Load Growth in West Texas

Infrastructure and Reliability

September 12, 2013
UTA TSDOS Dallas, TX

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Distribution and Transmission
Oncor Electric Delivery Co LLC

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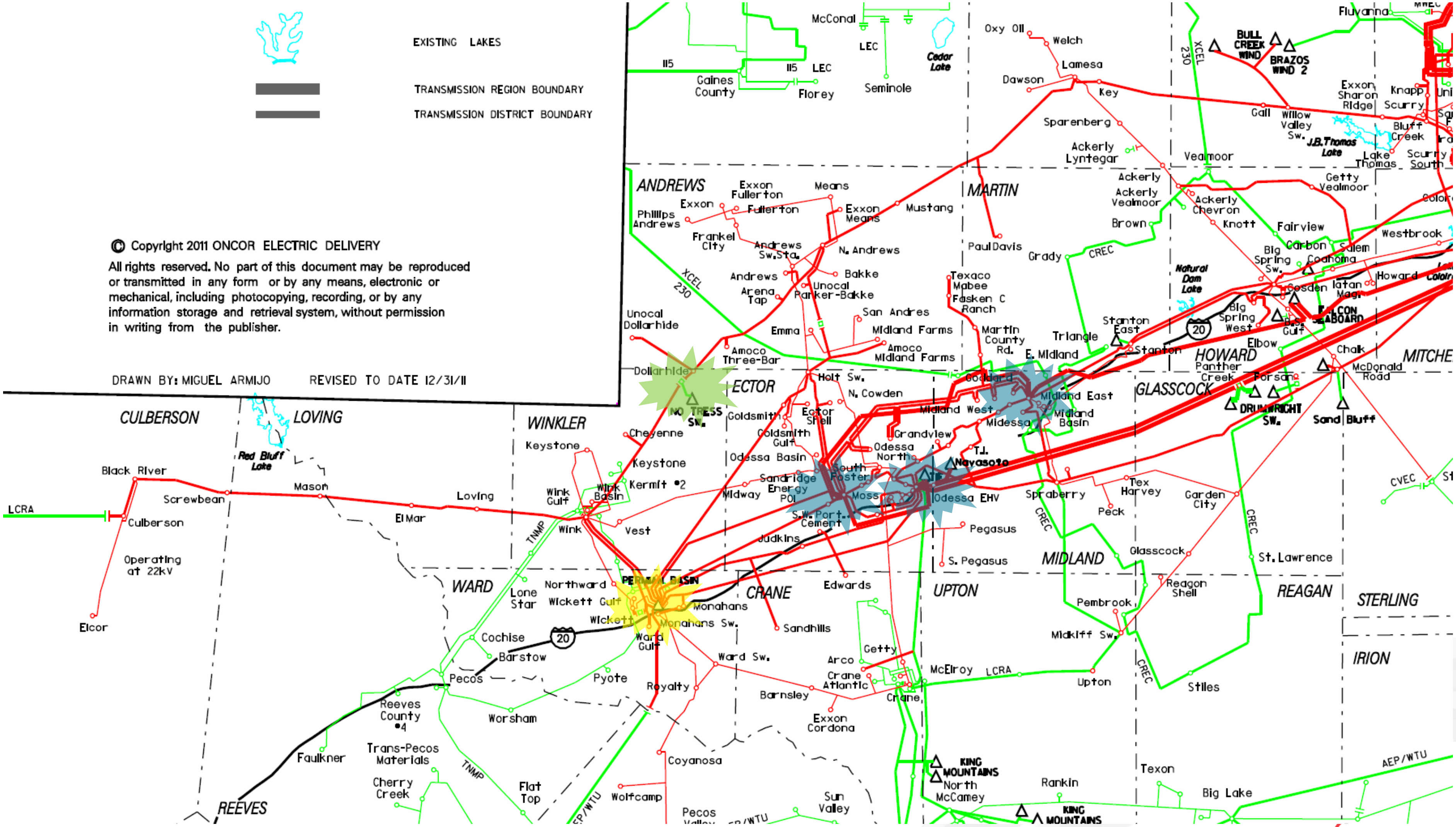
WEST TEXAS


