Demand Side Participation in the Texas Nodal Market

Presented by the Demand Side Working Group of the

Electric Reliability Council of Texas

May 9, 2008

Welcome

Brad Belk
Lower Colorado River Authority
Chair, ERCOT Wholesale Market Subcommittee

Overview, Background, and Introduction

Mike Grable, General Counsel
Electric Reliability Council of Texas

ERCOT Region

DRAFT for DSWG 04-18-08

75% of Texas land area

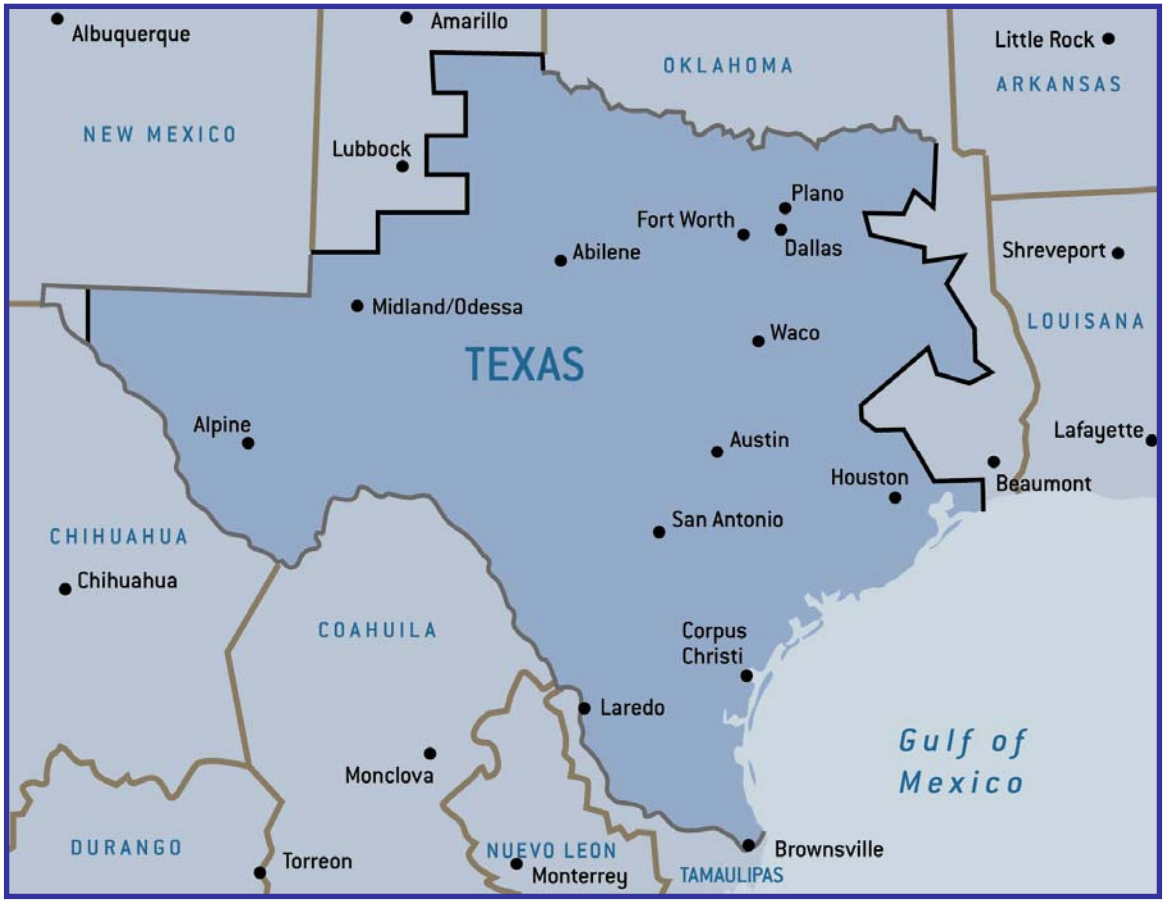
Includes Houston, Dallas, Fort Worth, San Antonio, Austin, Corpus Christi, Abilene and the Rio Grande Valley

Does not include:

- **El Paso area**
- **Texas Panhandle**
- **Northeast Texas**
  - Longview, Marshall and Texarkana
- **Southeast Texas**
  - Beaumont, Port Arthur, and the Woodlands

85% of Texas load

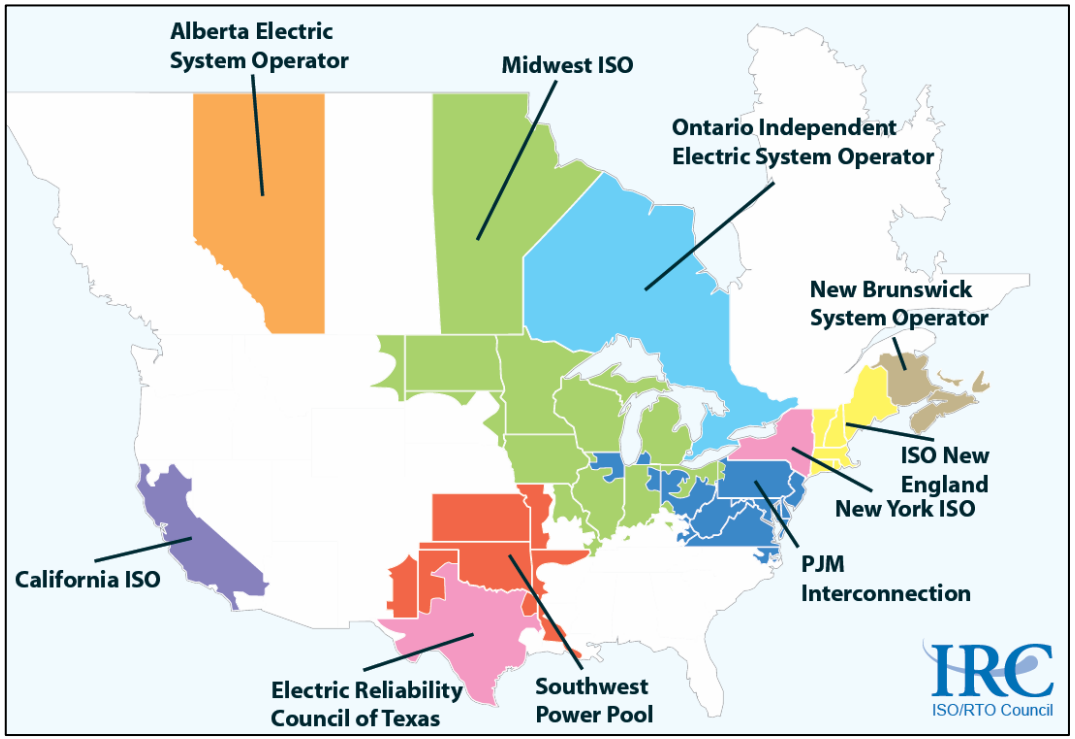
20 million Texans served



1996 – ERCOT was designated **Independent System Operator** (ISO) to insure impartial, third-party organization to oversee equal access to power grid.

This change was officially implemented **September 11, 1996**, when the ERCOT Board of Directors restructured its organization and initiated operations as a not-for-profit ISO, making it the first electric utility industry ISO in the U.S. (and the only one created under state law, not by FERC)

10 Independent System Operators / Regional Transmission Operators in North America



ERCOT Oversight and Governance

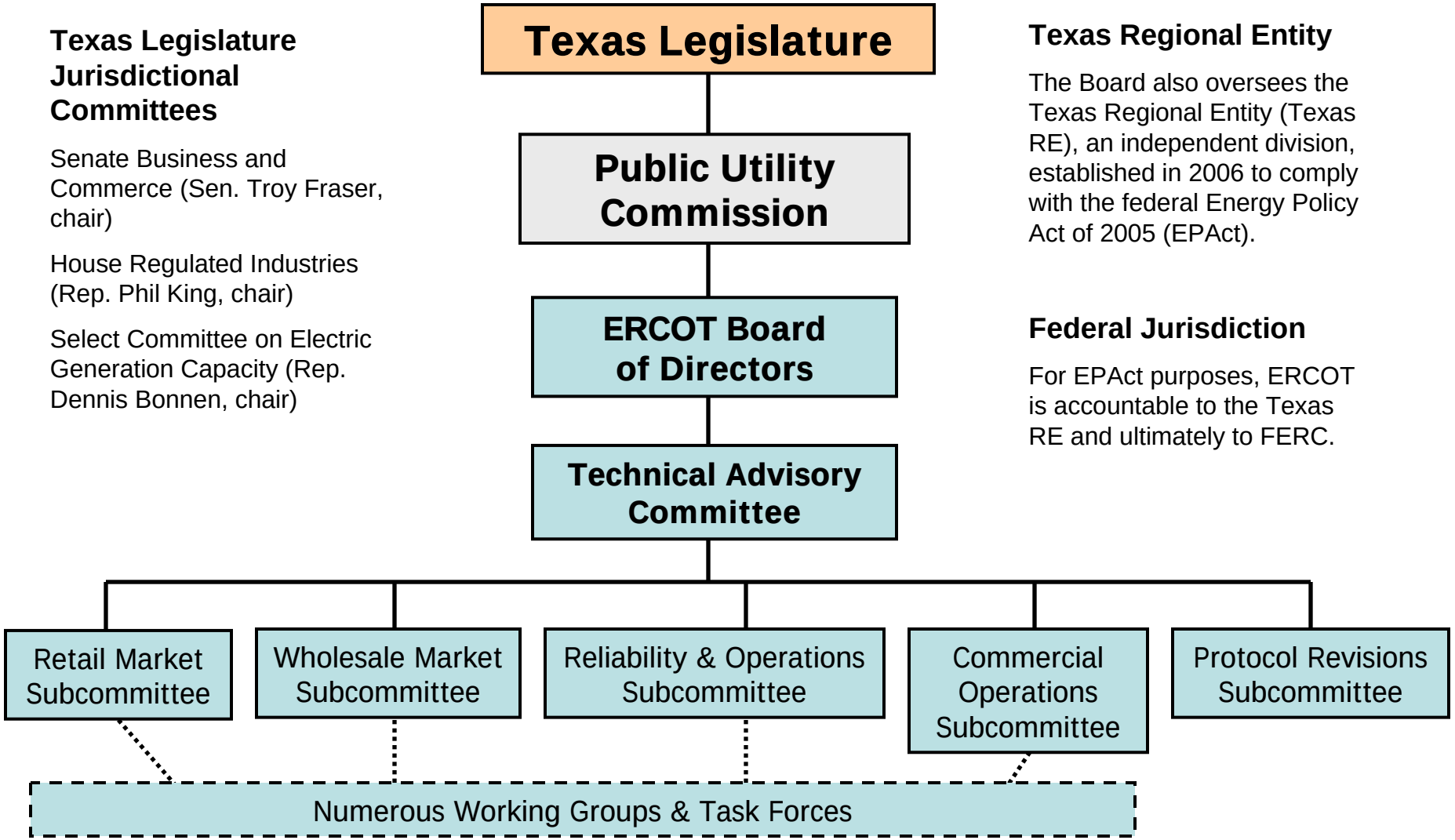
DRAFT for DSWG 04-18-08

Texas Legislature Jurisdictional Committees

Senate Business and Commerce (Sen. Troy Fraser, chair)

House Regulated Industries (Rep. Phil King, chair)

Select Committee on Electric Generation Capacity (Rep. Dennis Bonnen, chair)



Texas Regional Entity

The Board also oversees the Texas Regional Entity (Texas RE), an independent division, established in 2006 to comply with the federal Energy Policy Act of 2005 (EPAct).

