission line improvements.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	New Riley 345 kV Switch Station	Apr-11	345	0.0	0.0
2	Whitesboro SE - Gordonville 138 kV tap line	Jan-11	138	0.9	7.9

7.4.5 Planned Improvements Map – North Weather Zone

The map below identifies the location of the planned improvements for the North weather zone.



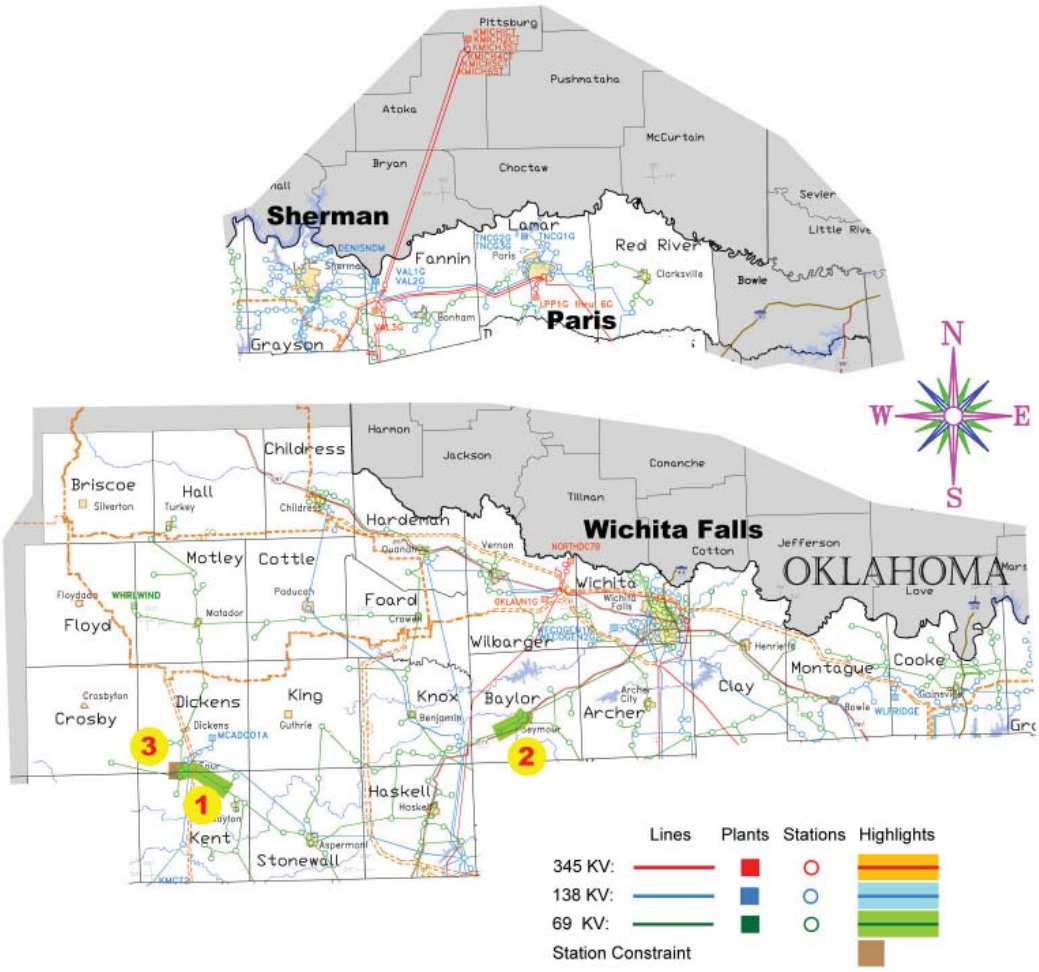
7.4.6 Planned Improvements – North Weather Zone

Most of the planned improvements in the North weather zone are the CREZ projects: The Krum West to Riley (Oklaunion) to Edith Clarke 345 kV lines, Cottonwood to Dermott and Edith Clarke 345 kV lines and other new 345 kV lines. All these new transmission projects are designated to serve the CREZ zones and to move electricity generation, primarily wind, from west Texas to the population centers such as Dallas/Fort Worth, Austin and San Antonio. The Matador substation to Paducah Clare substation 69 kV line upgrade will allow for the exit of a Special Protection Scheme at a nearby wind generation plant and improve the reliability for customers served by this line.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Krum West - Riley (Oklaunion) - Edith Clarke 345 kV lines	345	Jun-13
2	Cottonwood 345 kV Station and Cotttonwood to Dermott 345 kV line	345	Dec-12
3	Gray - Tesla - Edith Clarke 345 kV lines	345	Mar-13
4	Cottonwood to Edith Clarke double circuit 345kV line	345	Oct-13
5	White Deer to Hereford	345	Sep-13
6	Edith Clarke - Clear Crossing - West Shackelford double circuit 345kV lines	345	Sep-13
7	Silverton to White Deer	345	Sep-13
8	Silverton to Tesla, build double circuit 345 kV line	345	Sep-13
9	Gray to Oklaunion double circuit 345kV line (Tesla to Riley portion)	345	Jun-13
10	Silverton to Cottonwood	345	Mar-13
11	Silverton to Nazareth	345	May-13
12	Gray to White Deer, build double circuit 345 kV line	345	Mar-13
13	Matador to Paducah Clare, Rebuild 69 kV line	69	Jun-12
14	Nazareth to Hereford	345	Jul-13

7.4.7 Projected Constraints Map – North Weather Zone

The map below identifies the location of the projected constraints for the North weather zone.



7.4.8 Projected Constraints – North Weather Zone

Projected congestion in the North weather zone is mainly due to the addition of generation to that part of the transmission network that was originally designed to serve a relatively small load. Congestion is expected on the Spur to Girard Tap 69 kV line. This is due to the substantial increase in wind generation plants in this area. The Spur 138/69 kV autotransformer will remain congested until the implementation of the CREZ transmission upgrades. The congestion on the Seymour to Bomarton 69 kV line will be reduced significantly, though not completely eliminated, once the CREZ upgrades are implemented.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Spur – Girard Tap	69				
2	Seymour – Bomarton	69				
3	Spur autotransformer	138/69				

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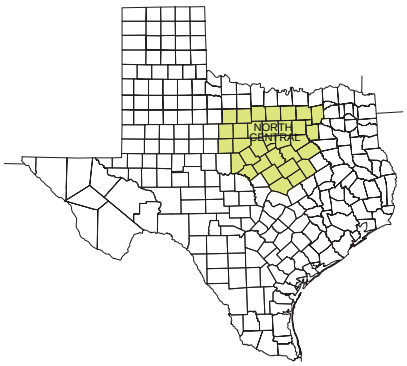
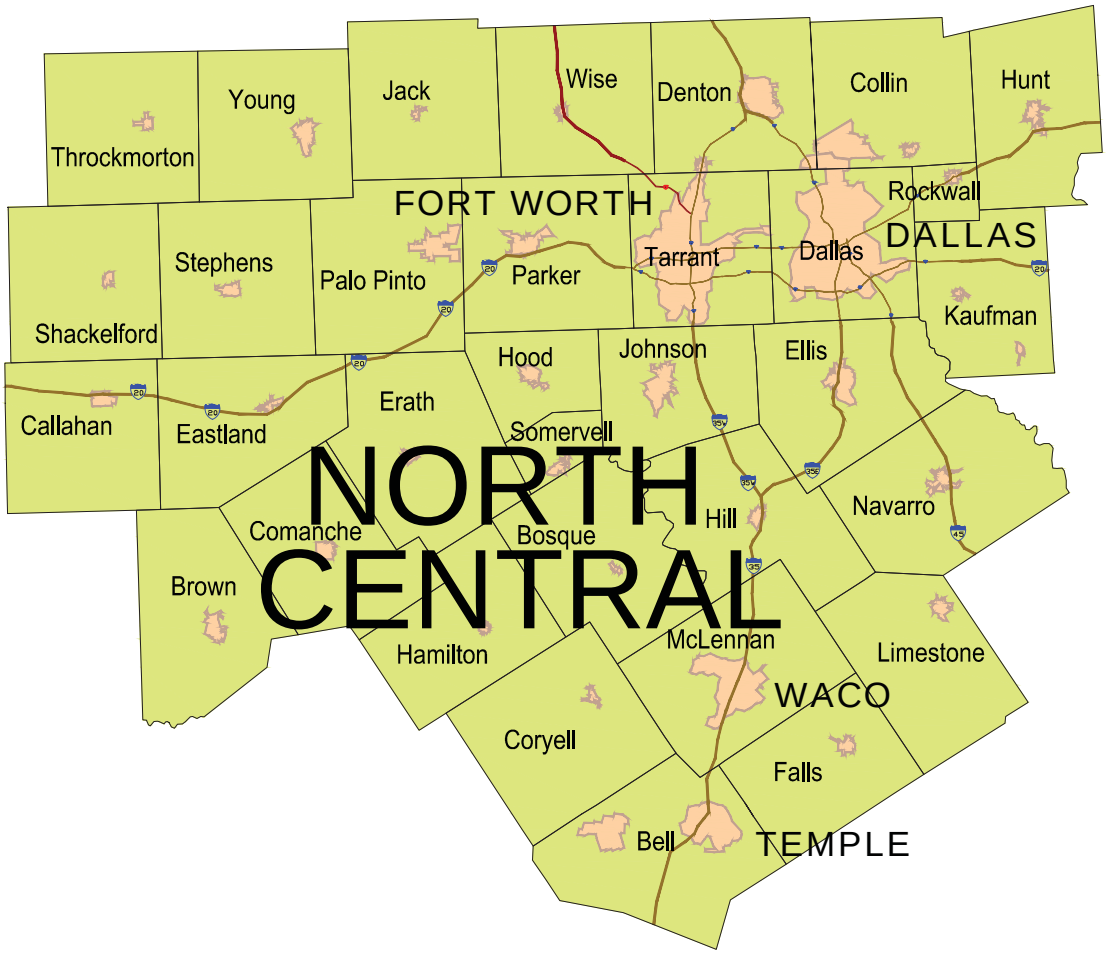
7.5 Area Constraints and Improvements – North Central Weather Zone

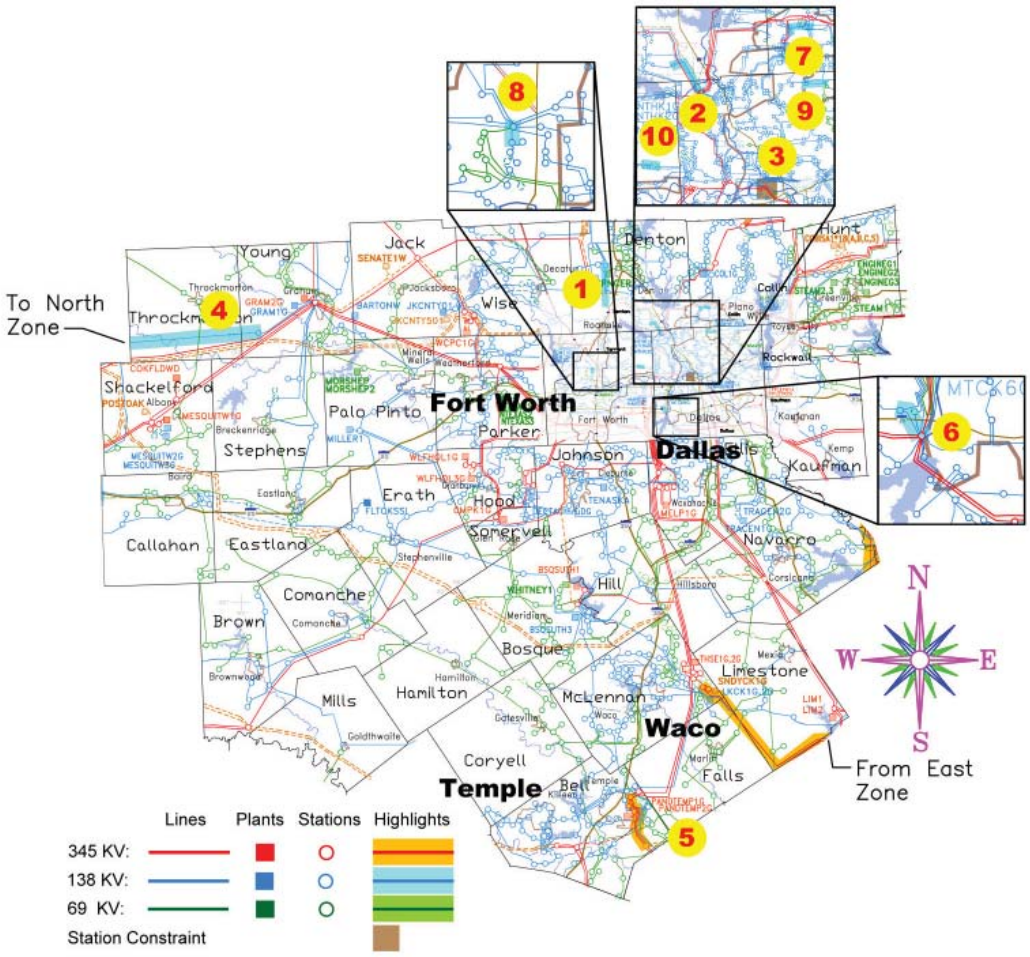


The North Central weather zone is comprised of the Dallas/ Fort Worth (DFW) metroplex, Waco, Temple and Killeen. This zone also extends west to the eastern edge of Abilene. The map below highlights the counties included in the North Central weather zone.