EXISTING LAKES
TRANSMISSION REGION BOUNDARY
TRANSMISSION DISTRICT BOUNDARY
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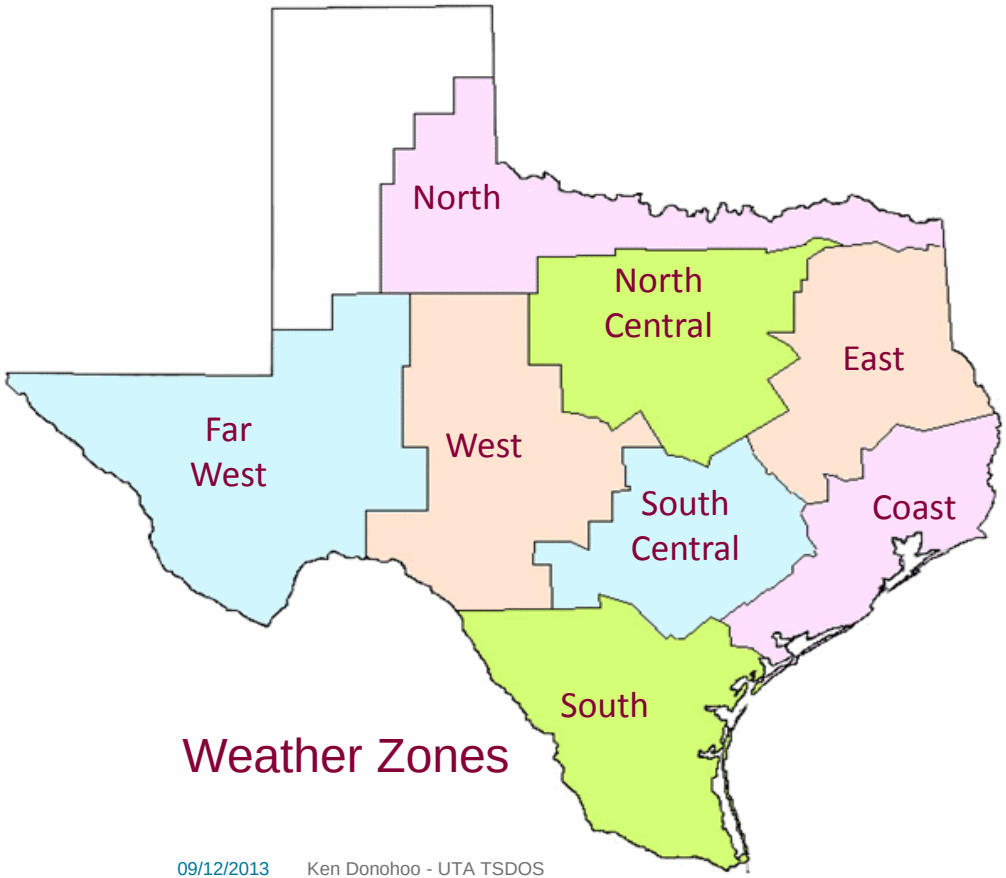
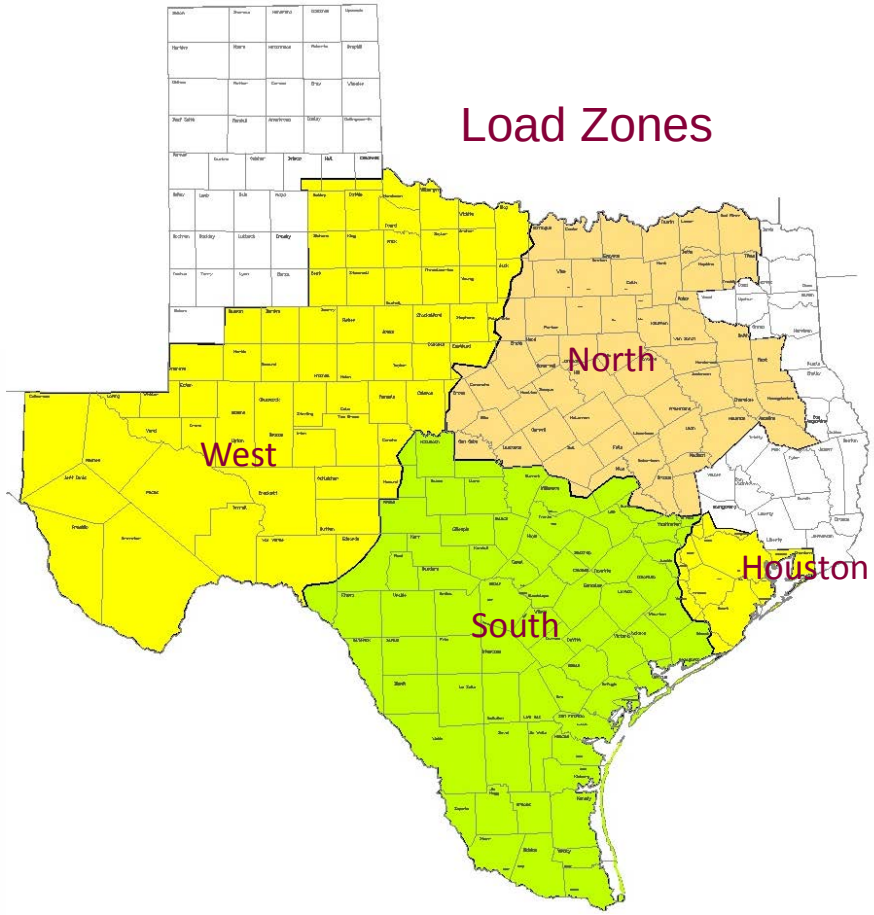
CULBERSON
LOVING
WINKLER
ANDREWS
MARTIN
HOWARD
ECTOR
MIDLAND
GLASSCOCK
WARD
CRANE
UPTON
REAGAN
STERLING
IRION
REEVES
MITCHE
McConal
LEC
Gaines County
Florey
Seminole
Cedar Lake
Oxy Oil
Welch
Lamesa
Dawson
Key
Sparenberg
Ackerly Lyntegar
Vealmoor
Fluvanna
BULL CREEK WIND
BRAZOS WIND 2
XCEL
Exxon Sharon Ridge
Knapp
Scurry
Gail
Willow Valley Sw.
J.B.Thomas Lake
Bluff Creek
Lake Thomas
Scurry South
Exxon Fullerton
Means
Exxon
Fullerton
Phillips Andrews
Exxon Means
Mustang
Frankel City
Andrews Sw.Sta.
N. Andrews
Andrews
Bakke
Arena Tap
Unocal Parker-Bakke
San Andres
Midland Farms
Amoco Midland Farms
Emma
Amoco Three-Bar
Unocal Dollarhide
Dollarhide
NO TRESS SW.
Paul Davis
Grady
CREC
Texaco Mabee
Fasken C Ranch
Martin County Rd.
E. Midland
Triangle
Stanton East
Stanton
Ackerly
Ackerly Vealmoor
Ackerly Chevron
Brown
Knott
Fairview
Getty Vealmoor
Westbrook
Big Spring Sw.
Carbon
Salem
Coahoma
Natural Dam Lake
Cosden
Iatan
Howard
Big Spring West
Big Gulf
FALCON SEABOARD
Elbow
Chalk
McDonald Road
Panther Creek
Forsan
DRUMWRIGHT SW.
Sand Bluff
Holt Sw.
N. Cowden
Goddard
Midland East
Midland West
Midland Basin
Midessa
Goldsmith
Ector Shell
Goldsmith Gulf
Grandview
Odessa North
Odessa Basin
T.J.
Navasota
South Foster
Sandridge Energy POI
Midway
Moss
Odessa EHV
S.W. Port. Cement
Judkins
Pegasus
S. Pegasus
Spraberry
Tex Harvey
Peck
Garden City
Glasscock
St. Lawrence
Reagan Shell
Pembrook
Midkiff Sw.
Cheyenne
Keystone
Kermit #2
Wink Gulf
Wink Basin
Wink
Vest
Loving
El Mar
Mason
Red Bluff Lake
Black River
Screwbean
LCRA
Culberson
Operating at 22kV
Elcor
TNMP
Northward
Wickett Gulf
Wickett
PERMIAN BASIN
Lone Star
Monahans
Monahans Sw.
Ward Gulf
Cochise
Barstow
Pecos
Pyote
Royalty
Ward Sw.
Edwards
Sandhills
Getty
Arco
Crane Atlantic
Crane
Barnsley
Exxon Cordona
McElroy
Upton
Stiles
Reeves County #4
Worsham
Trans-Pecos Materials
Faulkner
Cherry Creek
Flat Top
Coyanosa
Wolfcamp
Pecos Valley
Sun Valley
KING MOUNTAINS
North McCamey
Rankin
Texon
Big Lake
AEP/WTU
CVEC
20

