Today's ERCOT
In Plain English

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Gulf Coast Power Association
Austin, Texas, Sept. 26, 2005

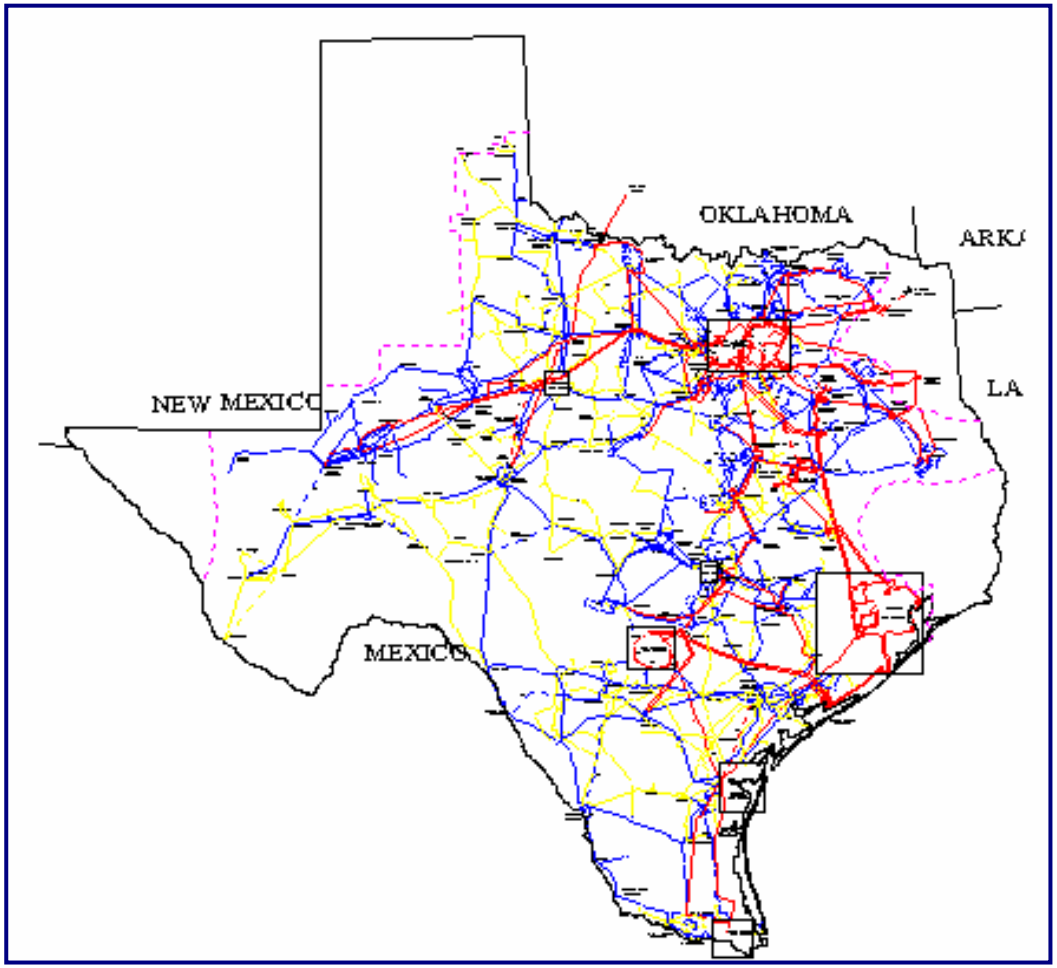
CONTENTS

1. Overview & review of core tasks
2. System planning & operations
3. Market operations
4. Stakeholder services
5. Change on the way

The ERCOT Grid

- **ERCOT grid covers 75% of Texas and serves 85% of Texas load**
  - Assets are owned by transmission providers and generators, including municipal utilities and cooperatives
- **ERCOT Region is 1 of 3 North American grid interconnections**
  - Grid interconnections based on Alternating Current (AC) -- electricity flows on path of least resistance
  - ERCOT Connections to other grids limited to Direct Current (DC) ties, which allow control over flow of electricity
- **Non-ERCOT parts of Texas:**
  - Panhandle
  - El Paso area
  - 2 areas of East Texas

ERCOT Region



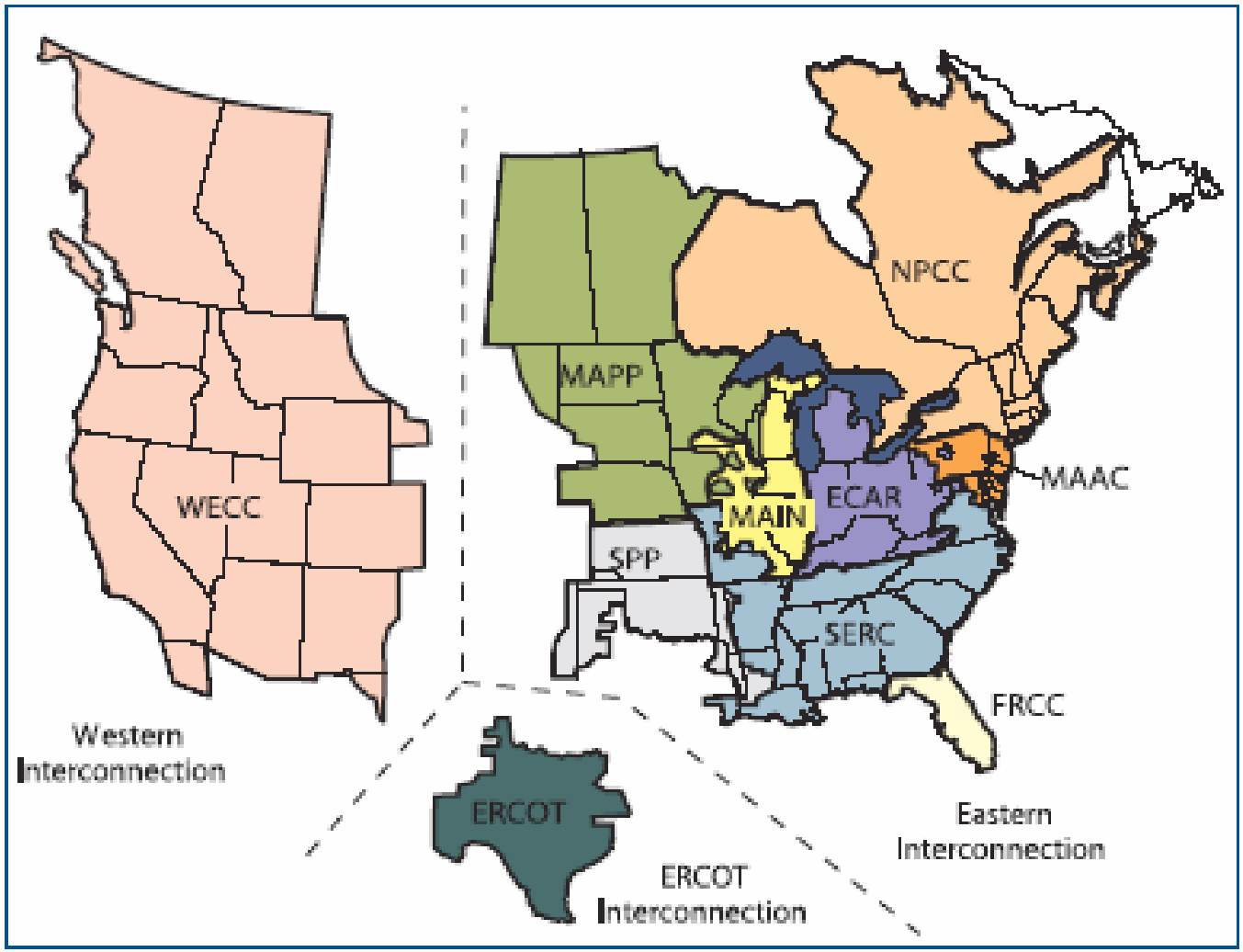
Facts & Figures

- **200,000 Square Miles**
- **38,000 miles of Transmission Lines**
  - Nearly 700 miles of 345 kV lines added since 1999
- **69,000 MW of total resources***
- **26,000 MW of new generation capacity added since 1998**
- **60,279 MW Peak Load (2005 est.)**
- **16.9% Reserve Margin for 2005**
- **3 DC Ties**
- **Single point of control**

* Includes DC Ties, switchable units, and mothballed units

North American Interconnected Grids

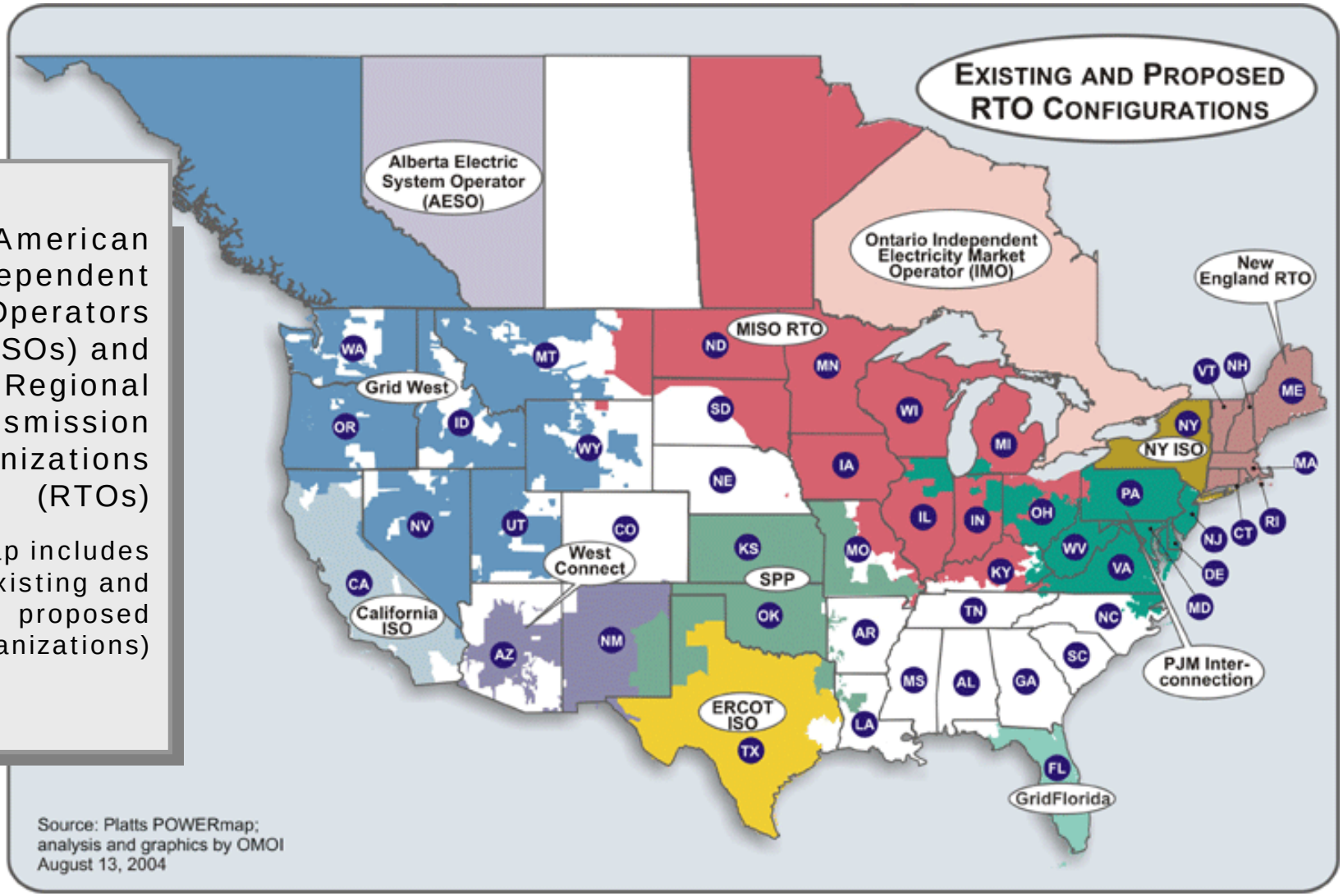
NERC Reliability Council Regions



ISOs and RTOs

North American Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs)

(Map includes existing and proposed organizations)



The many definitions of ERCOT

- **A geographical area (region) defined by electrical facilities and customers**
- **Regional Reliability Council within NERC (one of 10)**
- **Independent System Operator (grid operator) – one of 9 in U.S. and Canada – with multiple roles:**
  - Responsible for grid operations and reliability
  - Administrator of the wholesale power market (deregulated 1996)
  - Administrator of the retail electric market (restructured 2002)
  - Supervising entity for transmission planning
  - Administrator of the Renewable Energy Credit program for the State of Texas (2002)
- **A term frequently used to describe the collaborative stakeholder process for developing protocols & guides**

ERCOT is a nonprofit 501(c)(6) corporation

ERCOT under Senate Bill 7

(76th Legislature, 1999)

As the designated independent organization, ERCOT was assigned these SB7 responsibilities:

- **Ensure open access to transmission and distribution systems**
- **Ensure reliability -- "Keep the lights on"**
- **Ensure timely conveyance of information needed to support customer choice – retail switching**
- **Ensure accurate accounting for electricity production and delivery**

Senate Bill 7

- **SB7 became law in 1999**
- **Required creation of a competitive retail electricity market**
- **Municipal utilities and Cooperatives could decide when (and if) to "opt in"**
- **Open access to transmission was mandated**
- **ERCOT named as "central registration agent" for retail choice**

Signs of Success

- **Infrastructure investment process that works**
- **Excellent NERC compliance record**
- **Congestion costs falling**
- **Successful retail choice market**
- **Inclusive and transparent governance model**

ERCOT's Rules of the Road

ERCOT must perform its responsibilities consistent with:

- Texas Legislation (i.e., SB 7)
- NERC Guidelines
- PUCT Rules
- ERCOT Protocols and Guides as approved by ERCOT Board of Directors
- Rules-based -- even the process for changing the rules is highly rule-driven

"Seek institutional integrity, consistency and sound judgment in our operations -- per the rules that govern our operation"

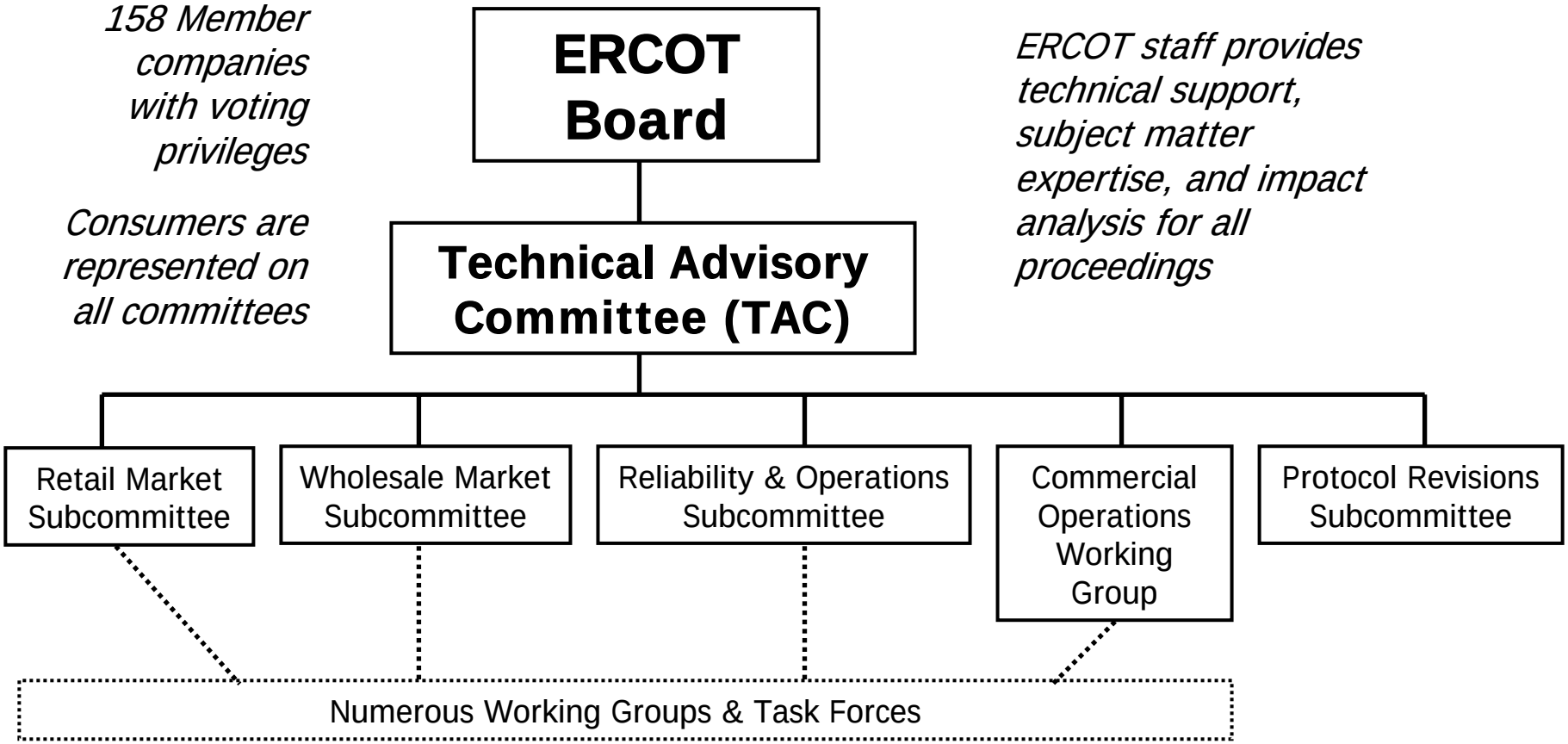
Policymaking: ERCOT as a Resource

- **ERCOT is a neutral and independent source of facts on electricity issues for policymakers**
- **Facilitates discussion and provides subject matter expertise**
- **Does not advocate positions on policy**
  - EXCEPTION: Issues involving grid reliability
- **Provides system impact analysis for proposed Protocol or Rule changes**
- **Ensures proposals will not negatively affect system reliability**
- **Identifies possible conflicts with other provisions**

ERCOT Stakeholder Process

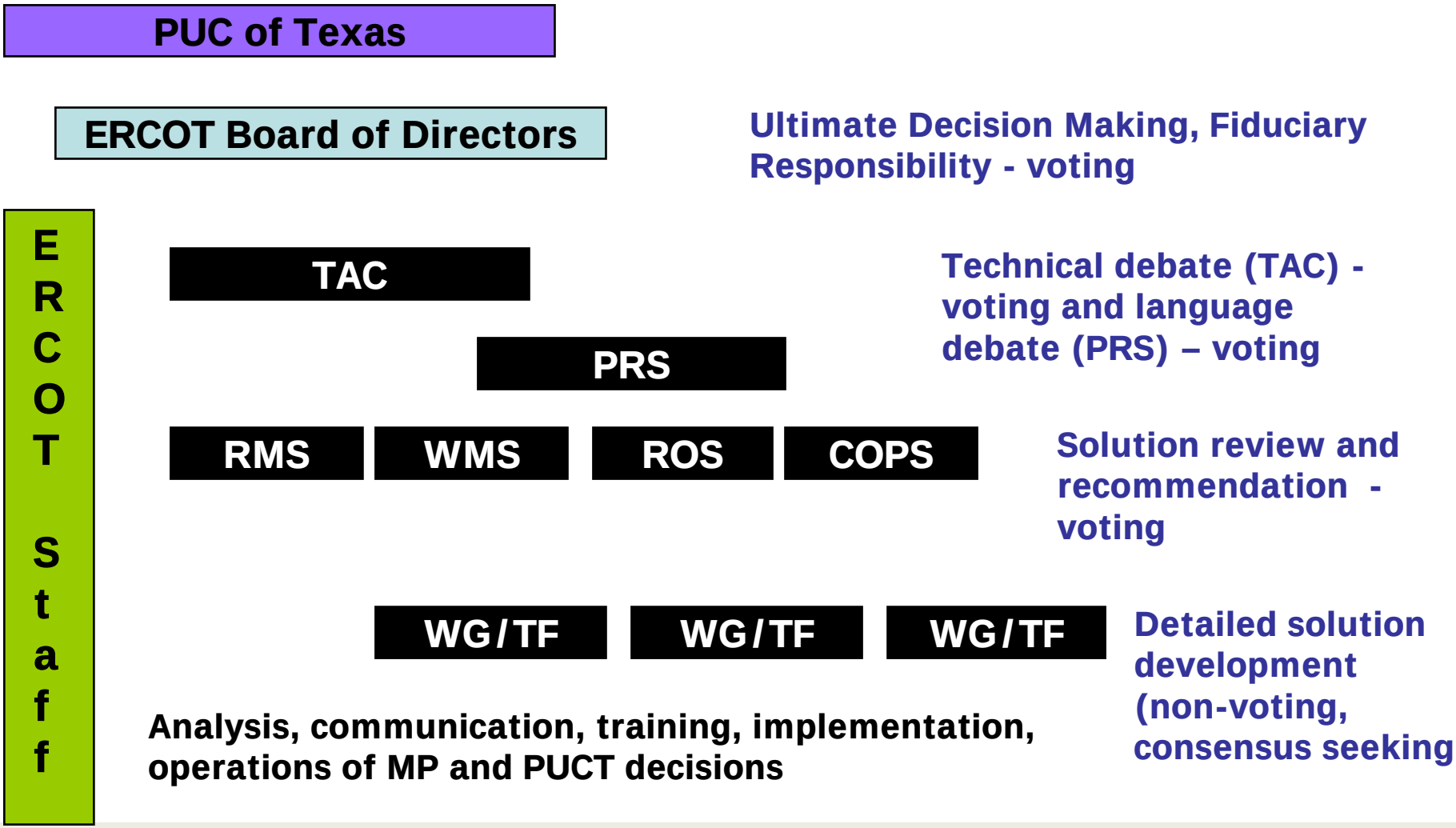
158 Member companies with voting privileges

Consumers are represented on all committees



ERCOT staff provides technical support, subject matter expertise, and impact analysis for all proceedings

Change in the Market: Market Participant Driven



Stakeholder Process -- A Significant Commitment

In 2004, over 600 ERCOT MP meetings:

- **Well more than 100 highly skilled ERCOT Staff called on to contribute to governance process. 30+ FTEs demanded by meeting volume and ERCOT service responsibilities.**
- **ERCOT costs to support GM estimated at $4-5mm/year**
  - **Staff (loaded), plus facilities (depr., util., taxes, insur.)**
- **MP & PUCT costs to support GM (if 3x) = $12 - 15mm**
  - **Staff (loaded), T&E, consultants/counsel…**

But, the return is great

- **Fair and open forum – democratic decision making**
- **Stakeholder driven agenda and accountability**
- **Deliberative, advance notice, no surprises**
- **Transparent via published agendas, minutes and votes**
- **Opportunity to ensure no issues are avoided**
- **Expected business outcomes:**
  - **Continuous improvement to the Texas electric market**
  - **Value of market benefits in excess of cost to change**

ERCOT rated the #1 competitive electric market in N. America !