7.5.1 Recent Constraints Map – North Central Weather Zone

The map below identifies the location of the recent constraints for the North Central weather zone.



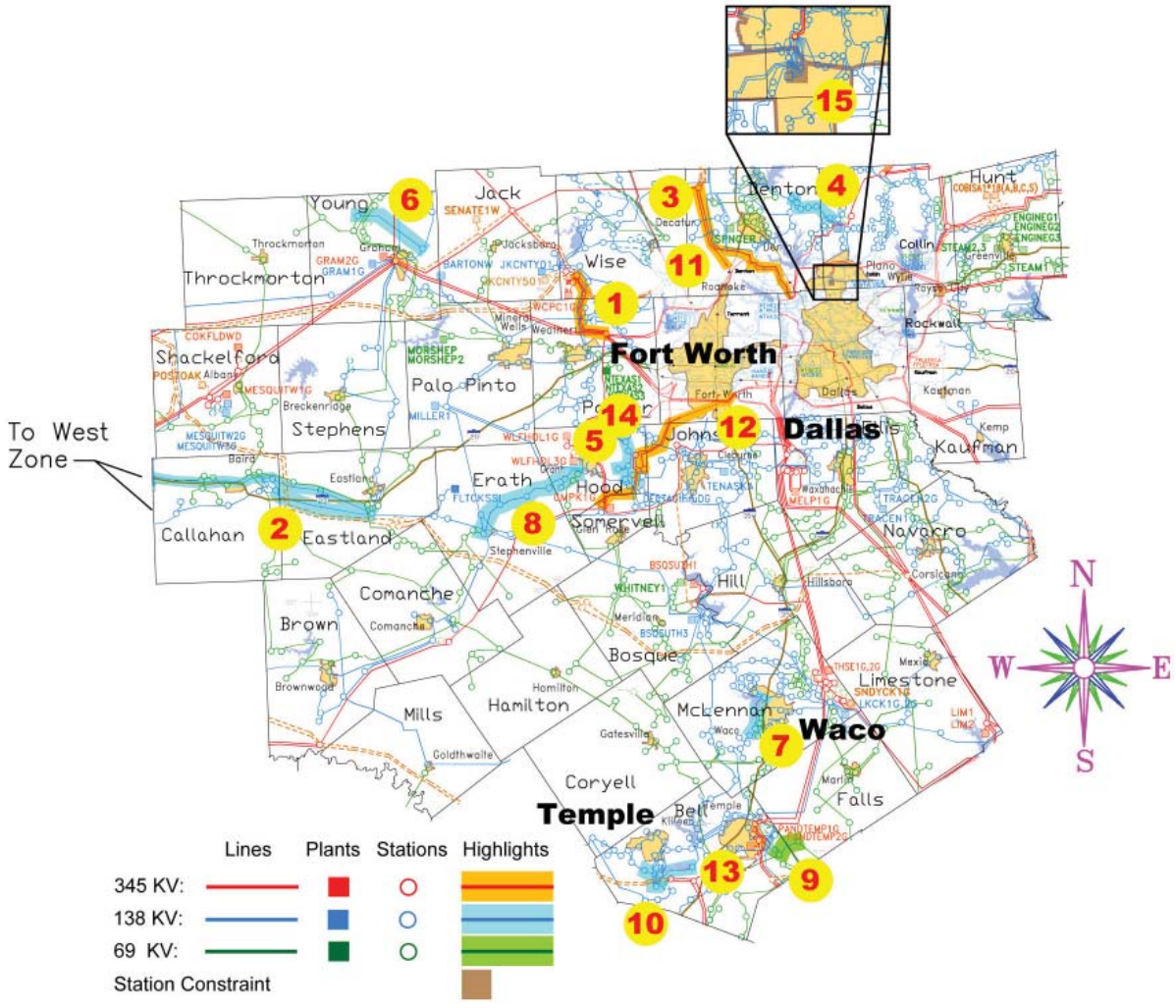
7.5.2 Recent Constraints – North Central Weather Zone

This zone has moderate load growth, particularly in the Dallas/Ft. Worth area. The combination of decreased local generation and the significant increase in load in the areas ouside of Dallas/Ft. Worth area led to congestion on the lines and transformers into the area. In addition, power transfers from west Texas have caused transmission constraints in the western part of the zone. Also the extremely cold weather in early February is another cause for transmission congestion.

Map Index	Constraining Element	Voltage (kV)
1	West Denton - Jim Cristal	138
2	Carrollton Northwest - Lakepointe	138
3	West Levee Switch Autotransformer	345/138
4	Paint Creek - Murray TU	138
5	Bell County East - Temple Switch	345
6	Cedar Hill Switch - Mayfield North Tap	138
7	Allen Switch - Plano Custer Road	138
8	Saginaw Switch - American MFG TAP	138
9	Apollo - Richardson East	138
10	DFW D1 - DFW C East	138

7.5.3 Completed Improvements Map – North Central Weather Zone

The map below identifies the location of the completed improvements for the North Central weather zone.



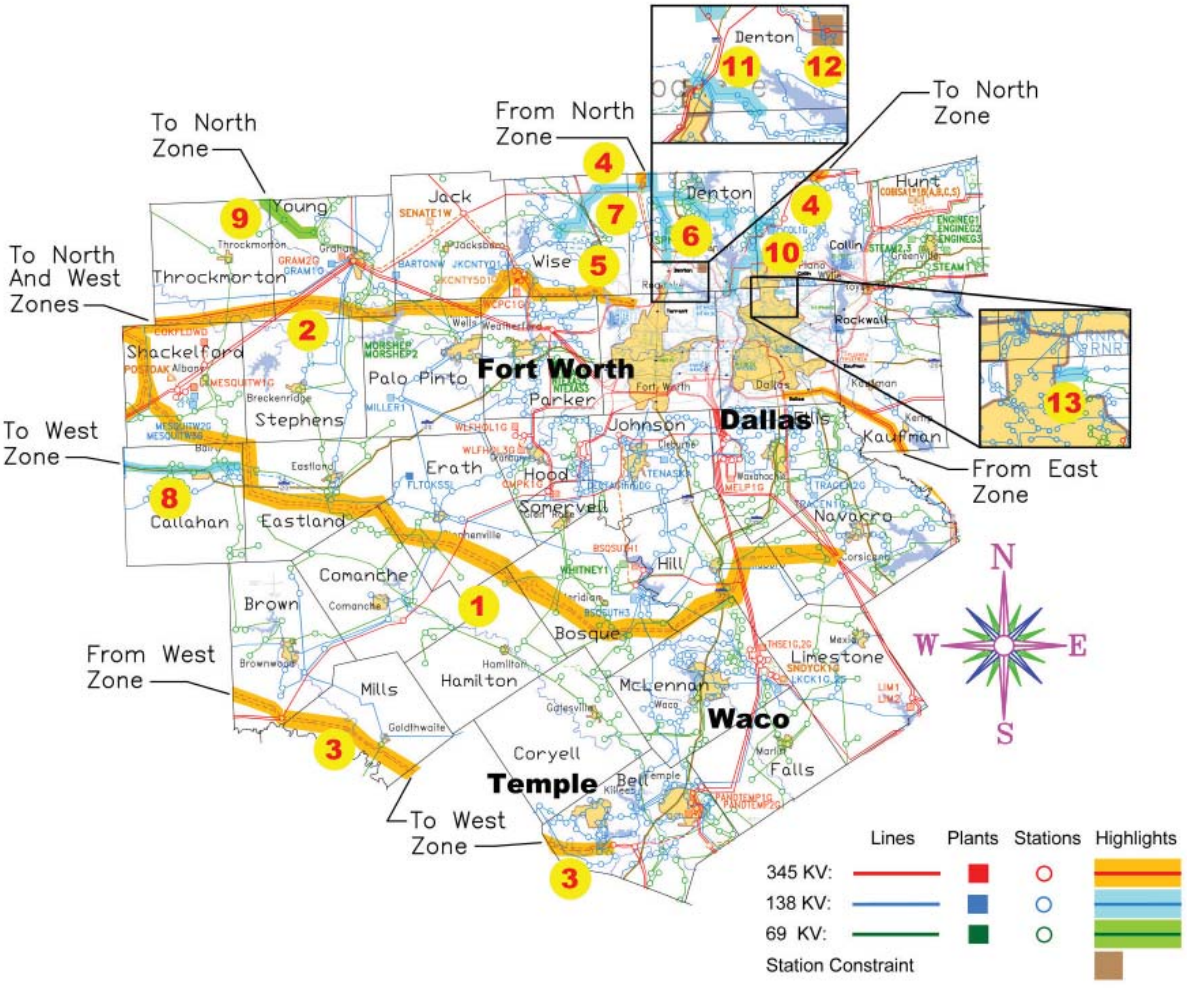
7.5.4 Completed Improvements – North Central Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the North Central weather zone. The elements consist of approximately 212 miles of transmission. There were over 69 miles of new transmission lines at 345 kV. In addition there were over 143 miles of upgraded lines shown below. Of this, 22 miles were at 345 kV, approximately 110 miles at 138 kV and 11 miles at 69 kV. The new and upgraded lines help bring power from the west Texas wind generation to the Dallas/Fort Worth area, relieve local congestion, and serve the growing load in the region more reliably.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Willow Creek - Parker 345 kV line	Dec-10	345	22.3	22.3
2	Putnam - Leon - Abilene South Upgrade	Jun-11	138	0.0	17.4
3	Krum West Switch - NW Carrollton 345 kV Line	Mar-11	345	37.2	0.0
4	Collin - Frisco - Krugerville 138 line upgrade	Feb-11	138	0.0	11.7
5	Waples to Hood Conversion	May-11	138	0.0	7.3
6	Olney to Rice Upgrade	May-11	138	0.0	17.1
7	Waco West - Waco Woodway - Waco Atco 138 kV Line Upgrade	Dec-10	138	0.0	5.8
8	Stephenville to Granbury 138KV Conversion	Feb-11	138	0.0	27.8
9	Seaton to Barclay Rebuild	Jan-11	69	0.0	10.2
10	Killeen Switch - Killeen South - Killeen Fort Hood West Tap 138 kV Line Upgrade	Jun-11	138	0.0	7.0
11	Roanoke Tap to West Denton 345kV CREZ Circuit	Dec-10	345	9.8	0.0
12	Parker - Comanche Peak - Everman 345 kV line	Apr-11	345	0.0	0.0
13	Killeen Switch - South Harker Heights 138 kV line	Jan-11	138	0.0	5.3
14	Nassau Bay to Nassau Bay Switch Rebuild	May-11	69	0.0	1.2
15	Renner SVC Phase II	Dec-10	138	0.0	0.0

7.5.5 Planned Improvements Map – North Central Weather Zone

The map below identifies the location of the planned improvements for the North Central weather zone.