ERCOT Zones



Weather Zones



Load Zones

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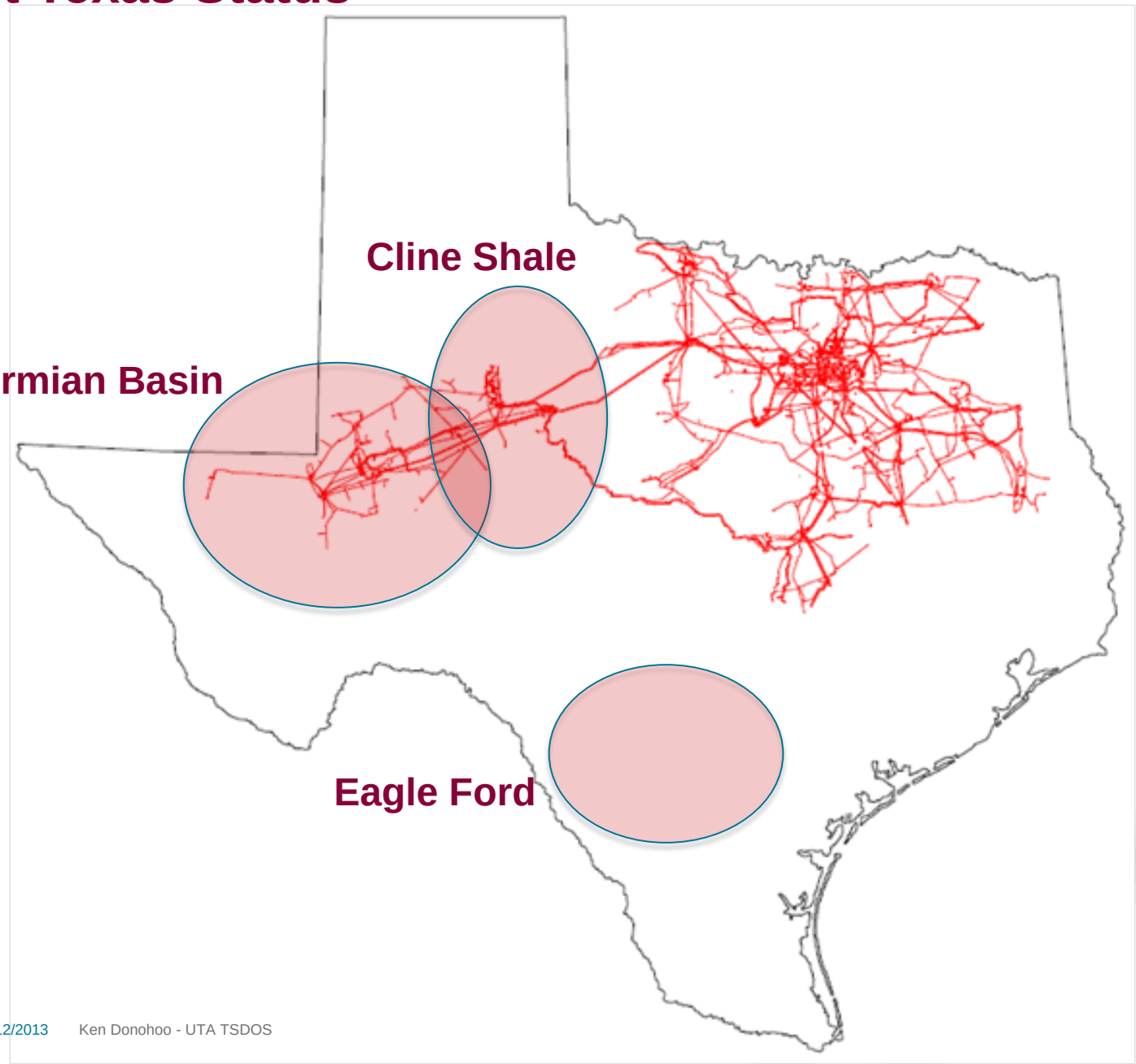
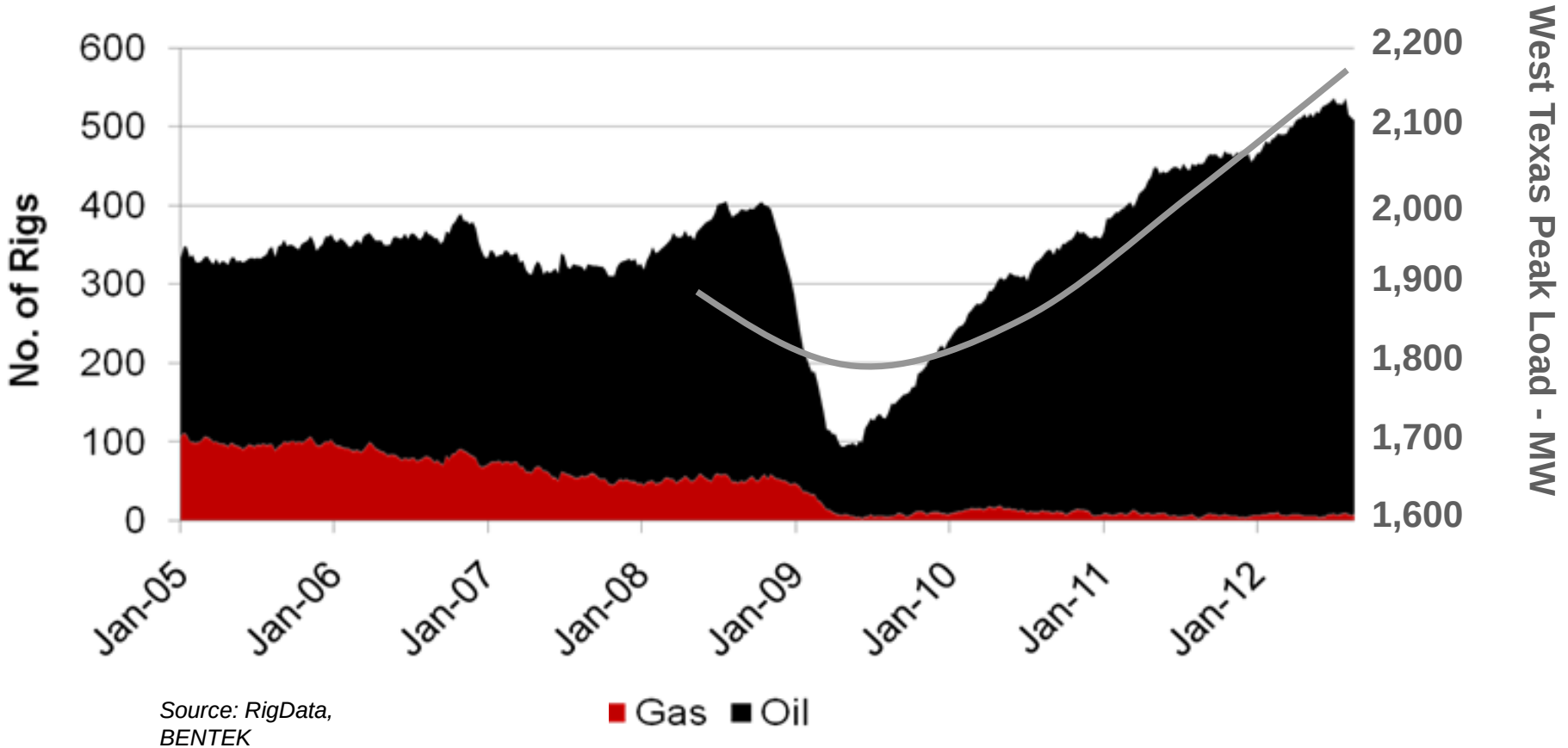
West Texas Status