Resource Requirements: TAC/Subcommittee Meeting Process

Chair

Meeting Infrastructure

- Schedule Meeting Spaces – SS (BA)
- Manage Acquisition – SS (BA)
  - AV Requirements
  - Catering
  - Communications
- Post on Web Calendar – SS (BA/AB)
- Facilitate Scheduling/Coordinate Conflicts – SS (BA)

Agenda

- Notice for Call (market and internal) – SS (AB)
- Create Draft Agenda –SS (AB)
- Review action items from prior meeting – MM
- Co-facilitation of Agenda Call – MM
- Finalize Agenda – SS (AB)
- Notify Specific ERCOT Staff – MM
- Internal Communication (internal clients/requested participants) – MM
- Distribute Agenda and post to web – SS (AB)

ERCOT Meeting Prep (internal)

- Coordinate presentation materials from internal authors – MM
- Schedule Preparation Meeting – MM
- Anticipate, Discuss, Establish ERCOT answers – MM
- Notify/Discuss Emerging Issues – MM
- Distribute/Post ERCOT Presentations – SS (AB)

ERCOT Meeting Prep (external)

- Follow up with external presenters – MM
- Receive/Distribute Presentations – SS (AB)
- Post presentations to web – SS (AB)

Final Briefing

- *Schedule meeting – MM*
- *Facilitate Conference Bridge – MM*
- *Internal Coordination – MM*
- *Meeting Notice – MM*
- *Co-Facilitate Meeting - MM*

Meeting Day Coordination

- Sign in Sheets/Record Attendance into Minutes – SS (AB)
- Tent Cards/Set-up – SS (AB)
- Receive and Manage Proxies/Alt. Reps – SS (AB)
- Presentation Setup/Preparations – MM
- Meeting Minutes – SS (AB)
- Coordinate Tech Support – SS (BA)
- Internal Summary/Action item development – MM
- ERCOT Presentations – SME/MP/MM
- Response to Market Inquiries – SME
- Voting – SS (AB)
- Facilitate lunch focus group/intrameeting groups – MM
- ERCOT Charge Approval (offsite) – MM
- ERCOT Input coordination – MM
- Quality/Feedback process, compilation, tracking -MM

Post Meeting

- Minutes – Draft – SS (AB)
- Incorporate Comments – SS (AB)
- Publish/Distribute for Comment – SS (AB)
- Publish Internal Summary/Action Items –MM
- Contact key ERCOT Staff on assignments and emerging issues – MM
- Update and publish final presentations to web – SS (AB)
- Email Vote Facilitation – SS (AB)
  - Notice/deadline
  - Compiling votes
  - Result notice
- Review/Approve costs meeting costs (room, catering, AV) – SS (BA)
- Offsite service/quality assessment – SS (BA)

Staff Focused on Continuous Improvement/ Change

- **Governance model assures *constant change***
- ***Complex systems* and business process challenge change**
- ***Effective change management* is critical to maintaining high performance standards**
- ***Experience and dedication* of highly talented Staff has been a key to our success**
- **Selection and *retention of key staff vitally important***

ERCOT Board

14-member 'Hybrid Board'

- **6 stakeholder members selected by market participant segment:**
  - IOUs
  - Municipal utilities
  - Electric cooperatives
  - Independent REPs
  - Independent Generators
  - Independent Power Marketers
- **3 consumer members**
  - Industrial
  - Commercial
  - Residential (OPUC)
- **3 unaffiliated (independent) members**
- **ERCOT CEO**
- **PUCT Chair (ex-officio, non-voting)**

Two-thirds majority vote required for Board action

Stakeholder Board model required by original SB7 due to complexity of market startup

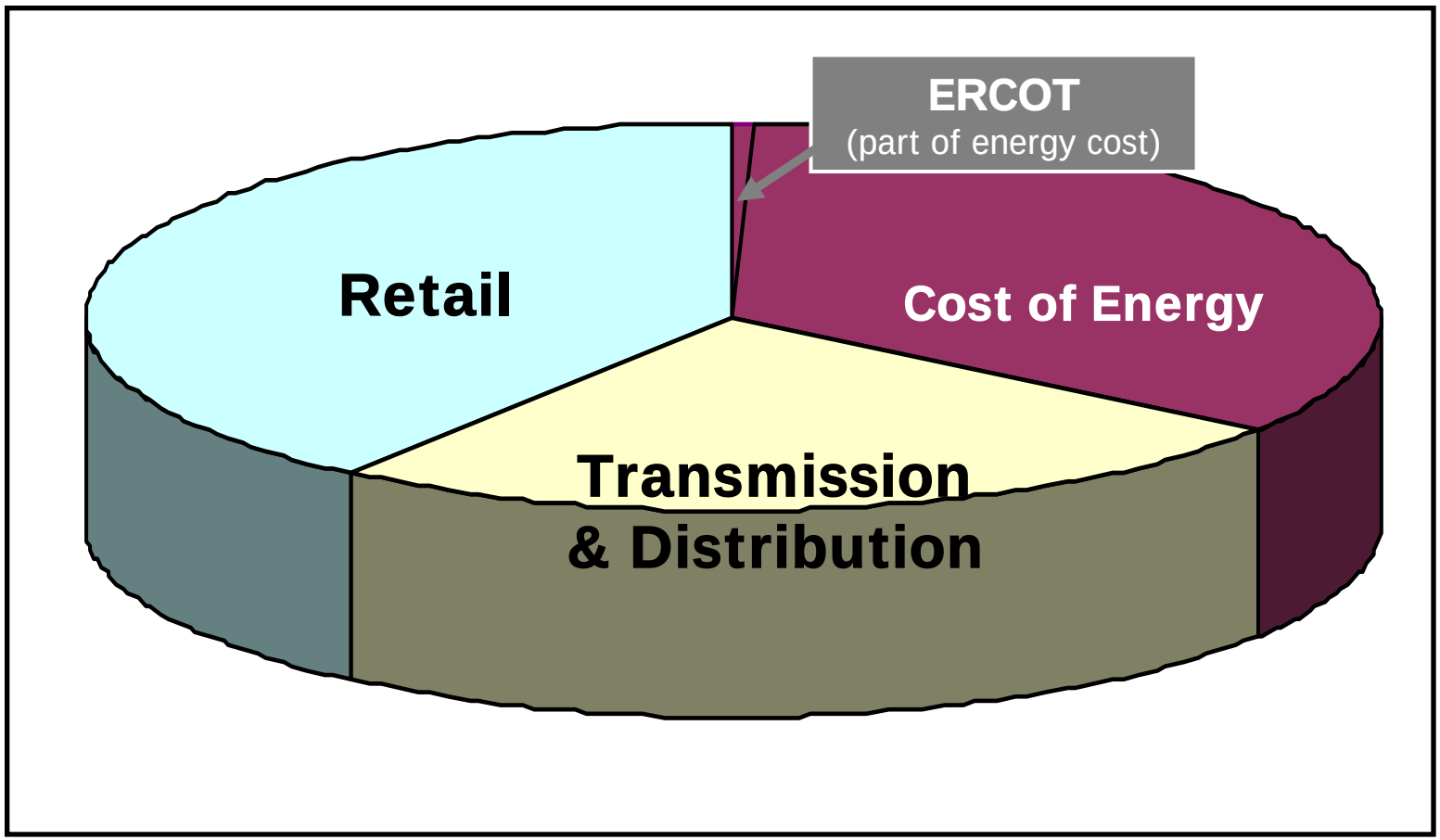
How ERCOT is Funded

ERCOT Administration Fee

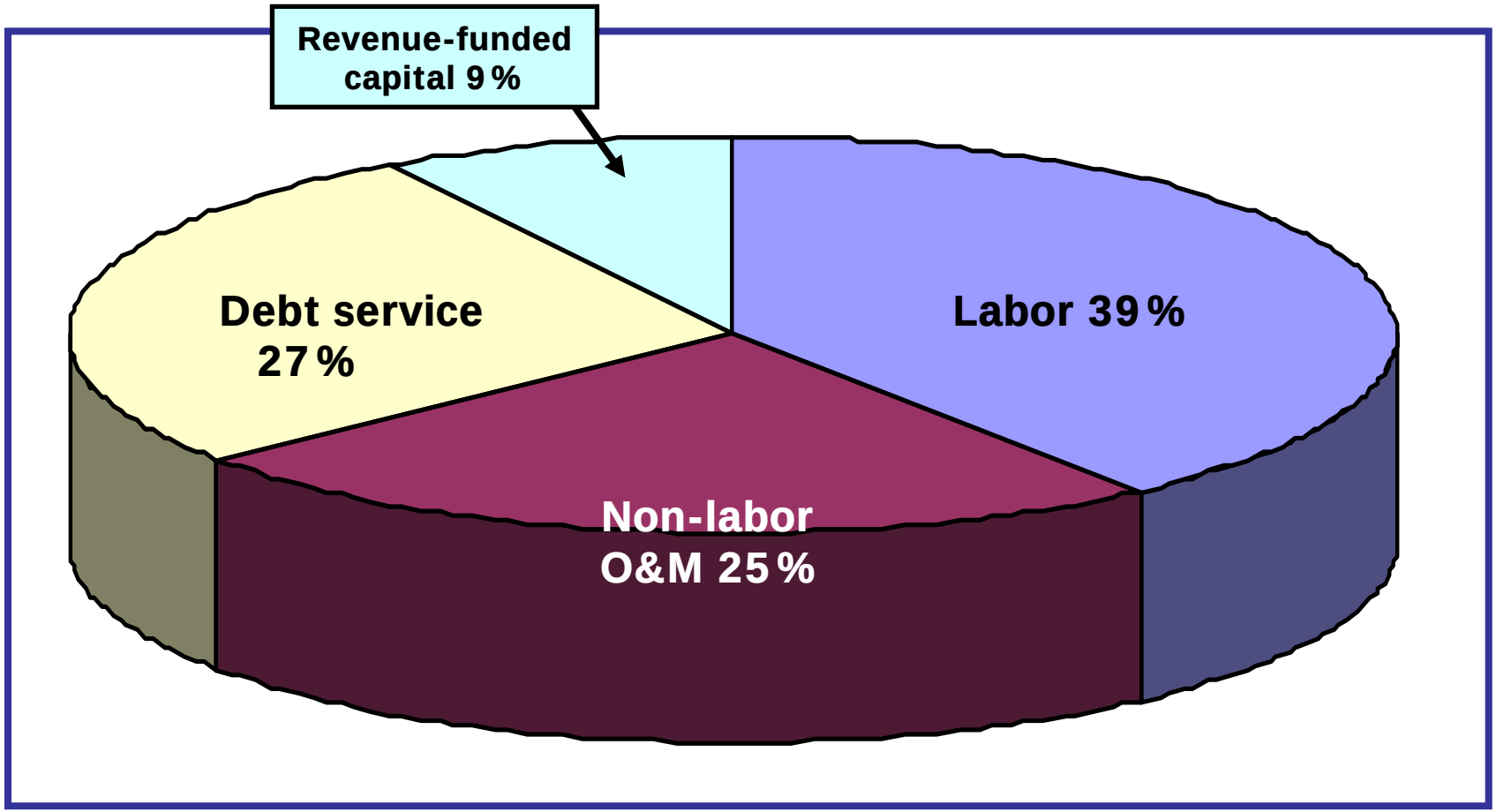
- **ERCOT is funded primarily by a PUC-approved Administration Fee**
  - Paid by QSEs representing load in the wholesale market
  - Applied to each MWh of electricity consumed
  - Not charged directly to retail customers
- **ERCOT is not funded by tax dollars**
- **Fee currently set at $.42 per MWh**
  - Other ISOs' costs range from $.54 to $.98 per MWh
- **Each $.01 of the Fee generates ~$3 million in revenue**
- **ERCOT's 2005 budget is ~$127 million**
- **Approximate cost to average residential customer = about $.42 per month (assumes pass-through: QSEs→LSEs →Customer)**

Residential Electric Bill

Approximate breakdown



ERCOT Budget



$127 million in 2005

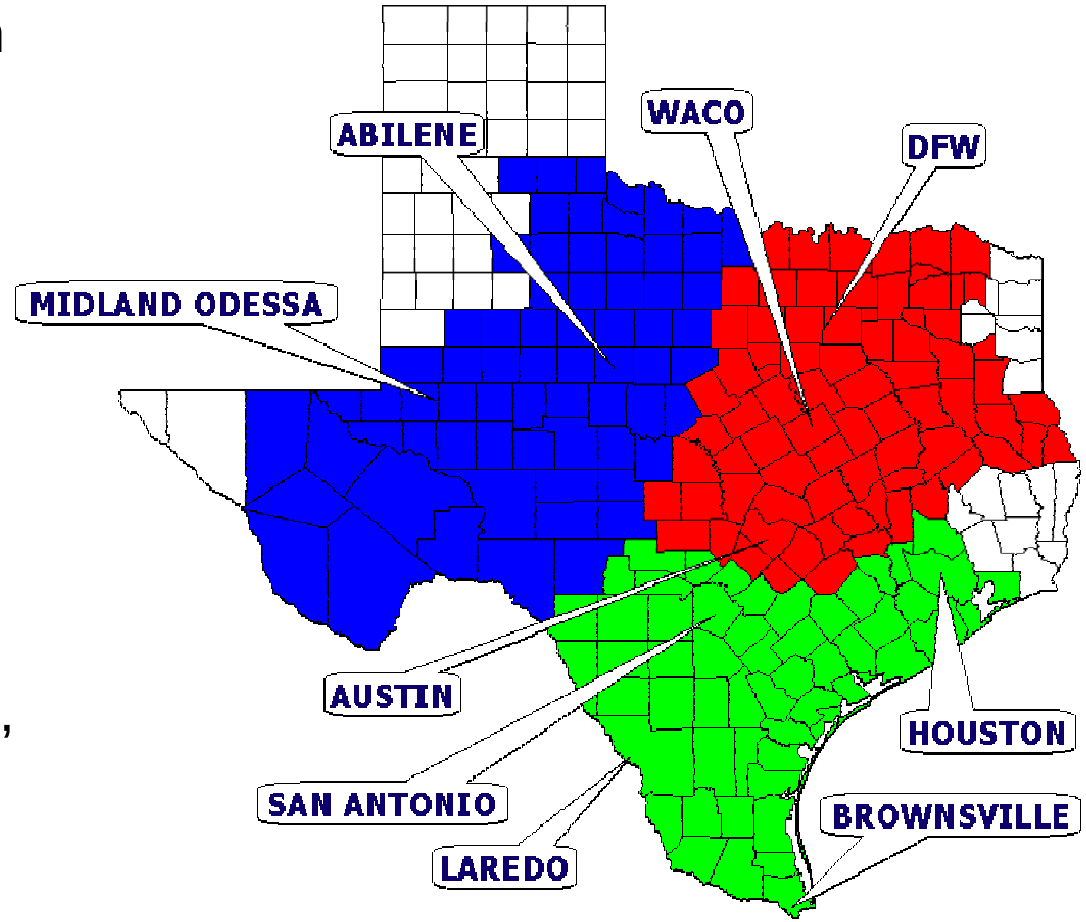
2. System planning & operations

ERCOT Planning Process

- **ERCOT supervises an open, non-discriminatory planning process that considers and balances the impact of transmission system additions on stakeholders**
- **Projects or studies can be proposed by any Market Participant, Transmission Owner or ERCOT Staff**
- **Stakeholders have opportunity to comment on proposals and offer alternative solutions**
- **ERCOT Staff performs independent review**
- **ERCOT Staff makes independent recommendation to the Board of Directors for major projects**
- **ERCOT Board endorsements are considered by the PUC for approval of Certificate of Convenience & Necessity**

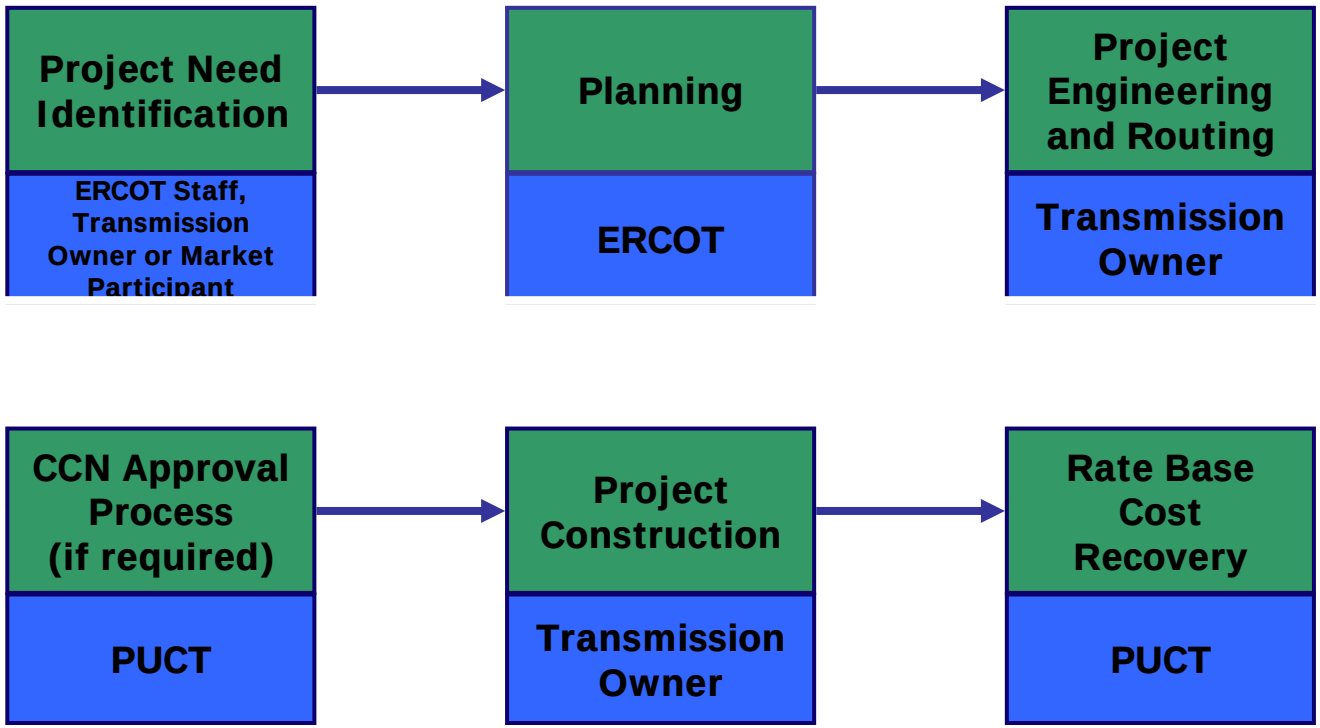
Regional Planning Groups

- ERCOT leads and facilitates three Regional Transmission Planning Groups (North, South and West)
- Information about planned transmission projects is distributed to and among members of these groups
- These groups provide the means for stakeholders to participate, express concerns, share alternatives, and provide input to the ERCOT staff independent recommendation



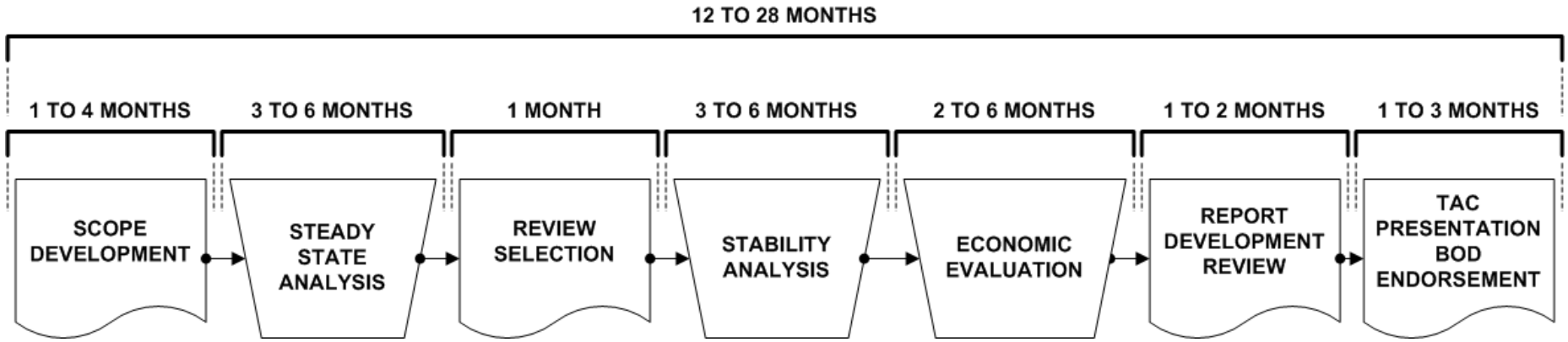
Implementation of New Transmission Projects

The ERCOT Planning Process is only one part of a broader process through which new transmission is implemented

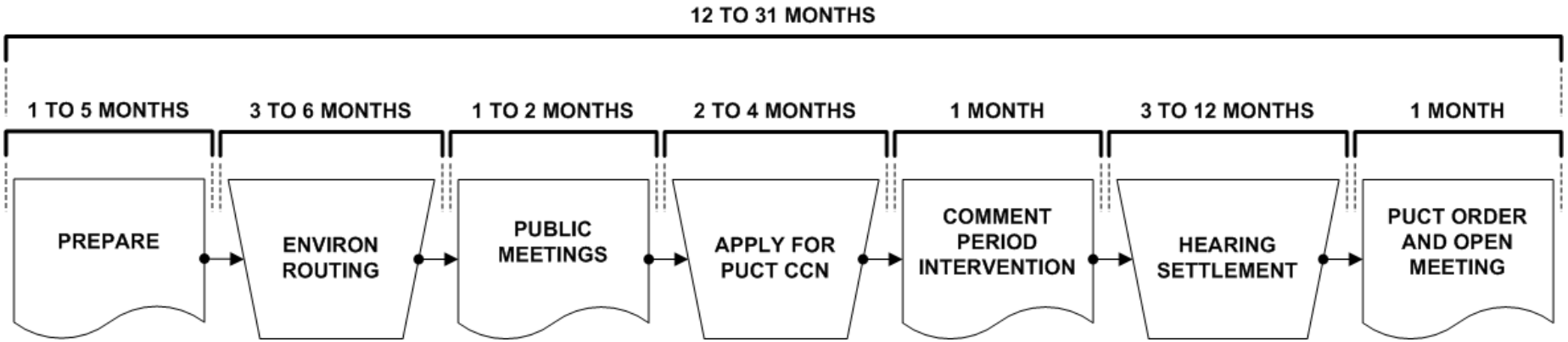


Detailed Timeline

Project development and review

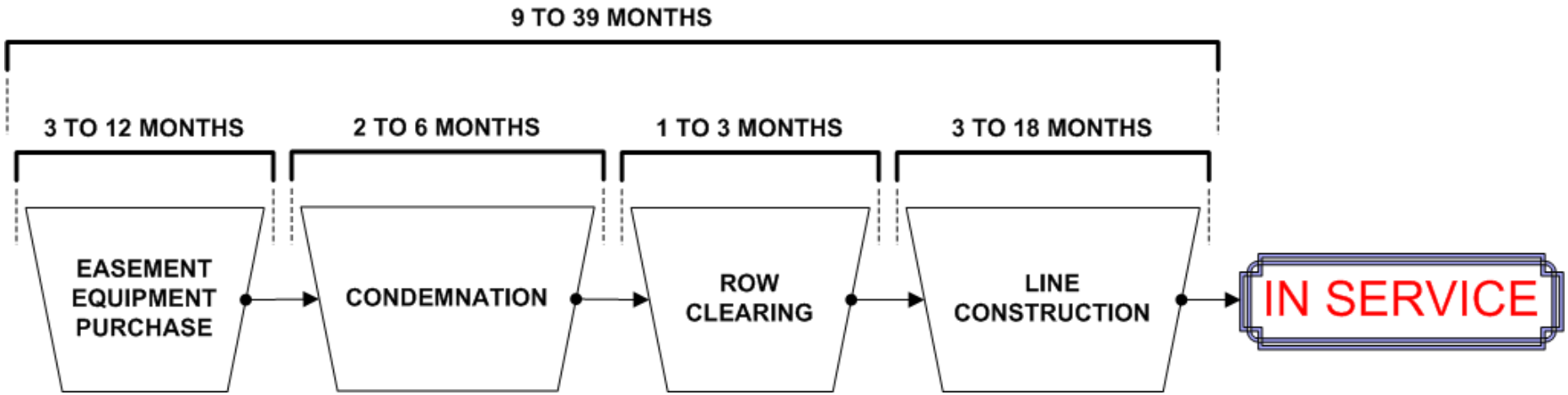


Regulatory review

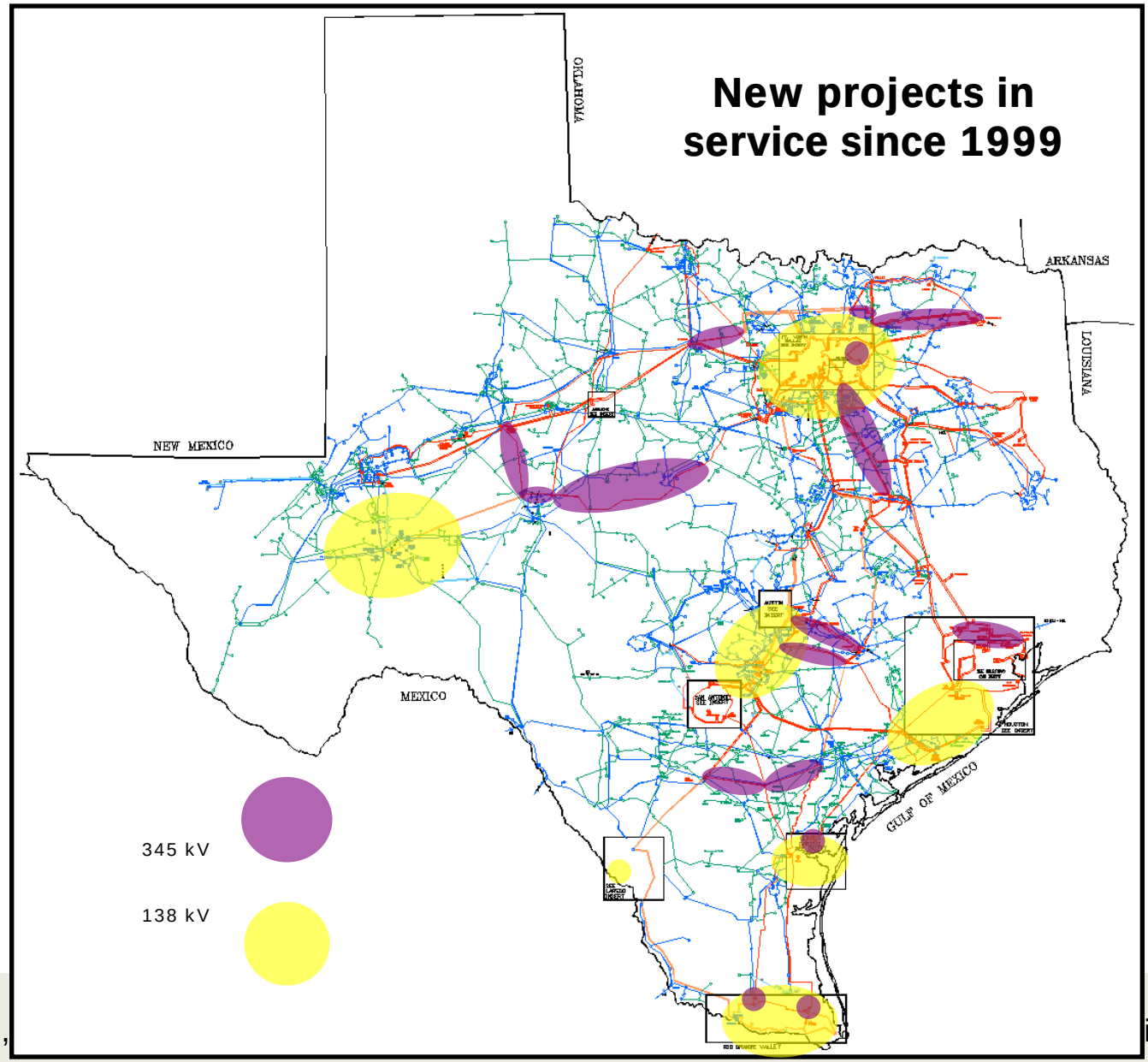


Detailed Timeline (cont.)