Federal Jurisdiction

For EPAct purposes, ERCOT is accountable to the Texas RE and ultimately to FERC.

ERCOT's Responsibilities

DRAFT for DSWG 04-18-08

Ensure reliability – 'keep the lights on'

- Adequate transmission
- Adequate generation reserves for contingencies – 12.5% reserve margin
- Adequate instructions are provided to market participants

Manage grid operations – direct traffic on the grid

- Coordinate scheduling of power by market participants
- Monitor and analyze all grid components every 2-4 seconds for status, load and output
- Dispatch generation to ensure power production matches load at all times

Unlike in other commodities markets, electricity cannot be stored – it must be generated and consumed at nearly the same time.

An intricate physical balance must constantly be maintained between the amount of power generated and the amount consumed.

Manage market operations

- Ancillary Services Market
- Balancing Energy Market

Manage financial settlement for deregulated wholesale market

Administer customer switching for 6.1 million Texans in competitive-choice areas

- No other ISO in North America has this responsibility
- ERCOT's neutral registration agent often cited as a major reason for success of ERCOT market

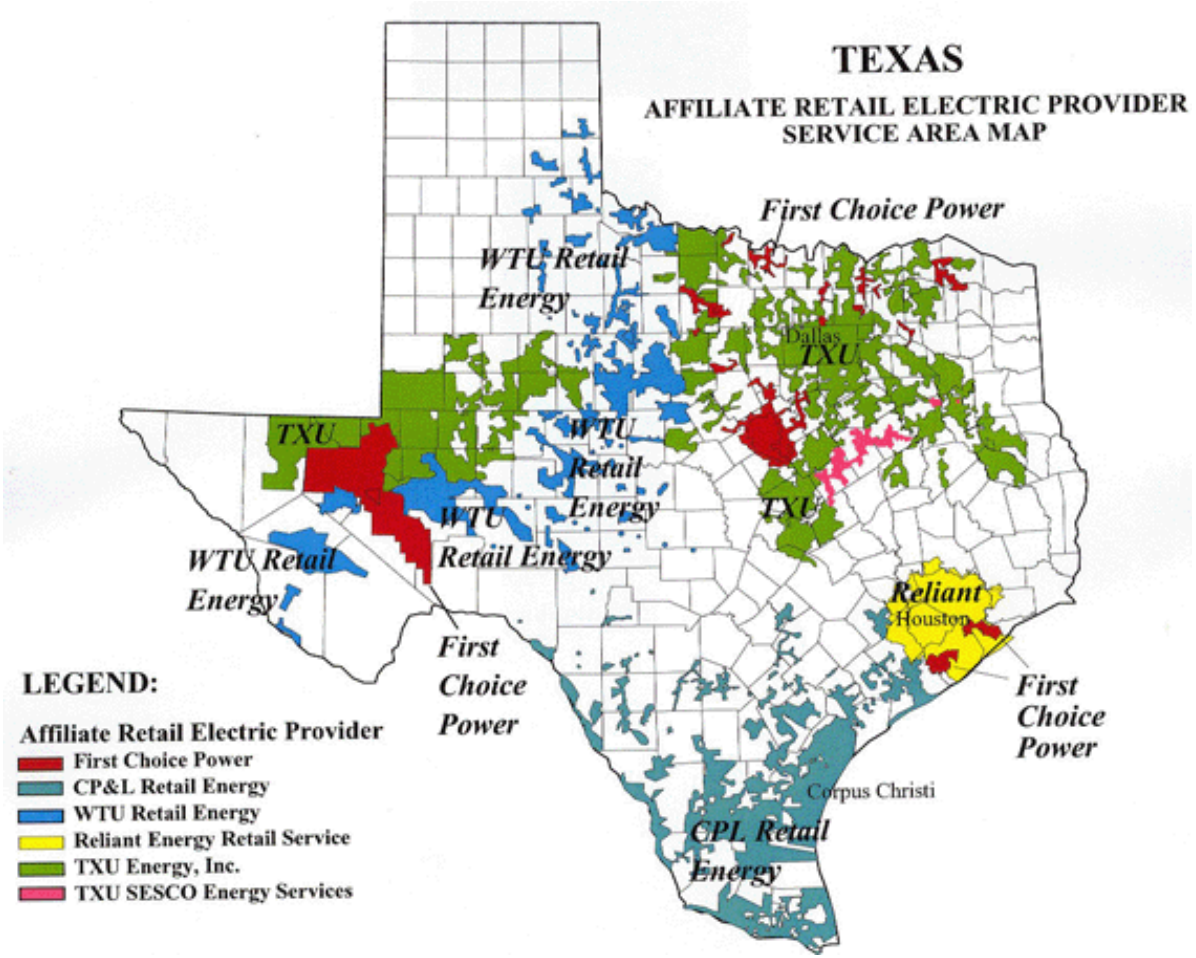
The ERCOT 'Retail Competition' Map

DRAFT for DSWG 04-18-08

- **This map shows the regions of Texas that are open to retail competition**
- **These are the areas served by the former monopoly investor-owned utilities (IOUs)**

IOU Transmission Providers

- **AEP Texas Central and North**
- **CenterPoint Energy**
- **Oncor Electric Delivery**
- **Texas-New Mexico Power Company**



Municipal Utilities and Co-ops (24% of the ERCOT Load) may opt in to competition

- To date, only Nueces EC has opted in

Antitrust Admonition

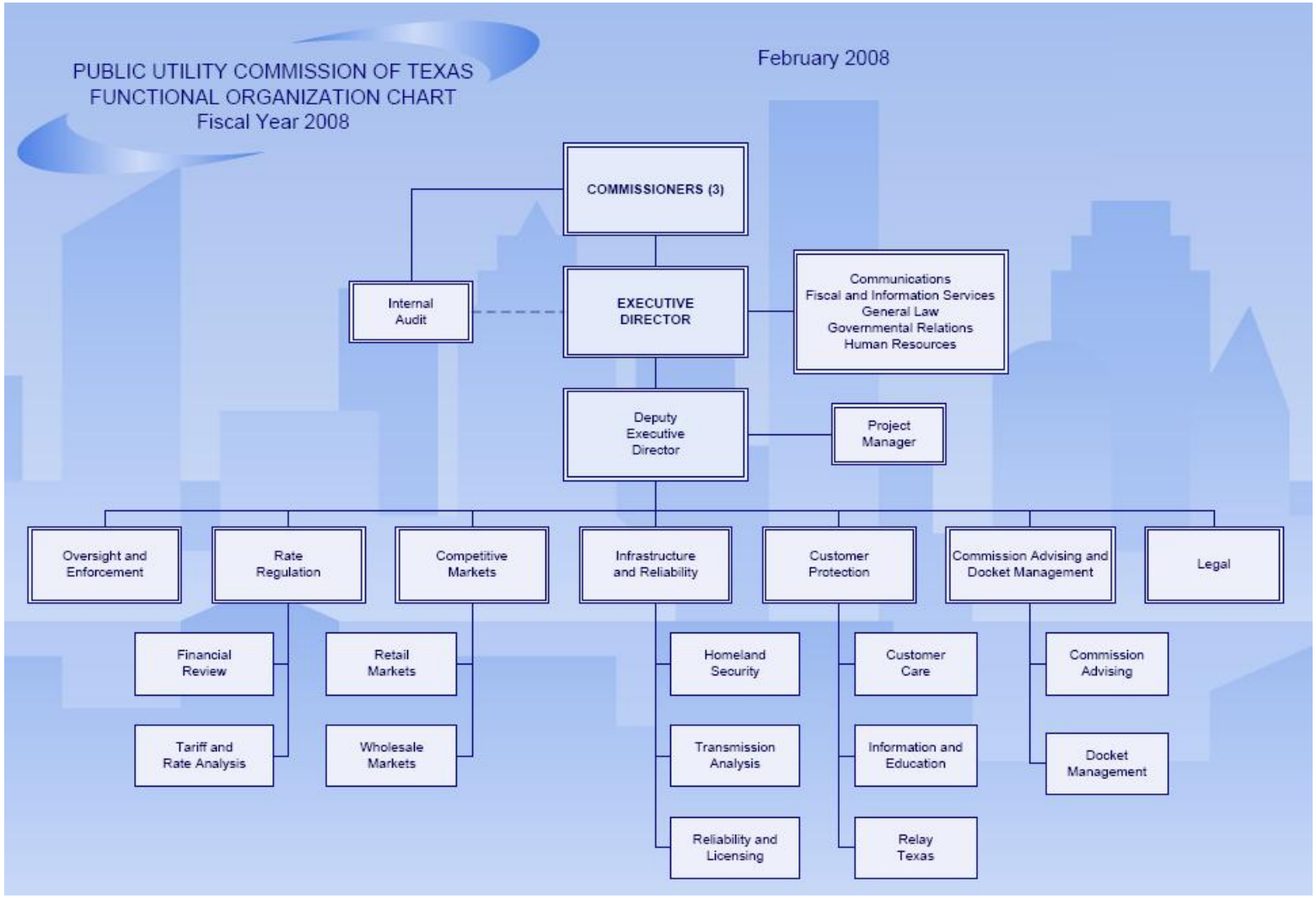
ERCOT strictly prohibits Market Participants and their employees who are participating in ERCOT activities from using their participation in ERCOT activities as a forum for engaging in practices or communications that violate the antitrust laws. The ERCOT Board has approved guidelines for members of ERCOT Committees, Subcommittees and Working Groups to be reviewed and followed by each Market Participant attending ERCOT meetings. If you have not received a copy of these Guidelines, copies are available at the Client Relations desk. Please remember your ongoing obligation to comply with all applicable laws, including the antitrust laws.

Importance of Demand Response in Nodal Market

Shawnee Claiborn-Pinto
Sr. Retail Market Analyst
Public Utility Commission of Texas

About the PUC

DRAFT for DSWG 04-18-08



DRAFT for DSWG 04-18-08

- 1975 - PUC established
- 1995 - Competitive wholesale market
- 1999 - Restructuring of retail market
- 2001 - Retail market opens with pilot
- 2002 - Full retail access (zonal)
- 2009 - Nodal wholesale market scheduled to open

The Commission supports Demand Response

DRAFT for DSWG 04-18-08

- **"Participation by loads is beneficial to the wholesale and retail markets and should be encouraged."-** ***Final Order 31540***
- **"Enhancing the opportunities for demand response can provide improved levels of reliability for customers who do not participate in the programs and financial benefits for customers who do."-** ***2007 Scope of Competition Report***

Commission thoughts on Demand Response

DRAFT for DSWG 04-18-08

- **"Robust load participation is a key element in well functioning, competitive electricity markets." - *Finding of Fact 46 – Docket 23320***
- **"ERCOT should develop additional measures and refine existing measures to enable load resources a greater opportunity to participate in the ERCOT markets." - *Finding of Fact 47 – Docket 23320***
- **"Load participation is a key element in well-functioning, competitive electricity markets." – *Finding of Fact 40 – Docket 31540***
- **"It is appropriate to defer further consideration of load-participation issues to a subsequent project. The investigation of load participation in wholesale and retail markets is necessary to ensure that the full benefits of these programs are included in the new wholesale market." - *Finding of Fact 42 - Docket 31540***

- **The commission believes that the energy only resource adequacy mechanism will work more effectively when a wider and deeper range of load response is available to the market.**

- **Under the energy-only resource adequacy mechanism the Commission endorsed, demand response can provide the following benefits:**
  - provide additional operating reserves;
  - avoid or reduce the impact of system emergencies;
  - increase the range of potential products that REPs can sell;
  - mitigate the market power of generators;
  - provide additional means for retail customers to respond to high prices; and
  - "shave" peak prices.