Dramatic Growth in Permian Basin Activity



Source: RigData, BENTEK

Key Points

- As of mid-May, there were 455 rigs active in the Permian Basin, nearly double the average rig count in 2010
- Permian Basin oil production has soared from 260 million barrels in 2009 to 312 million barrels in 2012 (Texas Railroad Commission data)
- After a long steady decline in oil output, operators have turned the historical trend line around, increasing total oil volumes by an average 17.3 million barrels in each of the past three years
- Optimized drilling and completion techniques, the rig count is expected to maintain its upward trajectory
- The answer involves switching from vertical to horizontal wells, this increases the amount of capital required to drill each well, it boosts production rates and estimated ultimate recoveries
- According to Randy A. Foutch of Laredo Petroleum Holdings Inc "The Permian Basin is going to be one of the best, if not the best, oil shale plays in the world. The quality of the basin keeps getting better and better as we gather more data."

West Texas Congestion

- **The West Texas economy is in full bloom due to the oil and natural gas industry, and it is stretching capacity of existing infrastructure**
- **Incessant demand for electricity has created congestion on existing transmission and distribution facilities**
- **The rapid rate of growth has created overloaded conditions, thus causing significant congestion to maintain reliability**
- **Congestion creates an electricity "price adder" for either the buyer or seller, depending on terms of their bilateral contract**
- **This "price adder" serves to indicate the need to construct additional transmission infrastructure in the Texas market**
- **Oncor is addressing infrastructure needs through various types of transmission infrastructure improvements, including,**
  - Voltage Upgrades - moving load from 69 kV to 138 kV
  - Rebuilds
  - Reconductoring
  - Autotransformer Replacements
  - Switching Station Work
  - New Transmission Line Construction

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Key Issues and Findings

- Rapid load growth concentrated away from the bulk/backbone system
- Rate of growth created overloaded conditions and caused congestion cost
- Congestion also seen in traffic, local services, hospitals, schools, living arrangements, restaurants, etc…
- Normal Company/Customer communications did not provide sufficient “early warning”
- Some growth was behind existing meters/infrastructure
- Having some infrastructure in place can potentially be worse than none at all
- Horizontal drilling techniques require materially more power than traditional vertical drilling
- Response & solutions requires departure from traditional utility approach
- Intermittent nature of wind generation impacting operations and clearances

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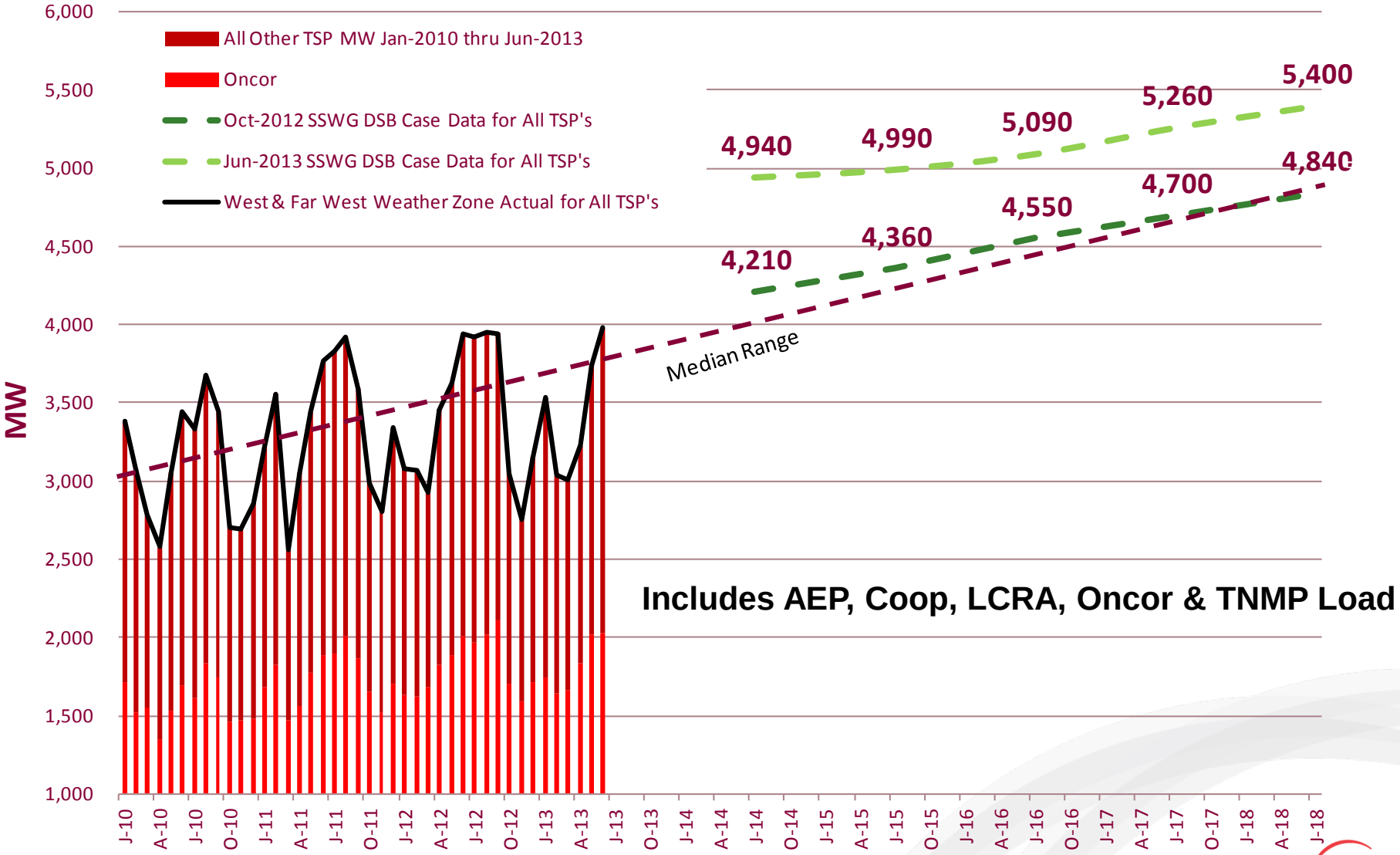
West Texas Electric Demand