Construction

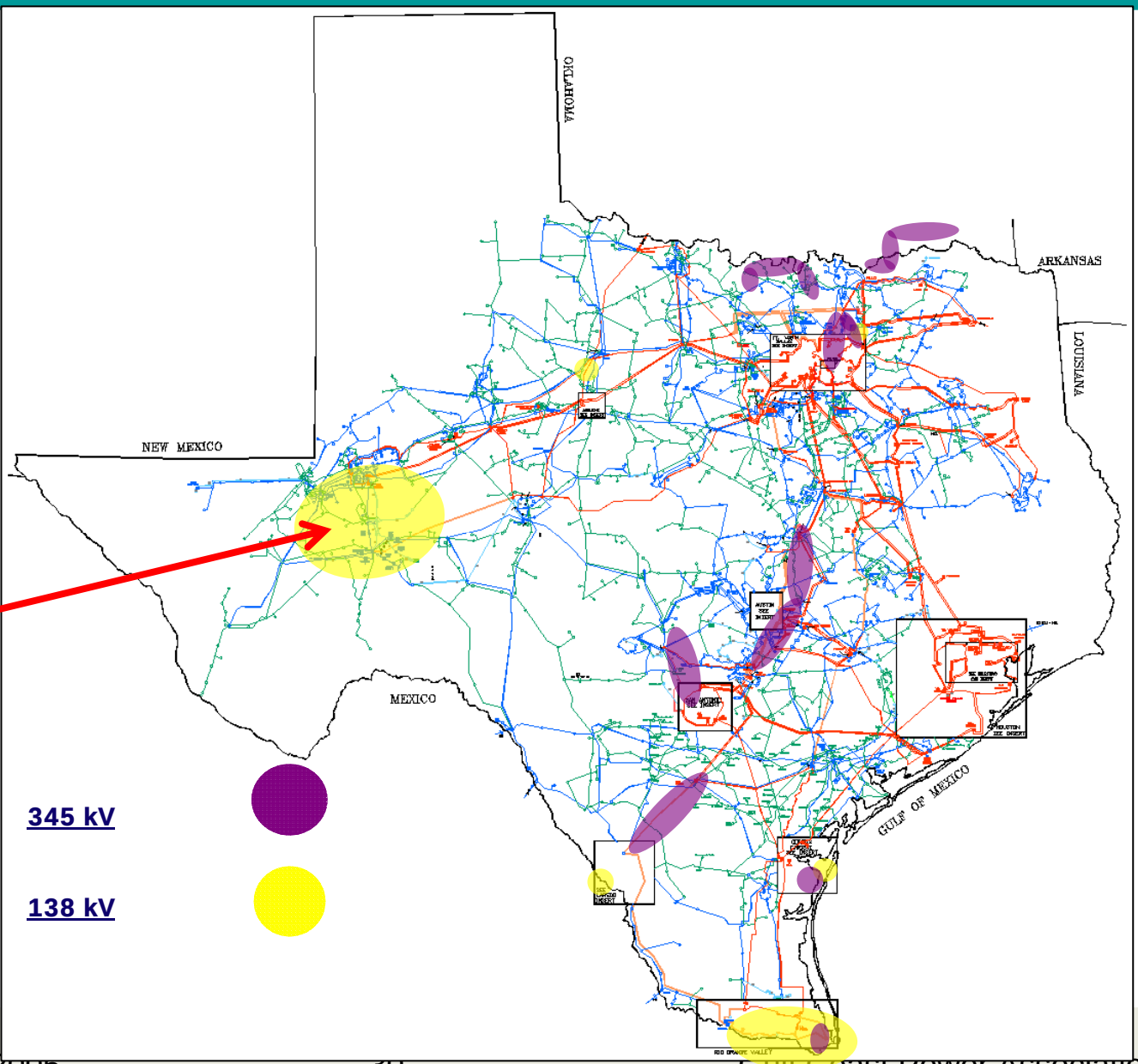


Major Transmission Completed



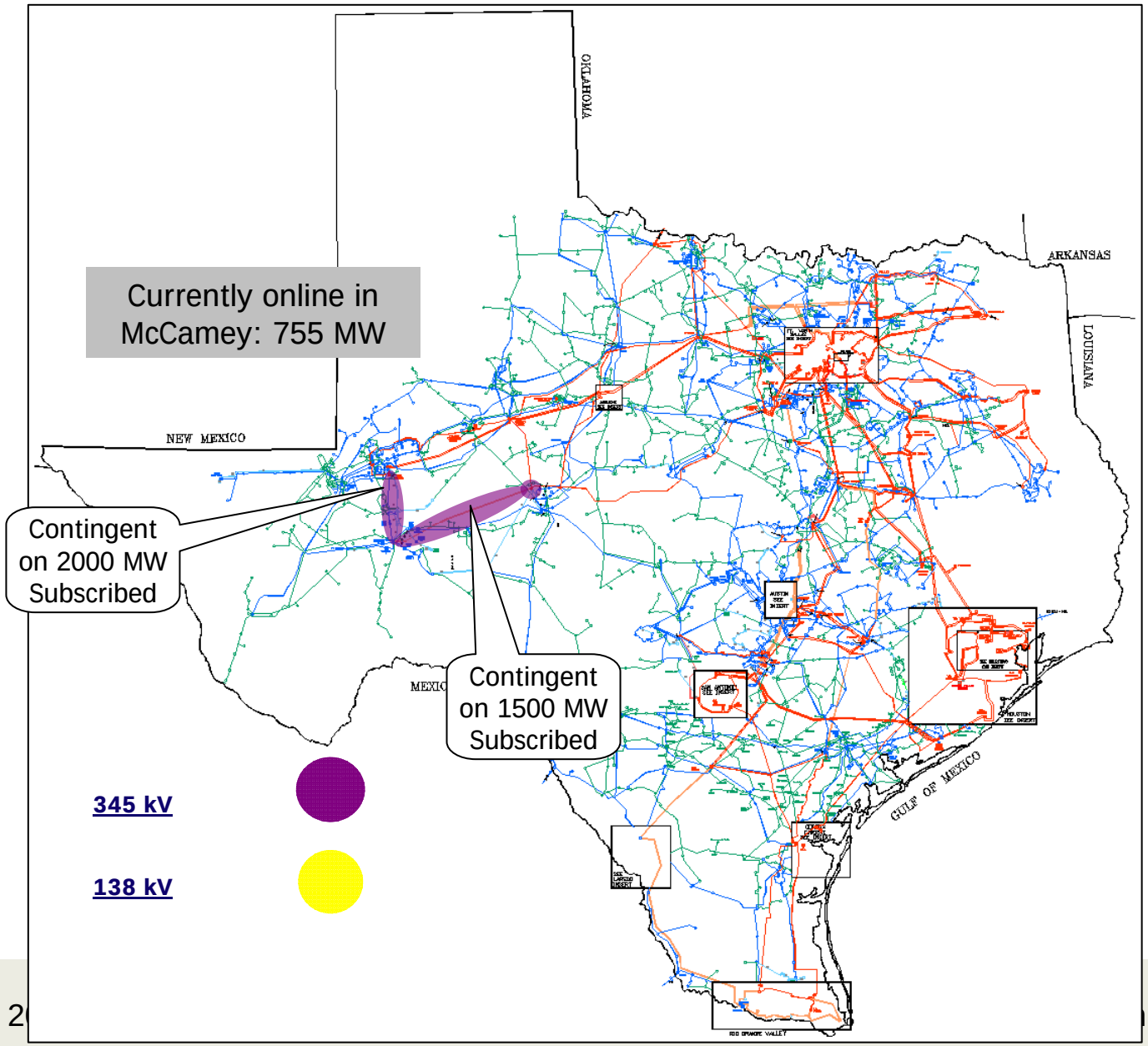
Transmission Projects Endorsed

Remaining 138kV upgrades in the McCamey area will be completed by 1Q 2006



Contingent Projects

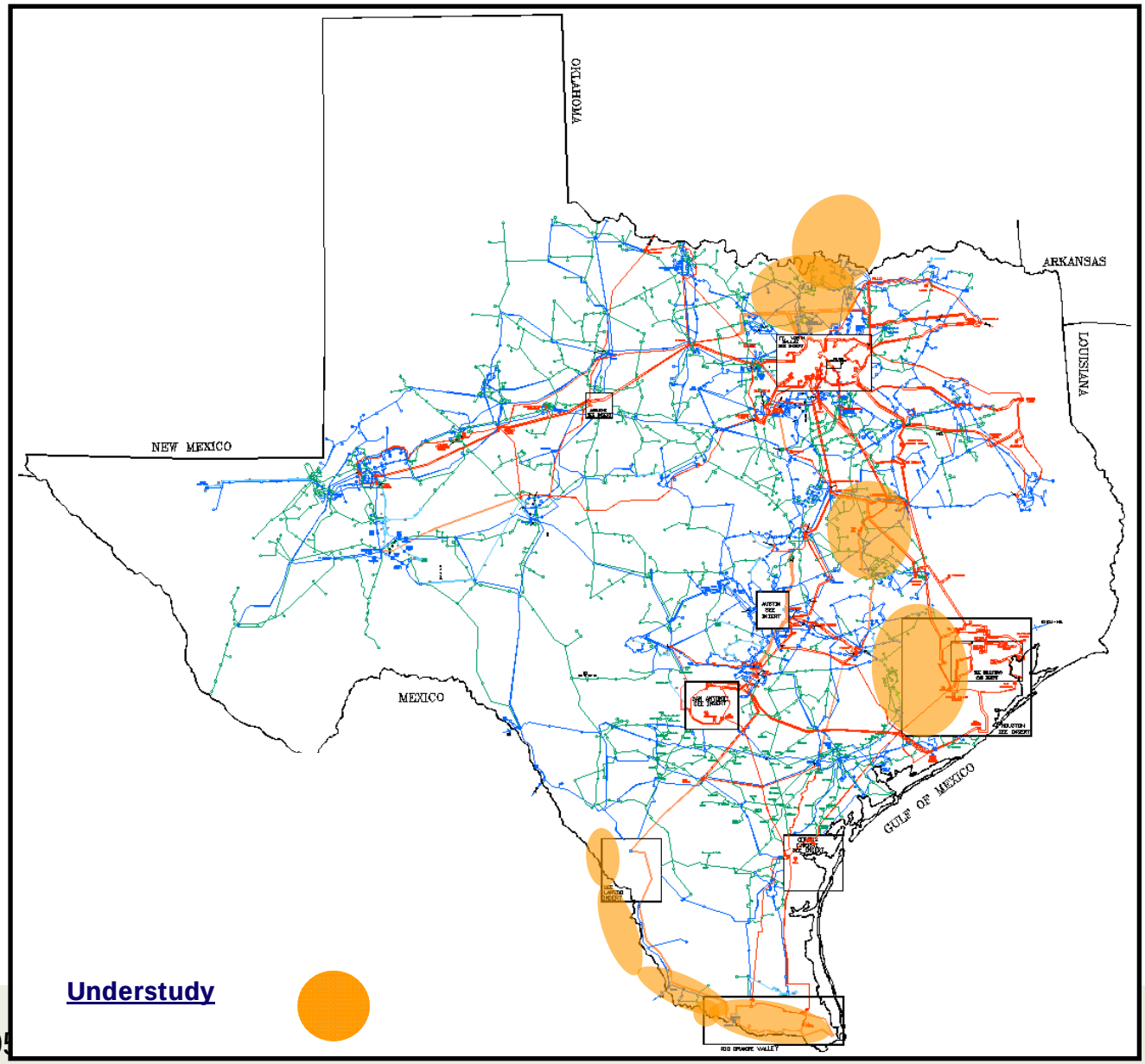
ERCOT Board in 2003 endorsed two major 345 kV projects from McCamey area contingent upon interconnection agreements



Other Projects Under Study

Areas where major transmission projects are under evaluation to reduce recurring local congestion:

- DFW
- College Station
- West Houston
- Rio Grande Valley

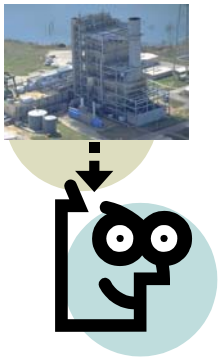


Transmission Expansion Issues

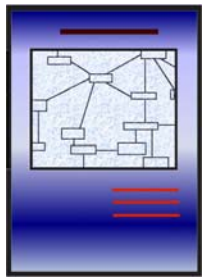
- **Time to build: due to permitting and right-of-way requirements, transmission projects can take years to complete**
- **Building ahead of need: Transmission Owners may not be willing to take the business risk for future generation interconnection projects**
- **Finite resources: ERCOT is experiencing record transmission expansion and new construction may be limited by available capital and resources**

Generation Interconnection Process Overview

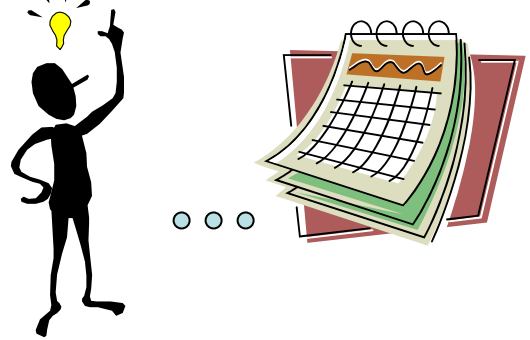
I. Interconnection Feasibility Request submitted to ERCOT



II. ERCOT performs steady state analysis and provides rough estimate of facility additions

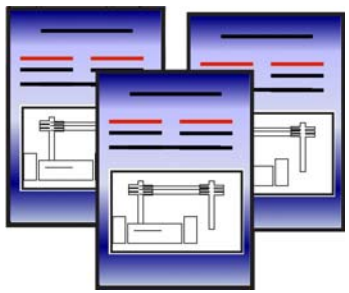


III. Generation owner reviews information and incorporates it into its decision – making process



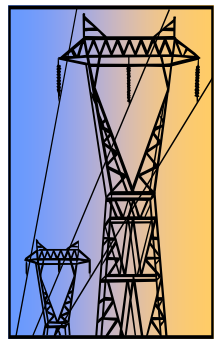
IV. Generation owner requests a full interconnection study

V. TOs and ERCOT performs detail analysis and determine final estimate.



VI. Generation owner signs interconnection agreement with TO

VII. Transmission Projects are approved



Planning Process Results

Facilities added and currently in service (since 1996)

- 26,500 MW of generation capacity interconnected (45% increase)
- Nearly $2 billion invested in transmission facilities
- 700 miles of new 345 kV transmission lines
- Several hundred miles of new or rebuilt 138 kV transmission lines
- Many 345/138 kV transformers
- Dynamic and static voltage control devices

Underway

- 619 miles of 345 kV transmission lines
- Numerous 138 kV lines and upgrades
- Additional $1.8 billion will be invested in the transmission system over next few years, based on current projections

ERCOT Region has seen much greater expansion of transmission infrastructure in recent years than any other North American region

Concern Over Generation Reserves

- **New generation in Texas since wholesale competition resulted in 20-30% reserve margins**
  - 31,000 MW statewide
  - 27,000 MW in ERCOT
- **Recently retirement and mothball have raised concerns about generation capacity**
  - Over 7,000 MW of Mothballed capacity
  - Margins below 12.5% by 2010

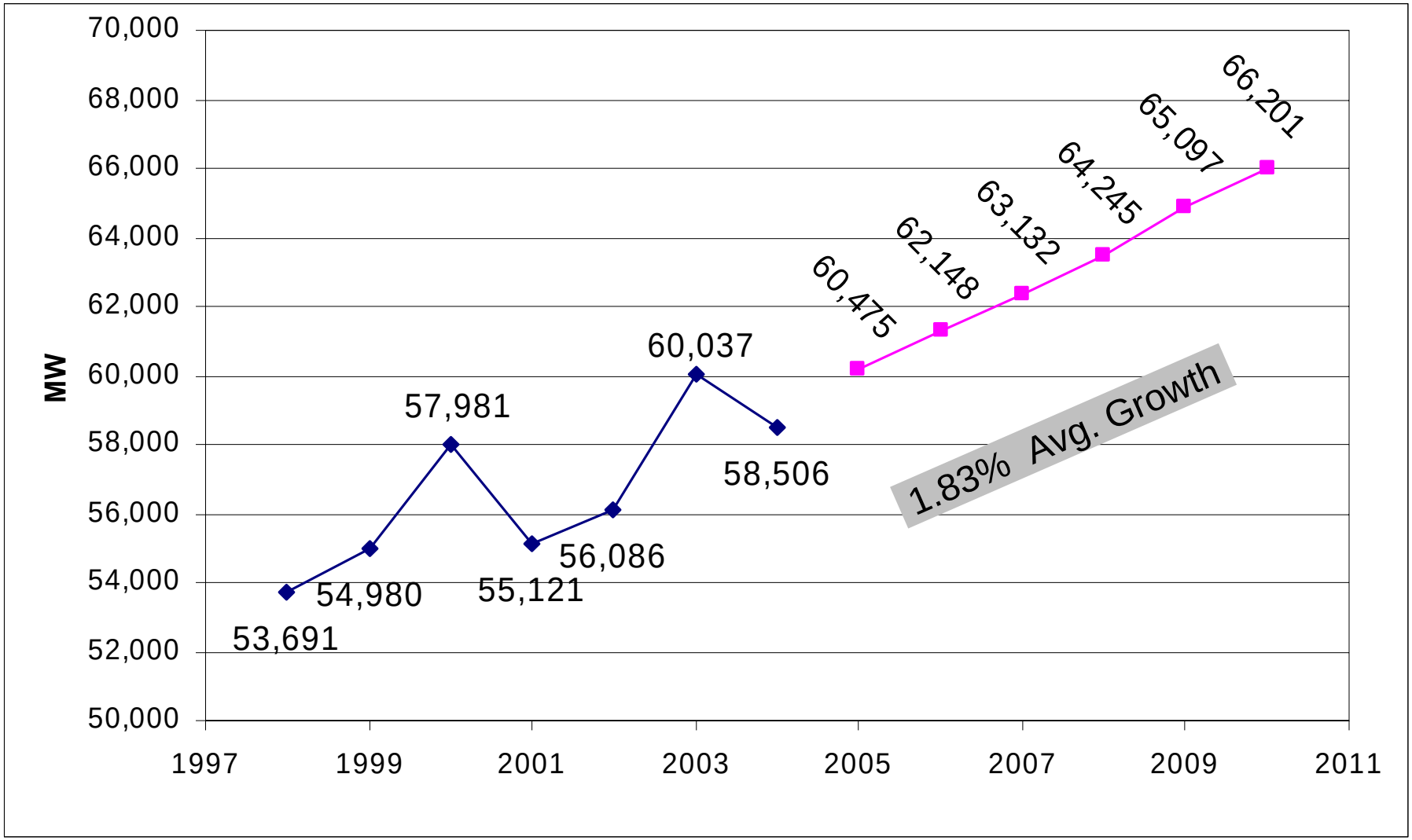
Fuel Diversity

Electric generation fuel sources in ERCOT

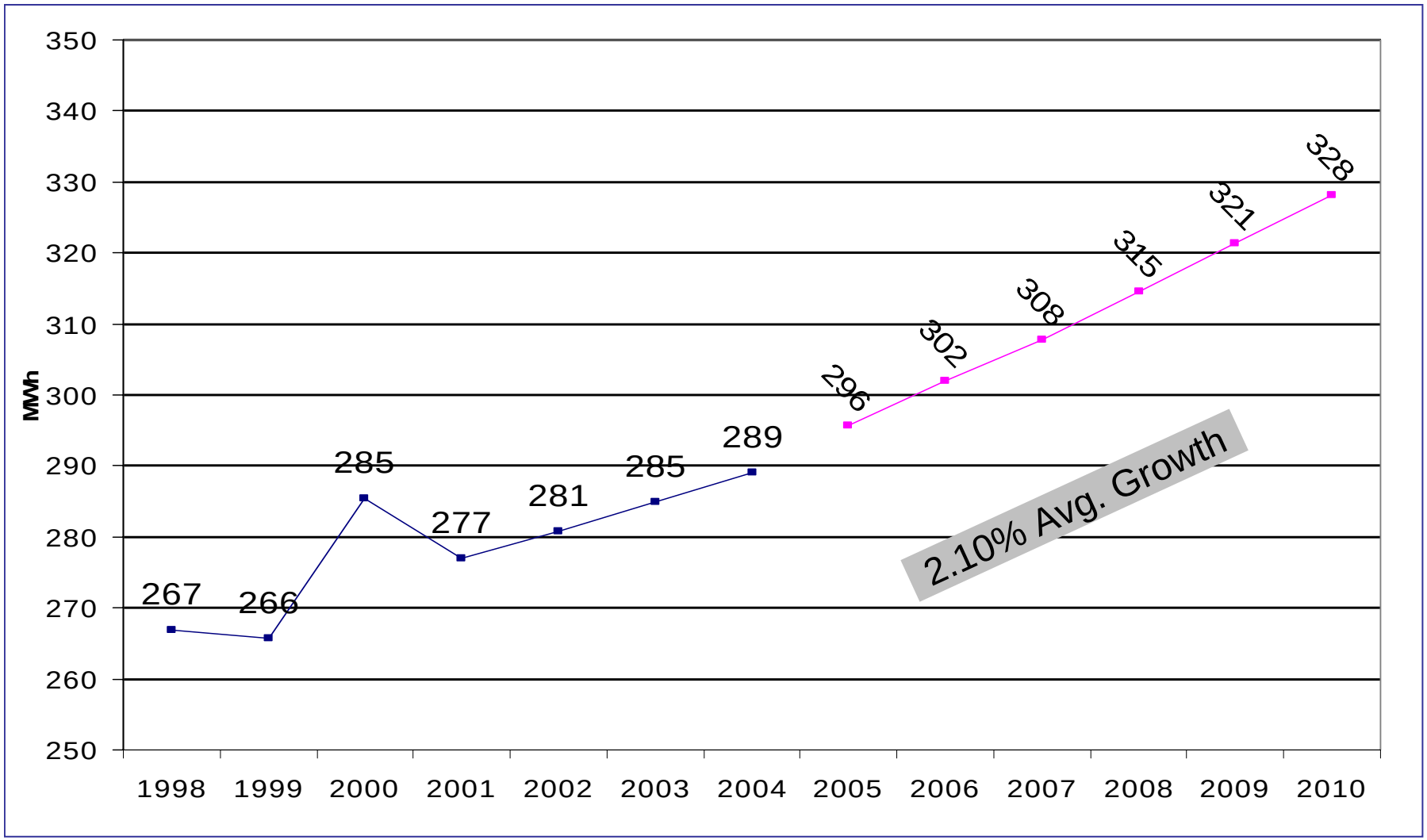
Fuel Source	*% Capacity* ***(Summer '05)***	*% Energy* ***(Jan.-July '05)***
Natural Gas (includes Dual Fuel)*	**72%**	**45%**
Coal	**20%**	**39%**
Nuclear	**6.5%**	**13%**
Renewables	**1.5%**	**2%**