7.5.6 Planned Improvements – North Central Weather Zone

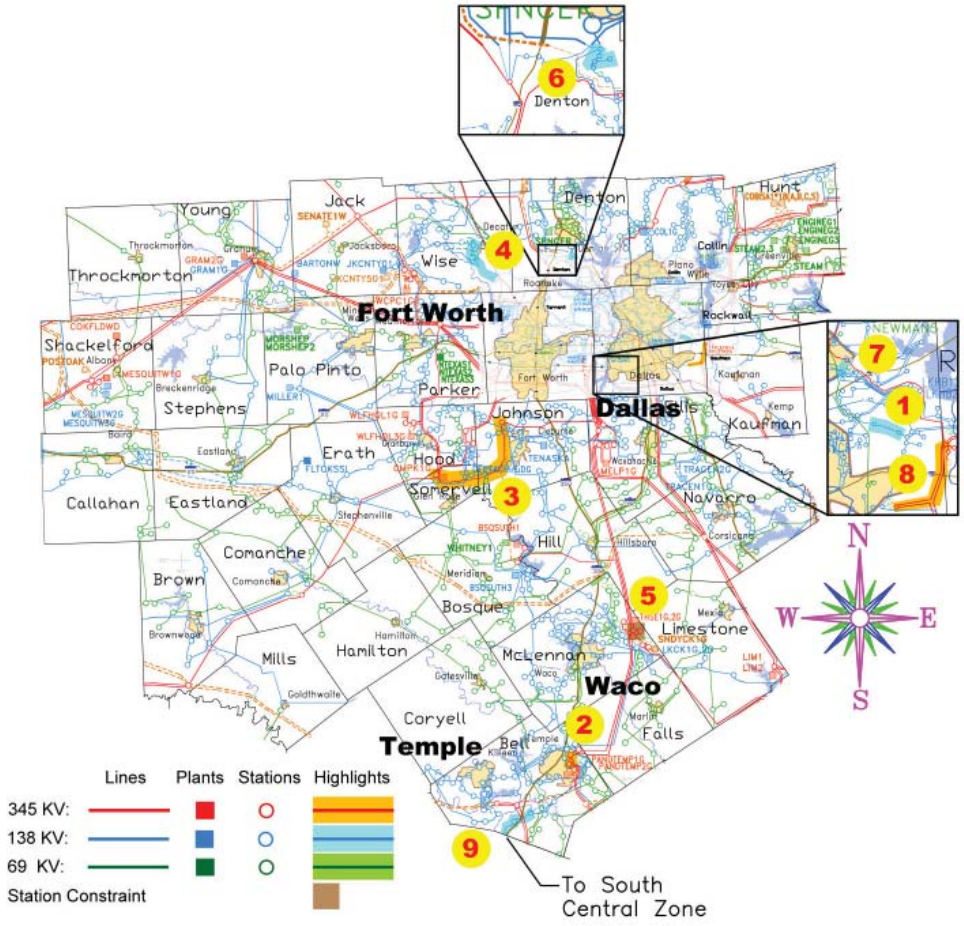
Many of the planned improvements in the North Central weather zone are the CREZ projects: The West Shackelford (Central C) to Sam Switch/Navarro 345 kV lines and substations, The Willow Creek to Clear Crossing to Dermott Switch 345 kV lines, Brown to Newton to Killeen Switch 345 kV line, and several other 345 kV and 138 kV lines.

Additionally, the planned improvements also include several 138 kV and 69 kV transmission upgrades. The Denton 138 kV system upgrades will relieve congestion and improve reliability in the area. The East Abilene to Putnam 138 kV line addition, the Northwest Carrollton to Collin 138 kV line upgrade, and the Roanoke Switch to Southlake to Coppell 138 kV line rebuilding will relieve overloading and enhance reliability in these areas.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	West Shackelford (Central C) - Sam Switch/Navarro	345	Mar-13
2	Willow Creek - Clear Crossing - Dermott Switch (Central B) 345 kV line	345	Dec-13
3	Brown - Newton - Killeen Switch 345 kV lines	345	Dec-12
4	Anna Switch - Krum W. Switch 345 kV line	345	Dec-13
5	Hicks Switch - Willow Creek 345 kV line	345	Jun-13
6	Denton 138kV System Upgrades	138	May-14
7	Spring to Bridgeport Switch	138	Dec-12
8	East Abilene to Putnam, Add 138 kV to existing 69 kV line	138	Oct-12
9	Olney to Lake Kemp Switch Rebuild	69	May-12
10	NW Carrollton - Collin 138 kV line	138	May-13
11	Roanoke Switch - Southlake - Coppell Tap - Coppell 138 kV line	138	Dec-12
12	Second Lewisville Autotransformer	345	Feb-12
13	Apollo - East Richardson Line	138	May-13

7.5.7 Projected Constraints Map– North Central Weather Zone

The map below identifies the location of the projected constraints for the North Central weather zone.



7.5.8 Projected Constraints – North Central Weather Zone

Most of the congestion in the North Central weather zone is predominantly due to the large demand in the area.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Mesquite West – Mesquite Western Electric	138				
2	Temple SS Line Tap – Temple SS	345				
3	Comanche Peak West – Johnson SS	345				
4	Rhome – Bennett Road SS	138				
5	Lake Creek Line Side Auto – Tradinghouse SES	345				
6	Corinth South #1 – Argyle	138				
7	Centerville – Centerville West Bus	345				
8	Seagoville SS – Forney	345				
9	Salado – Jarrell East	138				

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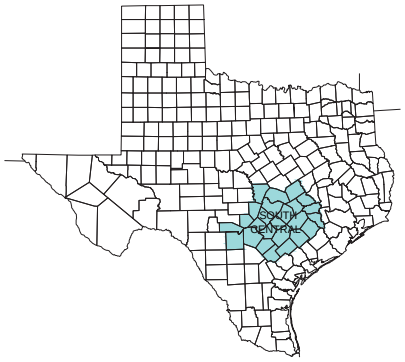
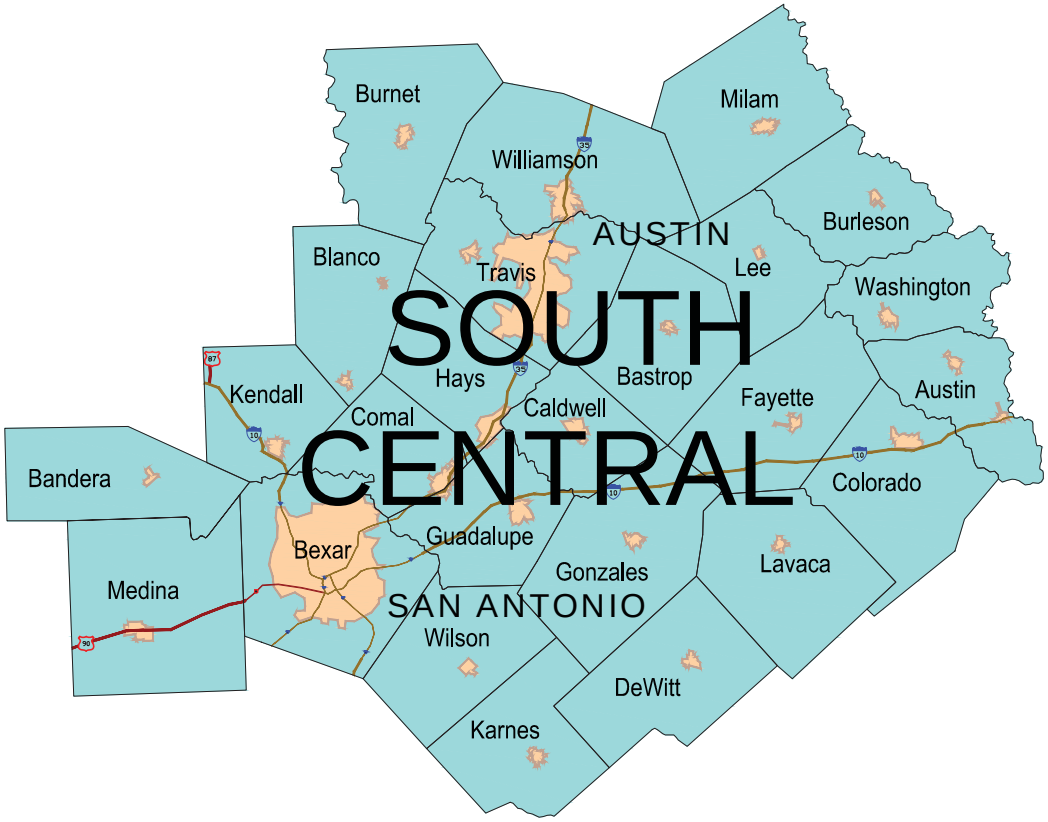
7.6 Area Constraints and Improvements –South Central Weather Zone

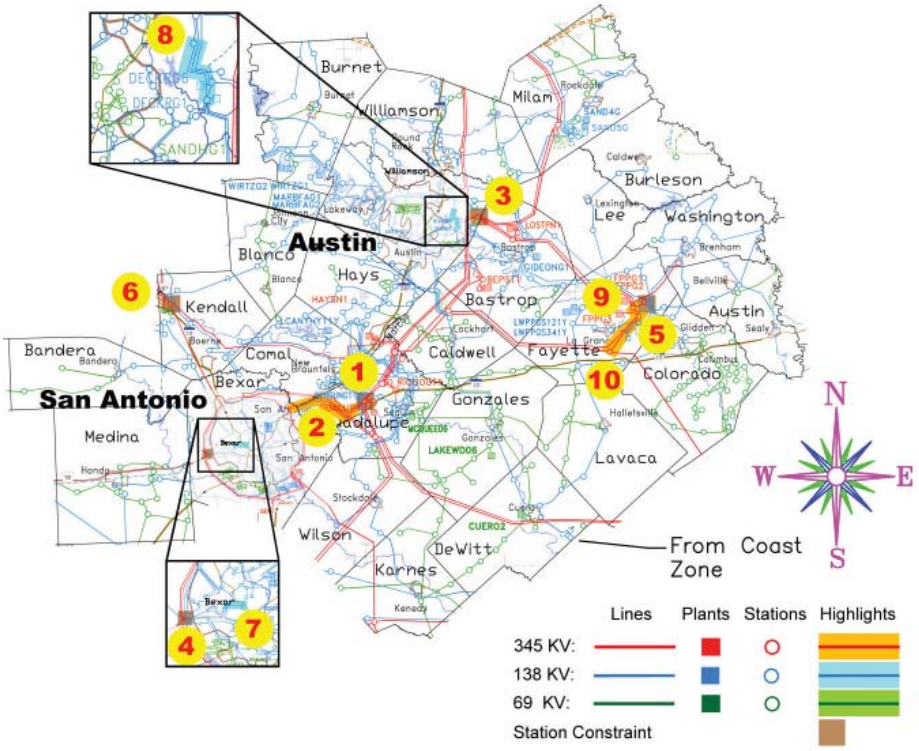


Austin, San Antonio, and the surrounding counties and suburbs make up the South Central weather zone. The map below highlights the counties included in the South Central weather zone.