Key Actions – West Texas

Short Term

- Immediately pursued readily available equipment upgrades and operational adjustments to ease congestion
- Enhanced communications with customers and market stakeholders
- Worked with customers to limit load to contract terms while adding system capacity
- Dynamic Line Ratings are being deployed to maximize capabilities
- Redesign of load forecasting processes for this segment

Longer Term

- Existing Oncor projects that have been approved are being accelerated
- Additional in-progress transmission projects include: voltage upgrades, line rebuilds, line re-conductors, switching station expansions, and new line construction
- Large and longer term bulk projects require ERCOT and PUCT review

Creative Solutions – West Texas

Short Term

- System reconfigurations
- Distribution load transfers
- Power factor correction
- Cooling equipment
- Online transformer monitoring
- Dynamic line rating technology
- Enhanced customer communications
- Elevated temperature operation

Longer Term

- Hot work & significant number of bypasses
- Working at night
- Acceleration of planned projects
- Additional planned projects

Enhanced Load Monitoring

West Texas

- Local information gathering
- Most of the load is nonconforming (not temp sensitive) high capacity factor
- High motor content
- Oncor expanded load monitoring to a monthly basis
- Monthly demand comparison by ERCOT Weather Zone All TSPs
- Load connected to Oncor System
- Actual demand compared to forecast
- Customer Owned Stations
- Primary Metered (PME) Accounts
- Load Addition Requests (new and proposed, Confidential and Protected)

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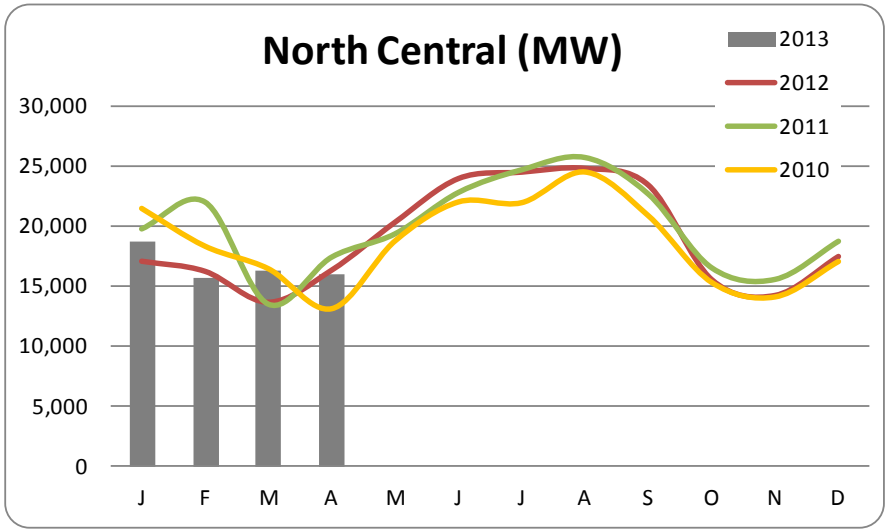
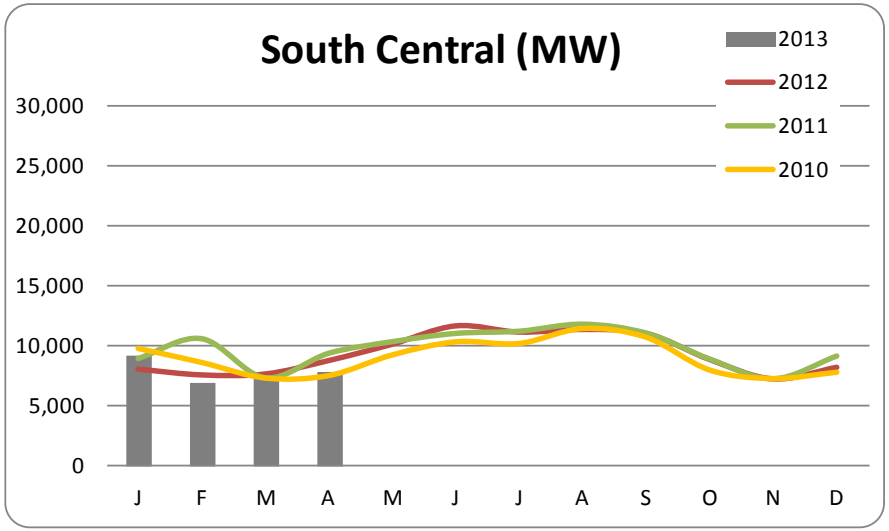
Monthly Demand Comparison by ERCOT Weather Zone

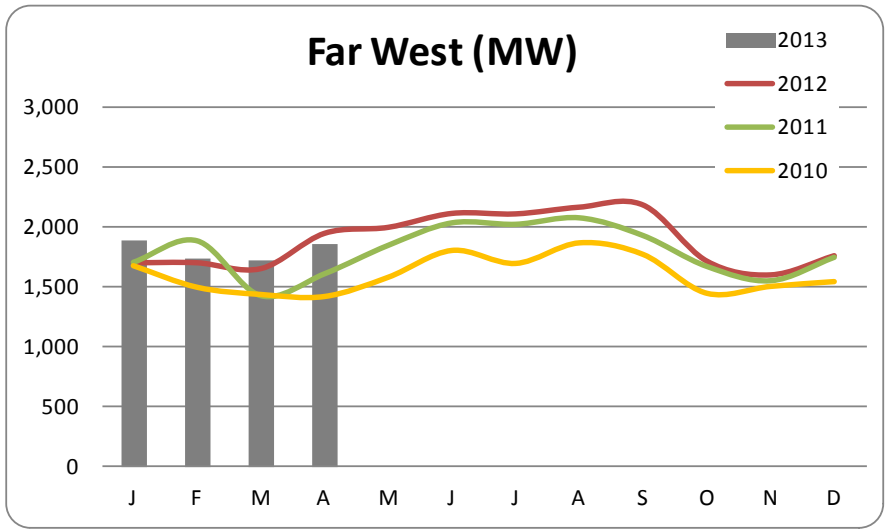
- **Overview**
- MW demand each month
- Includes all TSP load plus losses
- Broken down by weather zone
- 3-year actual demand