ERCOT Peak Demand Forecast

ERCOT Econometric Peak Forecast



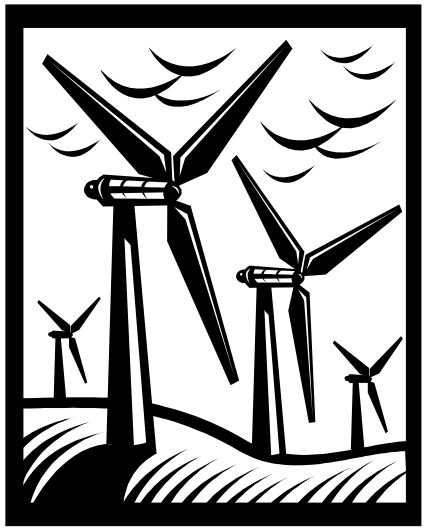
ERCOT Energy Forecast



Reserve Margin Calculations

Resources:	2005	2006	2007	2008	2009	2010
Installed Operational Units	61,932	61,597	61,597	61,597	61,532	61,139
Capacity from Private Networks	2,851	2,851	2,851	2,851	2,851	2,851
Operational Wind Generation (at 2.9%)	41	41	41	41	41	41
RMR Units under Contract	1,405	170	170	170	170	-
DC Ties	428	428	553	553	553	553
Switchable Operational Units	2,723	2,888	2,888	2,888	2,888	2,888
Returning Mothballed Unit Capacity	-	585	1,436	1,870	1,956	1,745
Planned Units with Signed Interconnects	-	727	738	2,493	2,493	3,243
Total Resources	69,380	69,287	70,274	72,463	72,484	72,460
Load Forecast:						
Total Summer Peak Demand Forecast	60,475	62,148	63,132	64,245	65,097	66,201
less Load Acting as Resources	(1,150)	(1,150)	(1,150)	(1,150)	(1,150)	(1,150)
Firm Load Forecast	59,325	60,998	61,982	63,095	63,947	65,051
Reserve Margin						
Projected (based on mothballed unit capacity availabilities provided by unit owners)	16.9%	13.6%	13.4%	14.8%	13.4%	11.4%
Mothballed Capacity for "High" Calculation	-	6,533	7,215	7,215	7,215	7,385
High (all mothballed units return)	16.9%	23.3%	22.7%	23.3%	21.6%	20.1%
Low (no mothballed units return)	16.9%	12.6%	11.1%	11.9%	10.3%	8.7%

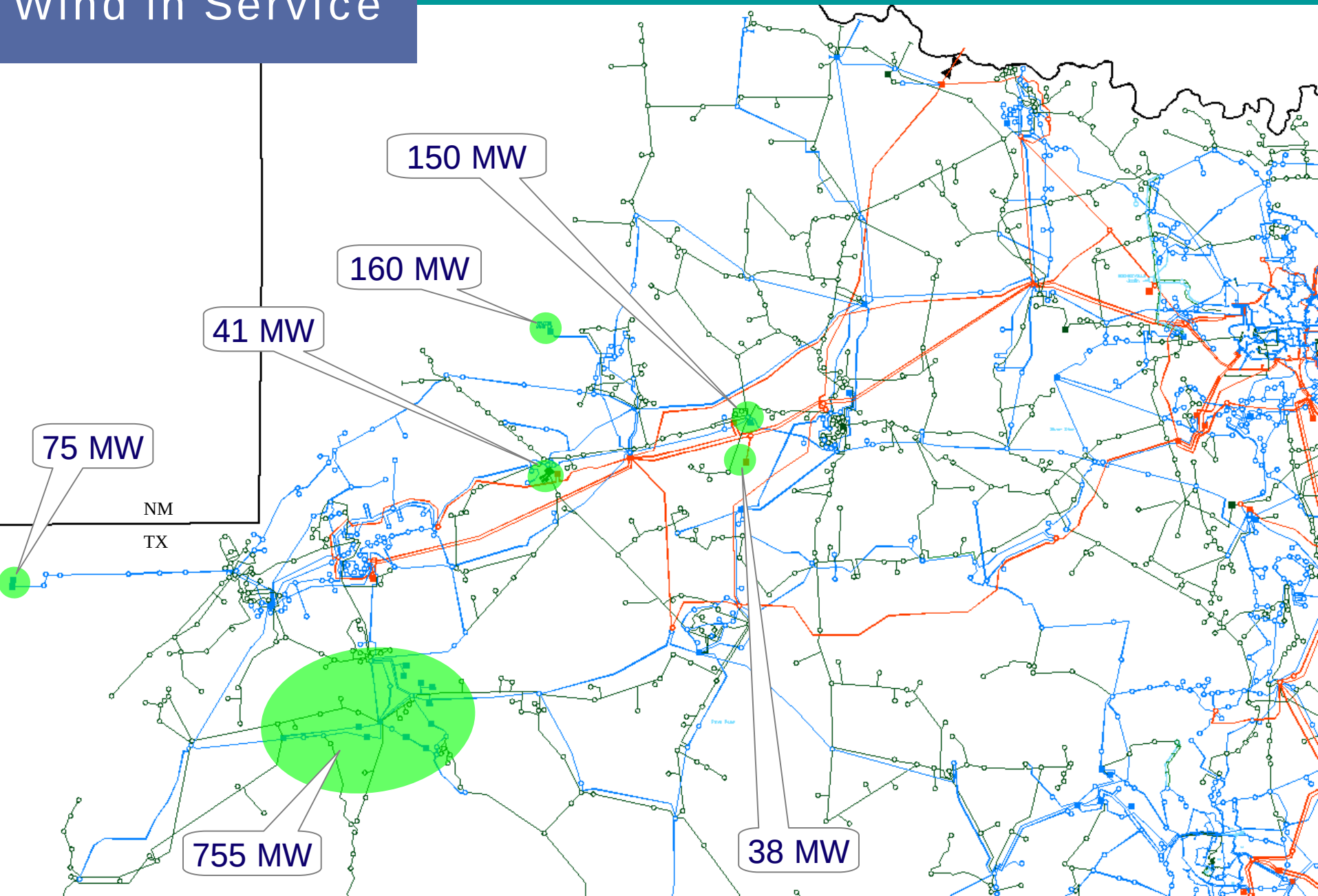
Wind Power



- **Texas will meet its SB7 renewable mandate of 2,880 MW by 2009 three years early**
- **Legislation to increase the requirement to 5,880 MW by 2015 was approved in the 2nd special session**
  - Upgrades to transmission system will be needed to accommodate the new mandate
- **Benefits: Clean energy, stable fuel price**
- **Challenges:**
  - Wind energy not as controllable or predictable as traditional sources
  - Thermal and voltage constraints require stabilization + line capacity
  - West Texas wind farms most productive off peak
  - Power must be delivered hundreds of miles to population centers in the east

ERCOT West Texas
Wind in Service

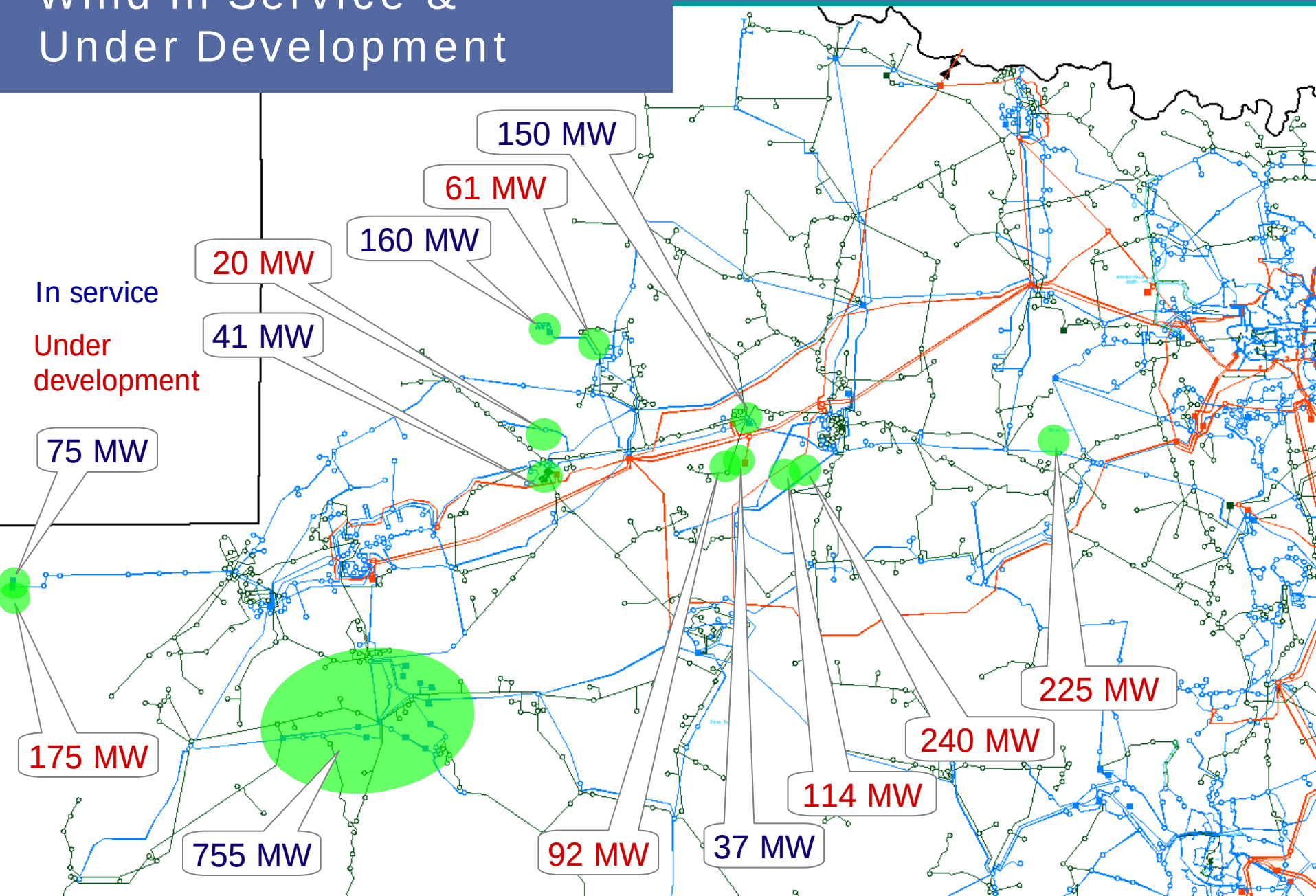
Total 1,219 MW



ERCOT West Texas

Wind in Service & Under Development

Total 2127 MW



Estimated Cost to Support 5,000 MW of Wind Power from West Texas

	McCamey	Morgan	Abilene	Total	**Cost**
Existing Gen	750 MW	250	200	1,200 MW	**$320M**
New Gen	1,150 MW	1,250 MW	1,400 MW	3,800 MW	**$1B**
Total	1,900 MW	1,500 MW	1,600 MW	5,000 MW	**$1.3B**

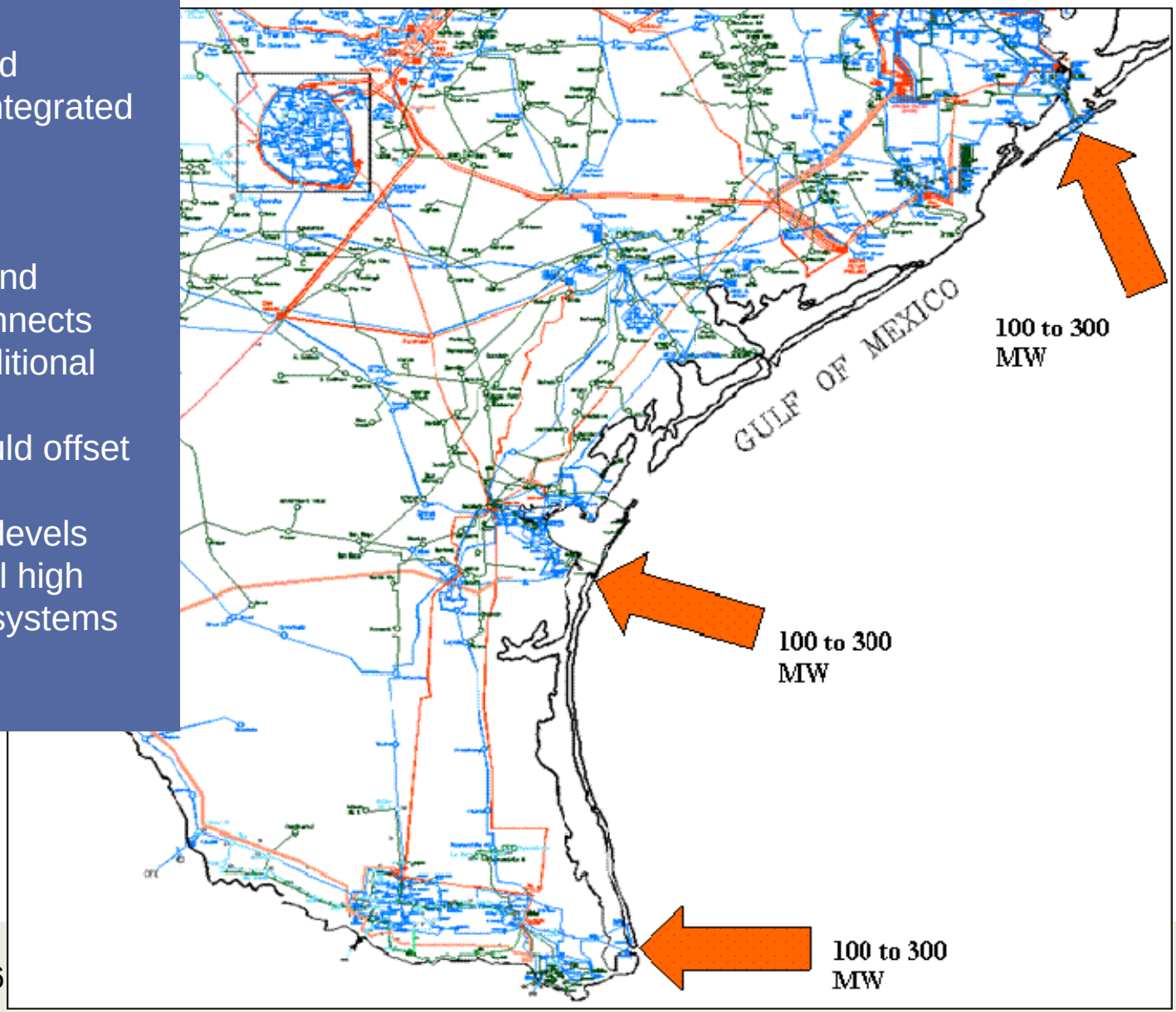
- **Total estimated cost of new transmission upgrades is ~$1 Billion**
  - Based on 345kV development option
  - 765kV is also an option to be considered
  - Transmission plan optimization could reduce this estimate
  - Does not include any cost for additional regulation or reserve services which may be required

Sources: LCRA, ERCOT staff, American Wind Energy Assn.

The Gulf Coast Alternative

- 100 to 300 MW of wind generation could be integrated near each:
  - Galveston
  - South Corpus
  - South Padre Island
- Based upon direct connects without significant additional upgrades
- Generation levels would offset local load in the area
- Additional generation levels could be added if local high voltage transmission systems are upgraded

Between 300 MW and 900 MW could be easily integrated



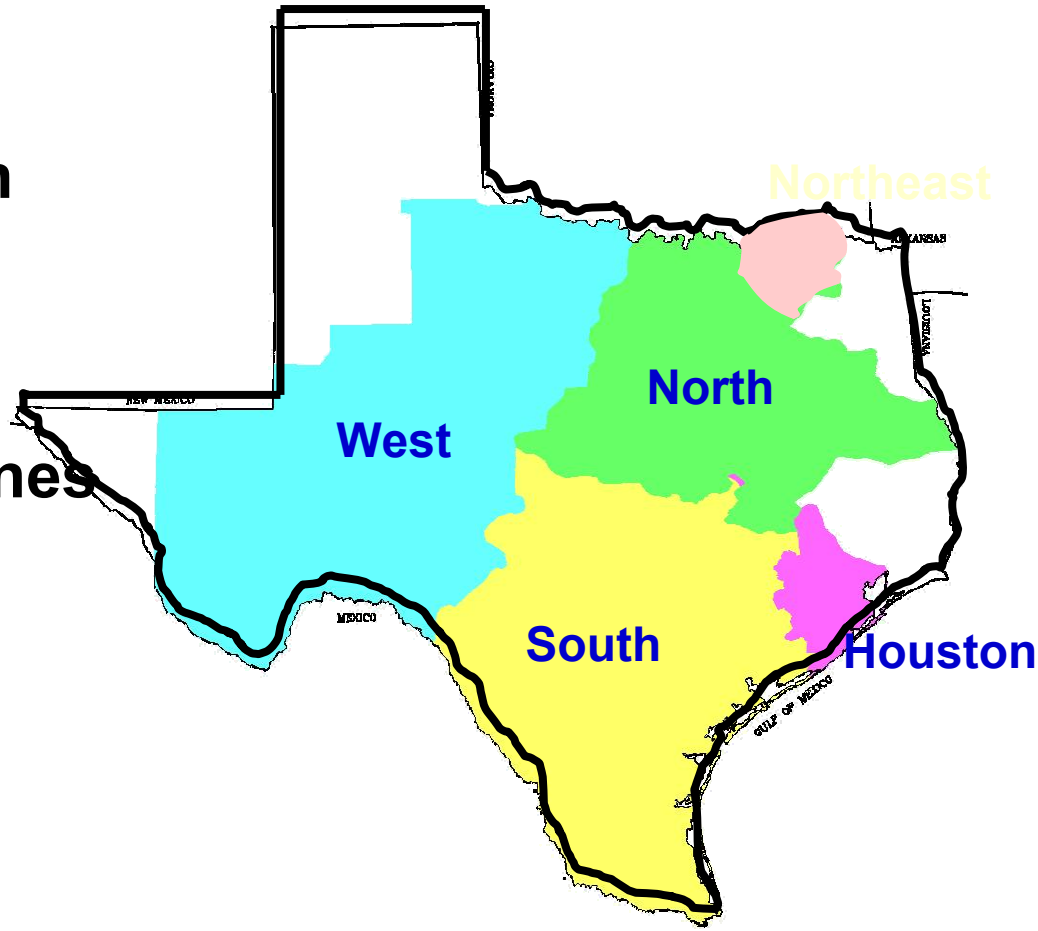
The 765kV Option

- Highest-capacity transmission circuits currently in ERCOT are 345,000 volts
- 765,000 volt (765kV) lines are in use in other regions and nations
- 765kV option appears to accommodate voltage and output fluctuations (typical of wind) better than lower voltage options
  - "Shortens the distance between generation and load"
- However, more substations (injection points) = less efficiency & higher cost
- The larger the renewable target, the more attractive the 765kV option becomes
  - Cost per MW of generation is inversely proportional to the capacity needed
  - The higher the capacity required, the lower per MW cost

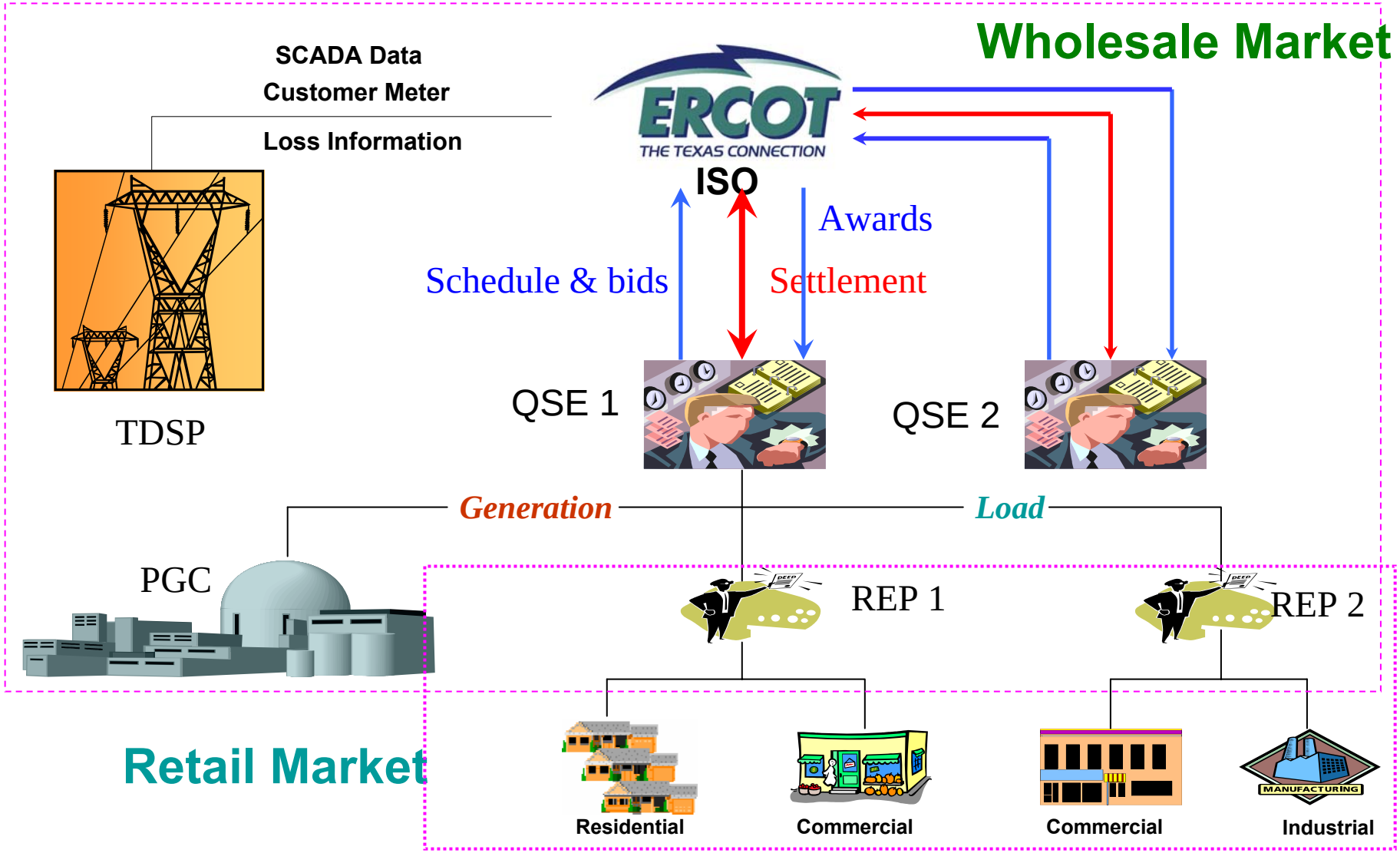
System operations

ERCOT System at a Glance

- ~69,000 MW Generation
- ~60,279 MW Peak Load (August 23, 2005)
- 8,000 Miles of 345kV Lines
- 16,000 Miles of 138 kV Lines