7.6.1 Recent Constraints Map – South Central Weather Zone

The map below identifies the location of the recent constraints for the South Central weather zone.



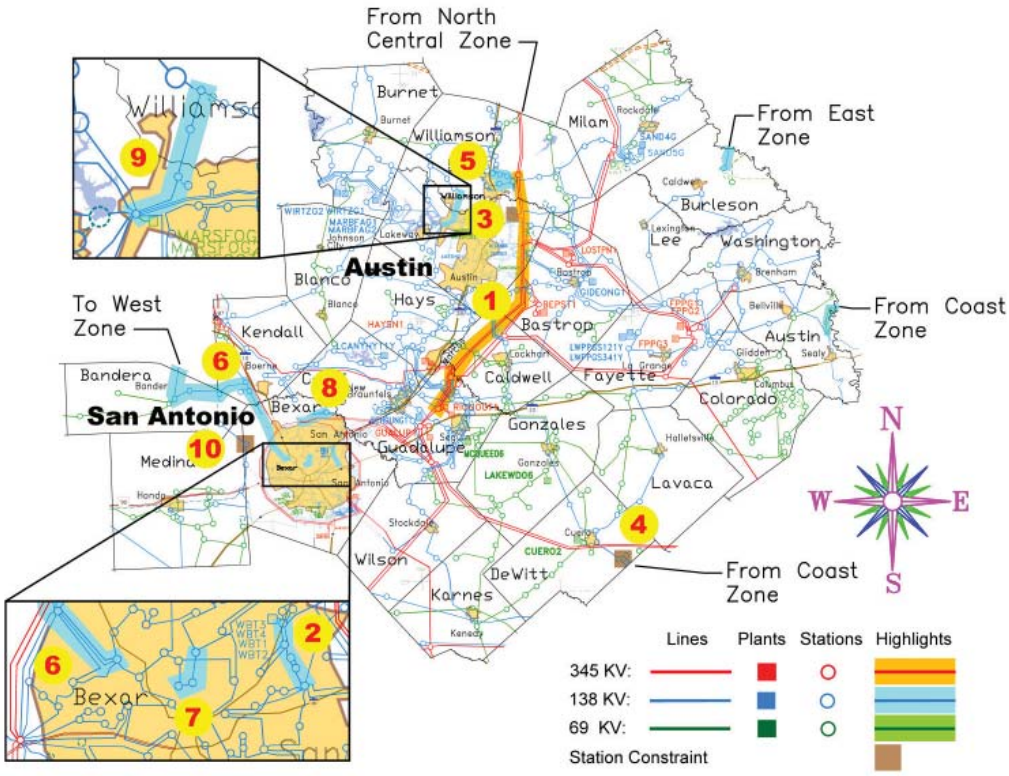
7.6.2 Recent Constraints – South Central Weather Zone

Transmission congestion in the South Central weather zone is due to a variety of factors including high load growth, which has resulted in transmission constraints. Congestion in this zone is also the result of transmission outages.

Map Index	Constraining Element	Voltage (kV)
1	Marion Autotransformer	345/138
2	Marion - Skyline	345
3	Austrop Autotransformer	345/138
4	Cagnon Autotransformer	345/138
5	Fayetteville Autotransformer	345/138
6	Kendall Autotransformer	345/138
7	Five Points - Westside CPS	138
8	Decker - Sprinkle	138
9	Fayette 1 - Fayette 2 Bus Tie	345
10	Fayette - Holman	345

7.6.3 Completed Improvements Map – South Central Weather Zone

The map below identifies the location of the completed improvements for the South Central weather zone.



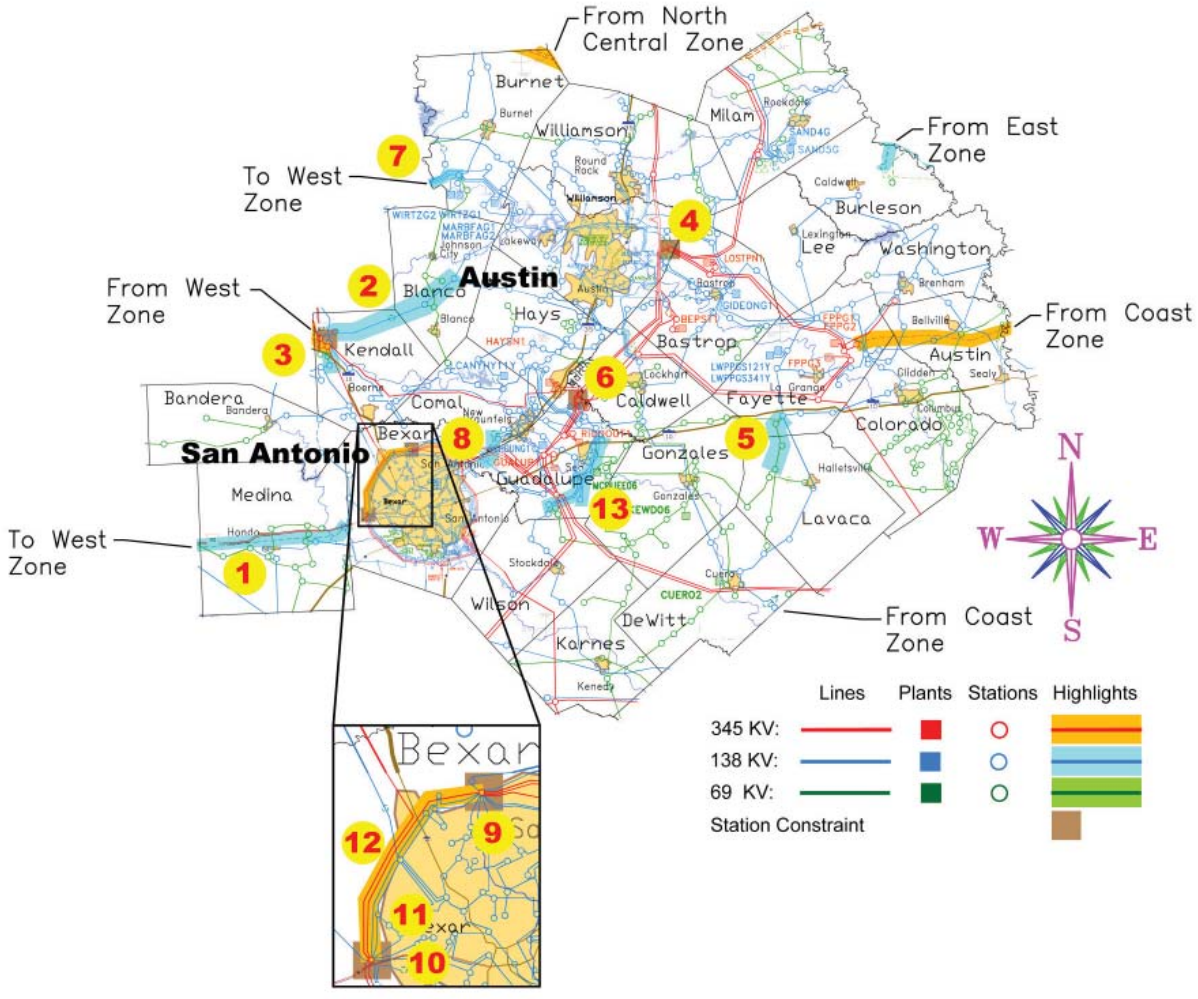
7.6.4 Completed Improvements – South Central Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the South Central weather zone. The elements consist of 234 miles of transmission, several substations, one autotransformer and one phase shifting transformer. The most significant upgrade was the Zorn/Clear Springs-Hutto Switch 345 kV line addition which added 165 miles of new 345 kV circuit. There were also 25 circuit miles of new transmission at 138 kV. Additionally, almost 44.5 miles of upgrades consisted of 7.5 miles at 345 kV and 37 miles at 138 kV. Most of the upgrades were carried out to serve the growing load in the region more reliably.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Zorn/Clear Springs-Gilleland Creek-Hutto Switch 345-kV Line	Feb-11	345	165.0	7.5
2	Kirby to Tuttle - 138 kV Circuit	Jun-11	138	6.5	0.0
3	Gilleland 345/138kV Autotransformer	Jan-11	345	0.0	0.0
4	Thomaston: Install 138 kV PST, Add 3-28.8 MVAR Cap Banks, Reterminate 138 kV Line	May-11	138	0.0	0.0
5	Hutto Switch - Round Rock NE - Round Rock 138 kV line	Dec-10	138	8.4	8.9
6	Bandera-Verde Creek Rebuild	Nov-10	138	0.0	15.0
7	Dresden to LA Heights - 138kV line Upgrade	May-11	138	0.0	3.3
8	Hill Country to Stonegate - 138 kV Second Circuit	Mar-11	138	10.0	0.0
9	Marshall Ford-Buttercup Upgrade	Jun-11	138	0.0	9.8
10	Talley Rd - New 138kV Substation	May-11	138	0.1	0.0

7.6.5 Planned Improvements Map – South Central Weather Zone

The map below identifies the location of the planned improvements for the South Central weather zone.



7.6.6 Planned Improvements – South Central Weather Zone

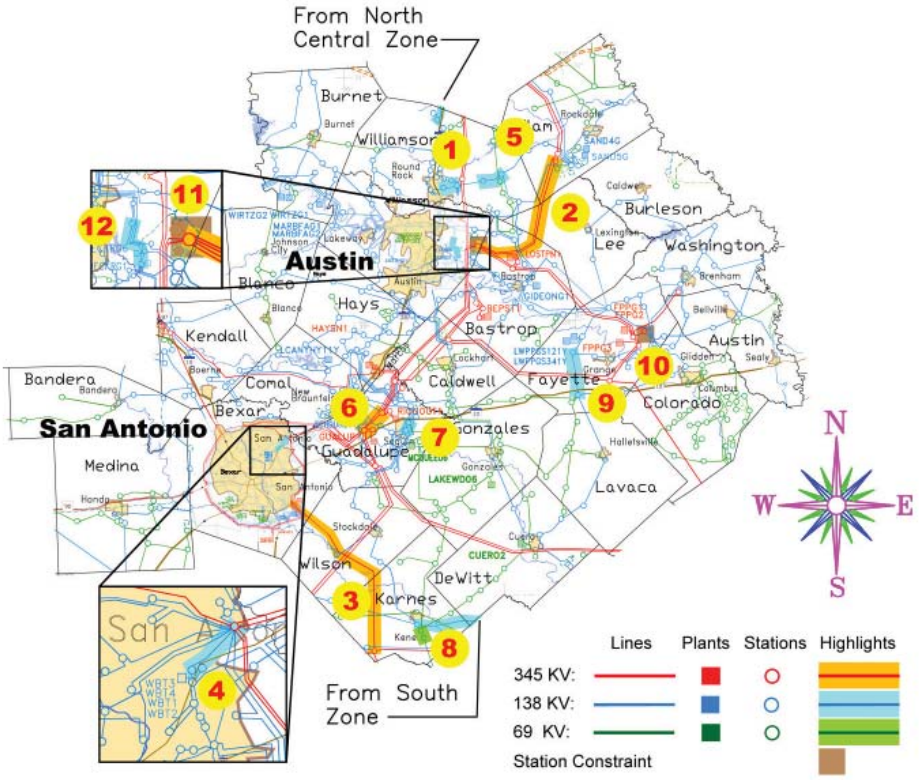
Many of the planned projects in South Central weather zone are designed to meet growing demand in the greater metropolitan areas of San Antonio and Austin. These include new Uvalde to Castroville 138 kV, autotransformer additions at Zorn, Hill Country and Cagnon, and Cagnon to Hill Country 345 kV line. The CREZ project Kendall to Miller to Paleface 138 kV upgrade and the Kendall autotransformer replacement are planned to improve the wind generation movement from West to South Central zone and increase reliability in the area.