ERCOT Market Structure

Mary Anne Brelinsky
Vice President, Lehman Brothers
Chair, ERCOT Demand Side Working Group

DRAFT for DSWG 04-18-08

- **Created in 2001 as a "Task Force" by directive of the Public Utility Commission of Texas**
- **In 2002 the Demand Side Task Force was converted into a permanent Working Group**
- **A broad range of Commercial and Industrial consumers, LSEs and REPs, TDSPs, and Generators participate in DSWG meetings and initiatives**

- **2008 Chairman:**
  Mary Anne Brelinsky, Lehman Brothers
- **2008 Vice Chairman:**
  Nelson Nease, Nucor Steel Texas
  Tim Carter, Constellation New Energy
- **ERCOT Demand Representatives:**
  Paul Wattles
  Steve Krein

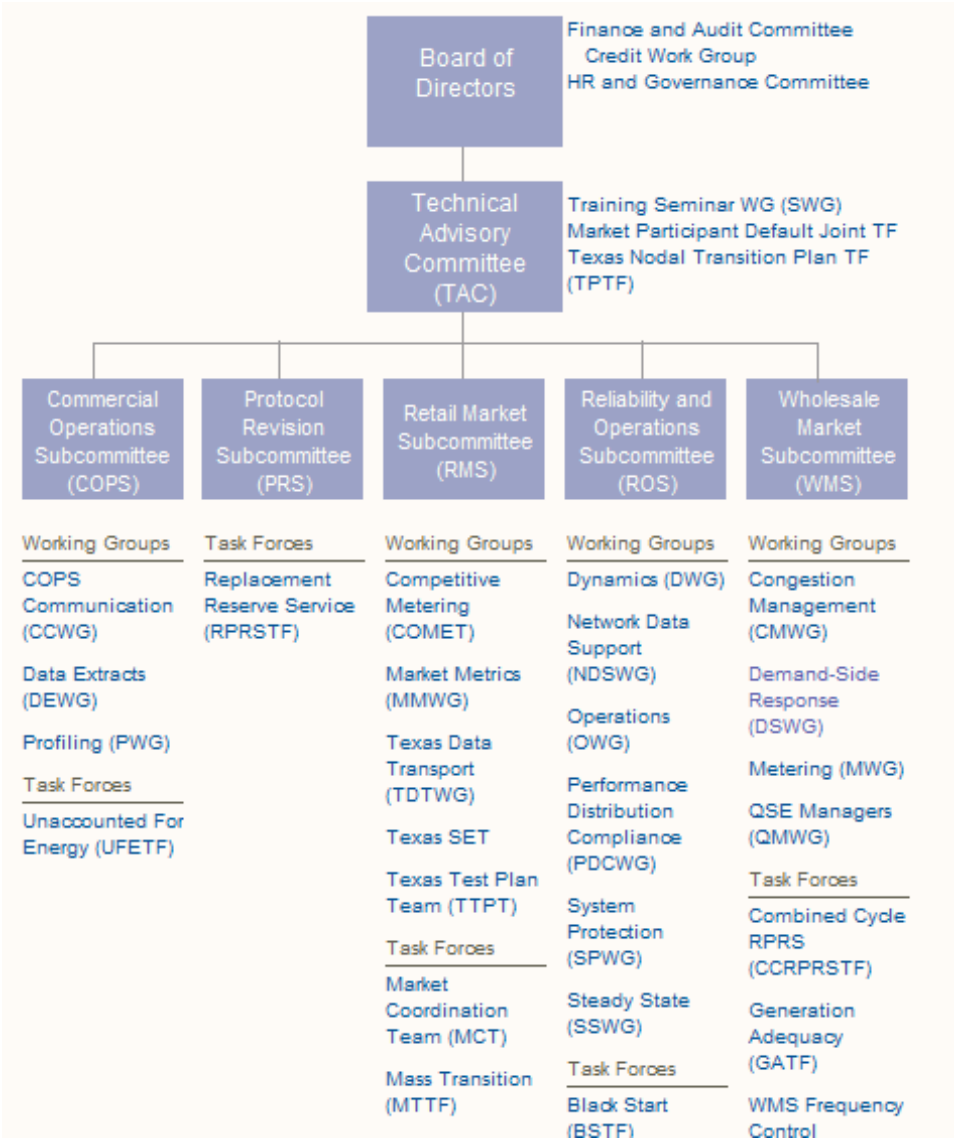
DRAFT for DSWG 04-18-08

The Demand Side Working Group's mission is to identify and promote opportunities for demand-side resources to participate in ERCOT markets and to recommend adoption of Protocols and Protocols revisions that foster optimum load participation in all markets.

Texas Uses A Stakeholder Process

DRAFT for DSWG 04-18-08

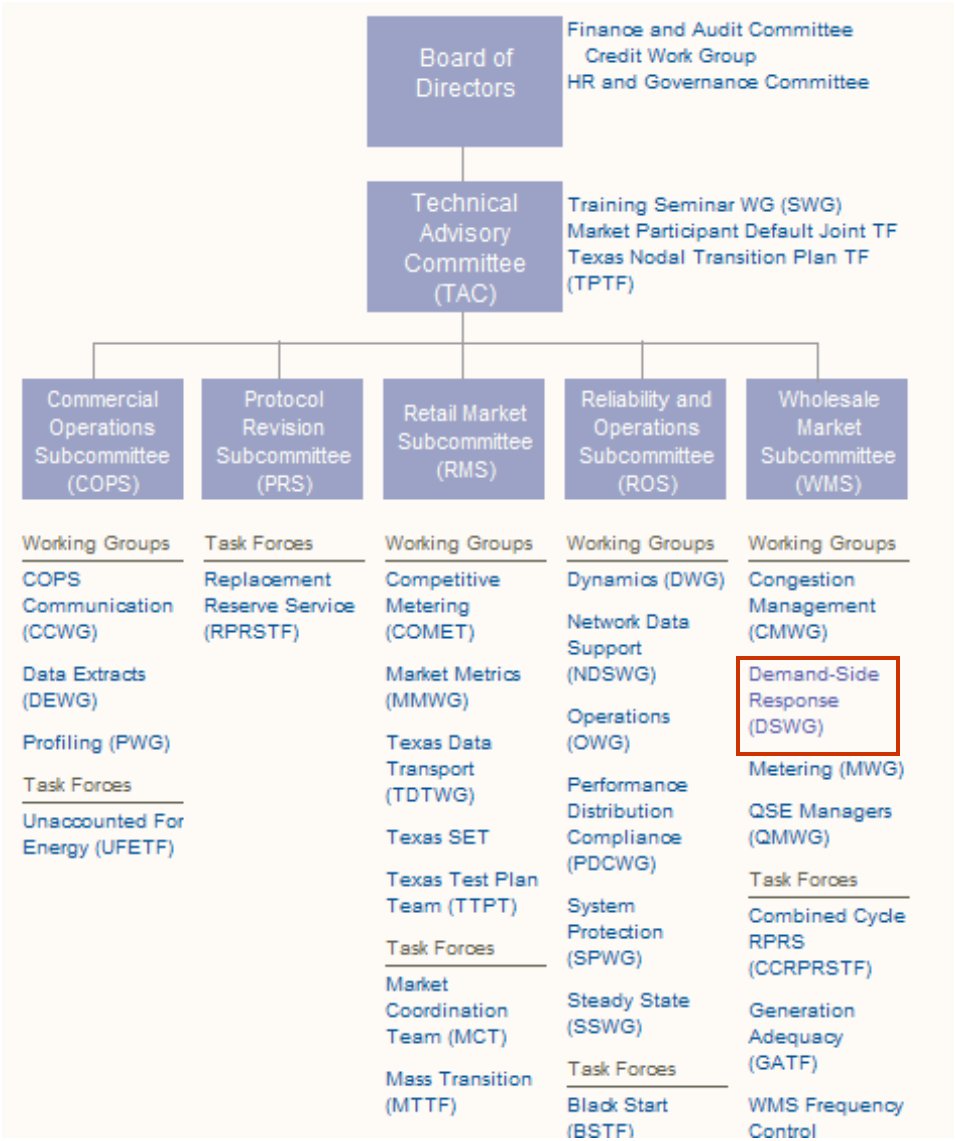
- **Rules are made using a "Stakeholder" process**
- **Changes to market rules are made and implemented by elected stakeholders**
- **Market participants fall into the following categories:**
  - Consumers
  - Electric Cooperatives and River Authorities
  - Independent Generators
  - Independent Power Marketers
  - Independent REPs
  - Investor Owned Utility (wires)
  - Municipal Utilities