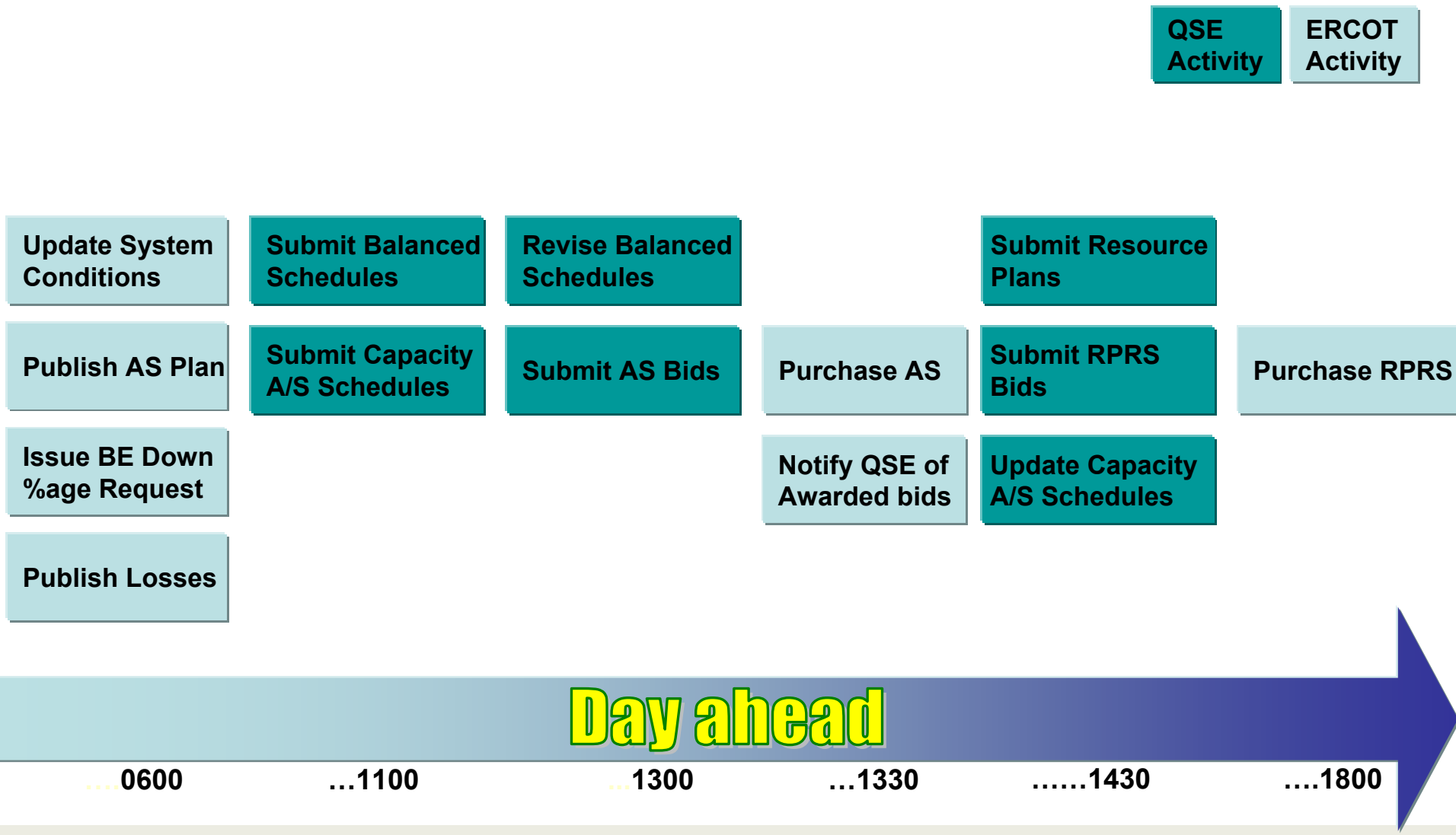
ERCOT Operations & the Wholesale Market



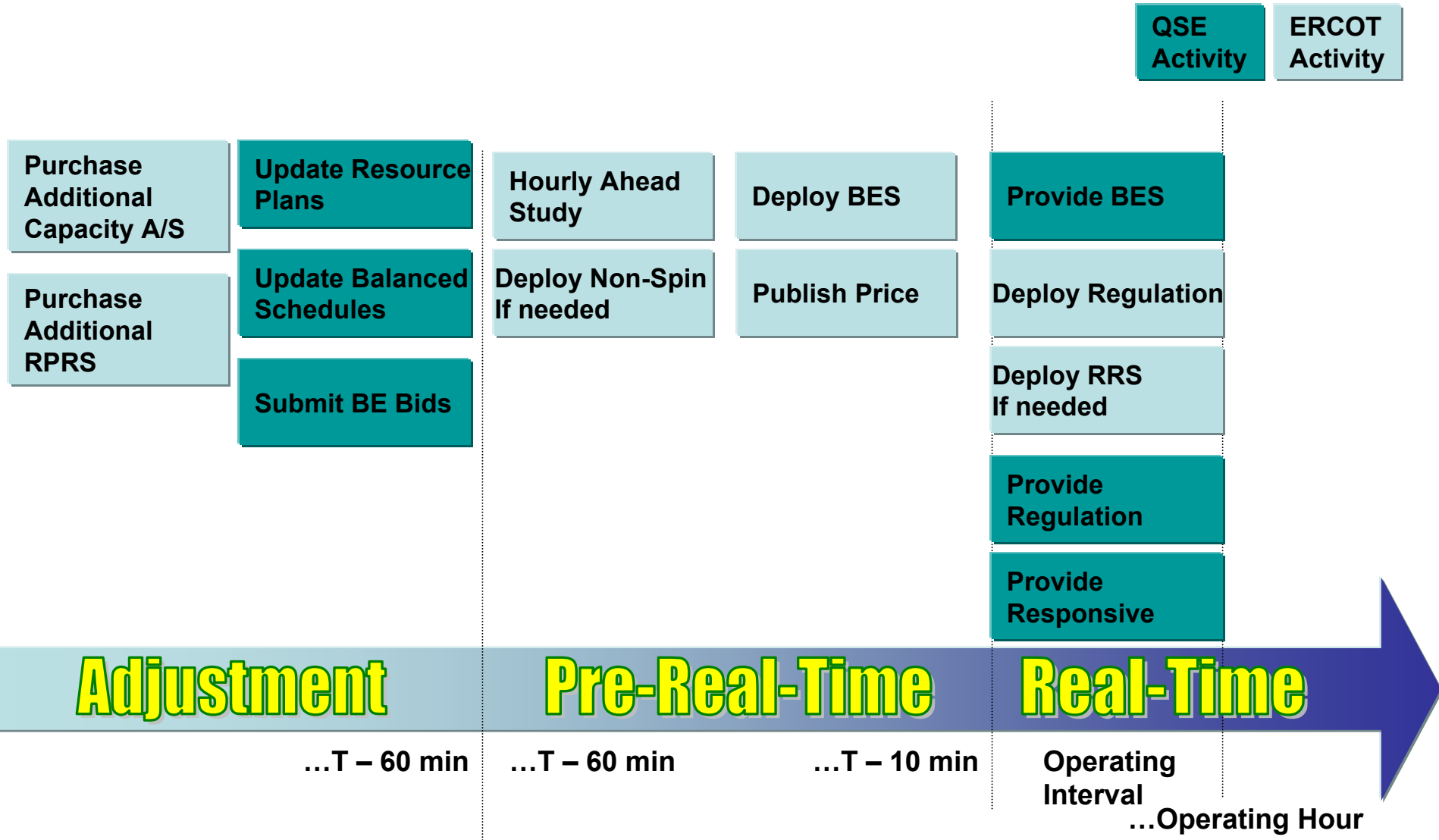
ERCOT Market

- Single Control Area
- Bilateral + Ancillary Services
- No Spot Market
- No Day-ahead Energy Market
- Zonal Portfolio Schedules
- Zonal Locational Pricing Model
- Inter-zonal Congestion Management
  + Intra-zonal Congestion Management
  = Balancing Energy Market
- Ancillary Services + Balancing Energy Services
  = ~$1 billion per year
  - Of ~$27 billion retail market
- Transmission Congestion Rights

ERCOT Scheduling Process



ERCOT Scheduling Process



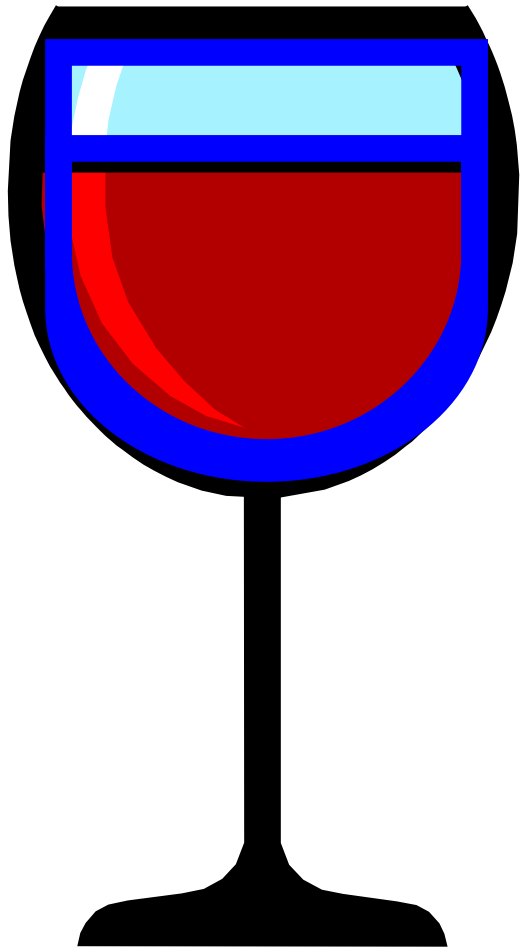
Service Types

Capacity

- Regulation Reserves
- Responsive Reserves
- Non-Spinning Reserves
- Replacement Reserve
- Out of Merit Capacity (OOMC)
- Black Start
- Reliability Must Run (RMR)

Energy

- Balancing Energy
- RMR Energy
- OOM Energy (OOME)



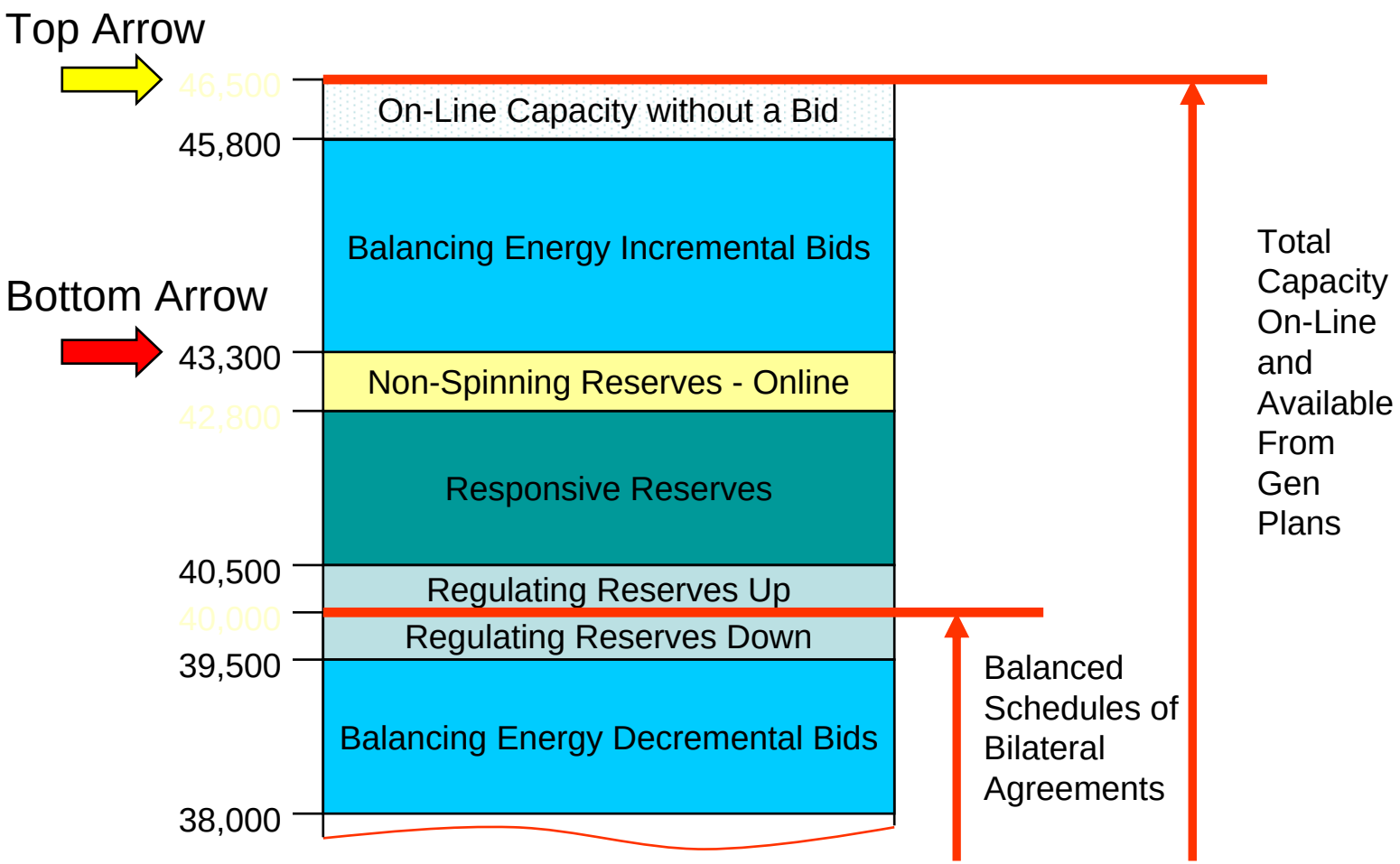
ERCOT Capacity Ancillary Services Market

- **ERCOT uses the Day-Ahead load forecast to develop an Ancillary Services Plan**
  - Identifies amount of Ancillary Services needed for each hour of the next day.
- **ERCOT allocates the amount of Ancillary Service to QSEs in proportion to their historical actual loads.**
- **QSEs fulfill their obligations**
  - Self-arranged Ancillary Capacity
    - QSE's own resource
    - Purchase from other QSEs through bilateral transactions
  - Purchase from ERCOT in Ancillary Service Market

ERCOT Capacity Ancillary Services Market

- **Single Round Auction**
- **Procure Capacity Ancillary Service in a sequential order, i.e., in the order of Regulation Down, Regulation Up, Responsive Reserve, and Non-Spin Reserve.**
- **Procure the total required amount of each Ancillary Service, less the amount self-arranged**
- **Price of the last MW procured sets Market Clearing Price of Capacity (MCPC) for all**

Capacity Deployed by ERCOT



Congestion Management

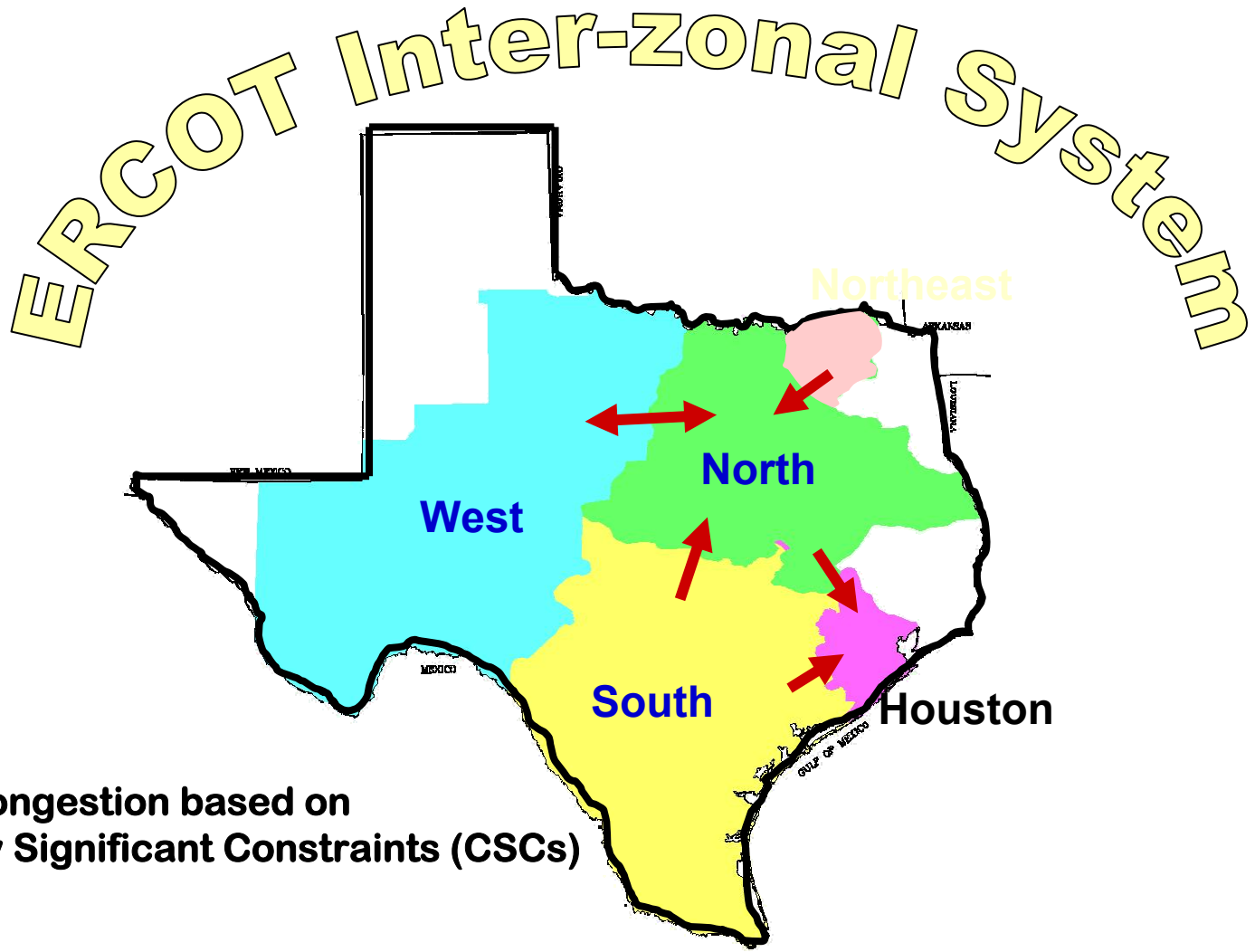
- Congestion occurs whenever the loss of any single facility in the system would cause overload on remaining facilities

- Real Time Contingency analysis (RTCA) is run every 5 minutes to determine where congestion is and what must be done

Congestion Management

- Zonal
  - Five wholesale pricing “nodes” (congestion zones)
  - Commercially Significant Constraints (CSCs) for inter-zonal congestion management
  - Average shift factors within congestion zones
  - Zonal balancing energy deployed by ERCOT
  - Zonal congestion costs directly assigned based upon cost causation
- Local
  - Unit specific deployments
  - Payments based on unit type
  - Local congestion costs uplift to all load

ERCOT Congestion Zones



Inter-zonal Congestion based on Commercially Significant Constraints (CSCs)

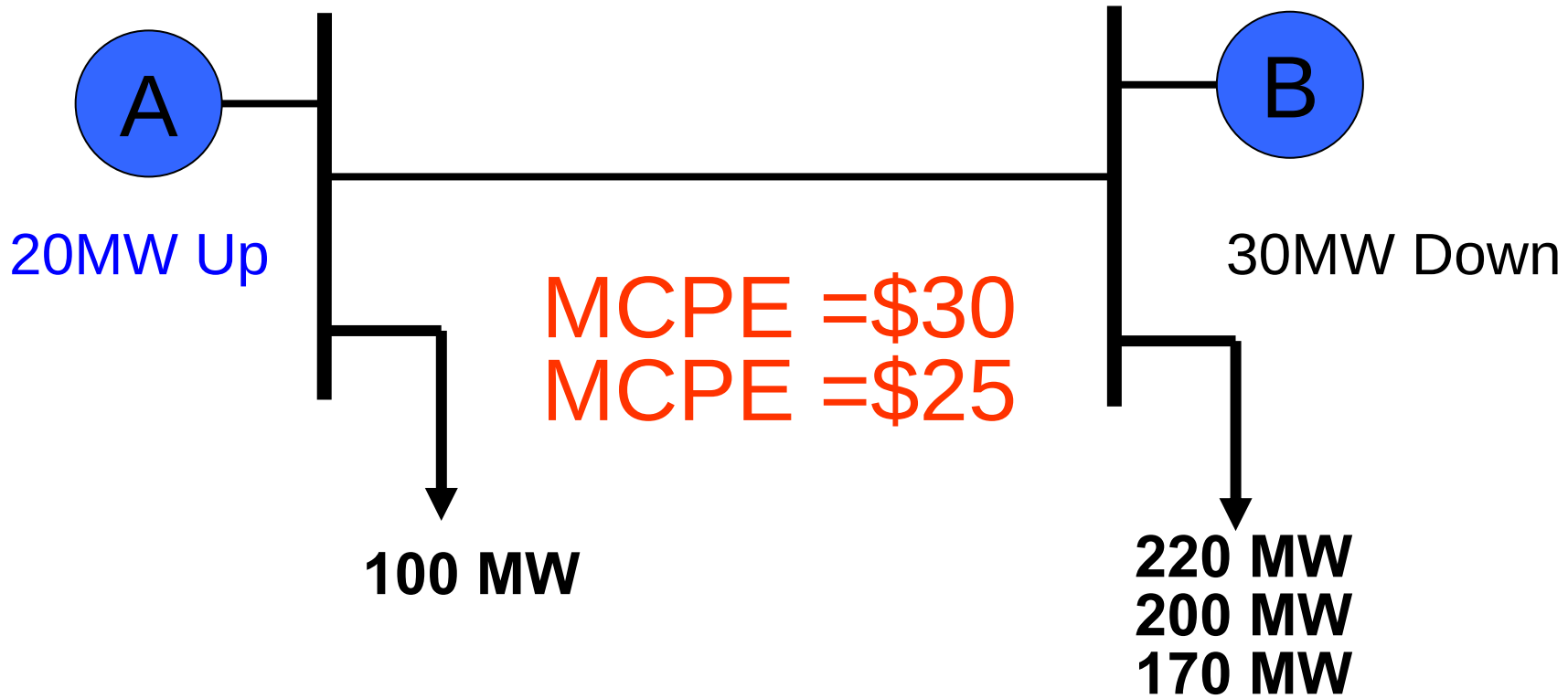
Balancing Energy Service: Inter-zonal

- **ERCOT deploys Balancing Energy bids to balance QSE's generation schedules and ERCOT Load Forecast**
- **ERCOT deploys Balancing Energy bids to resolve any inter-zonal congestions**
- **Zonal Market Clearing Price of Energy (MCPE) based on price of last MW**
- **Calculate Shadow Price of Zonal Congestion**