Other major improvements in the South Central weather zone include the conversion of Flatonia to Yoakum Gartner Road substation 69 kV line to 138 kV service, upgrade of Ferguson to Wirtz 138 kV line and the construction of the new Parkway to EC Mornhinweg 138 kV line.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Uvalde to Castroville, build 138 kV line, double circuit capable	138	Dec-12
2	Kendall to Miller Creek to Paleface	138	May-13
3	Kendall Autotransformer Replacement	345	Jun-12
4	Dunlap 138/345kV Autotransformer Project	345	Mar-13
5	Flatonia-Yoakum Gartner Road	138	May-13
6	Zorn Autotransformer Addition	345	May-13
7	Ferguson to Wirtz	138	Jun-12
8	Parkway to EC Mornhinweg	138	Aug-14
9	Hill Country - Install Fourth 345/138 kV Autotransformer	345	Jun-12
10	Cagnon - Install a Fourth 345kV Autotransformer	345	Jun-14
11	Cagnon - Install a Third 345kV Autotransformer	345	Jun-13
12	Cagnon to Hill Country - 345kV 2nd Circuit	345	Jun-20
13	Cushman - Highway 123 Line	138	Jun-14

7.6.7 Projected Constraints Map – South Central Weather Zone

The map below identifies the location of the projected constraints for the South Central weather zone.



7.6.8 Projected Constraints – South Central Weather Zone

Load growth in the Austin and San Antonio metropolitan areas will cause congestion in the South Central weather zone. Demand in east Austin is expected to cause congestion on the Sandow to Austrop 345 kV line, Austrop 345/138 kV autotransformer, and the Decker to Sprinkle 138 kV line. Moderate congestion is expected on the Marion to Clear Springs 345 kV line and several 138 kV lines in the northeast San Antonio area. Congestion in the Round Rock area north of Austin is expected on the Hutto to Round Rock Northeast 138 kV line. The Fayetteville 345/138 kV autotransformer is projected to experience some congestion before the upgrade of Fayette Power Project to Fayetteville 345 kV double circuit lines and the new Fayetteville to Zenith 345 kV line are added by the end of 2016.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Hutto – Round Rock Northeast	138				
2	Sandow – Austrop	345				
3	Spruce – Pawnee Switch	345				
4	Skyline - Nacogdoches Road	138				
5	Taylor – Taylor West	138				
6	Marion – Clear Springs	345				
7	Seguin – Seguin West	138				
8	Kenedy Switch - Kenedy	69				
9	Flatonia – Plum	138				
10	Fayetteville Autotransformer	345/138				
11	Austrop Autotransformer	345/138				
12	Decker - Sprinkle	138				

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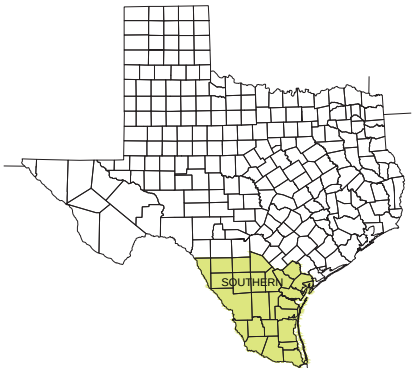
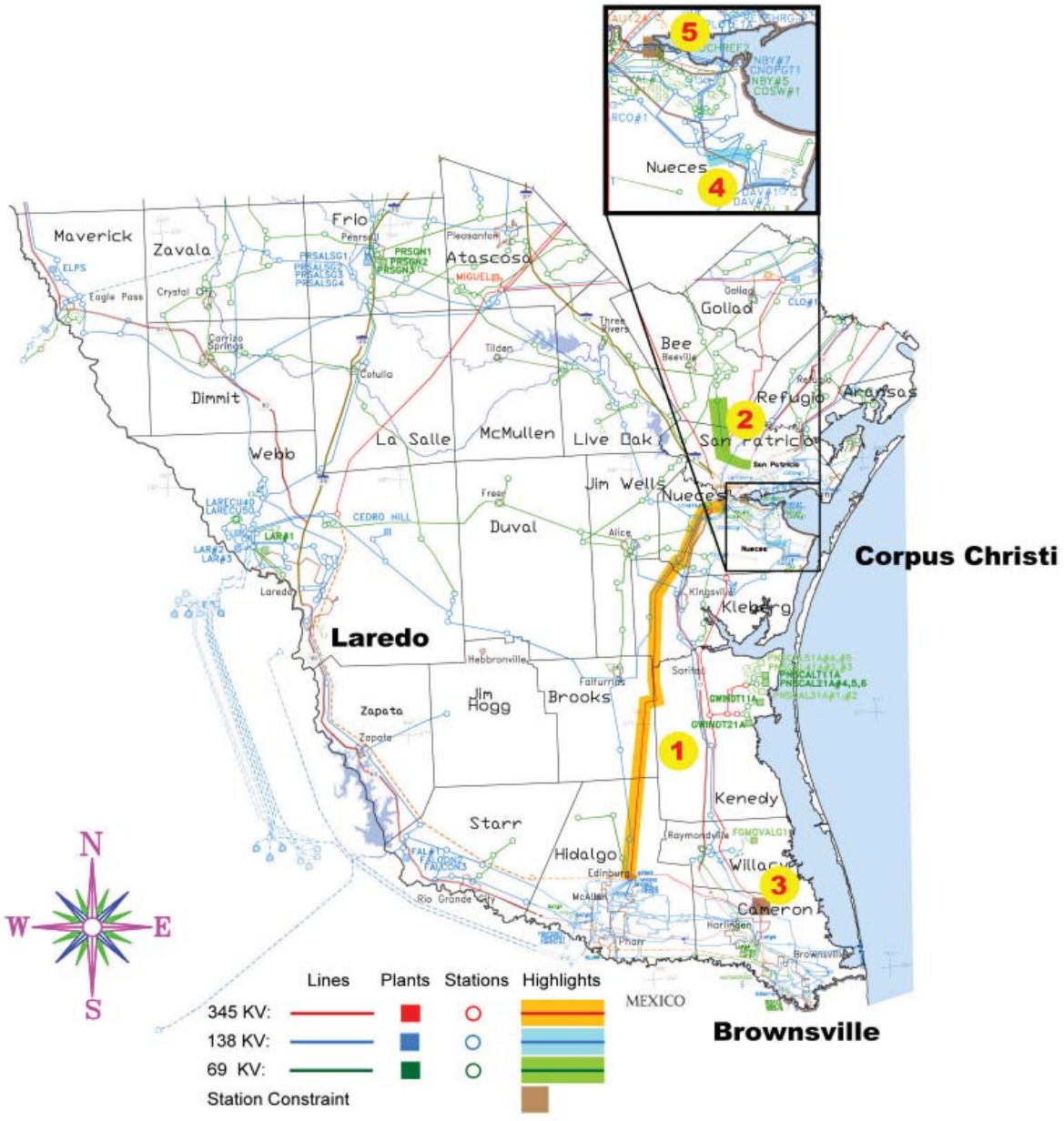
7.7 Area Constraints and Improvements – Southern Weather Zone



The Southern weather zone covers the south Texas plains and contains the cities of Laredo, Corpus Christi, McAllen, and Brownsville. The map below highlights the counties included in the Southern weather zone.

7.7.1 Recent Constraints Map – Southern Weather Zone

The map below identifies the location of the recent constraints for the Southern weather zone.



7.7.2 Recent Constraints – Southern Weather Zone

The transmission congestion in the Southern weather zone is due to a variety of factors including the sizeable load growth and transmission outages. In addition, congestion in this zone is also the result of the extremely cold weather in early February.

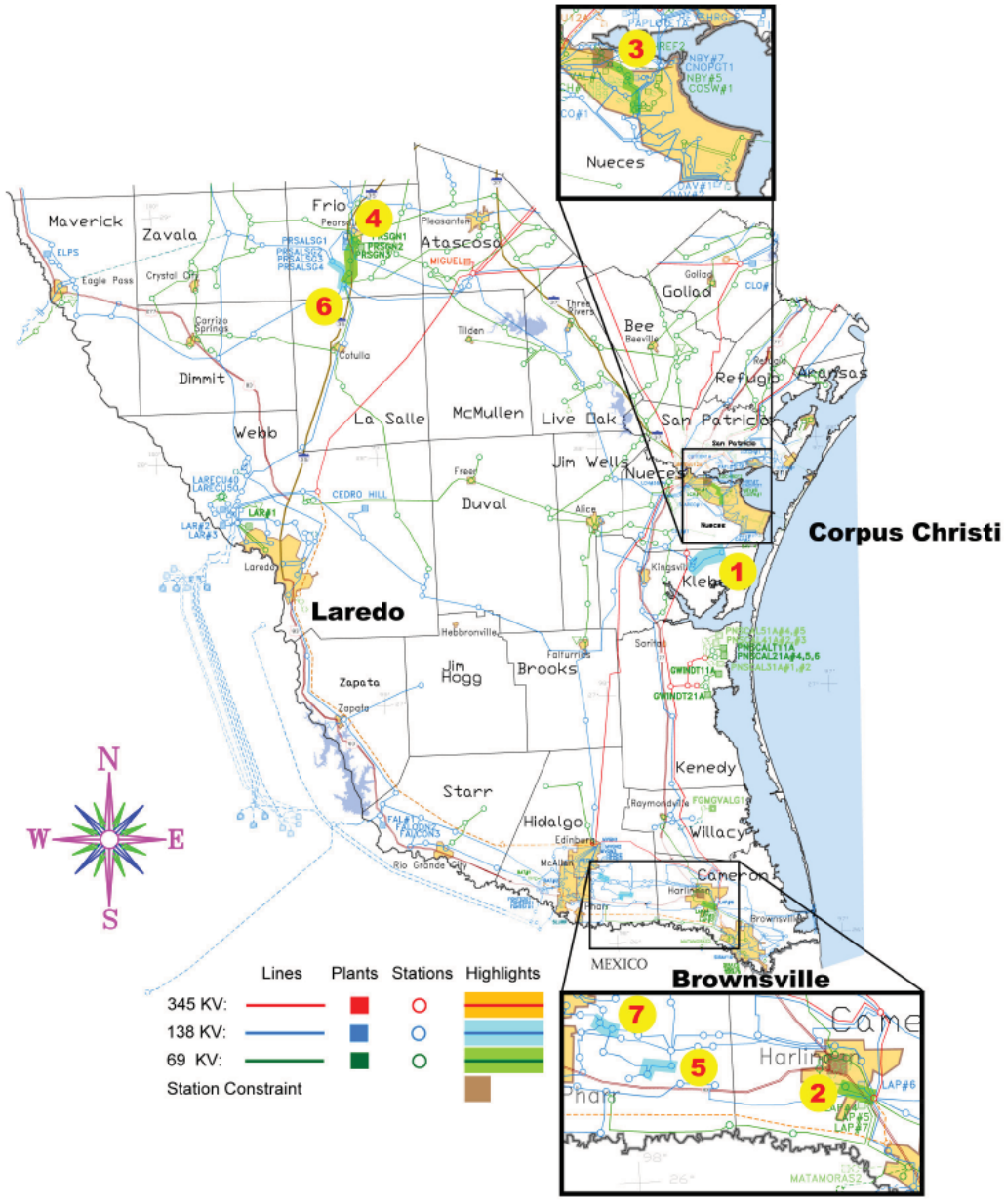
Map Index	Constraining Element	Voltage (kV)
1	Lon Hill - North Edinburg	345
2	Sinton - Skidmore	69
3	Rio Hondo Series Capacitor 1	345
4	Airline - Cabaniss	138
5	Koch Up River Autotransformer	138/69

Non-specific element

na	Valley Import	345/138

7.7.3 Completed Improvements Map – Southern Weather Zone

The map below identifies the location of the completed improvements for the Southern weather zone.