ERCOT Committee Structure

DRAFT for DSWG 04-18-08

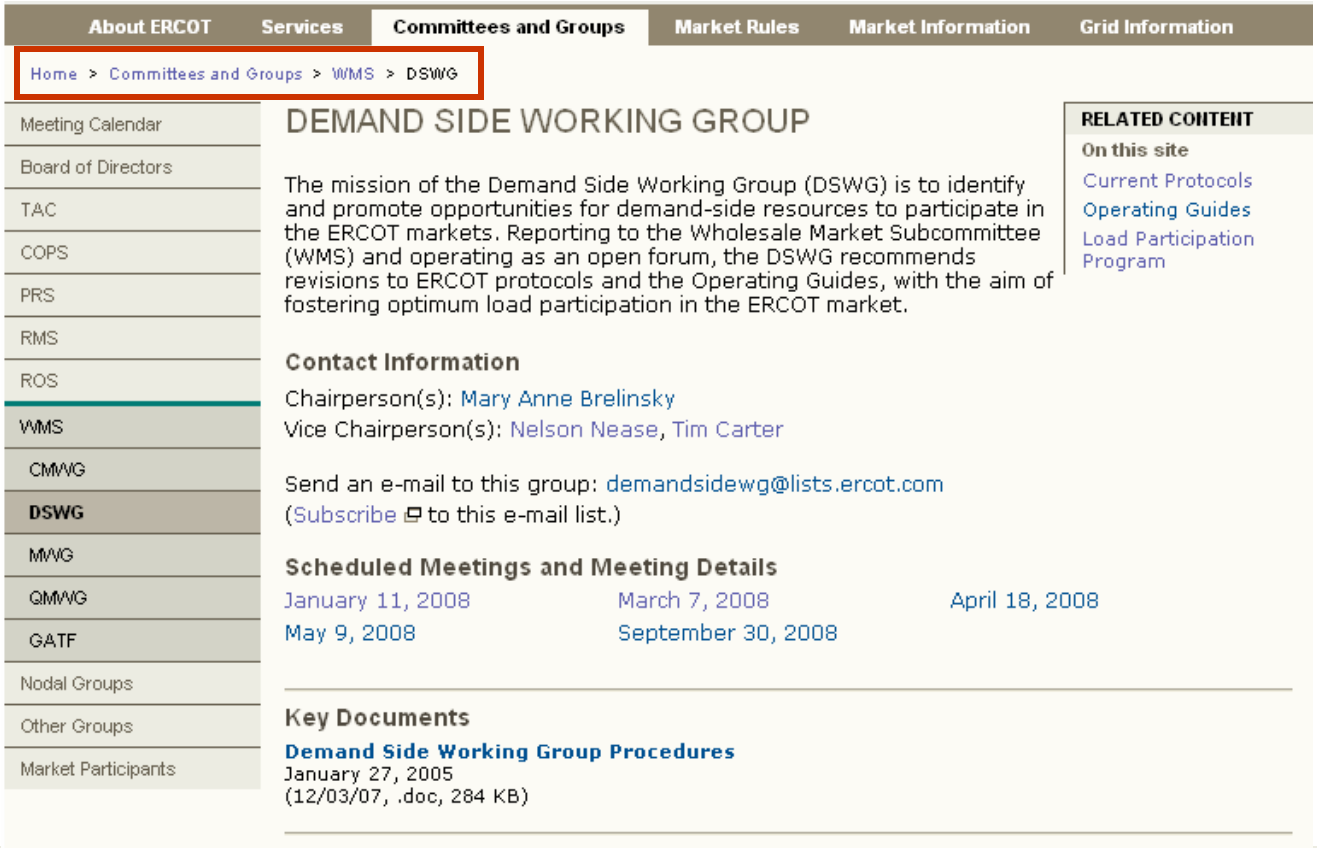
- **DSWG is a chartered subcommittee working group**
- **Currently the Demand Side Working Group reports to ERCOT's Wholesale Market Subcommittee (WMS)**
- **DSWG meets either monthly or bi-monthly depending on number or items or projects impacting working group**
- **Provide updates and reports at monthly WMS meetings**



How Do You Participate in DSWG?

DRAFT for DSWG 04-18-08

- **Membership is not limited to ERCOT members; anyone can participate in DSWG meetings**
- **Every member has an opportunity to voice opinions and participate**
- **Meeting dates can be found at www.ercot.com**
- **To add items of interest to our agenda please contact Mary Anne Brelinsky or Steve Krein**



2008 Goals and Objectives

DRAFT for DSWG 04-18-08

DSWG Goals for 2008 Update						
#	DSWG Goal	Deliverable	Target Date	Primary Owner	Additional Team Members	Status
1	Conduct Nodal Training Workshop for End Use Consumers	Workshops Completed and Presentations Posted on Website	End of 2nd Quarter	**Paul Wattles**	Jay Z, Mary Anne B, Floyd, Scott W	In Progress
2	Notice of Nodal LMP & Load Zone Prices	Document to post on DSWG web site	End of 1st Quarter	**Jay Zarnikau**	Mary Anne, Floyd T, Nelson N	In Progress
3	RUC Capacity Short Charge—How do you insulate price responsive loads from these charges	Overview at DSWG Meeting in July	End of 2nd Quarter	**Mark Smith**	Nelson N, Scott W, John T, Tim B	In Progress
4	Review of Dynamics Working Group Study on LaaR Participation	Summary Report and Presentation to DSWG, Possibly Comments to ROS	End of 3nd Quarter	**Steve Krein**	Scott W, Rick K, Malcolm S, Roger Y	Not Started
5	Revisit DLC and Energy Aggregation and create Roadmap of issues related to AMI settlements	Review Infrastructure requirements to support DLC and Mass Market Programs	End of 4th Quarter	**Steve Isser**	Jay Zarnikau and Eric Goff	In Progress
6	LR Participation in Nodal and Potential Issues of Negative Bidding	NPRR to address Issue	End of 3rd Quarter	**Mary Anne Brelinsky**	Malcolm S, Scott W.	In Progress
7	Develop Guidelines for Alternative to IDR Metering for EILS	Protocol revision	End of 3rd Quarter	**Paul Wattles**	John T	
8	4CP and Price Responsive Load Analysis	Report and Presentation to the DSWG	End of 3rd Quarter	**Paul Wattles**	Malcolm S, Mark S.	Not Started
9	Nodal Implementation of LR and How Procurement and Proration will work with Unit Specific Procurement	Presentation to DSWG	End of 2nd Quarter	**Steve Krein**	Paul W	In Progress
10	Wind Study Ancillary Service Product	Outline potential 15 minute AS Product	End of 4th Quarter	**Tim Carter**	Mary Anne, Floyd T, Nelson N	Not Started

Your Participation Is Important!

DRAFT for DSWG 04-18-08

- **What is done now for Nodal will impact your ability to participate for years to come**
- **There are many Nodal Protocols issues that will affect the market rules for participation (i.e. whether your load is suitable, physically and /or financially, for providing Ancillary Services)**
- **If you have a stake, you cannot afford not to participate**

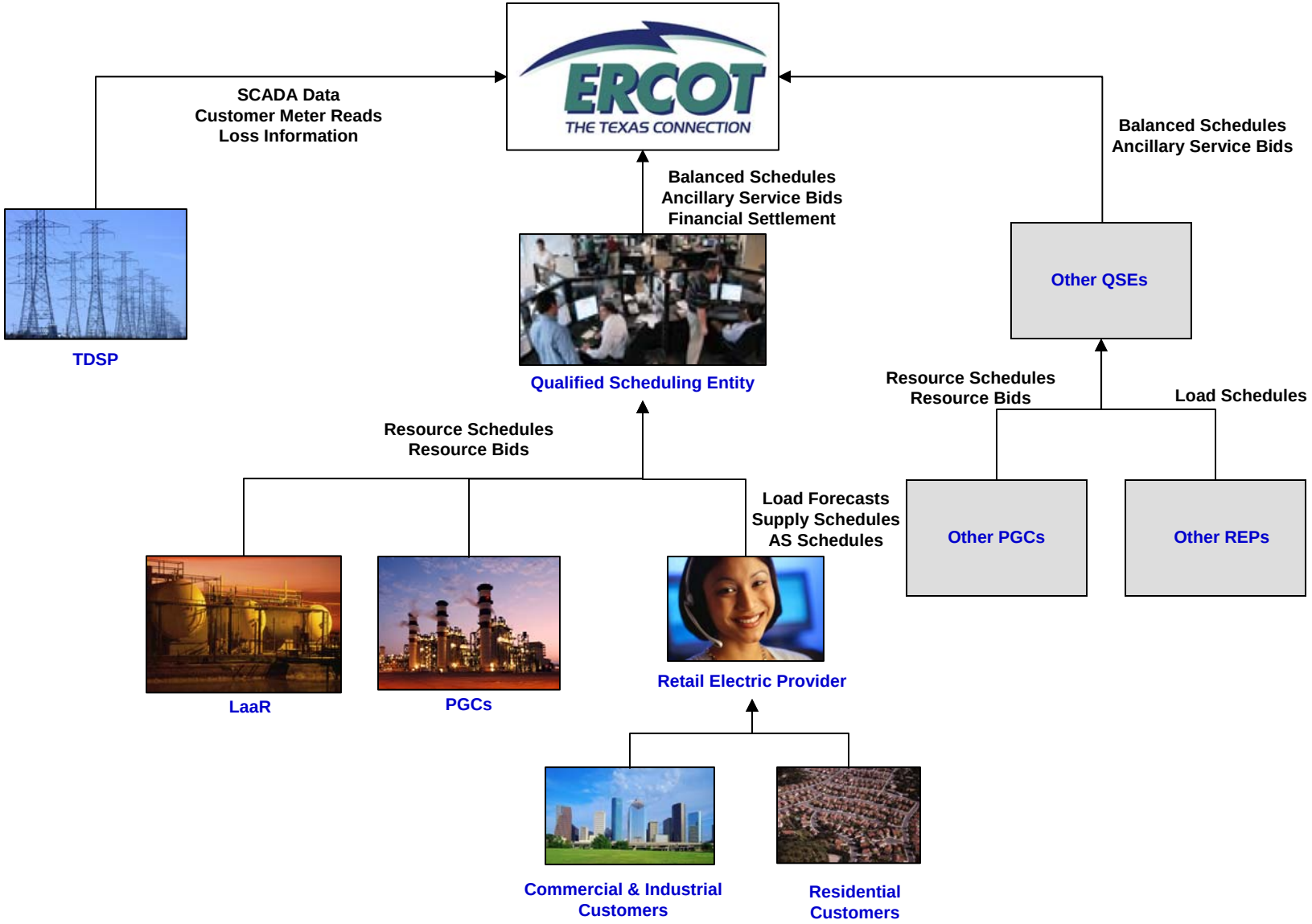
Market Participant Acronyms and Terms

DRAFT for DSWG 04-18-08

- **ERCOT – Electric Reliability Council of Texas - certified by the Public Utility Commission of Texas as the Independent System Operator (ISO)**
- **LSE – Load Serving Entity - Provides electric service to retail and wholesale customers. LSEs include Retail Electric Providers, Competitive Retailers, and Non-Opt In Entities that serve Load.**
  - **REP:** Retail Electric Provider – A person or group that sells electric energy to retail Customers in ERCOT
  - **CR:** Competitive Retailer – A Municipally Owned Utility or Electric Cooperative that offers Customer Choice and sells electric energy at retail in the restructured electric power market in Texas; or an REP
  - **NOIE:** Non-Opt In Entity – An Electric Cooperative or Municipally Owned Utility that does not offer Customer Choice
- **PGC - Power Generation Company**
- **QSE – Qualified Scheduling Entity - Market Participant that is qualified by ERCOT to submit Balanced Schedules and Ancillary Services bids and settle payments with ERCOT**
- **TDSP - Transmission and Distribution Service Provider - Owns or operates for compensation in this state equipment or Facilities to transmit and/or distribute electricity, and whose rates for Transmission Service, distribution service, or both is set by a Governmental Authority**

ERCOT Market Participant Structure

DRAFT for DSWG 04-18-08



- **The current ERCOT market rules allow demand side participation under three general classes of services:**

Resource Type	Service that can be Provided	Requirements
Voluntary Load Response	Curtailment or reduction in response to Market Price or other factors	• Metering and/or curtailment technology defined in REP contract
Qualified Balancing Up Load (BUL)	Balancing-Up Load (associated with the Balancing Energy Market)	• IDR meter • ERCOT Qualification
Load Acting as a Resource (LaaR)	Various ERCOT Ancillary Services (AS)	• IDR meter • Telemetry • ERCOT Qualification
Emergency Interruptible Load Service (EILS)	Curtailment in response to ERCOT Dispatch	• IDR meter • ERCOT Qualification

- **These products and services are impacted by Nodal and that is the primary reason we are here today.**

Texas Nodal Electricity Market Overview

Floyd J. Trefny, P.E.
Director of Market Design
Reliant Energy

Why a Nodal Market?