A Mini-Power Market

Schedule: 200 MW
Up bid: 100 MW @ $30
Dn bid: 150 MW @ $20

Schedule: 100 MW
Up bid: 100 MW @ $40
Dn bid: 50 MW @ $25



A Mini-Power Market

Schedule: 200 MW
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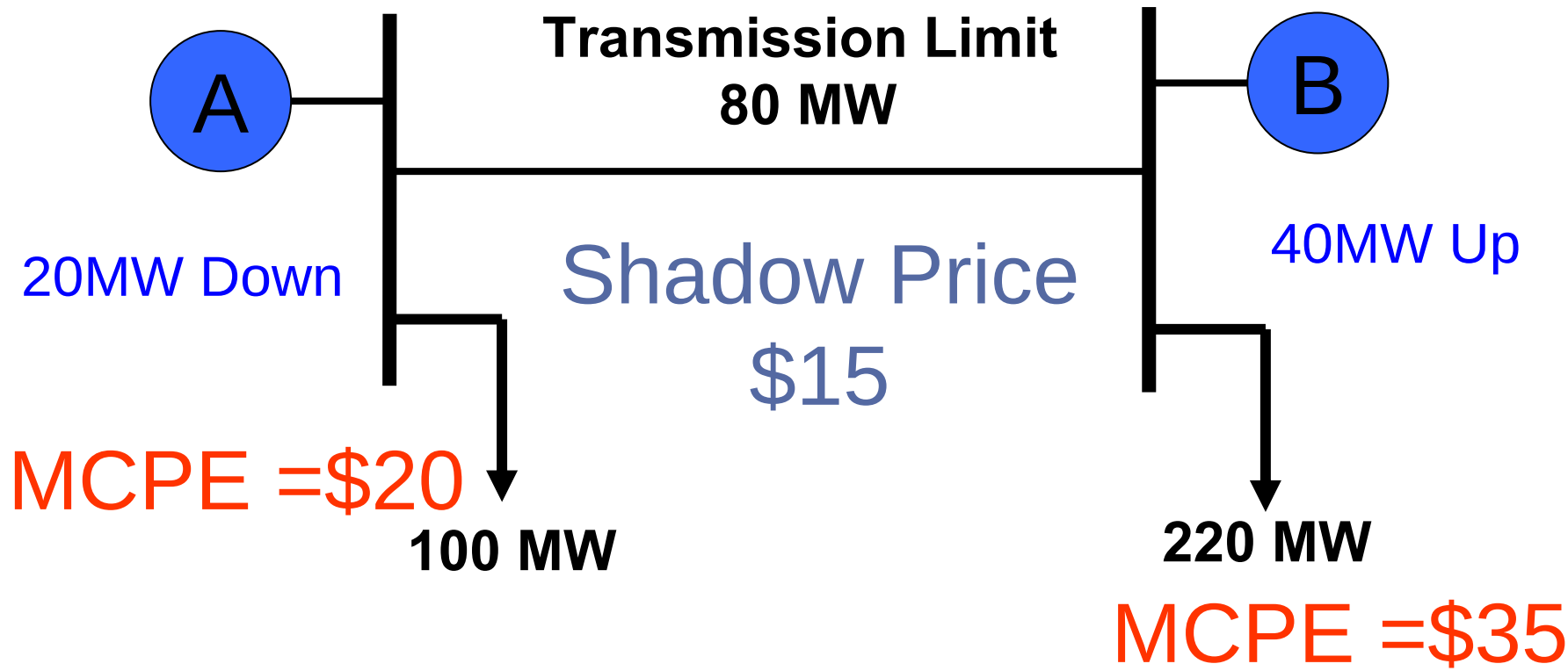


Inter-zonal BES Market Settlement

Zonal Congestion Charge

- **A QSE whose schedules aggravate Zonal Congestion will be charged at the Shadow Price of the Zonal Congestion**
- **A QSE whose schedules contribute to resolving Zonal Congestion will be paid at Shadow Price in proportion to its scheduled counter flow**
- **Transmission Congestion Rights (TCRs) can be bought to hedge or speculate on zonal congestion**

Intra-zonal Congestion Management

- **ERCOT System estimates a unit's operation level based on current SCADA data and QSE's zonal portfolio schedule**
- **ERCOT system allocates a QSE's zonal portfolio deployment to its units**
- **ERCOT deploys Unit Specific Balancing Energy or OOME to resolve any intra-zonal congestion**
- **Maintain Power Balance by Zonal Balancing**

3. Market operations

ERCOT's Role in the Retail Market

- ERCOT maintains the Centralized Registration Database
- We are the Transaction Clearing House for all Retail Transactions
- Active, non-voting participant in the Stakeholder Process
- Flight Administrator for Retail MP Qualification & Testing
- Responsible for compiling information and reporting on Retail Market Metrics

ERCOT's Role in the Retail Market

- **Approximately 6 million customers have the "Power to Choose"**
- **ERCOT is central hub of retail transaction system**
  - Registration agent for all of these customers and their retail providers
  - Independent, neutral entity to facilitate customer switching
  - Monthly receipt of usage data for 6 million meters and transmittal to proper Retail Electric Provider
- **No other ISO in North America has these responsibilities**
  - Neutral registration agent has been cited as a major reason for success of this market
- **Standardization lowers transaction costs for all**
- **Customer complaint levels related to choice are low**
- **Customers continue to take advantage of choice**

Retail Market - Making it Work

- **Complex retail transaction system had start-up problems at launch**
  - Some reps had customer billing issues
  - Move-ins & move-outs – "Texas Set" did not reflect field realities
  - Complex ERCOT retail systems not stable
  - BUT…reliability maintained
- **Intense pressure from Legislature, PUC and market to make it work**
- **Problems were attacked, system is functioning smoothly today**
- **ERCOT has now completed nearly 15 million transactions related to choosing a retail provider (switches, move-ins, & move-outs)**
  - Switching averaged 38,000 per month during 2004
  - Move-ins averaged 9,000 per day
- **Major upgrade of system (Texas SET 2.0) implemented on schedule in 8/04 -- streamlines the move-in/move-out "stacking" challenge**

Retail Market Today

- ✓ **ERCOT's centralized approach is now an acclaimed model for retail competition**
- ✓ **Many moving parts must function well (ERCOT, TDSPs, REPs)**
- ✓ **Billing timeliness & accuracy rates of 98-99% are now equivalent to pre-restructuring levels**
- ✓ **ERCOT strives to synchronize market data on a daily basis**

Customers Choosing Competitive Retail Providers

As of 8/31/05

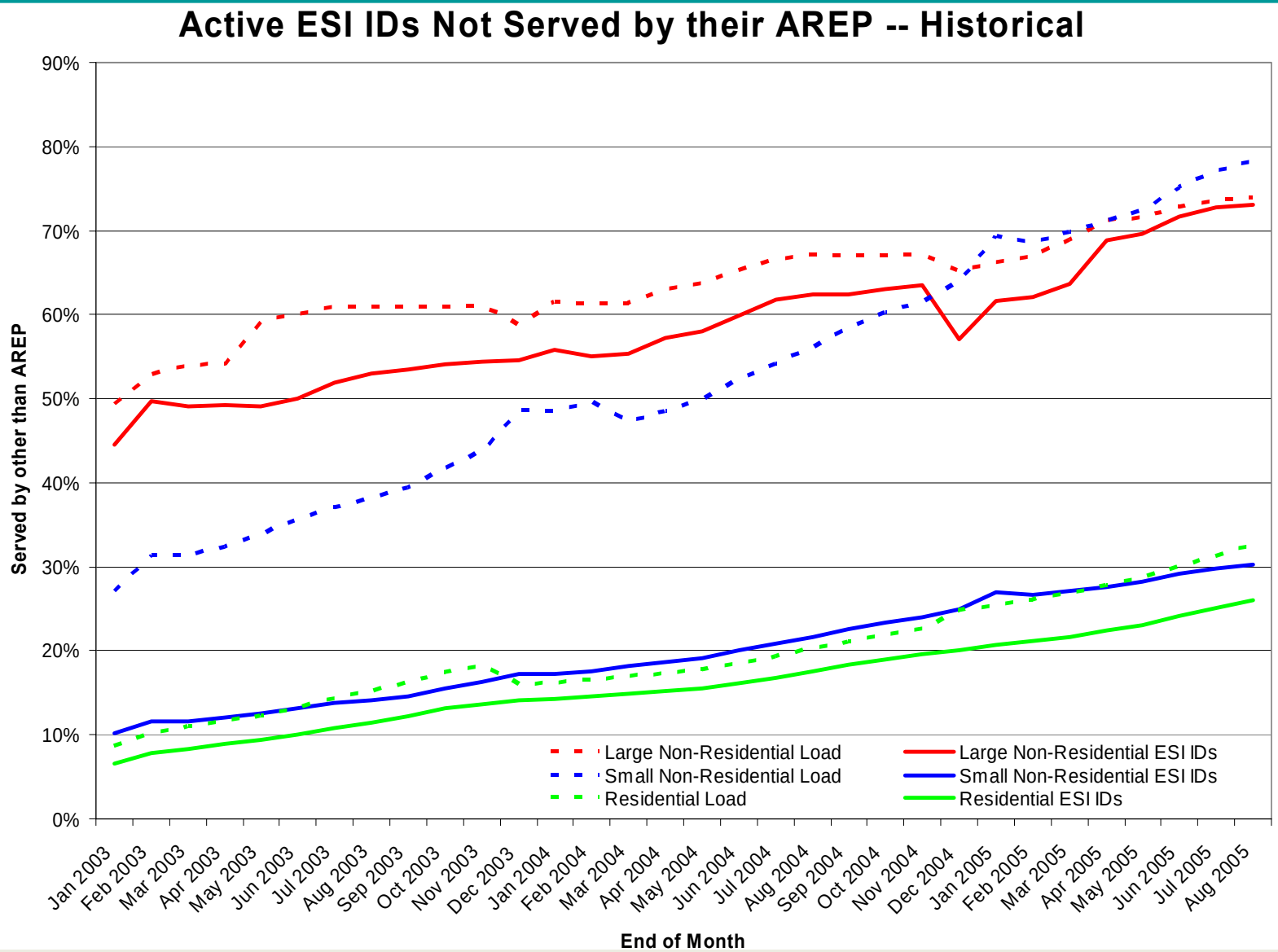
Over 2 million total switches completed to date

Category	Customers	Load
Residential	**26.1%**	**32.5%**
Small Non-residential	**30.3%**	**78.2%**
Large Non-residential*	**73.1%**	**73.9%**

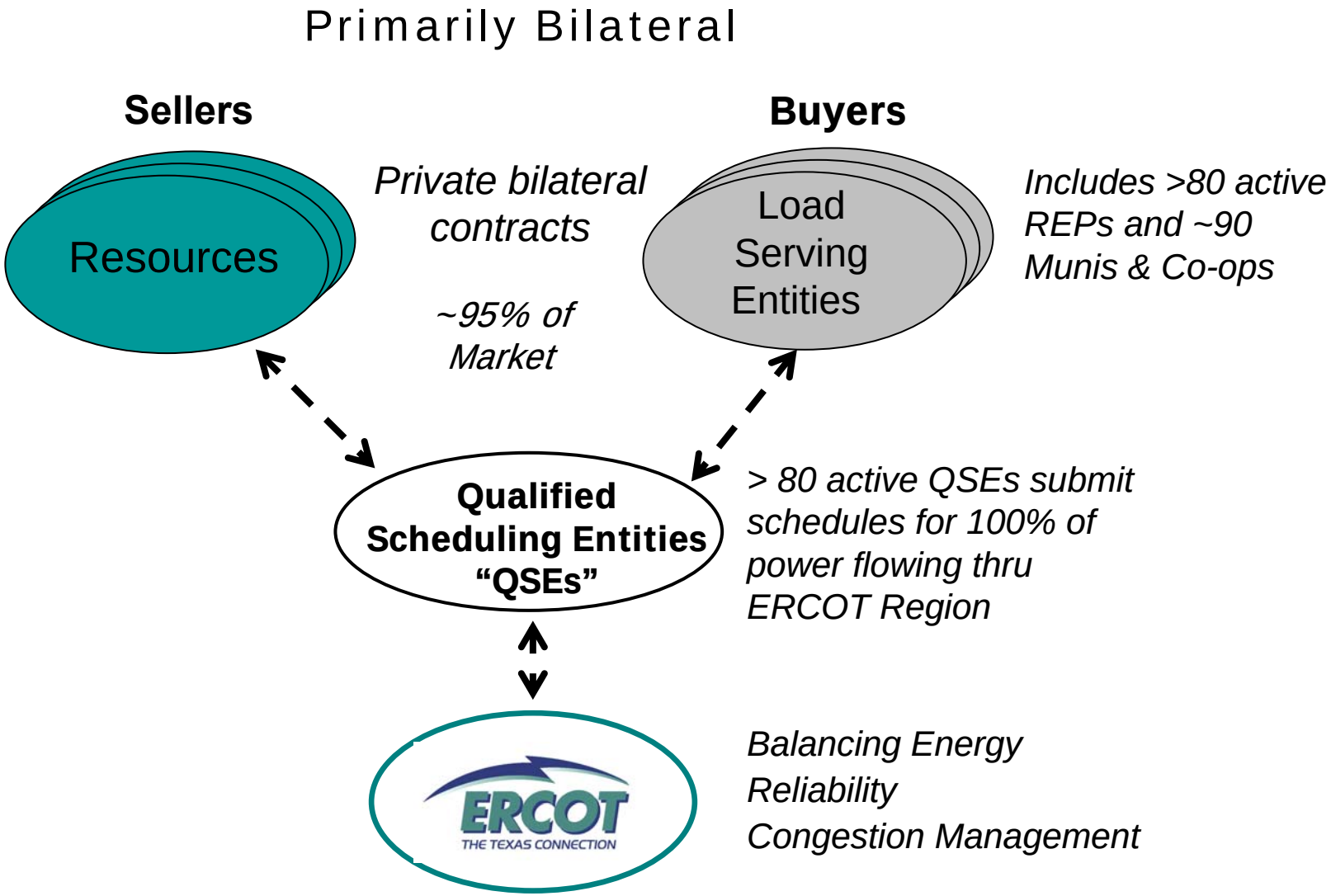
Large customers have been free since market opened to negotiate lower rates with incumbent REPs (no Price to Beat).

* > 1MW in peak demand

Trend of Customers Choosing Competitive Retail Providers
As of 8/31/05



The ERCOT Wholesale Market



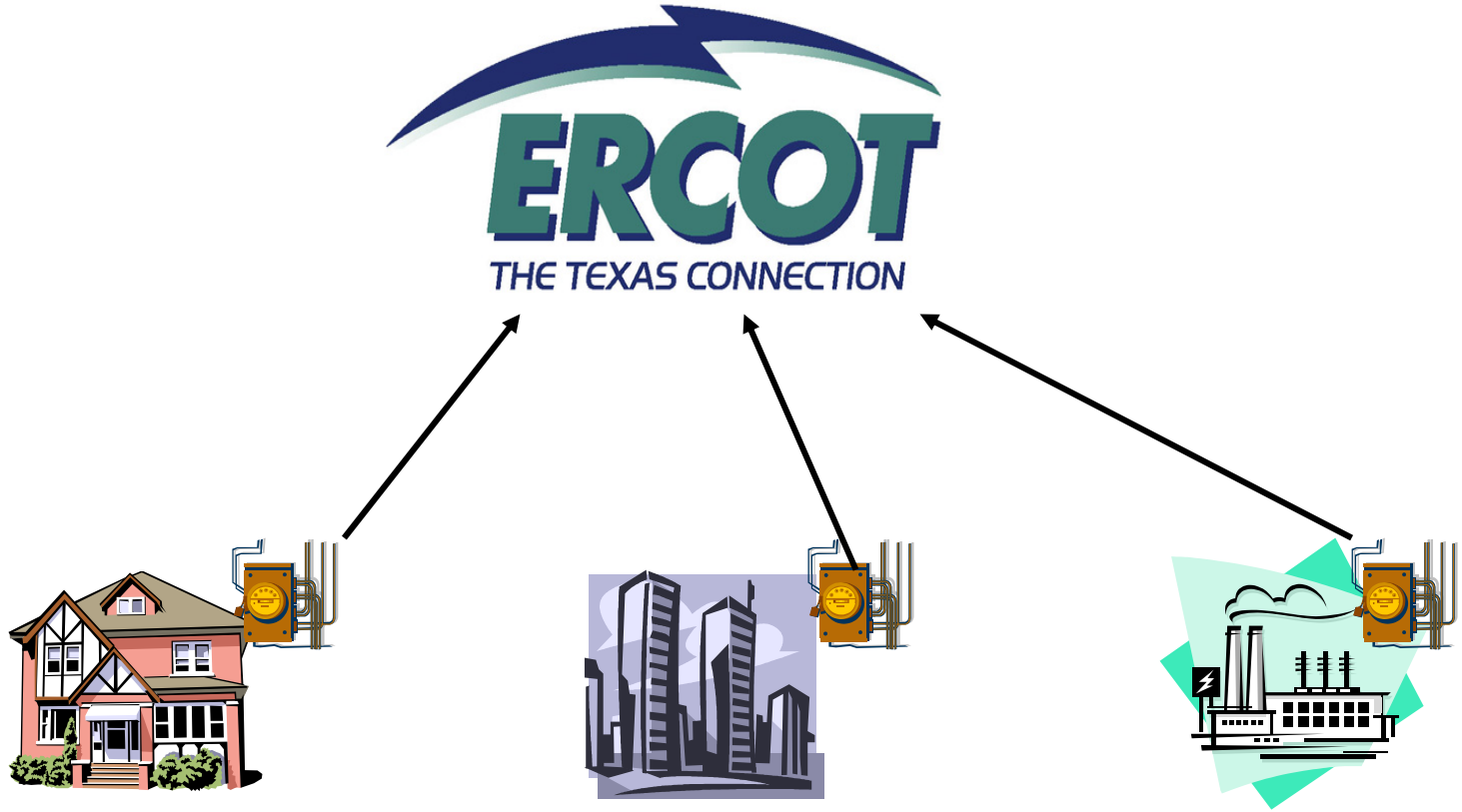
Wholesale Market Settlement

Key Activities:

- **Data Acquisition**
- **Load Profiling**
- **Data Aggregation**
- **Settlements & Billing**

Meter Data Acquisition

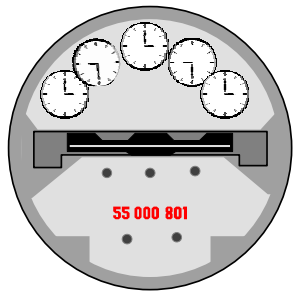
How does ERCOT acquire meter data?



Meter Data Acquisition

- **ERCOT acquires generation & consumption meter data from:**
  - TDSPs
  - ERCOT Polled Settlement Meters (EPS)

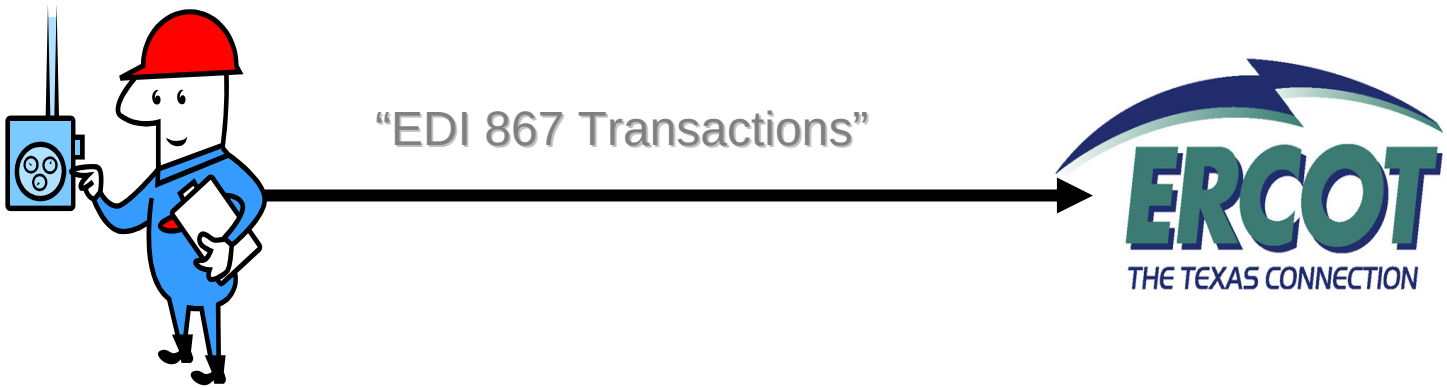
Result: Data *ready* to be processed (aggregated) for settlement



TDSP Provided Meter Data

- **Non-Metered locations (calculated)**
- **Non Interval Meters**
- **Interval Data Recorder (IDR)**
  -Records consumption in 15-minute intervals

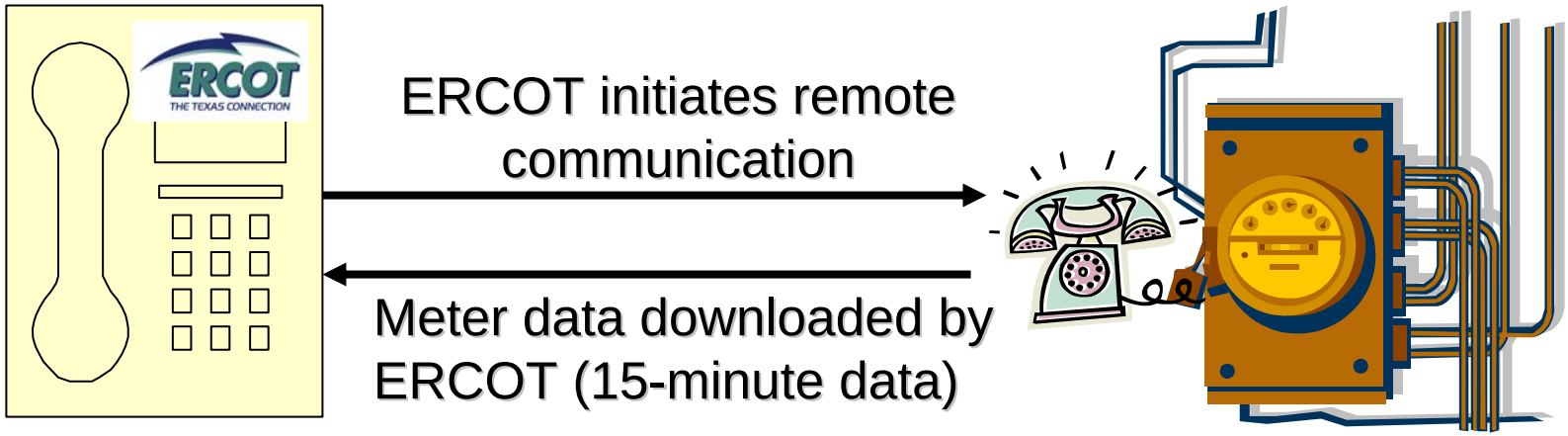
- **Data is submitted to ERCOT via "EDI 867 Transactions" and loaded into ERCOT's *LODESTAR* system for settlement.**



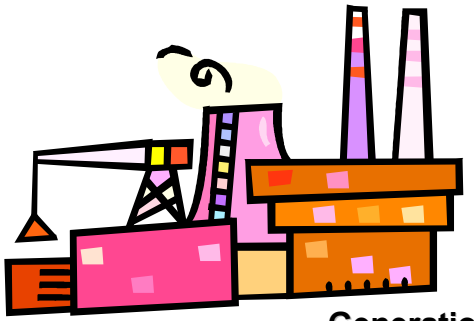
ERCOT Polled Meter Data

- **ERCOT-Polled Settlement Meters (EPS)**
  - Records data by 15-minute interval
  - ERCOT queries by remote communications
  - Data is collected *daily* by MV90 software

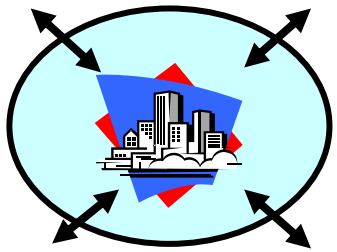
- **ERCOT converts the raw data to Settlement Quality**



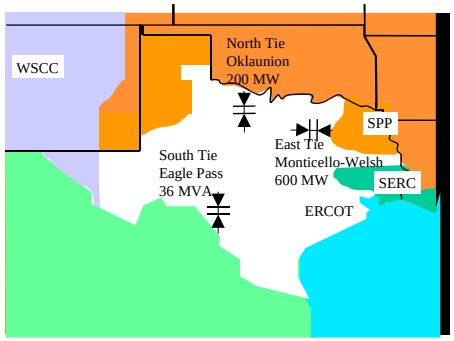
ERCOT Polled Meter Data



Generation



NOIE Points of Delivery



DC Ties

When is an EPS meter required?