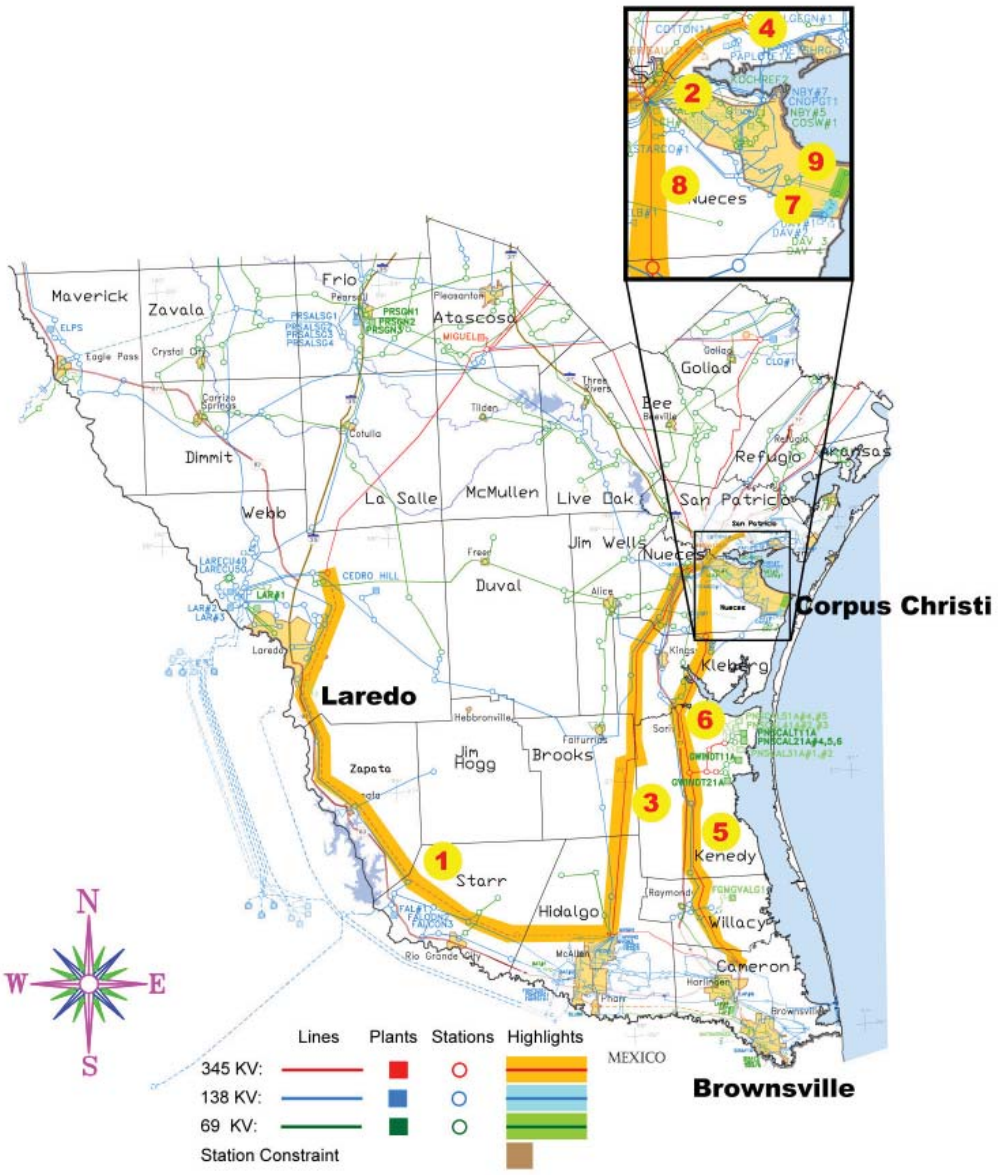
7.7.4 Completed Improvements – Southern Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the Southern weather zone. The elements consist of almost 53 miles of transmission and one new switching station. There were 13.5 miles of new transmission at 138 kV, 13.5 miles of upgraded lines at 138 kV and over 25 miles of upgraded lines at 69 kV. Many of these improvements were accomplished by rebuilding the existing lines and building new lines.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Alazan to Nelson Sharpe 138 kV Line Rebuild	May-11	138	0.0	10.1
2	Oleander, Construct 138/69 kV Substation	May-11	138	0.0	0.0
3	Highway 9 to Valero West 69 kV Upgrade	Jun-11	69	0.0	4.0
4	Pearsall to Dilley 69 kV Line Upgrade	Feb-11	69	0.0	21.8
5	Sioux-Gandy 138kV Line and Sioux Substation	Mar-11	138	4.5	0.0
6	Palo Duro to AEP Dilley SS 138 kV Line and new Palo Duro Station	Feb-11	138	9.0	0.0
7	MVEC Merett - MVEC Pharr-Alberta Switch	May-11	138	0.0	3.4

7.7.5 Planned Improvements Map – Southern Weather Zone

The map below identifies the location of the planned improvements for the Southern weather zone.



7.7.6 Planned Improvements – Southern Weather Zone

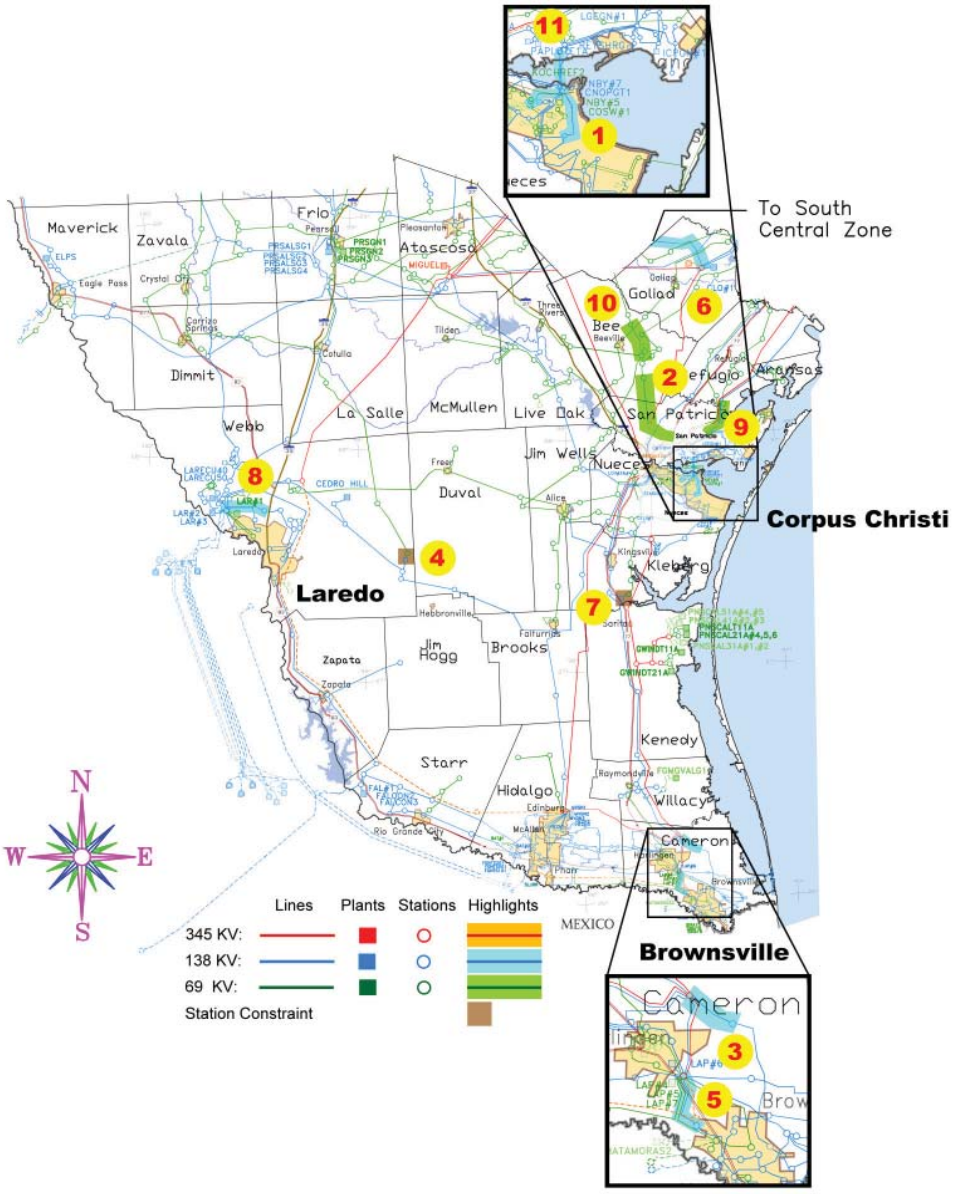
The most substantial system improvement planned for the South weather zone will be the completion of the Lobo to Rio Bravo to North Edinburg new 345 kV line. This project is designed to increase the power import capability to the Lower Rio Grande Valley area, improve reliability and meet future load growth in the area. In conjunction with this project, several other projects are planned to further strengthen the transmission system and thus relieve congestion in the area: upgrades of Lon Hill to North Edinburg and Lon Hill to Nelson Sharpe to Ajo to Rio Hondo 345 kV lines.

Additionally, several other improvements in the South weather zone include the construction of new Barney Davis to Laguna 138 kV line and the upgrade of Laguna to Naval Base 69 kV line. These project will relieve the overloading in the Corpus Christi area.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Lobo to North Edinburg: Construct 345 kV line	345	Jul-16
2	Lon Hill to Sand Dollar 345 kV: Construct New 345 kV Transmission Line	345	Sep-14
3	Lon Hill to North Edinburg: Reconductor 345kV line	345	Dec-14
4	Nopalito to Sand Dollar 345 kV: Construct New 345 kV Transmission Line	345	Sep-15
5	Ajo to Rio Hondo: Reconductor 345kV line	345	May-13
6	Nelson Sharpe to Ajo: Reconductor 345kV line	345	Dec-13
7	Barney Davis to Laguna: Construct 138 kV line	138	Dec-13
8	Lon Hill to Nelson Sharpe: Reconductor 345kV line	345	Jun-15
9	Laguna to Naval Base	69	Feb-13

7.7.7 Projected Constraints Map – Southern Weather Zone

The map below identifies the location of the projected constraints for the Southern weather zone.