DRAFT for DSWG 04-18-08

- **In the Zonal markets today, a price is established across a large geographic area to represent the value of energy in that area**
- **Major transmission lines that connect the areas are used when moving power from one area to another**
- **If these major transmission lines are limited then the generation from one area can not be moved to another area**
  - Thus, the generation located in the area must be used to meet the load demands of the area even if it is at a higher price
  - This creates differences in prices (MCPE) between the large areas
- **When the zonal market was designed, most participants thought that only the large transmission lines between zones would govern which generation to use**
  - Management of the smaller lines constraints would be minimal and cost consumers no more than $20 M per year

@

Why a Nodal Market?

DRAFT for DSWG 04-18-08

- **The management of transmission constraints inside the area is costing consumers averaging $221 million per year**
  - Not reflected appropriately in the prices paid for energy
- **New generation was being built, but in locations where more transmission would have to be built to get the generation to the loads in the cities**

	TOTAL
2001	26,605,341
2002	225,812,847
2003	405,154,453
2004	279,024,665
2005	266,567,435
2006	183,626,919
2007	163,546,576
2008	12,950,078
Grand Total	1,563,288,314

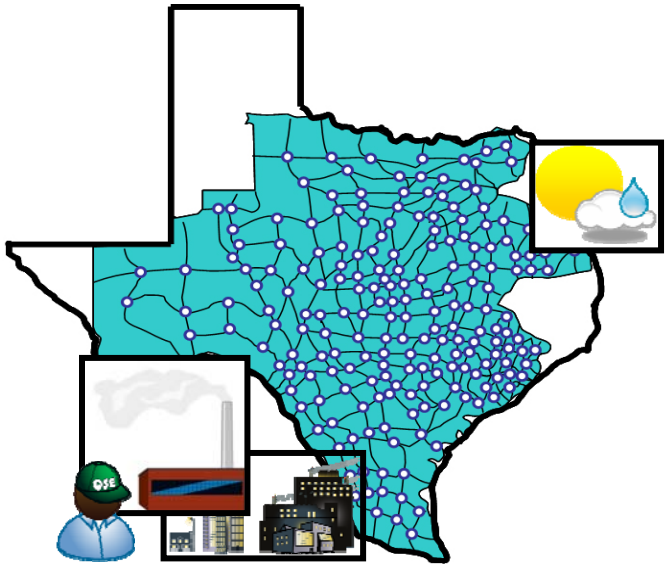
- **The Public Utility Commission acted and passed a new rule §25.501 in November 2004 directing ERCOT to build a new wholesale market** ***"… shall promote economic efficiency in the production and consumption of electricity; support wholesale and retail competition; support the reliability of electric service…"***

- **The commission directed ERCOT to:** ***"… directly assign all congestion rents to those resources that caused the congestion." and "Nodal energy prices for resources shall be the locational marginal prices…" or LMPs***

What is a Nodal Market with LMPs?

DRAFT for DSWG 04-18-08

- **Least cost dispatch of generation**
- **Manage all Transmission Element limitations**
  - Flows on Lines & Transformers
  - Generation Limits
  - F lows from on major area to another
- **Price Mitigation if a transmission constraint is not competitive**
  - Sometimes there is a limited number of generators that can manage the constraint

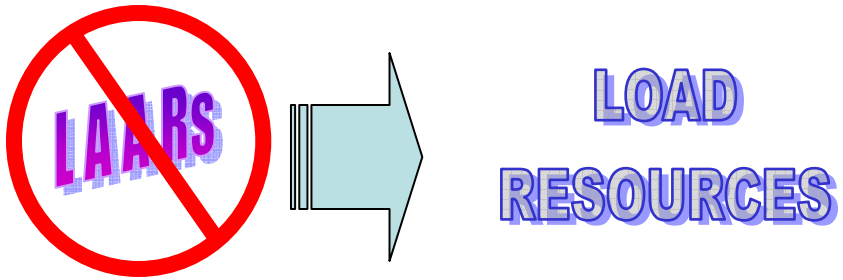


- **Results in a solution that tells Generation Resources how much to generate and computes the value of energy at every Electrical Bus on the Grid**
- **Generators are paid the value of energy on the bus where they generate**
- **Loads are charged the bus load weighted average value of energy in the Load Zone where it is located**

Nodal Protocols

DRAFT for DSWG 04-18-08

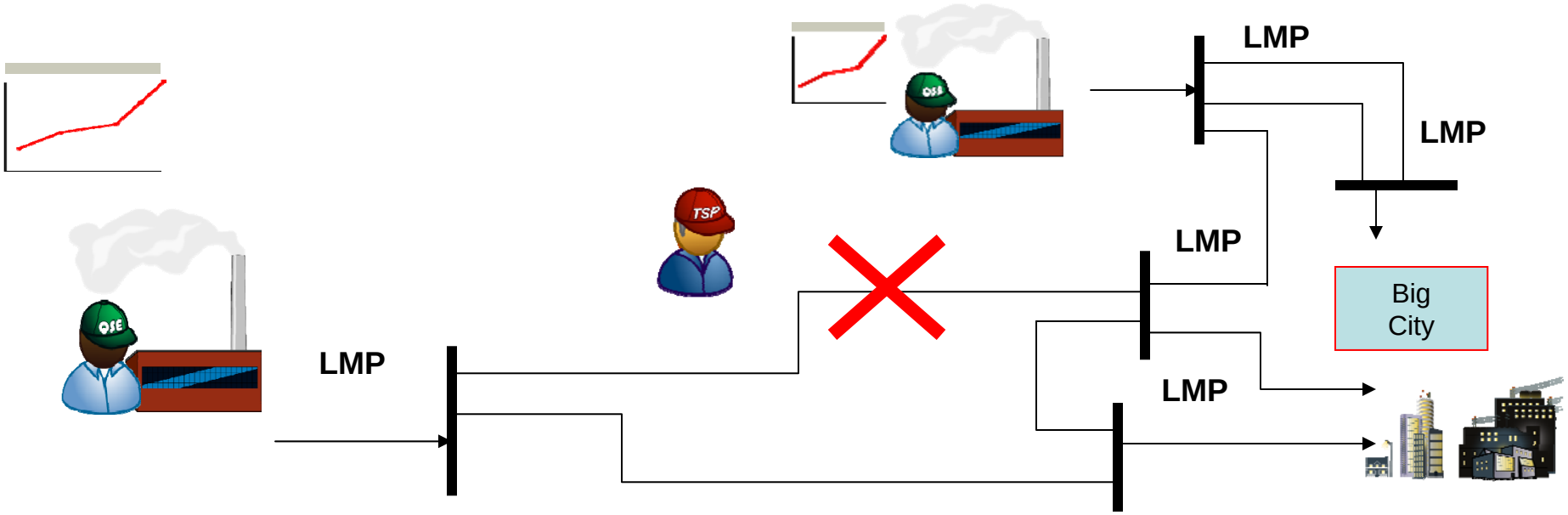
- **At last count, there are 693 pages of Protocols covering the nodal market (not counting the retail sections)**
- **Posted at ERCOT web site: http://nodal.ercot.com/protocols/index.html**
- **New sections covering:**
  - Management Activities of the ERCOT System
    - Details on Telemetry, operations models, engineering models, submission schedules for model changes, equipment name consistency, model testing
  - Day Ahead Operations
    - DA Market, RUC, Transmission Security
  - Transmission Security Analysis and Reliability Unit Commitment
  - Adjustment Period and Real Time Operations
  - Congestion Revenue Rights
  - Performance and Compliance
  - Settlements
  - Market Information System
- **New terms such as:**
  - Load Resources
  - Day Ahead



@

How Does an LMP Market Work?

DRAFT for DSWG 04-18-08



- **ERCOT's computers calculate the value of power at all the Electrical Buses based on Offers to sell generation from power plants**
  - These prices are used to control the generation deliveries to the loads
- **When the transmission system is limited or lines are taken out for maintenance, a Generation plant that is closer to the load may need to be used**
  - Generation plants closer to the loads may have higher prices
- **Prices also decrease in other areas**

@

- **Generation Resources get new Base Points from SCED every time it runs**
- **ERCOT sends an updated desired generation point to every generator every 4 seconds that "ramps" the unit to its Base Point**
- **Load Frequency Control is provided on Generation and some Load Resources who where awarded Regulation Ancillary Services in the DA market**

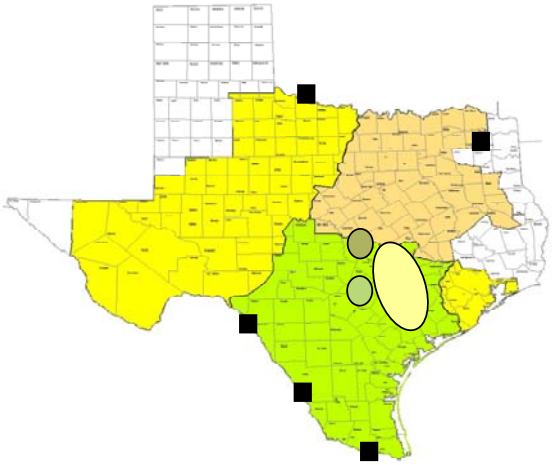
- **As the ERCOT load fluctuates, ERCOT's computers send to each individual Resource a control signal to move the Resource either up or down to meet the demand**
- **All Generation Resources and those Load Resources participating in managing ERCOT's demand must meet strict performance requirements**
  - Performance is measured by individual Resource registered at ERCOT

Reliability of the Transmission System is controlled by setting prices

@

DRAFT for DSWG 04-18-08

- **Approximately 400 Resource Nodes in the ERCOT model**
- **A price for each node is calculated every time the Security Constrained Economic Dispatch (SCED) calculation runs**
  - New prices every 5 minutes or faster if needed
  - Generation is paid in 15-minute Settlement Intervals using the time weighted LMPs at its Resource Node