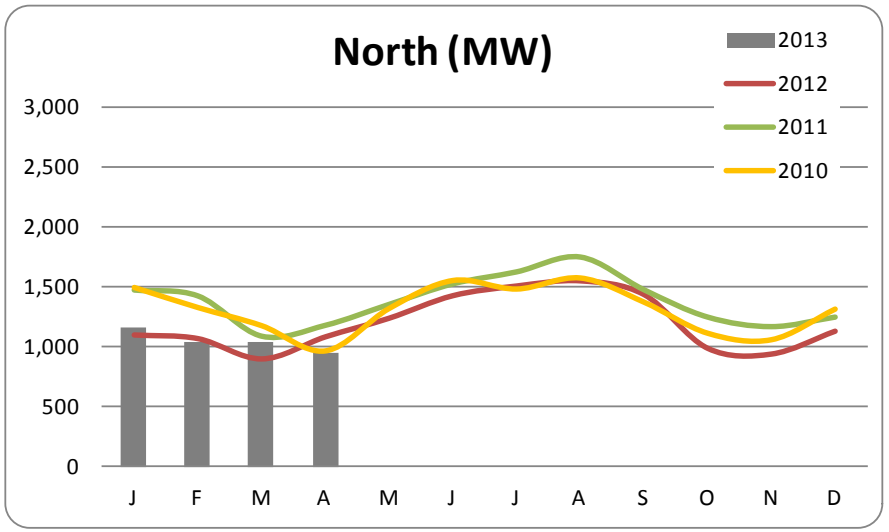


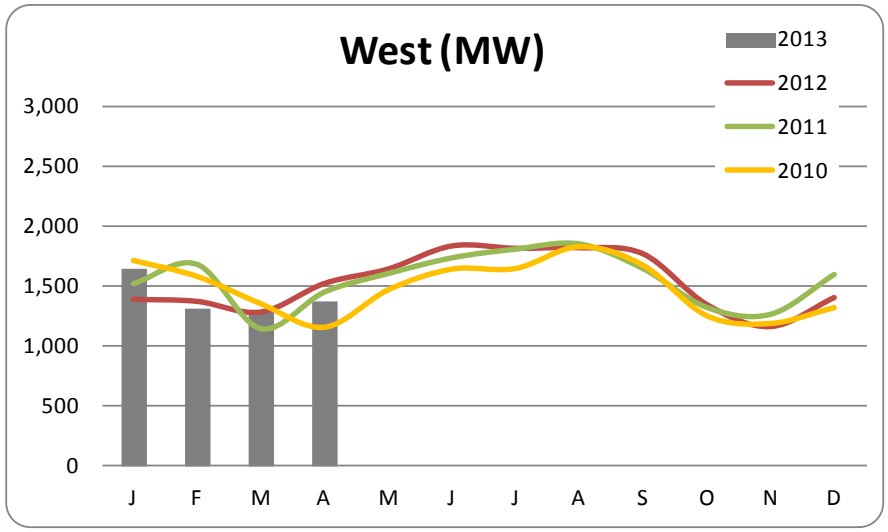


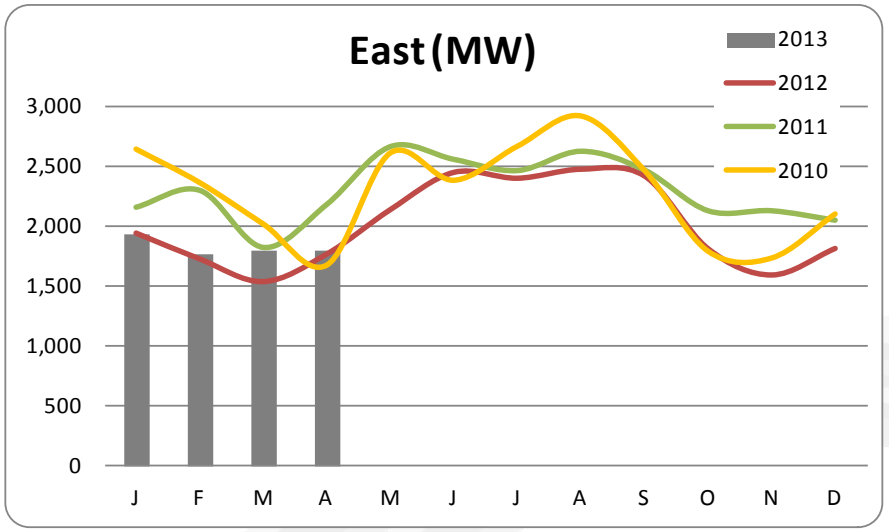
- Oncor footprint 6 zones;
  - North Central (D/FW)
  - South Central
  - Far West (Permian Basin)
  - West (Cline Shale)
  - North
  - East