- **In general, generation:**
  - Directly connected to transmission system
  - >10MW
  - Ancillary Services & Auxiliary Load
- **Also:**
  - Bi-Directional NOIE Points of Delivery
  - DC Ties

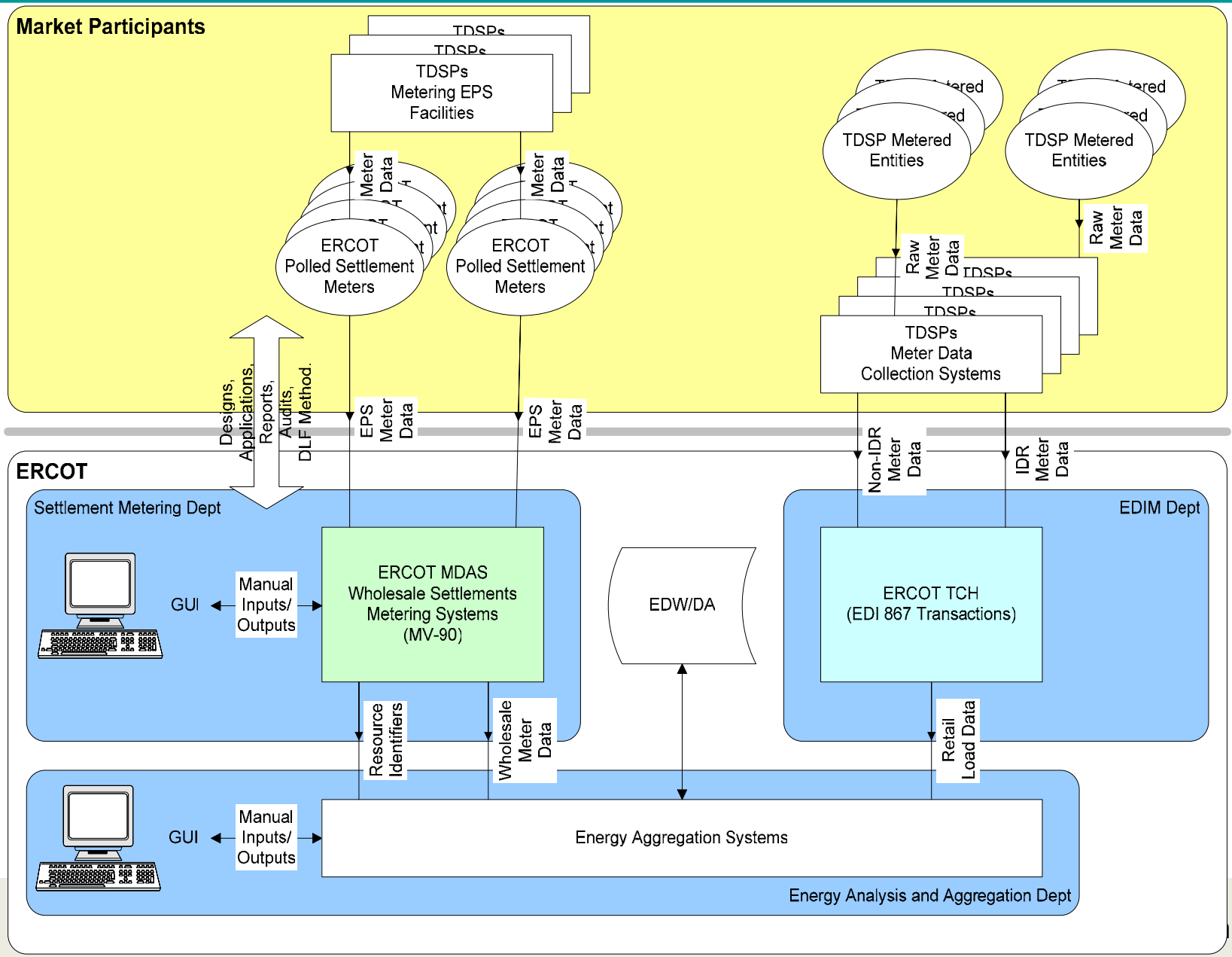
Number of EPS Meters in ERCOT

~275 Facilities

~1226 EPS Meters (Includes Primary & Backups)

~630 Metering Points (ERCOT does not poll both Primary and Backup Meters)

Meter Information to ERCOT

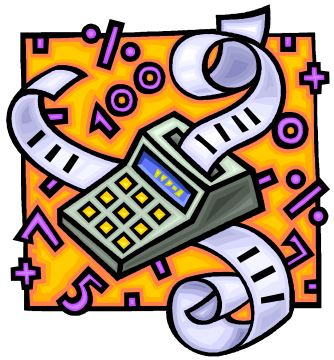


Data Aggregation

- What is Data Aggregation?
  - Calculation process to achieve load & generation totals to be used for settlement. *Taking energy inventory*!

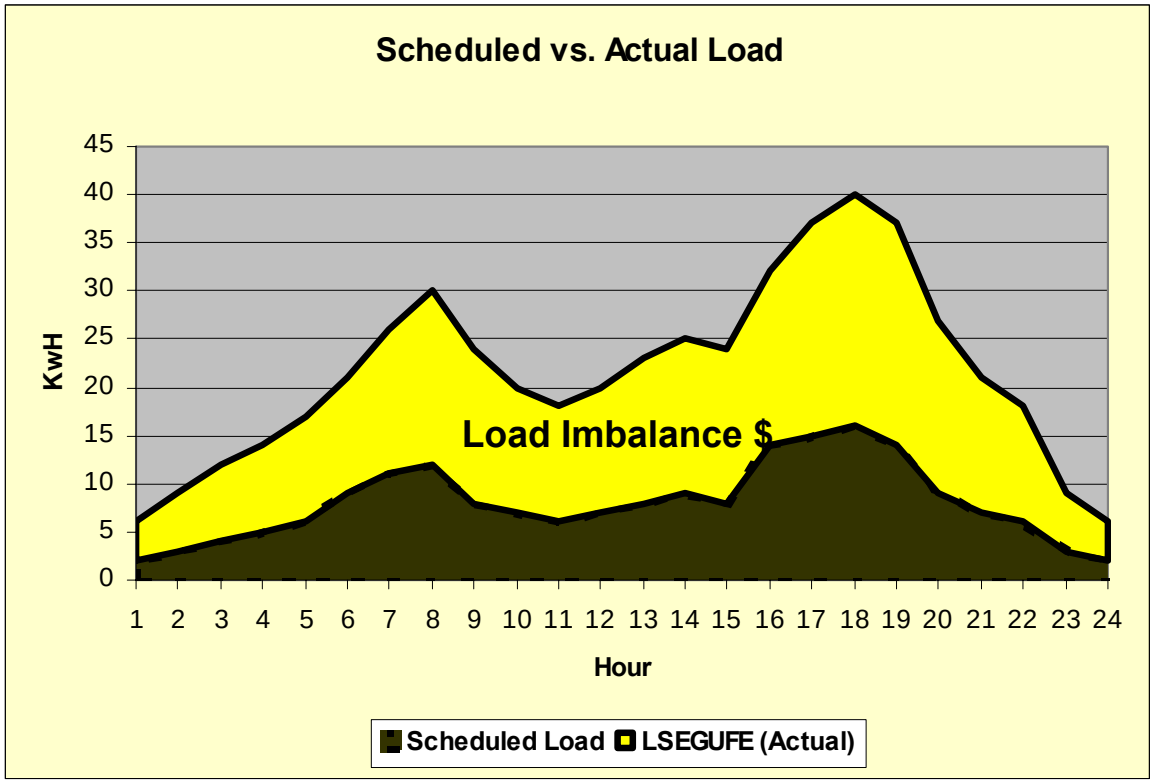
<u>Primary Outputs to ERCOT Settlements</u>

- Generation & Load Totals by entity
- Load Ratio Share



Data Aggregation Relationship to Settlement

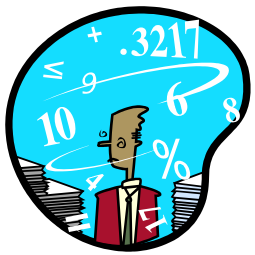
Settlements compares scheduled data vs. *actual* data to bill QSEs for charges, such as Load & Resource Imbalance.



Data Aggregation Relationship to Settlement

- The *ACTUAL* data used for the comparison has been:
  - Grouped by responsible entity (QSE, REP, LSE)
  - Converted to 15-minute settlement intervals (for non-IDR meters by using Load Profiles)
  - Adjusted for transmission & distribution losses
  - Adjusted to account for Unaccounted-for-Energy (UFE)

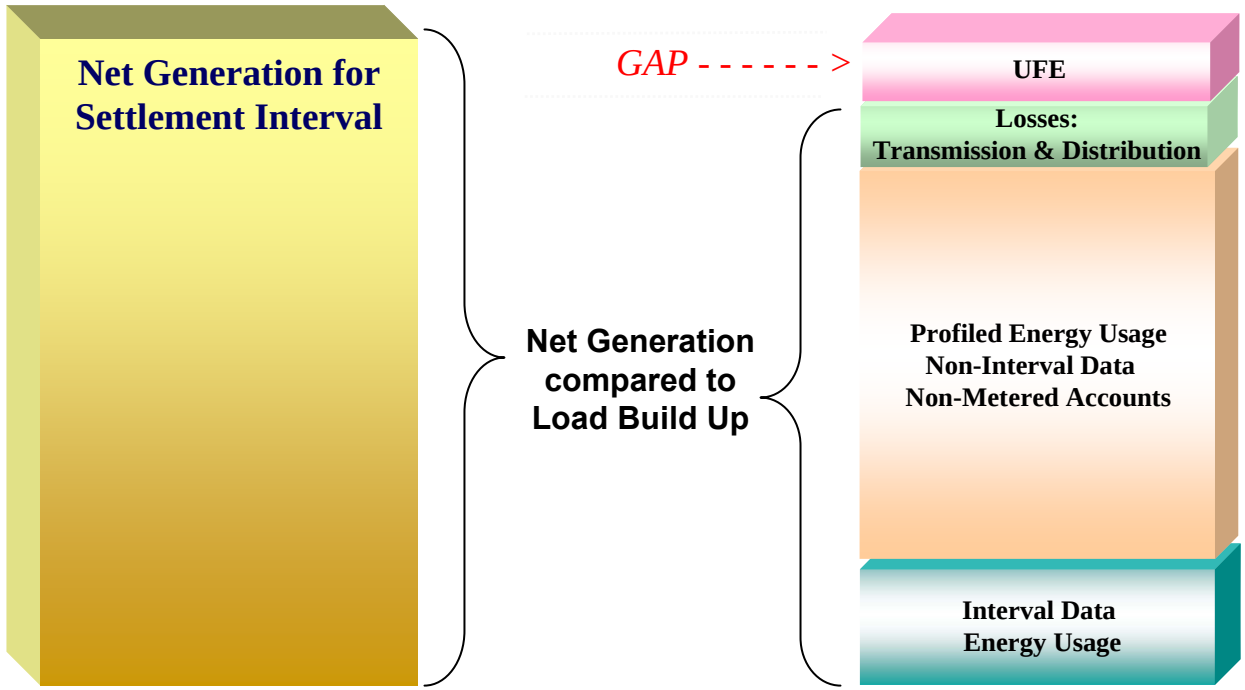
- Load Ratio Share is also determined



What are we trying to do with Load Profiling & Data Aggregation?

Determine load obligations for use in settlement calculations.

To determine load obligations, we must ensure that Load and Generation match so that all energy is accounted for.



Data Aggregation Process

Main Activities:

- **Generation Aggregation**
- **DC Tie Aggregation**
- **NOIE Aggregation**
- **Load Aggregation**

Data Aggregation Process

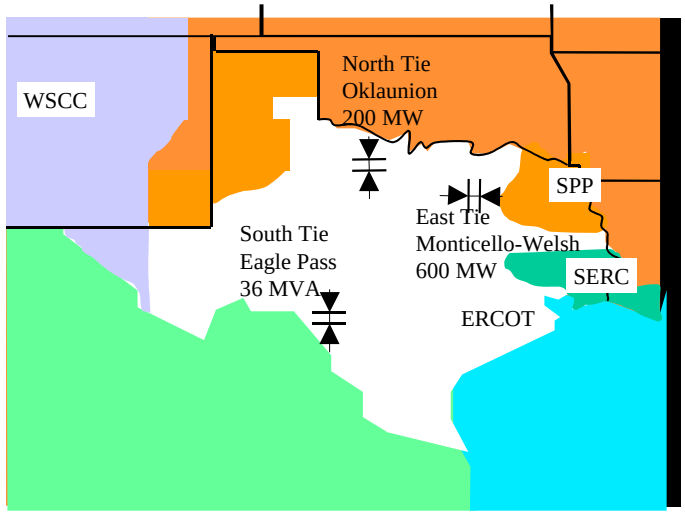
Generation Aggregation

- Collect Data
- Apply Loss Compensation
- Calculate Net Energy at the Site:
  - Net Generation or Load?
- Calculate each Unit's Output
  - Use Real-Time Telemetry/SCADA to determine unit output percentage
    - Apply % to Net Generation

DC Tie Aggregation

- Collect QSE bilateral schedules
- Compare against NERC tag

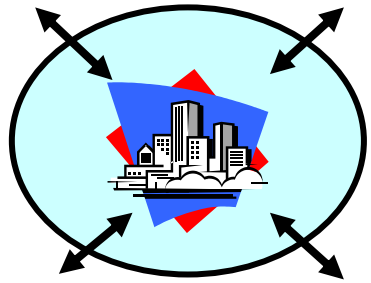
DC Imports = *GENERATION (+)*
DC Exports = *LOAD (-)*



Data Aggregation Process

NOIE Aggregation

- Calculate net inflows at NOIE meter points
- Add internal generation
- Adjust for internal transmission losses
- Adjust for NOIE external load

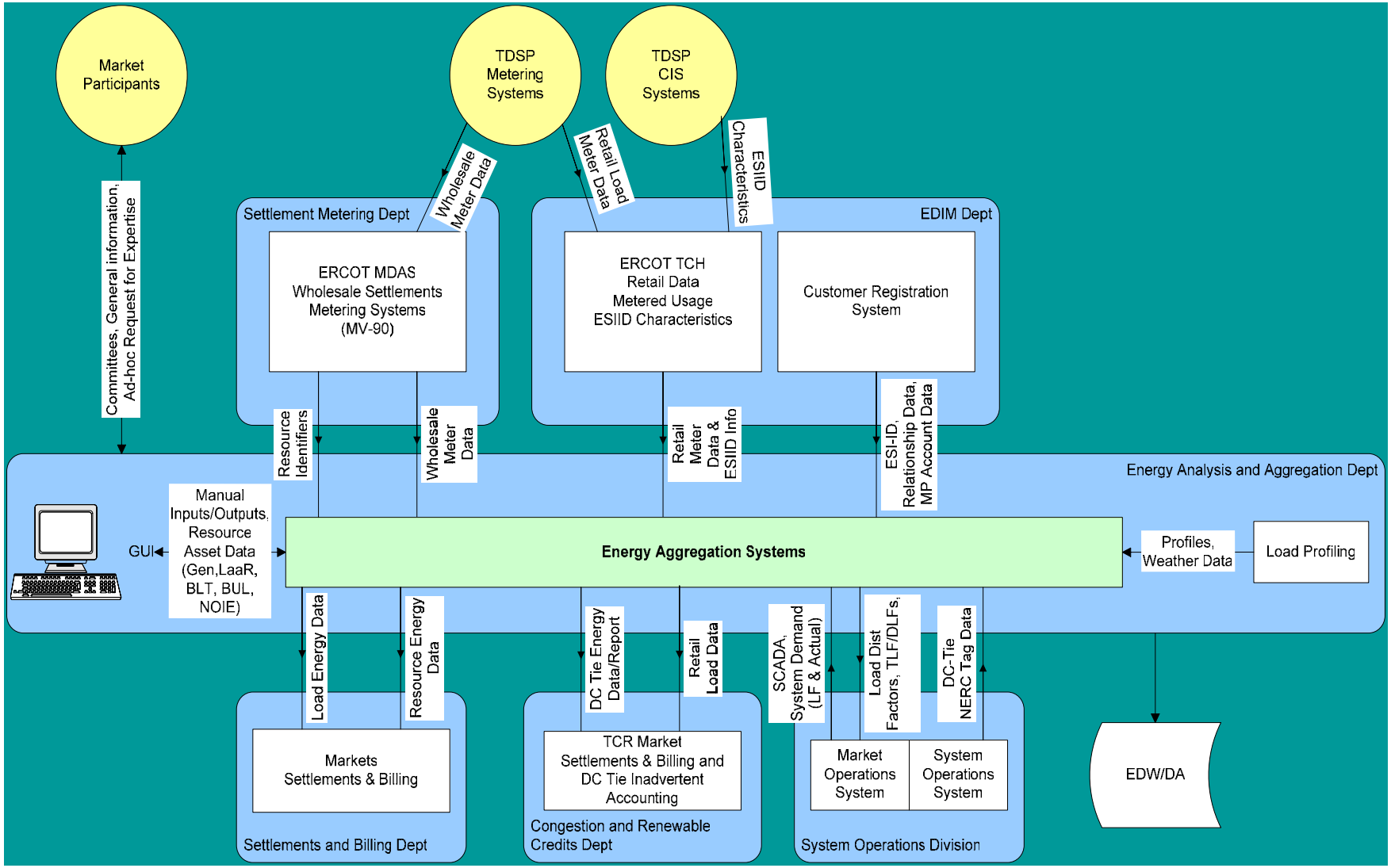


NOIE Points of Delivery

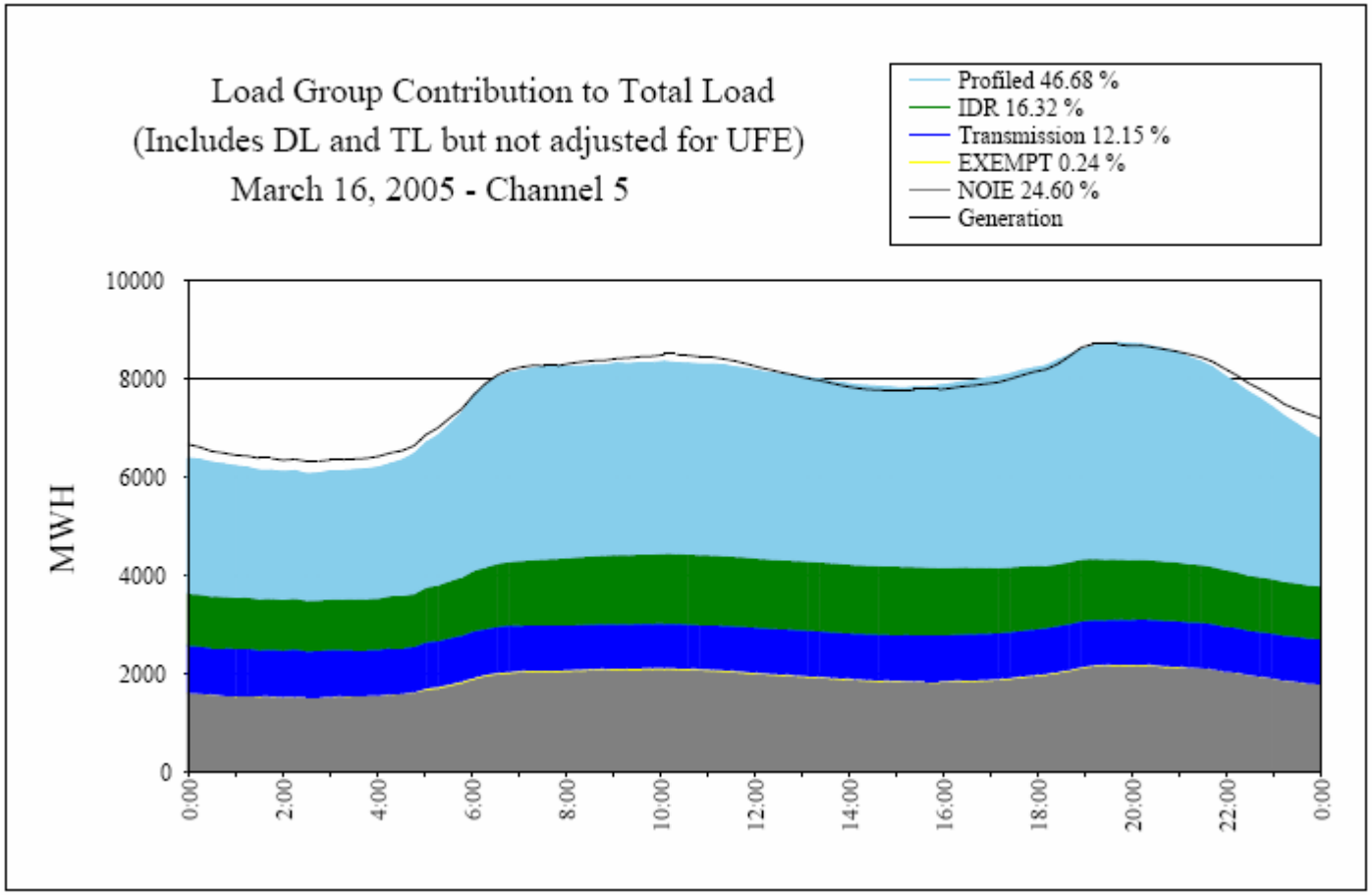
Load Aggregation

- TDSP Meter Data (Load Profiles applied)
- NOIE Data (Net Load / Gen)
- EPS Load Data
- Collect Meter Data
- Apply Load Profiles (convert to 15 minute data)
- Apply Transmission & Distribution Losses
- Apply Unaccounted-for-Energy (UFE)
- Calculate Load Ratio Share by QSE, LSE

Data Flow for Aggregation Process



Example of Aggregation Results



Settlement & Billing Overview

Settlement

- Process used to resolve financial obligations for Market Services procured through ERCOT for registered Market Participants
- Assess administrative & miscellaneous fees & provides transmission-billing determinants to Transmission and/or Distribution Service Providers (TDSP)

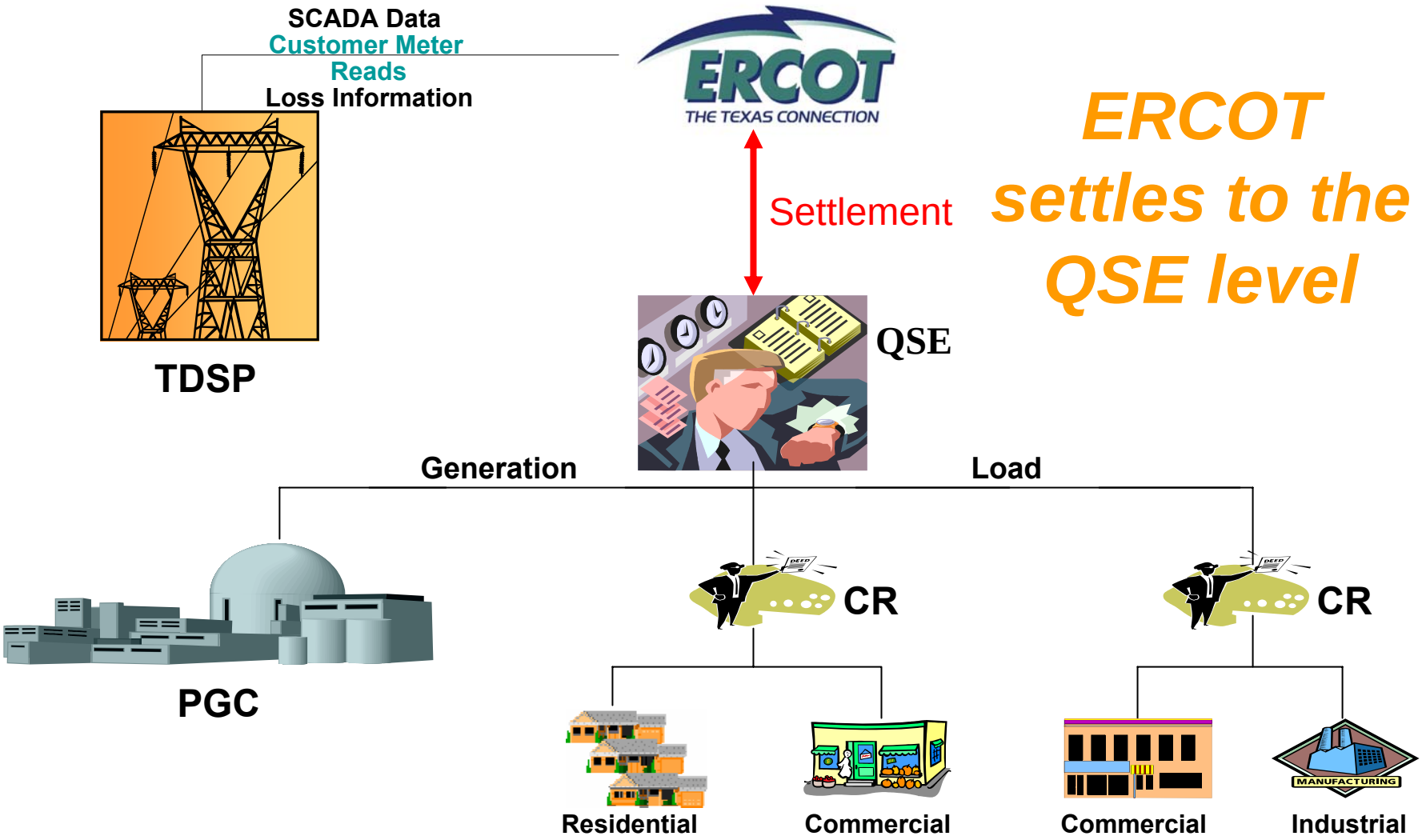
Daily Settlement Statements

- Reflect breakdown of market charges for hourly and 15-minute interval Market Services
- Includes administrative & miscellaneous fees and monthly and annual charges