7.7.8 Projected Constraints – Southern Weather Zone

The majority of the projected congestion in the Southern weather zone is expected in the Corpus Christi and Rio Grande Valley areas ahead of several transmission improvements in the areas. This is due to the sizeable load growth in the area.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Nueces Bay – Morris Street	138				
2	Sinton - Skidmore	69				
3	Rio Hondo – East Rio Hondo	138				
4	Bruni Sub Autotransformer	138/69				
5	La Palma – Villa Cavazos	138				
6	Coleto Creek – Kenedy Switching Station	138				
7	Loyola Autotransformer	138/69				
8	Laredo – Del Mar	138				
9	Rincon - Bonnieview	69				
10	Beeville - Normanna	69				
11	Whitepoint - Gila	138				

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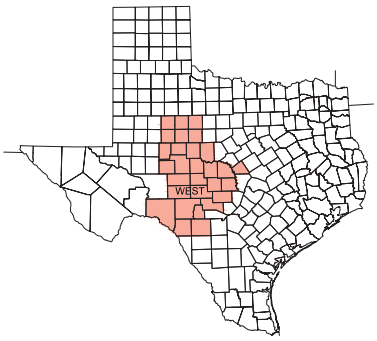
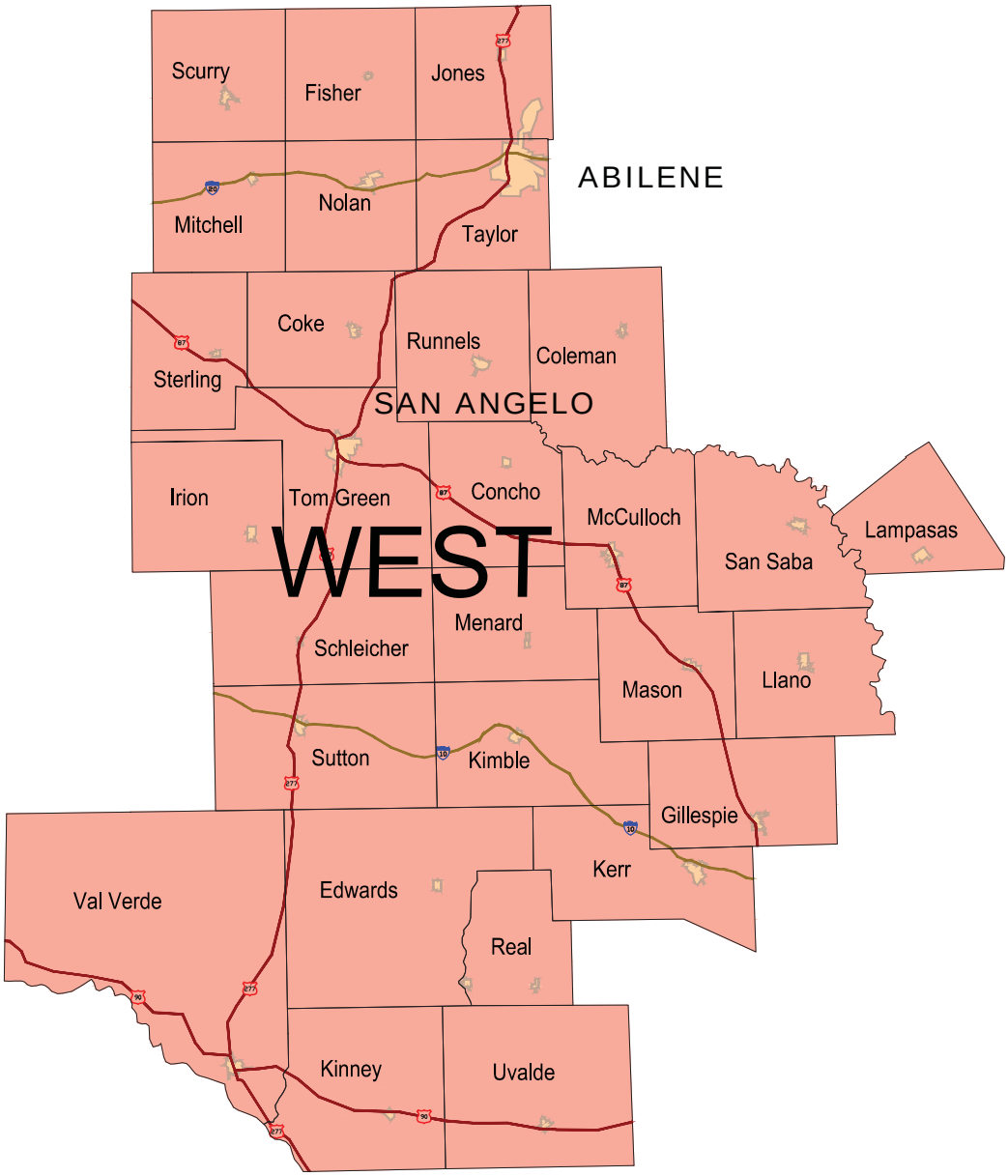
7.8 Area Constraints and Improvements – West Weather Zone

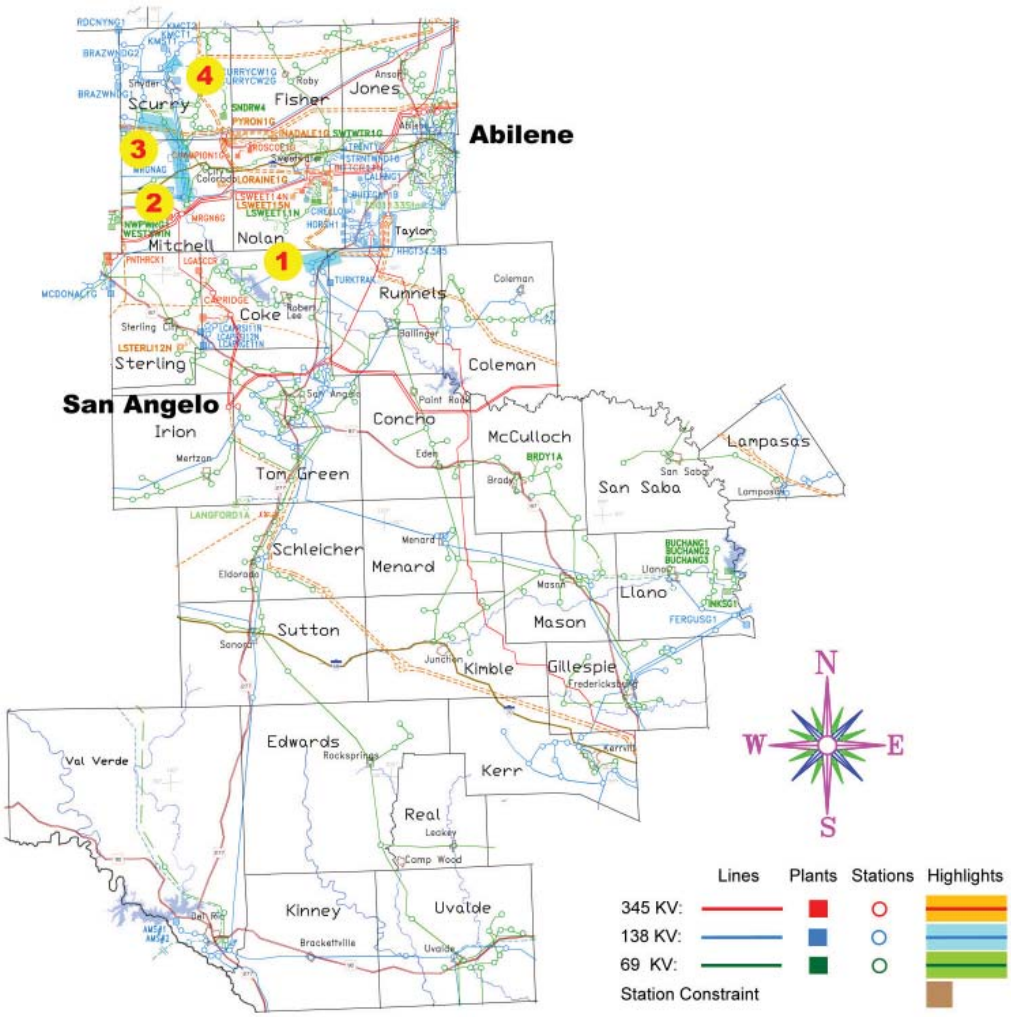


The West weather zone includes Del Rio, Abilene, San Angelo, and the western part of the Texas hill country. The map below highlights the counties included in the West weather zone.



7.8.1 Recent Constraints Map – West Weather Zone

The map below identifies the location of the recent constraints for the West weather zone.



7.8.2 Recent Constraints – West Weather Zone

Congestion in the West weather zone is due to the large amount of wind generation capacity with limited transmission capacity to the high load growth central Texas area.

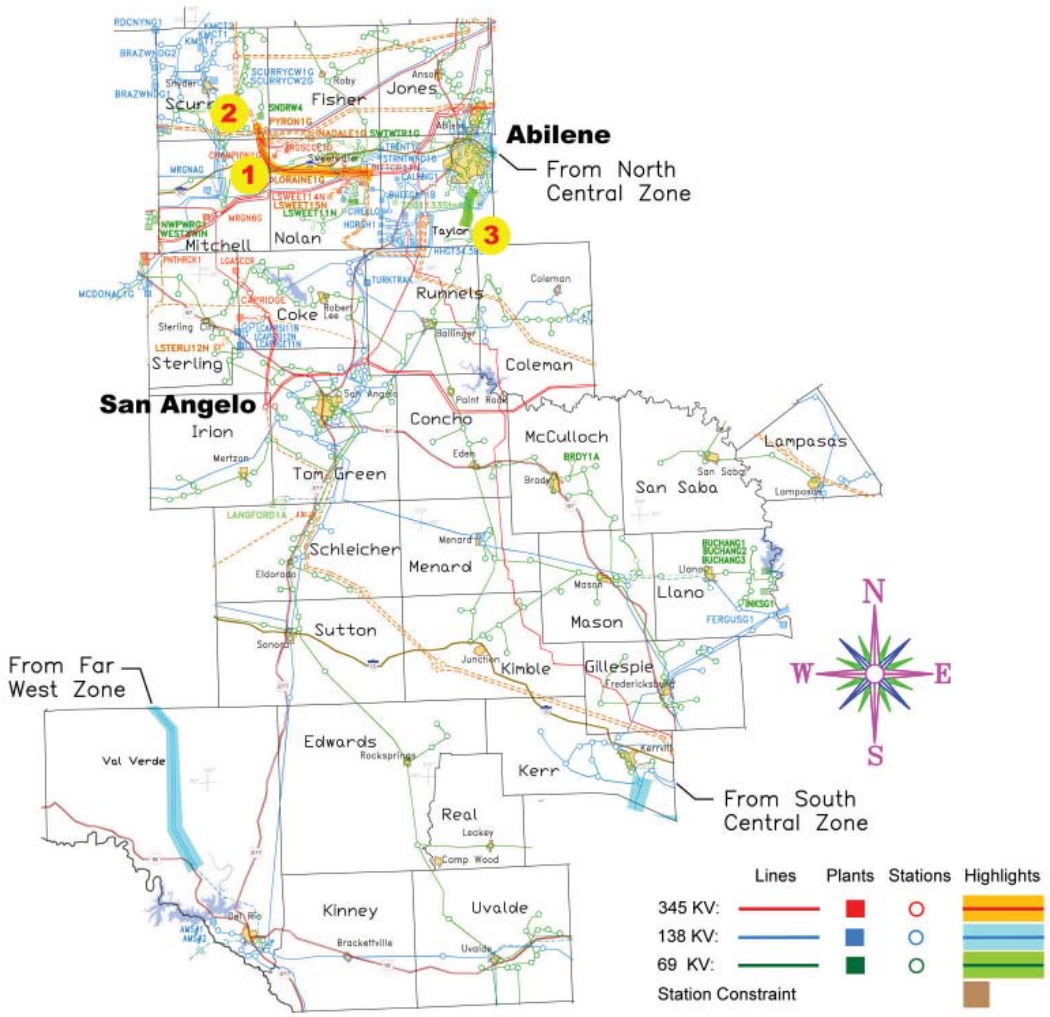
Map Index	Constraining Element	Voltage (kV)
1	Nicole - Oak Creek	138
2	Morgan Creek SES - China Grove Switch	138
3	China Grove Switch - Bluff Creek Switch	138
4	Golden Switch - Brand TU	138

Non-specific element

na	West - North Stability Limit	345

7.8.3 Completed Improvements Map – West Weather Zone

The map below identifies the location of the completed improvements for the West weather zone.