Monthly Demand Comparison by ERCOT Weather Zone

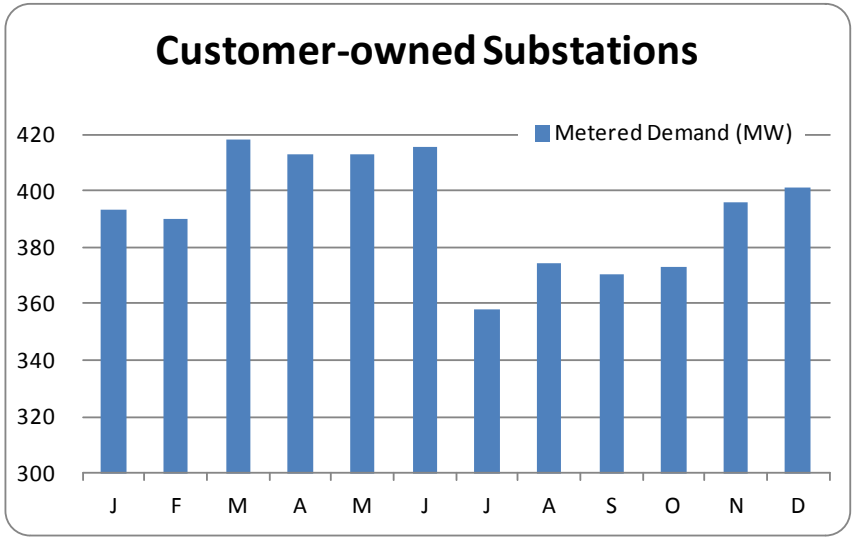


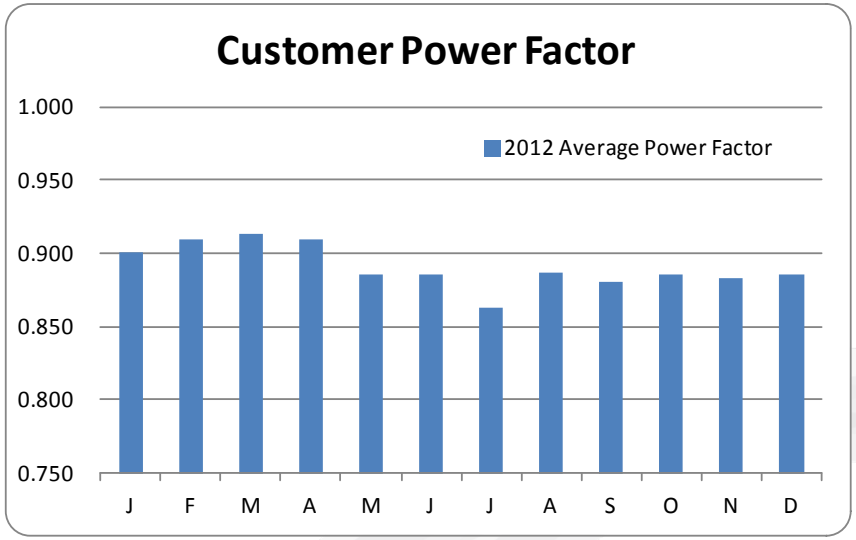




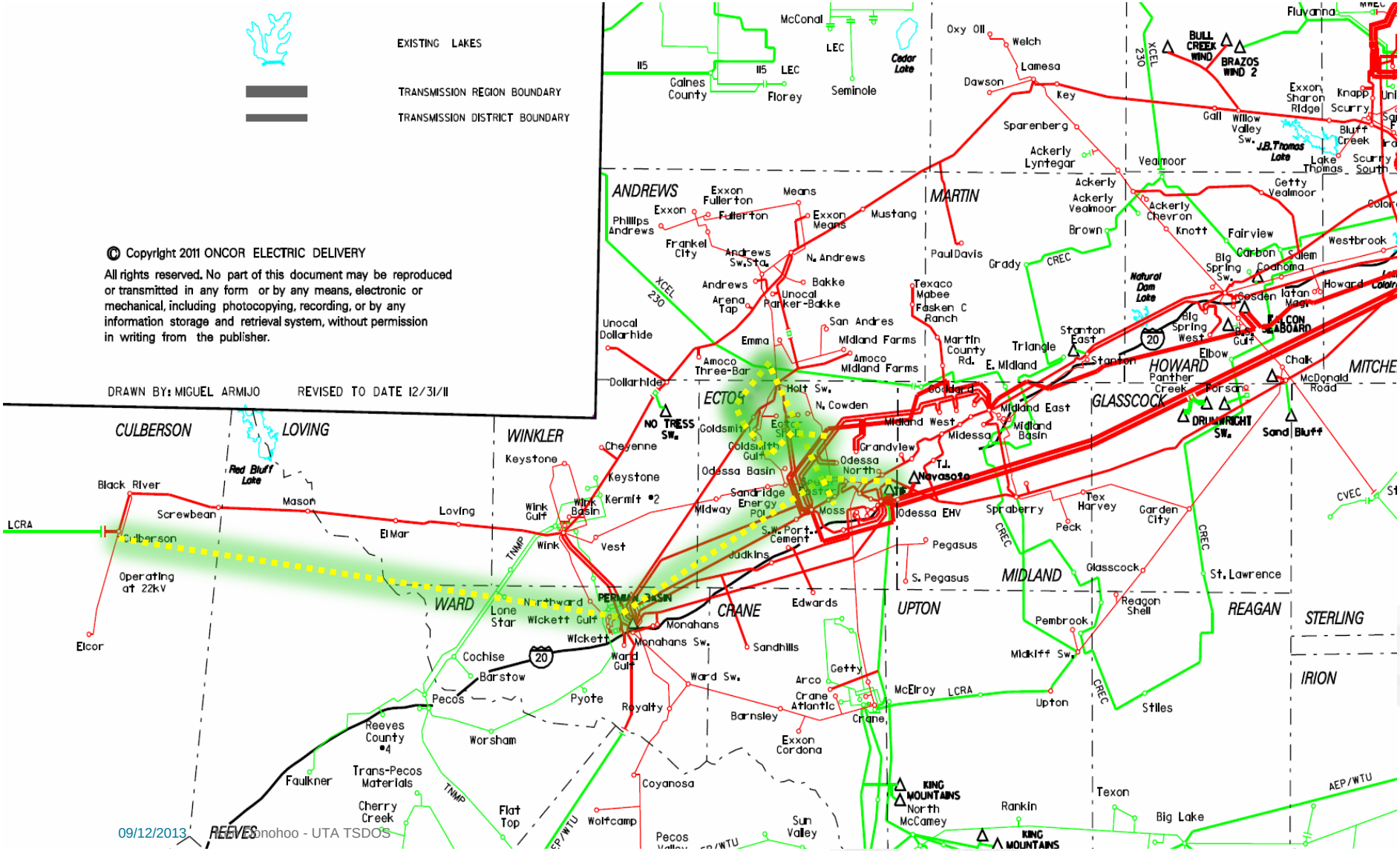


Customer-Owned Substations Demand & Power Factor





West Texas Congestion – Projects System Map



West Texas Congestion - CCN

Permian Basin – Culberson 138 kV Transmission Line

- **Project Description**
  - Construct an electric transmission line interconnecting the existing Permian Basin Switching Station, located in Ward County approximately 4 miles west of Monahans, Texas, with the existing Culberson Substation located in Culberson County approximately 17 miles south of the Texas/New Mexico state line and approximately 42 miles west of Mentone, Texas.
  - Approximate length: 90 miles (dependent on approved routing).

- **Purpose and Necessity**
  - Completion of the project will provide an effective solution that creates a transmission loop for serving the existing customers and future load growth.
  - This project will help ensure continued reliable electric service to the entire local region.
  - The need to expand Oncor Transmission facilities in West Texas is being driven by increased need for electricity in the community, and oil and gas industry development.

- **Schedule**
  - Line routing to be determined through Env. Assessment/Routing Study**. (Currently In Progress)**
  - Public Participation Meetings scheduled for October, 2013 (4 meetings)
  - Estimated CCN Filing 2nd Qrtr. 2014
  - In Service: 2015

West Texas Congestion - CCN

Permian Basin – Moss – Odessa EHV 345 kV Line

- **Project Description**
  - Construct an electric transmission line interconnecting the existing Permian Basin Switching Station located in Ward County approximately 4 miles west of Monahans, Texas, with the existing Moss Switching Station located in Ector County approximately 2 miles north of Interstate 20 and approximately 8 miles west of Odessa, Texas.
  - Approximate length: 35 miles (dependent on approved routing).

- **Purpose and Necessity**
  - Completion of the Oncor project will achieve system upgrades that are necessary for serving existing customers and future load growth that is projected in the Permian Basin
  - Anticipated electrical load growth in the region west of the City of Odessa will be served by transmission level electric facilities that lack strong electric generation support.
  - Due to high electrical load levels and a low amount of generation available in the area, there is limited ability to take electric facilities out of service for scheduled clearances to complete regular maintenance or testing.