ERCOT's Role in Settlements

- **Settle with each QSE**
  - Hourly intervals for capacity services
  - 15-minute intervals for balancing energy & congestion
- **Publish billing determinants, settlement statements & invoices**
- **Collect & remit all charges & payments via electronic funds transfer**
- **Provide dispute research and resolution**
- **Manage revenue neutrality**

Settlement Tree



Wholesale Market Timeline

ERCOT Market Timeline

Market Operations

Day-Ahead Period: *6:00am to 6:00pm prior to Operating Day.*

Adjustment Period: *Precedes Operating Period*

Operating Period: *Balancing Energy Clearing Occurs every 15 minutes*

Power Operations

Commercial Operations

Initial Settlement *17 days after Operating Day*

Final Settlement *59 days after Operating Day*

True-up Settlement: *180 days after Operating Day And/or specific Protocol Criteria is met*

Settlement Timeline

- **Energy consumed (Operating Day)**
- **Initial Settlement information provided**
- **Final Settlement for day 0 provided**
- **True-Up Settlement**

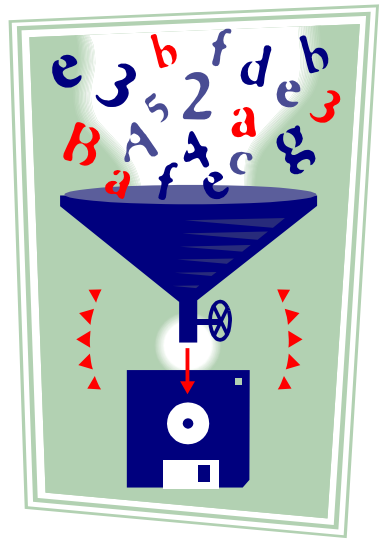
Invoices due in 16 days

Payments due by COB of due date (1700 CPT)

Disbursements paid the following day

Settlement and Billing Statistics

- Approximately 60 Charge Types
- 24 Capacity Intervals per day
- 96 Energy Intervals per day
- 80+ QSEs settled each day
- 3 trade days (minimum) on each statement
- An Estimated 300 Million Annual Line Items



Balancing Energy

- Balancing Energy represents the increase or decrease in energy dispatched by Settlement Interval in real time to ensure the balancing needs of ERCOT
- The energy is supplied by ERCOT through acquisition of resources (generating units and interruptible demands) to meet load variations not covered by Regulation Service
- Settled by comparing scheduled values to actual values

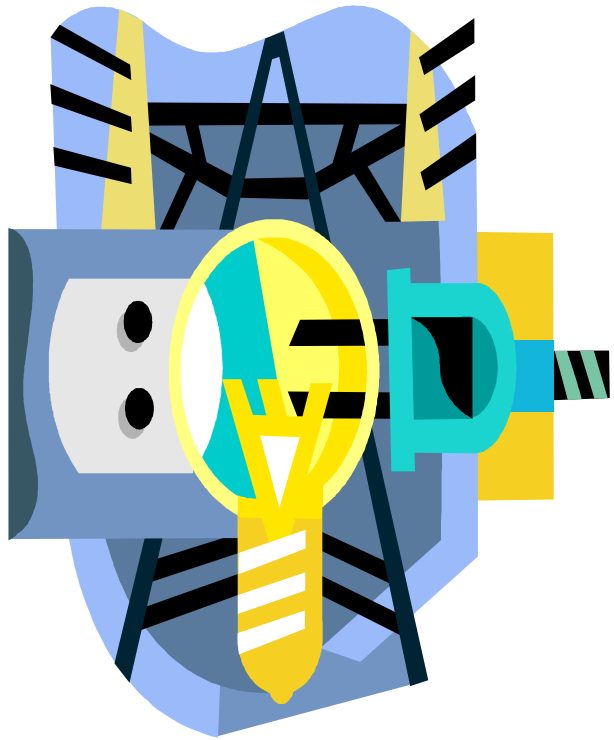
Ancillary Services

Capacity (Settled Hourly 24 Intervals)

- Regulation Reserves
- Responsive Reserves
- Non-Spinning Reserves
- Replacement Reserve
- Reliability Must Run (RMR)
- Out of Merit (OOM)
- Black Start

Energy (Settled 15-Minute 96 Intervals)

- Balancing Energy
- RMR Energy
- OOM Energy
- Black Start Energy



Contracted Services and Other Fees

- RMR Service Settlement:
  - Standby Fee, Startup Fee, Energy Payment, Non-performance Fee
- Black Start Service;
  - Standby Fee, Capacity Fee, Energy Payment
- Usage Fees- ERCOT Administrative Fee
- Non-ERCOT Administrative Fee

Cost of Congestion

How does congestion affect a QSE with load?

Local Congestion

- Total cost *Uplifted at Load Ratio Share* ERCOT-wide
- All *QSEs with load* pay for local congestion if it exists *anywhere*

Zonal Congestion

- *Direct Assignment* to *ALL QSEs* with schedules impacting congested CSCs
- Cost = *Schedule Impact on each CSC* * Shadow Price

Cost of Congestion

How does congestion affect a QSE that has no load?

Local Congestion

- No effect, no charges.

Zonal Congestion

- *Direct Assignment* to *ALL QSEs* with schedules impacting congested CSCs
- Cost = *Schedule Impact* on each CSC * Shadow Price

Transmission Congestion Rights (TCRs)

Transmission Congestion Rights (TCRs)

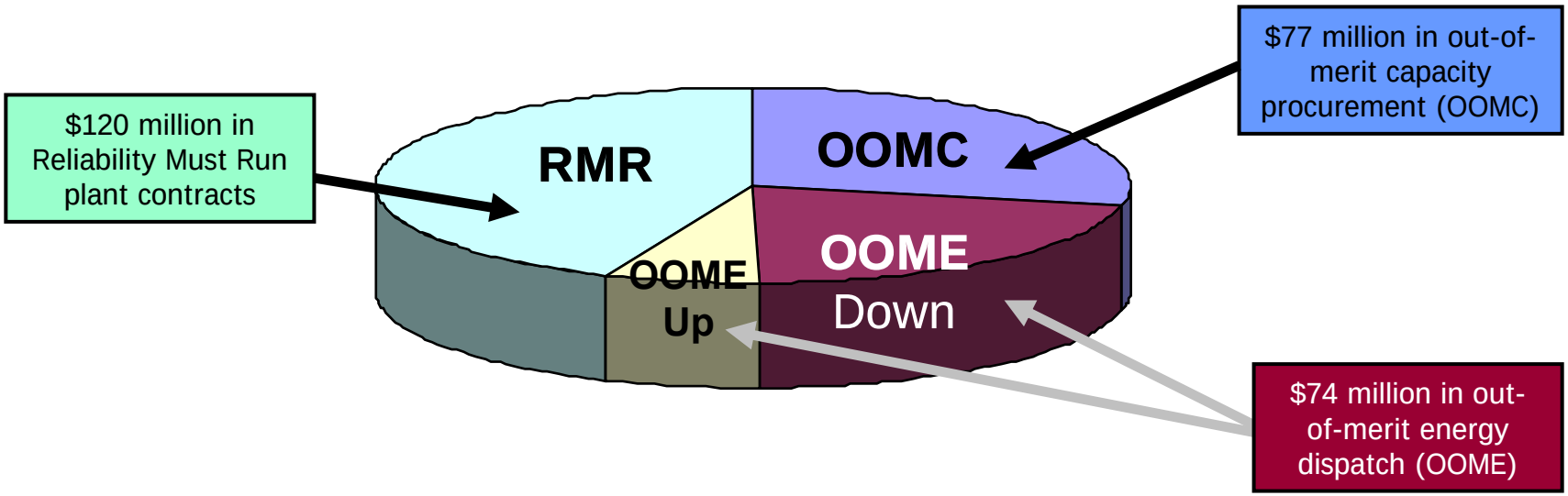
- *Financial instruments*
- *Can be a* hedge against congestion charges
- Revenues from TCR auctions go to QSEs @ LRS!

TCR Auctions

- TCR Auction Distribution:
  - *Annual -* 40%
  - *Monthly* - 60%

Transmission Congestion

Local Congestion Cost Breakdown 2004



- **$271 million in ERCOT local congestion costs in 2004**
  - 1% of ~$27 billion market

Falling Congestion Costs

- **Local congestion costs down ~35% (YTD ’05 vs. ’04) despite higher natural gas costs**

- **Drivers:**
  - ***Transmission improvements***
  - ***Dynamic line ratings***
  - ***Commitment to operator training***

Data Transparency

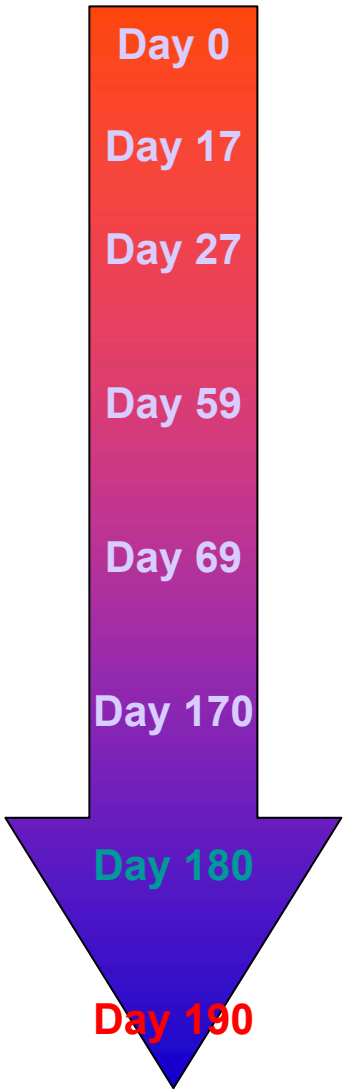
- **ERCOT provides underlying settlement information to market participants via data extracts and reports to facilitate shadow settlements.**

- **Settlement Disputes and Retail Data Extract Variances (DEVs) are the mechanisms for players to file disputes and seek correction to data for settlements.**

Dispute Process

- Disputes will be accepted for all Statements and Invoices
- Disputes on Initial Statements will be resolved on Final Statements
- Resettlement will occur for timely submitted disputes
- True-up Settlement will take place for resolution of issues between Final/Resettlement or True-up Process
- Alternative Dispute Resolution

Dispute Timeline



- Energy consumed (Operating Day)
- Initial Settlement information provided
- Timely Disputes for Initial Settlement due
- Final Settlement for day 0 provided
- Timely Disputes for Final Settlement due
- All Disputes Due
- True-Up Settlement
- Dispute on True-Up Due

Data Extract Variance Process

- Data Extract Variances are filed on ESIID level data
- Variances are filed by LSEs
- Filing timing requirements allow for resolution prior to true-up settlement of an operating day

4. Stakeholder services

ERCOT Independent System Operator

Does not own:

Generation, transmission, distribution, or end use customers

Does not set:

Market Policy

Does provide:

Operating and implementation services to buyers, sellers, G/T owners and marketers

No vested interest in the wholesale or retail price of power, but a strong interest in a well functioning market

ERCOT: Our Services

Reliability
- RMR procurement
- load forecasting
- transmission outage coordination
- scheduling and monitoring
- RMR dispatch (unit commitment)
- procurement
  - responsive reserve
  - non-spinning reserve
  - regulation service
  - balancing energy
  - out of merit service
- load shedding administration
- service interruption investigation
- transparency

Congestion Management
- congestion zone designation
- TCR market administration
- transparency

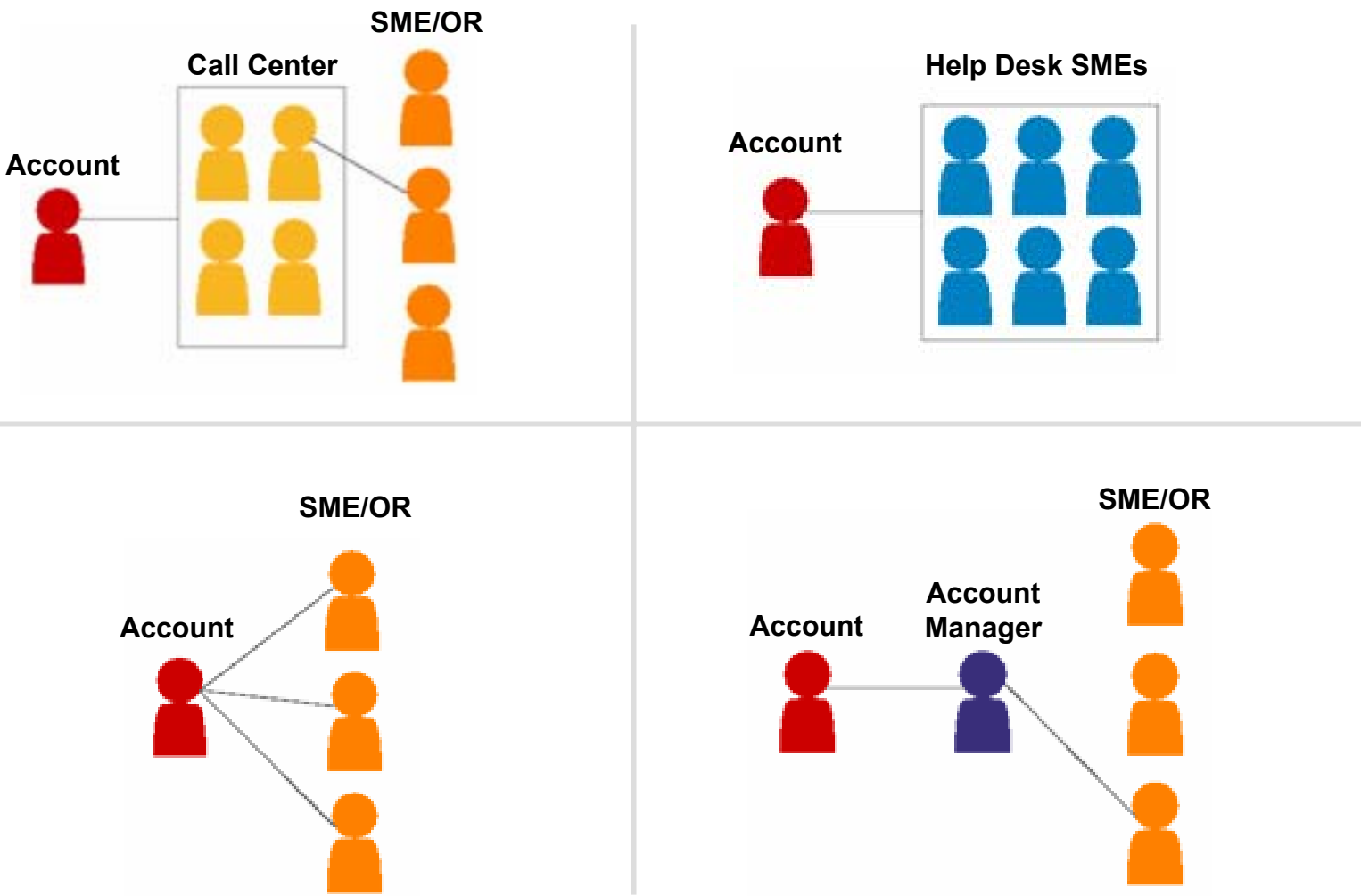
Transmission Planning
- grid planning
- transmission project tracking
- transparency

Settlement and Billing
- billing
- credit and collections
- payments
- transparency

Metering & Data Aggregation
- SCADA and polling data aggregation
- usage data aggregation
- load profiling
- UFE analysis
- meter inspections
- transparency

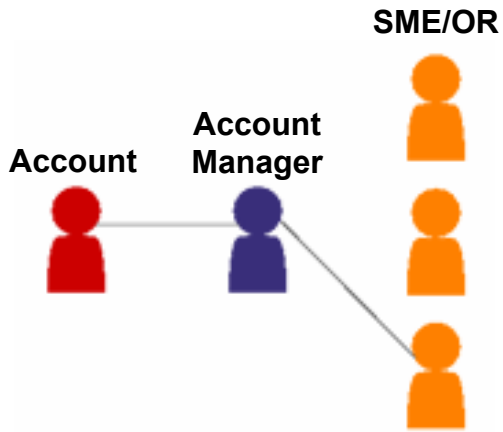
Central Registration
- A/S and BES Certification
- REP Certification
- maintenance of relationships
  - REP to QSE
  - Resource to QSE
  - Resource to technology
  - ESI ID to REP
  - ESI ID to TDSP
- transparency

Account Management Models



ERCOT's Account Manager Model

ERCOT chose this model because it:



- **Provides single point of contact for account**
- **Builds personal relationship between account staff and account manager**
- **Places the burden and accountability on the account manager – not the account – to find the appropriate resource to resolve the issue**
- **Serves operations by taking misdirected or excessive requests and navigating within the account – keeps ops team focused on ops**
- **Links many related MP facing activities: (1) communications, (2) MP operating performance, (3) issue response, (4) training/education, (5) dispute resolution and (6) satisfaction, into a consolidated account view**
- **MP service continuity maintained via "primary and secondary" AM**

How ERCOT Services Accounts

Three distinct areas of focus:

- **Account Development** – activities centered around setting up and orienting a new account
- **Transactional Support** – responding to day-to-day issues or questions about transactions
- **Market Management** – providing change management support as the market evolves

Account Development Services

Account Development Goals:

To ensure MPs a smooth transition into market, training and education, continuous improvement related to MP needs/performance, maintain personal connection, execute changes to status, resources, certification, contact information.

Activities:

- **Site visits**
- **Account plans**
- **Training and education**
- **Qualification, certification, registration**
- **Contact management**
- **Target improvement opportunities for training, communications or processes**

Transactional Support

Transactional Support Goals:

To ensure prompt and accurate responses to ad hoc inquiries, timely and accurate dispute processing, market notification communications, problem resolution and pattern analysis.

Activities:

- **Respond to ad hoc inquiries**
- **Manage dispute resolution**
- **Evaluate issue patterns**
- **Market notifications/communications related to day-to-day operations**
- **Target improvement opportunities for training, communications or processes**

Meeting Management

Meeting Management Goals:

Process management of governance model, S.P.C. for committee leadership and staff, communications and tracking of market change agenda

Activities:

- **Management of voting/seating of market committees**
- **Governance model "meeting management" and process improvement**
- **Agendas and minutes/notes for all market meetings – posted to ERCOT.com**
- **Survey MP "perceptions" regarding wide range of ERCOT services and management practices**
- **Target improvement opportunities for training, communications or process**

ERCOT Staff Goals

Professional support of the MP market meeting structure

- ***Consistent*** **execution**
- ***Efficient*** **way to meet the needs of the participants and staff**
- ***Right resources*** **available given the body type and agenda**
- ***Sound preparation*** **of ERCOT presentations and positions**
- ***Timely and precise communication*** **with stakeholders**
- ***Early identification of issues*** **and coordination across ERCOT**
  - **ID, coordinate, analysis/impact, position development,…**
- ***Optimal utilization*** ***of ERCOT facilities***

5. Change on the way

ERCOT in Transition

Start-up to an Operating Organization

Launch →	*Transition* →	*Operating*
Start-up		**On-going**
Technology enabled	**Core systems work**	**Customer focused**
Hard driving	**Assessment**	**Operating excellence**
Make it work	**Org. development**	**Business processes**
Make it work	**Change**	**Continuous improvement**

ERCOT Management Action

- **7 major audits or reviews conducted in 2004-05**
  - No compromises to grid reliability or market data found in any of the audits
- **ERCOT commits to major effort to improve internal controls, as identified by audits**
- **Management Action Plan under way**
  - Contracting and HR procedures strengthened and tightened immediately
  - Internal Control Management Program
- **Legislature and PUC offer tough scrutiny of ERCOT**
  - Internal controls and business processes
  - Spending and fiscal discipline
  - Communications and responsiveness
- **ERCOT agrees to Fee reduction after settlement discussions led by PUC Staff**
  - Effective $6 million budget cut for 2005
  - Additional $2 million set aside for audit compliance

Senate Bill 408

- **Passed at final deadline, regular session**
- **Consistent with Sunset Commission recommendations**
- **Reauthorizes PUC through 2011**

- **Adds 2 independent ERCOT Board members**
- **Rotates Board chairmanship among independents**
- **Requires Board members to recuse themselves from votes related to their company's interests**
- **Requires ERCOT Board meetings to be open to the public, with advance notice similar to Open Meetings Act**

SB 408 (continued)

- **Grants explicit authority to PUC:**
  - ✓ to require detailed financial information from ERCOT related to approval of the Administration Fee
  - ✓ for oversight over ERCOT budget and finances
  - ✓ to require or conduct audits
- **Strengthens market monitoring role with an increased responsibility for ERCOT**
  - ✓ ERCOT to fund and support the Independent Market Monitor selected by the PUC
  - ✓ Monitor reports to PUC
  - ✓ Enforcement responsibility remains with PUC
  - ✓ Rulemaking underway

Change on the way: PUC policy issues on the table

Market Power

Texas Nodal

Renewables (SB 20)

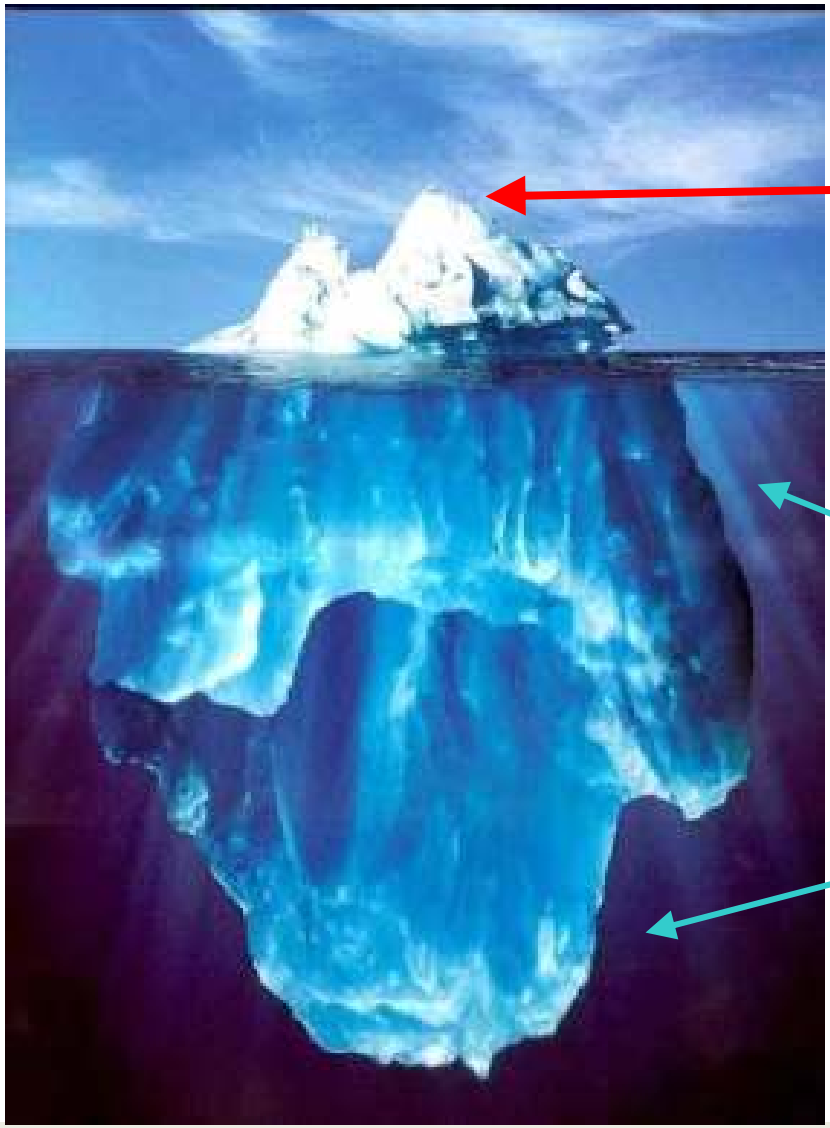
Resource Adequacy (energy only)

Independent Market Monitor

Price to Beat/ POLR/ Default Provider

BRAVE NEW WORLD!

ERCOT 101 Graduation



After today's presentation, you are here

This is the rest of the ERCOT Market

Thank you!

Questions?