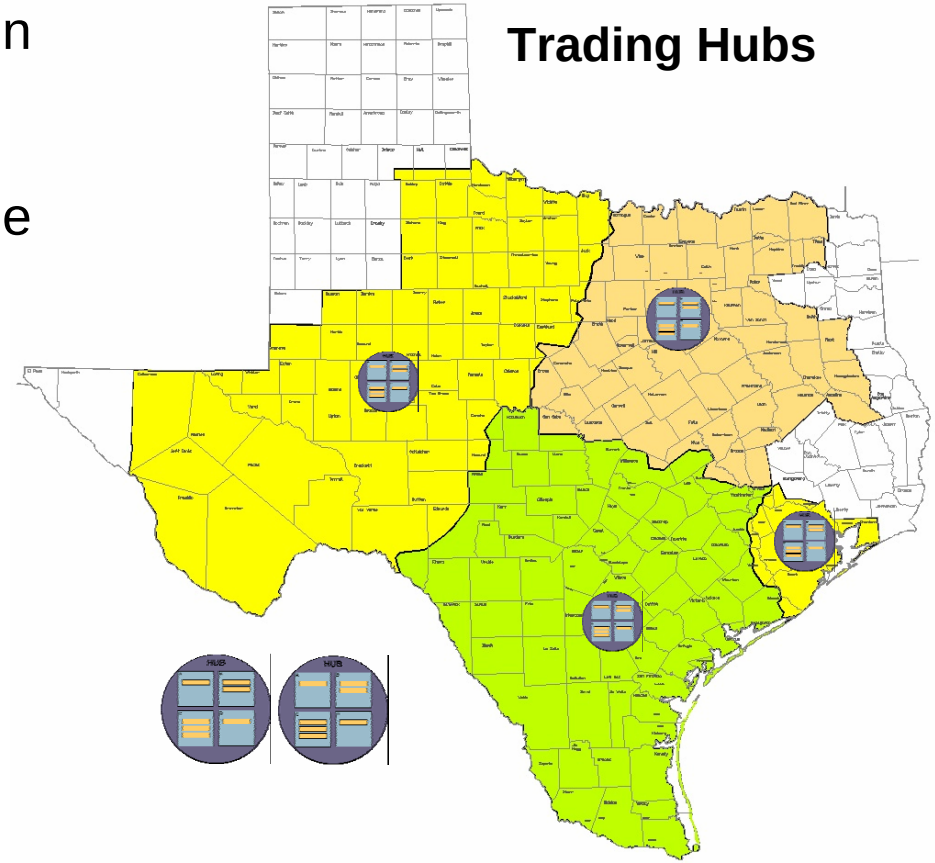


@

- **Thirteen Load Zones in Nodal**
  - Four for the areas covered by the 2003 Congestion Management Zones, except for the following new nodal zones
    - CPS Energy (San Antonio)
    - Austin Energy
    - LCRA
    - Brazos
    - DC Ties (4)
    - Variable Frequency Transformer - Laredo
  - Load Nodes – 7500+ used in the Calculations

- **Six defined HUBs in the ERCOT protocols**
  - Four HUBs are the average LMP of all the 345 Kv busses in the four 2003 Congestion Management Zones
  - One HUB is the simple average of all the above HUBs
  - One HUB is the average of all 345 Kv busses in ERCOT
- **Prices for HUBs are produced for every SCED and 15-minute Settlement Interval**
- **HUB prices for each hour are also available from the Day Ahead Market**

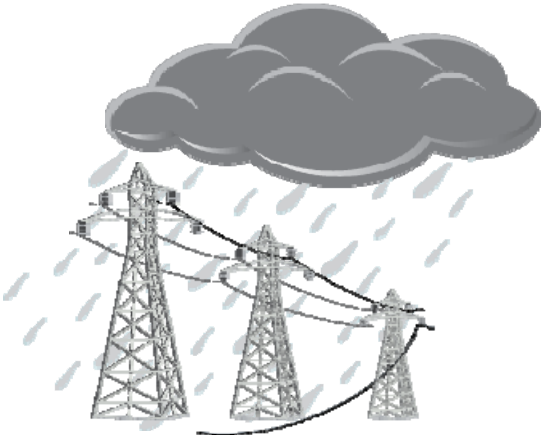
ERCOT Trading Hubs

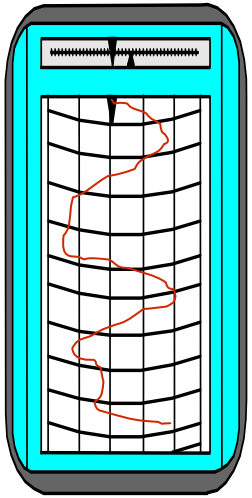


Emergency Operations

DRAFT for DSWG 04-18-08

- **ERCOT's Emergency Operations in Nodal are similar to that in Zonal**
  - Market wide communication of actual reserves and projections of future capacity needs
- **Better descriptions of the Notices sent to Market Participants regarding Operating Conditions, Advisories, Alerts, and Emergency Operations**





- **Responsive Reserve may only be deployed on Load Resources during the EECP**
- **Deployments are split into two groups to manage the effect the load reductions have on SCED**
  - Each group is defined daily from the Resources selected in the DAM
- **Emergency Interruptible Load Service is also used in the nodal market**
  - Also proposed to deploy in two groups if the amount of EILS is greater than 500 Mw

The Nodal Project – When??

DRAFT for DSWG 04-18-08

- **Hundreds of ERCOT employees, Vendors, and Contractors are working to implement the Protocols**
- **Market Participants have contracted with Vendors or are building in-house the new systems to receive new individual Generation and Load Resources controls**
- **ERCOT is using an Early Delivery System to test controls and the ability of TSPs, QSEs, and CRR account holders to access the Market Operations systems**
- **ERCOT Readiness to Go-Live is posted on the ERCOT site at: http://nodal.ercot.com/readiness/index.html**
- **ERCOT's pending budget is over $319 million**
- **A Go-Live Plan is being developed by ERCOT and Market Participants**

ERCOT Believes

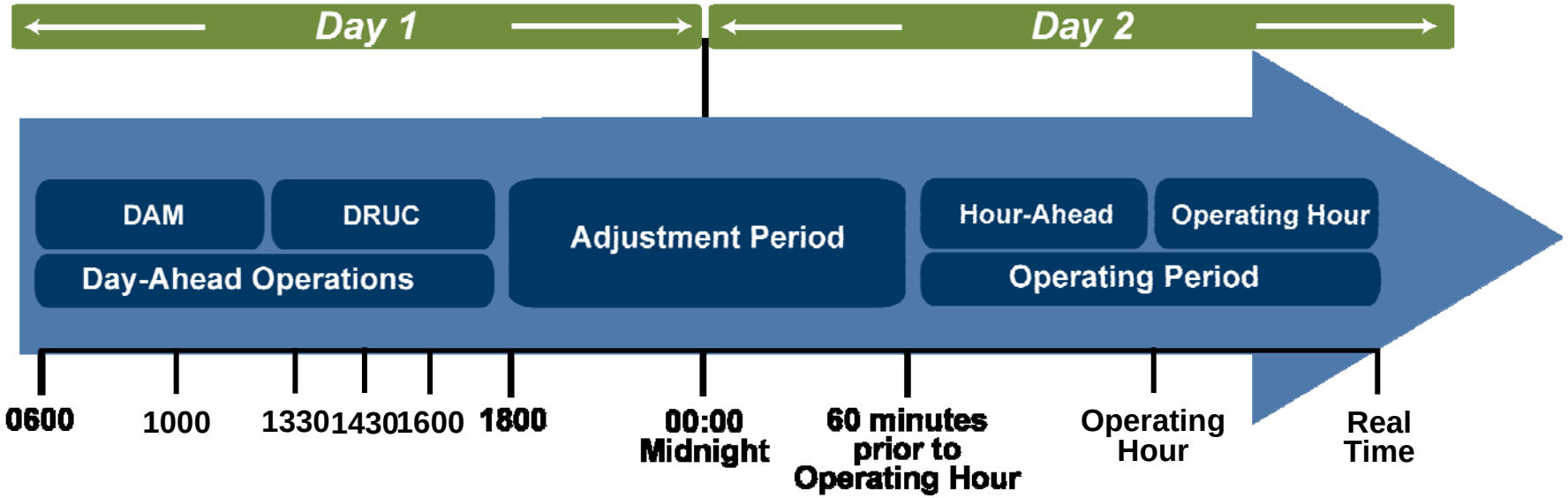
December 1, 2008 is still possible

@

Nodal Market Timeline

DRAFT for DSWG 04-18-08

- Load Resources and Retail Load Participation



Day-Ahead Operations

- **Day-Ahead Energy Market**
- **Ancillary Services Market**

Operating Period

- **Real Time Load Response to Prices**
- **Emergency Interruption of Load Resources**

Day-Ahead Market – Load Resources and Ancillary Services

Malcolm Smith - ConsumerPowerline
Steve Krein – ERCOT Staff

What are Ancillary Services?

- Services necessary to support the transmission of energy to Loads while maintaining reliable operation of the Transmission Service Provider's transmission system using Good Utility Practice.

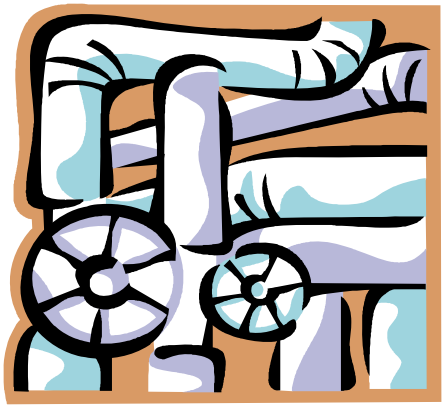
What types of Ancillary Services are Needed?

- Regulation Service (RGSUp and RGSDown)
- Responsive Reserve Service (RRS)
- Non-Spinning Reserve Service (NSRS)
- Reliability Unit Commitment (RUC)
- Black Start
- Reliability Must Run (RMR)

Day Ahead Market - Load Resources and Services

DRAFT for DSWG 04-18-08

- **Types of Services that can be supplied by Loads**
  - Responsive Reserve Service
  - Non-Spinning Reserve Service
  - Regulation (Up and Down) Service



- **Types of Load Resources**
  - Controllable Load Resource
  - Non-controllable Load Resource
    - Controlled by High Set Under-Frequency Relay (UFR)
    - Interruptible Load
  - Switchable between CLR and non-CLR

Day Ahead Market – Load Resource Requirements

DRAFT for DSWG 04-18-08

- Registration as a Load Resource under a Resource Entity with an existing relationship to a Qualified Scheduling Entity
- Interval Data Recording (IDR) Meter Installed
- Real Time Telemetry provided to ERCOT thru QSE
  - Real Power (MW)
  - Reactive Power (MVars) for CLRs
  - Analog Power Response (MW)
  - Status of Interrupting Device (CB, etc.)
  - Status of UF Relay (UFR Load Resources)
- One Line Drawing submitted with all applicable data
- Relay Test Reports Submitted (UFR Load Resources)
- Complete Qualification Test for the Ancillary Service(s) to be provided

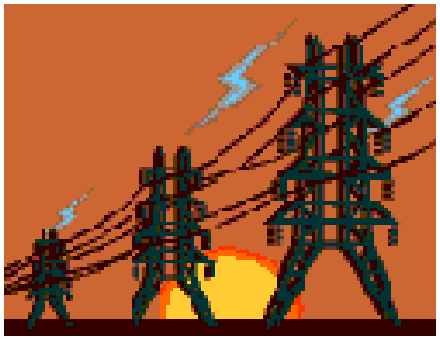
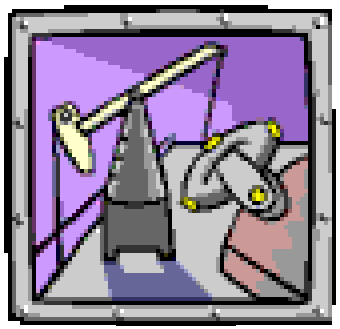
Day Ahead Market – Load Resource Deployments

DRAFT for DSWG 04-18-08

Non-CLR Load Resources Providing RRS can be deployed:

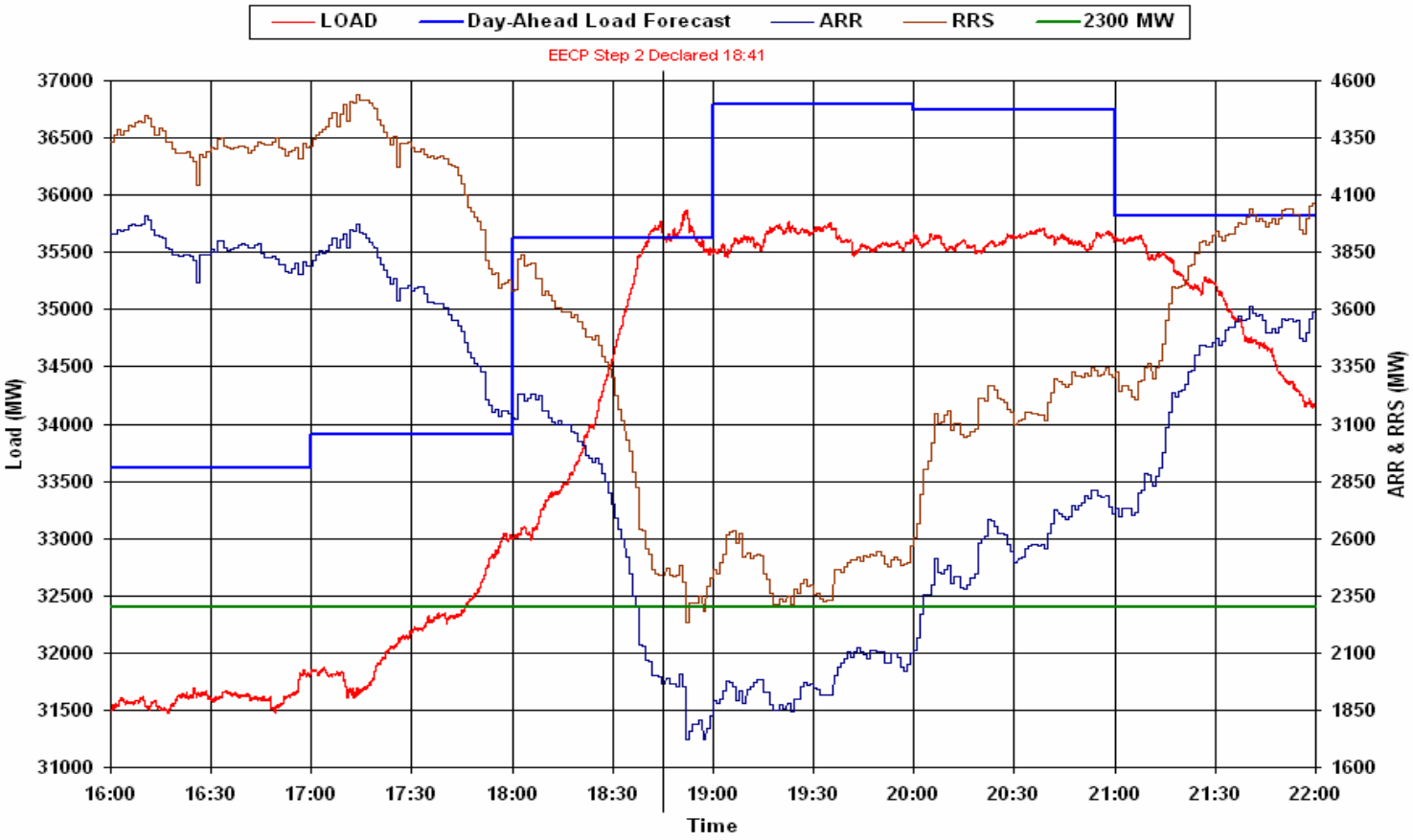
1. Automatic trip based on UFR settings
2. Verbal dispatch by ERCOT during EECP event (by group or as a block*)
3. Verbal dispatch by ERCOT during an Emergency Condition (by group or as a block*)
4. Verbal dispatch by ERCOT to solve a local Emergency Condition (location-specific)