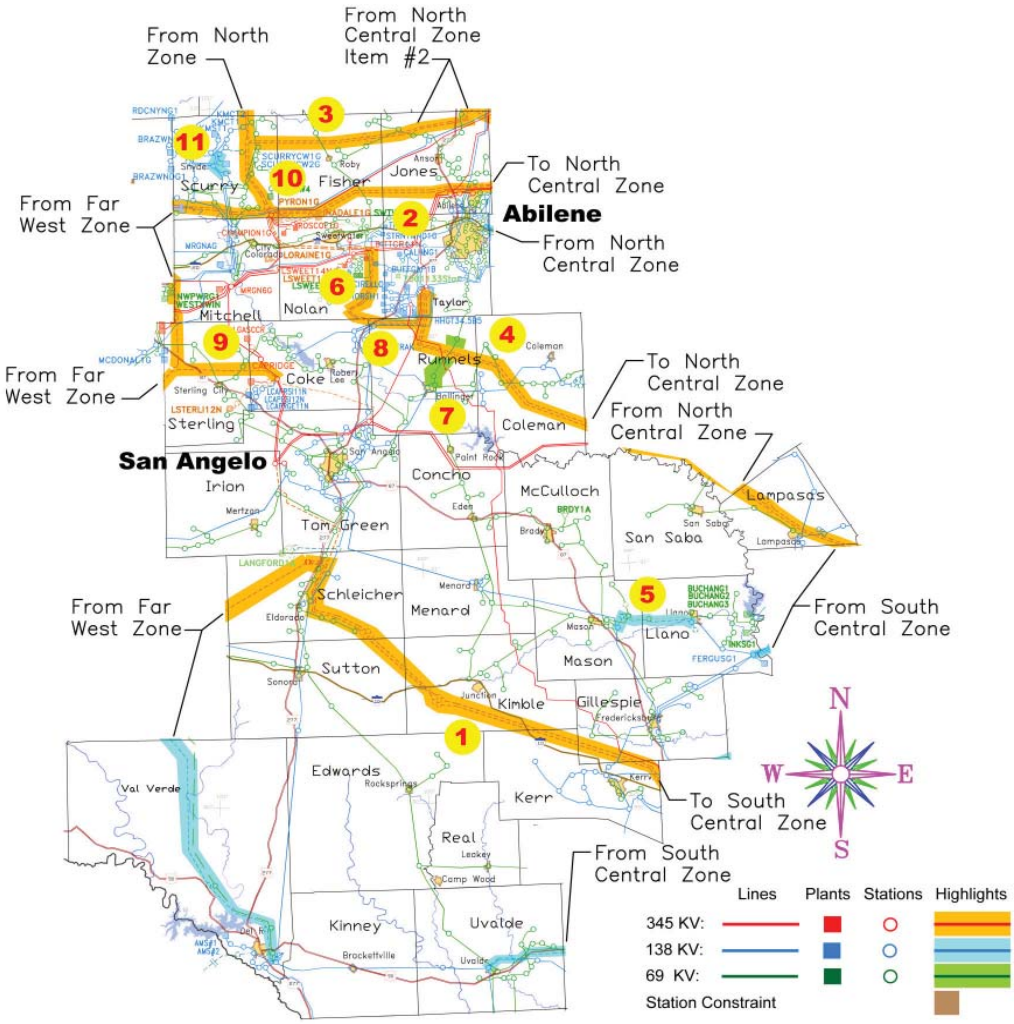
7.8.4 Completed Improvements – West Weather Zone

The map shows the most significant new and upgraded elements that were completed in 2010 and 2011 in the West weather zone. The elements consist of 105 miles of transmission. Of the transmission lines, there were approximately 94 miles of new 345 kV circuit related to the CREZ project and 11 miles of upgraded 69 kV circuit related to reliability improvements. The transmission improvements were accomplished by building new lines or rebuilding the existing line.

Map Index	Completed Improvement	In-Service	Voltage (kV)	New (miles)	Upgrade (miles)
1	Tonkawa - Sweetwater East 345 kV line	Jun-11	345	63.4	0.0
2	Scurry County South Switch (Central A) - Tonkawa 345 kV line	Jun-11	345	30.4	0.0
3	Abilene South to Tuscola, Rebuild 69 kV line	Jun-11	69	0.0	11.4

7.8.5 Planned Improvements Map – West Weather Zone

The map below identifies the location of the planned improvements for the West weather zone.



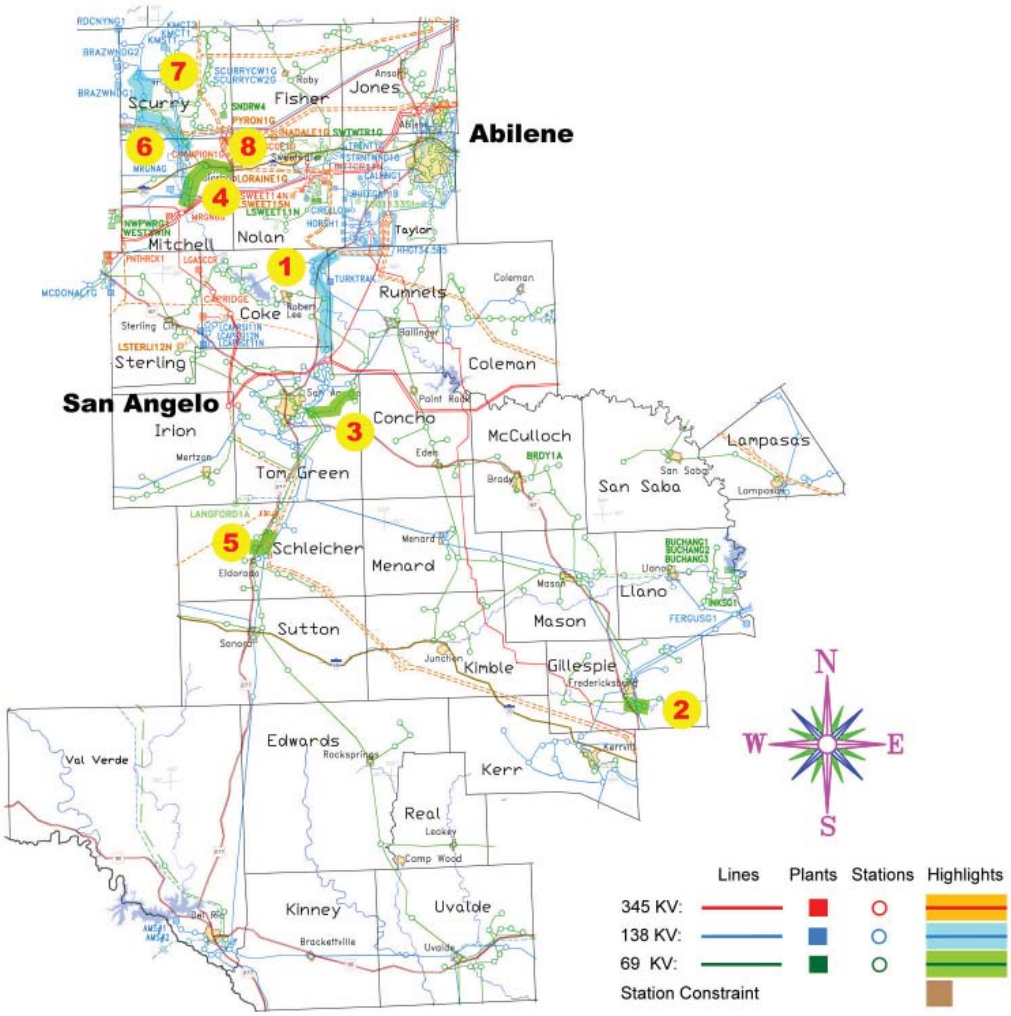
7.8.6 Planned Improvements – West Weather Zone

Most of the planned improvements in the West weather zone are CREZ projects: new Big Hill to Kendall 345 kV, Scurry County to West Shackelford 345 kV, Dermott to Willow Creek 345 kV and several other 345 transmission lines. This new construction will serve the purpose to move power, mainly wind, from west Texas to other zones such as North Central, South Central and South. The Ballinger to Winters 69 kV line upgrade will improve reliability in the area.

Map Index	Planned Element	Voltage (kV)	Year In-Service
1	Big Hill to Kendall	345	Sep-13
2	Scurry County (Central A) - West Shackelford (Central C)	345	Mar-13
3	Dermott to Willow Creek (Dermott to Clear Crossing portion) double circuit 345kV line	345	Sep-13
4	Bluff Creek - Brown 345 kV line	345	Jun-12
5	Fort Mason to Pitsburg	138	Nov-11
6	Sweetwater East - Central Bluff 345 kV line	345	Dec-11
7	Ballinger to Winters, Rebuild 69 kV line	69	Dec-11
8	Central Bluff - Bluff Creek 345 kV line	345	Dec-11
9	Sand Bluff 345 kV Station and Sand Bluff to Divide 345 kV line	345	May-13
10	Dermott Switch (Central B) - Scurry County South Switch (Central A) 345 kV line	345	Dec-11
11	Sun Switch – Golden Switch – Brand – Scurry Chevron 138 kV Upgrade	138	May-12

7.8.7 Projected Constraints Map – West Weather Zone

The map below identifies the location of the projected constraints for the West weather zone.



7.8.8 Projected Constraints – West Weather Zone

While moderate load growth has contributed to some congestion, a majority of the constraints projected in the West Weather zone is mainly caused by the large increase in wind generation in the area. Some of the congestion will be mitigated with the implementation of the CREZ transmission upgrades.

Power transfer from west Texas is mainly constrained by the congestion on the West to North Transient Stability Limit in 2012. This will likely be relieved with the CREZ facilities when the new lines come into service by 2012 through 2013.

Index	Projected Constraining Element	Voltage (kV)	2012	2013	2014	2015
1	Nicole – Orient	138				
2	Live Oak Tap – Fredrickburg	69				
3	Veribest – San Angelo Concho	69				
4	Morgan Creek SES – Colorado City	69				
5	Pave Paws 69 kV Tap – Live Oak	69				
6	Bluff Creek – China Grove	138				
7	Knapp – Scurry Chevron	138				
8	Colorado City - Loraine	69				

Non Specific Elements

na	West to North Transient Stability Limit	345				

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8. Long Term System Assessment Summary

ERCOT assesses transmission system adequacy for longer term (years six through ten) planning horizons on an annual basis. In even numbered years the ERCOT Long-Term System Assessment (LTSA) fulfills this requirement for both the State of Texas Legislature and NERC. This assessment, unlike shorter term assessments, quantifies underlying system needs that may require more than five years to implement. In odd numbered years, ERCOT reviews previous long term assessments, as well as any supplemental long term studies in progress, in light of current system conditions, assumptions, or expectations.

[1]Senate Bill 20 requires that the Public Utility Commission of Texas (PUCT) and the Electric Reliability Council of Texas, Inc. (ERCOT) study the need for increased transmission and generation capacity throughout the state of Texas and report on these needs to the Legislature.

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9. Contacts and Links

9.1 Contacts and Information

For general communications and queries, the public can submit a request for information at: http://www.ercot.com/about/contact/inforequest.cfm

Media:	Regulatory:	Government Relations:
Dottie Roark	Matt Morais	Theresa Gage
512-225-7024	512-248-4577	512-225-7074

9.2 Internet Links

ERCOT Home Page: http://www.ercot.com

Operations and System Planning Data Area: http://planning.ercot.com

Users must register for access to this area. Folders in this area include data, procedures, reports and maps for both operations and planning purposes. Helpful information that can be found on this site includes:

- Capacity, Demand, and Reserves Reports
- Demand and Energy Reports (D&E) Monthly Actuals
- Generation Project Interconnection Information
- Regional Planning Group information
- Steady-State Base Cases
- System Protection Data
- Transmission Project and Information Tracking (TPIT)

10. Disclaimer

This report was prepared by the Electric Reliability Council of Texas (ERCOT) staff. It is intended to be a report of the status of the transmission system in the ERCOT Region and ERCOT's recommendations to address transmission constraints. Transmission system planning is a continuous process. Conclusions reached in this report can change with the addition (or elimination) of plans for new generation, transmission facilities, equipment, or loads.

Information on congestion costs presented herein is based on the most recent settlement calculations at the time of the development of this report. Future settlements as well as ERCOT Board of Directors and Public Utility Commission of Texas directives may change the figures presented herein.

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