- **Schedule**
  - Line routing to be determined through Env. Assessment/Routing Study**. (Currently In Progress)**
  - Public Participation Meetings scheduled for October to follow ERCOT review in August, 2013 (2 meetings)
  - Estimated CCN Filing 1st Qrtr. 2014
  - In Service: moved from 2015 to spring 2016 due to ERCOT review timeframe

ERCOT West Texas Sensitivity Study

- **ERCOT is conducting a study to analyze system needs in west Texas due to the oil and gas load growth.**
  - **Reliability Analysis/Assumptions: 2015 and 2017 steady-state reliability and economic analysis, final summer peak cases from the 2012 5YTP with updated load forecast from the TDSPs.**
  - **Cases include all recently approved RPG projects in the area.**
  - **January – March**
    - Meet with west Texas TDSPs to discuss plans, latest load forecasts and customer requests.
    - Update study cases with latest load forecast .
  - **April – May**
    - Complete the reliability analysis and propose projects .
  - **June-August**
    - Conduct economic analysis and propose projects.
    - Draft final report to TO's.
  - **September**
    - Prepare final report and present to RPG.

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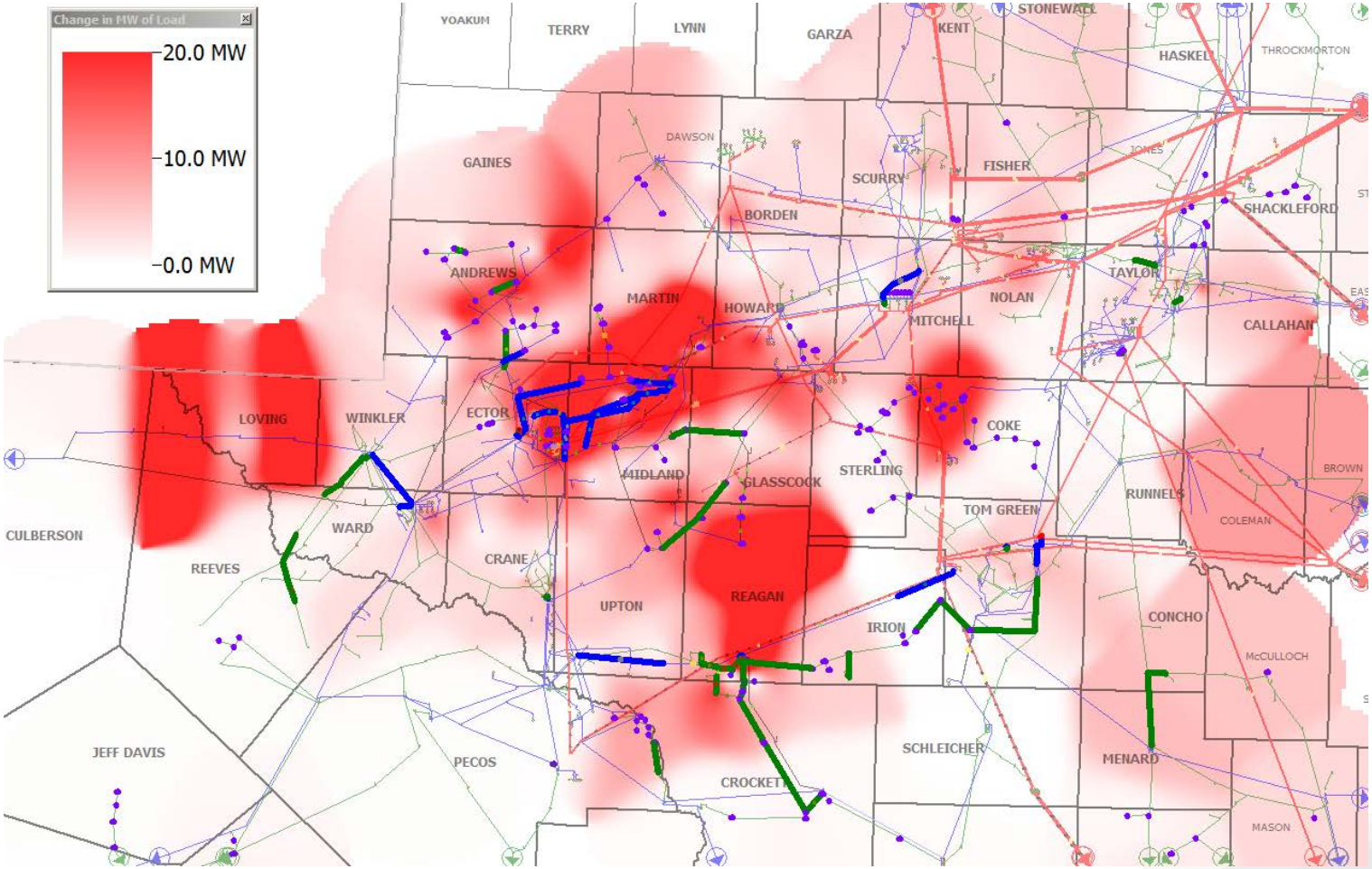
ERCOT West Texas Sensitivity Study



2017 WTS loads compared to 2012 5YTP- 2017 case

69 kV element:

138 kV element:

Source: ERCOT; Regional Planning Group, May 21, 2013

ERCOT West Texas Sensitivity Study

- **Preliminary review indicates 83 total projects; ~40 are not in Oncor's area.**
- **Of the remaining 43 projects, Oncor has already identified the same need for 29 and these and scheduled completion prior to 2017.**
- **For the remaining 14 projects identified in the ERCOT study Oncor believes these will be resolved either by the proposed Permian Basin-Moss-Odessa EHV 345 kV line or other existing Oncor projects.**
- **Verified the already-approved Permian Basin-Culberson 138 kV line is included in the analysis.**
- **Still need to:**
  - Examine proposed projects in detail, analyze feasibility
  - Review system protection requirements
  - Develop station one-line diagrams
  - Perform dynamic analysis
  - Examine right of way/land issues
  - Develop high-level cost estimates
  - Discuss TSP coordination
  - Develop and propose any alternate projects

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West Texas Summary

- Our understanding is better
- The load grew and continues to grow quickly
- With your help, short term needs are being addressed
- We have changed our processes and procedures
- We will continue to monitor the situation and change processes and procedures as needed
- We still need your help and would love your input, it is needed, valuable and appreciated
- More information on long range plans enable long term infrastructure

CREZ Update

- **Key Milestones:**
  - December 2012 - Completed ROW acquisition for all CREZ projects
  - December 2012 - Completed all awarded CREZ Priority projects
  - June 2013- Completed all awarded CREZ Default projects

- **June 2013 In-Service Projects:**
  - Willow Creek to Hicks (41 Miles) – 100% Complete
  - Riley to Krum West (163 Miles) – 100% Complete
  - Killeen to Harker Heights (7 Miles) – 100% Complete

- **December 2013 In-Service Projects:**
  - Clear Crossing to Willow Creek (110 Miles) – 86% Complete
  - Krum West to Anna (70 Miles) – 61% Complete

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