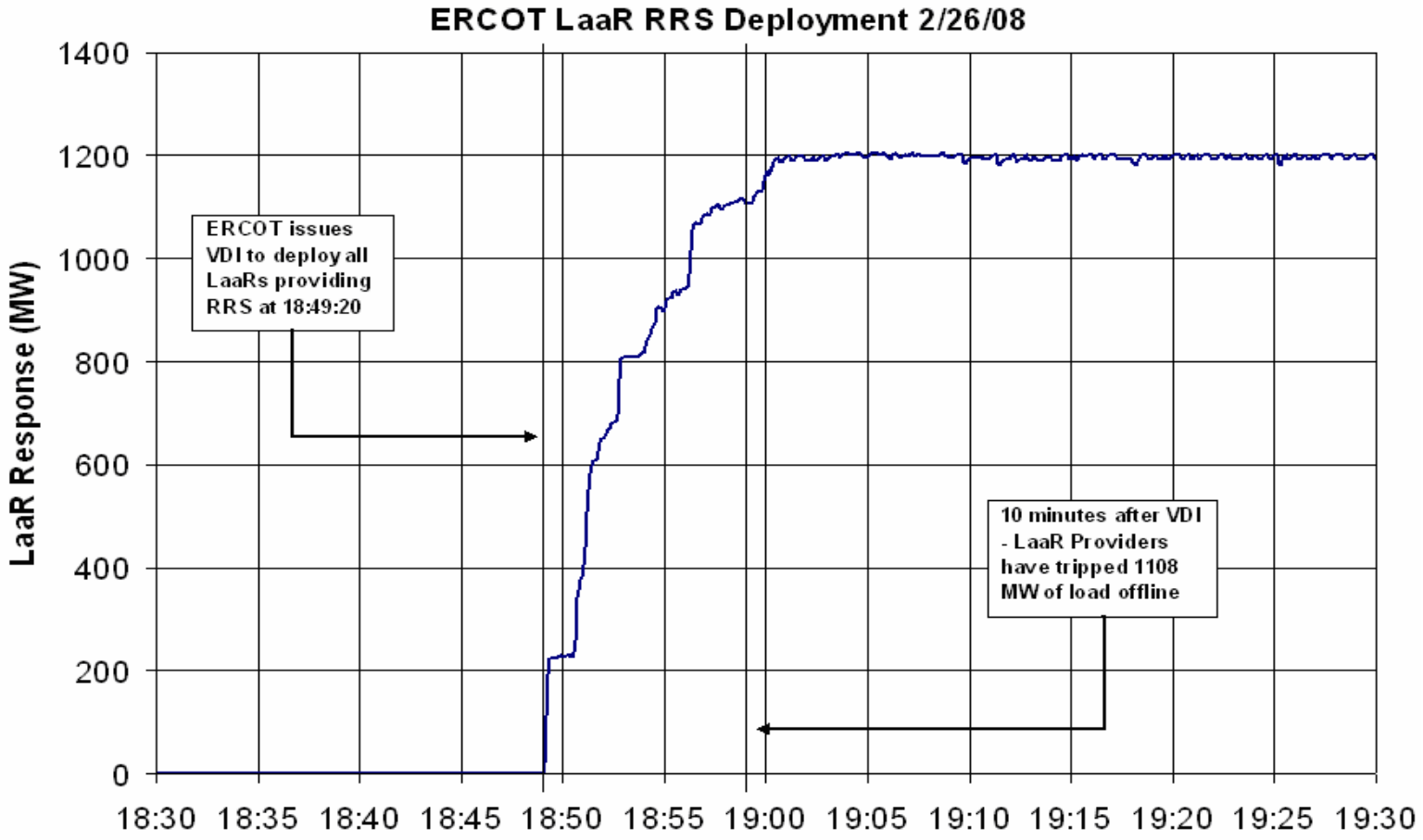



* More detail to come on split deployments

Typical VDI type of deployment – Step 2 of EECP

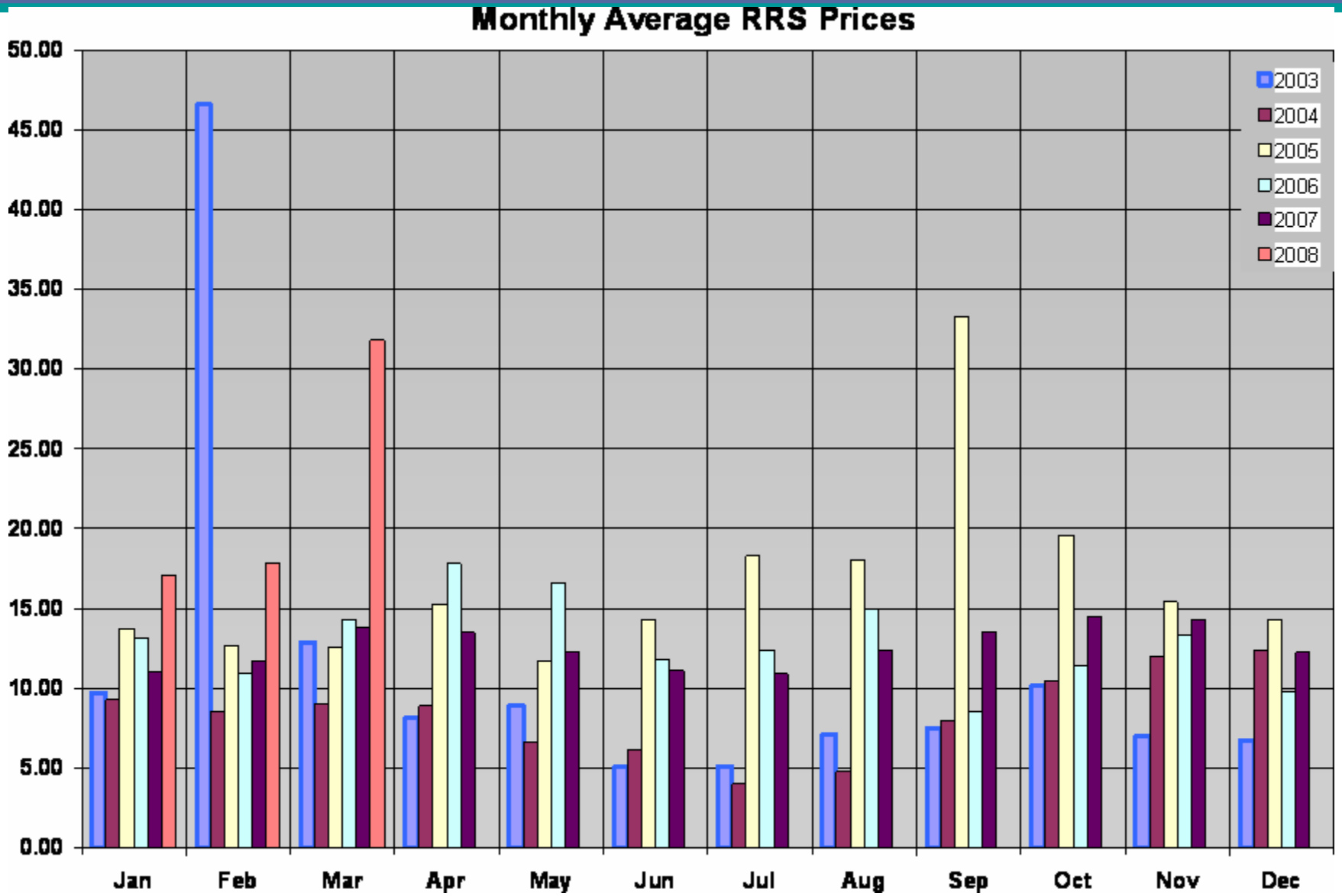


LaaR Response to the VDI



Day Ahead Market – Historical Costs

DRAFT for DSWG 04-18-08

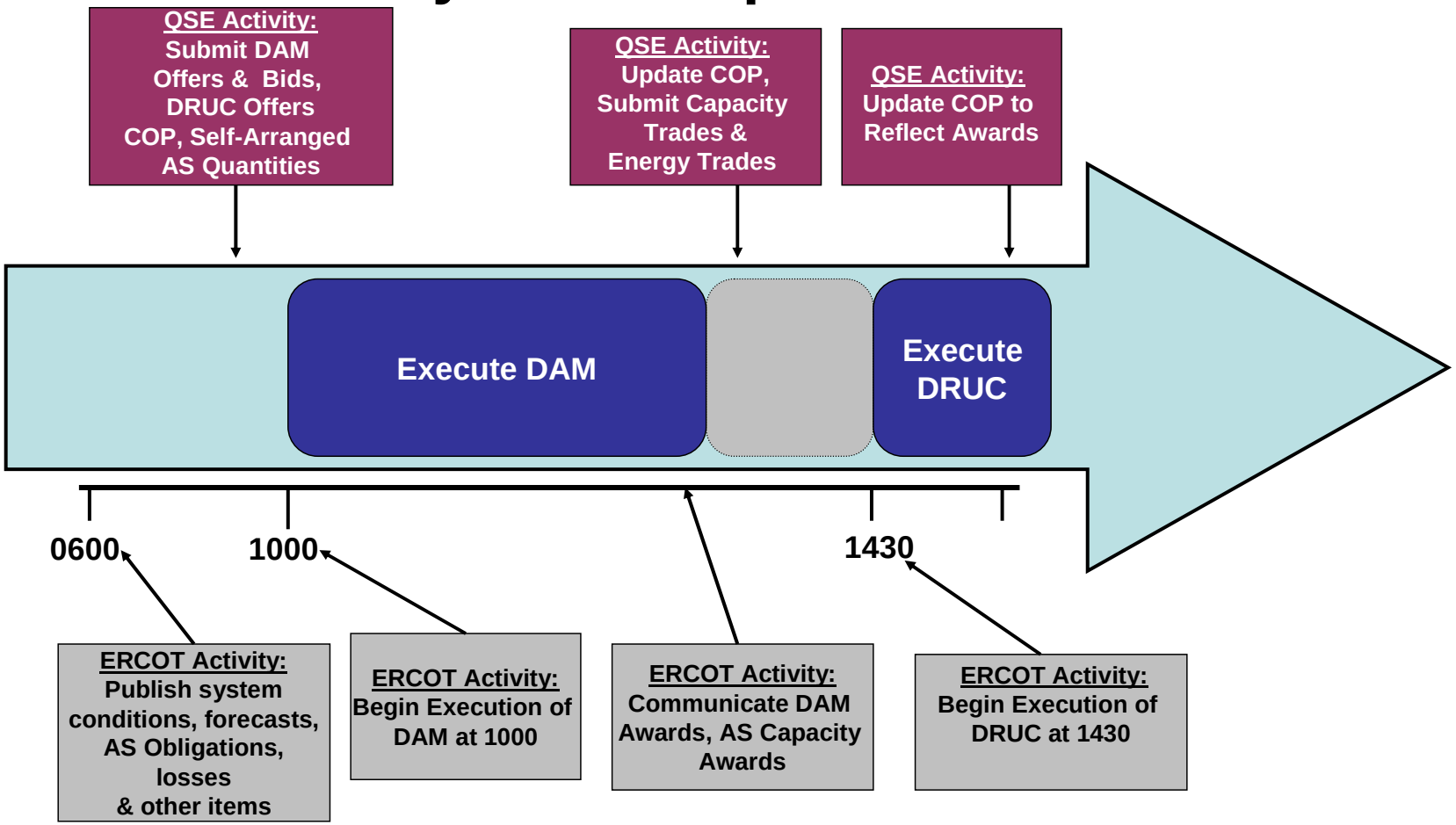


What's Changing in the Nodal Market Design for Ancillary Services

- LaaRs will be called Load Resources
- Can have more than one Load Resource per ESI ID
- A Load Resource can provide more than one Service at a time
- Bids, Awards and Scheduling will be resource specific; no more portfolio treatment of Resources
- New Sign Convention for Load Resources
- Restrictions have been removed on the use of Controllable Load Resources
- "Replacing" gives way to Capacity Trades
- Split Stacks (two) for System Wide Deployments
- XML messages will be sent to initiate manual deployments and then followed by Verbal Dispatch Instruction
- Outage Schedules must be submitted for Load Resources

DRAFT for DSWG 04-18-08

Day Ahead Operations



DRAFT for DSWG 04-18-08

Resource Specific Bids must include:

- Resource identifier
- Ancillary Service Type offered
- MW of capacity offered
- Price

Note: Multiple Load Resources can exist for a single ESI ID.
One Load Resource can provide multiple AS Types.

Bids must be submitted by 10am Day Ahead.

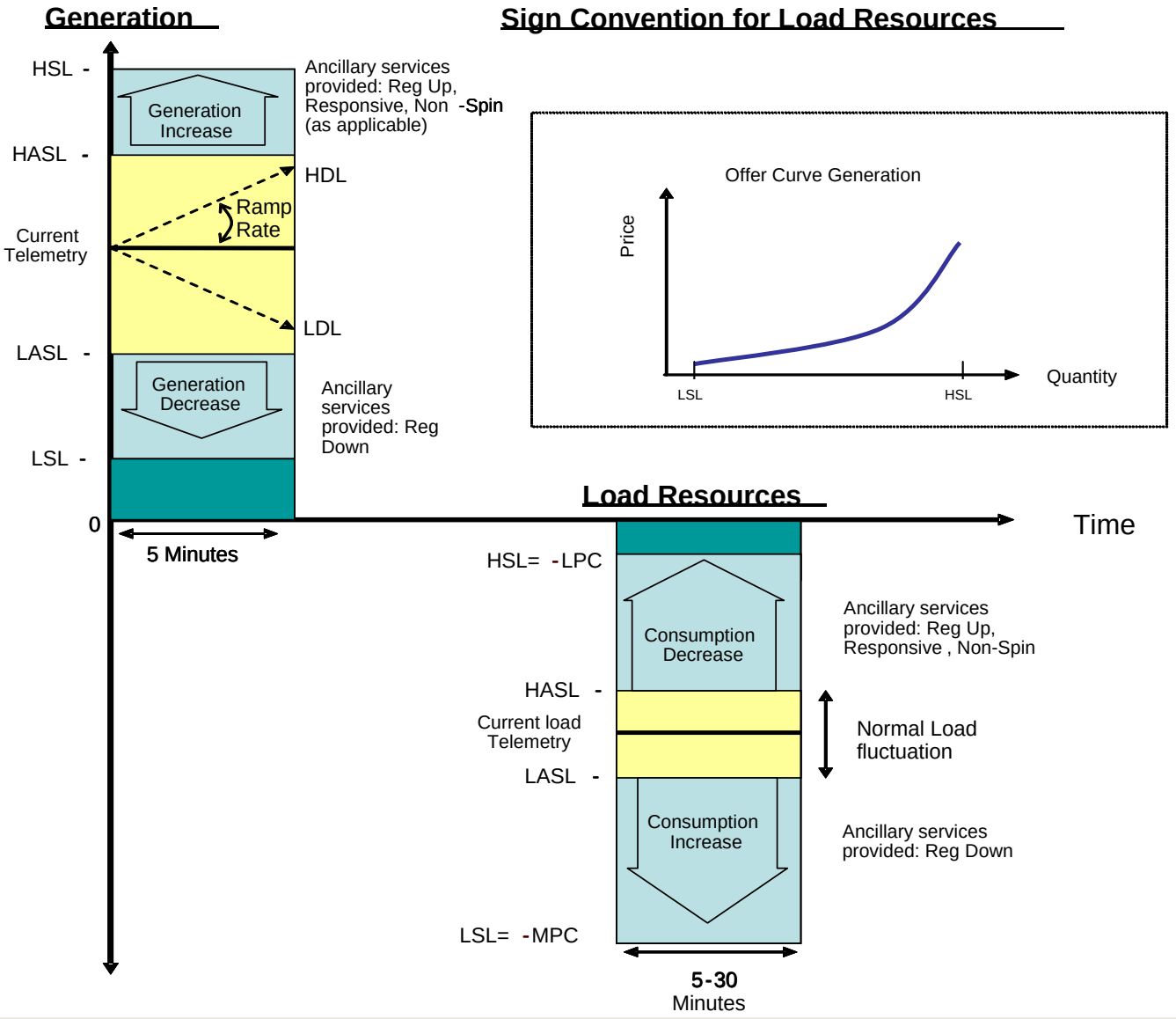
Resource Specific Awards shall include:

- Resource identifier
- Ancillary Service Type selected
- MW of capacity Awarded
- Awarded Price

Awards will be communicated by 1:30pm Day Ahead.

Day Ahead Market – Load Resource Treatment

DRAFT for DSWG 04-18-08



Controllable Load Resources

- "Load Resource capable of controllably reducing or increasing consumption under dispatch control (similar to AGC) and that immediately responds proportionally to frequency changes (similar to generator governor action)."
- http://nodal.ercot.com/protocols/2008/04/02/02-040108_Nodal.doc#_Toc189453661

- Potential controllable loads include:
  - Large Electro-chemical Processes
  - Variable Speed Motors
  - Thermal Energy Storage
  - Others???

- Note: In Nodal, CLRs no longer need to reside at a net-gen site (Zonal market requirement)

Trades for LR in Nodal

- Rather than "replacing" when short on obligation, QSEs now enter Capacity Trades.
- Capacity Trades transfer financial responsibility (change settlement) for providing AS capacity to ERCOT.
- Capacity Trades can be either in the Day Ahead or Adjustment Period.

- A Capacity Trade must be submitted by a QSE and include:
  - The buying QSE;
  - The selling QSE;
  - The quantity in MW; and
  - The first hour and last hour of the trade.
- A Capacity Trade must be confirmed by both the buyer and seller to be considered valid.

Split Deployment

- Two Groups established daily in the day-ahead -- after DAM clears and COPS have been established
- One hour will be randomly selected and committed LRs from that hour will be randomly assigned to Group 1 or Group 2
- All remaining LRs will be put in Group 1
- Results will be posted to the MIS
- QSE deployment systems need to be ready to issue Resource Specific Instructions, Group Instructions or full System Deployment Instructions
- For system wide emergency conditions, situation will dictate which of 3 deployment types ERCOT Operator may issue via VDI:
  - Group 1 only
  - Group 1 followed by second VDI for Group 2
  - Groups 1 and 2 simultaneously
- For localized emergency conditions, ERCOT Operator will issue Resource Specific instructions after declaring an emergency condition exist (and no generation solution is available).

Manual Deployment

- The XML message format for deployment instructions is available via the *EIP - External Interfaces Specification v1.11* document which is available for download at http://nodal.ercot.com/readiness/sandbox/documents/index.html.

- Verbal Dispatch Instructions will be issued using Scripts associated with each type of deployment as noted in the Operating Guides and Operating Procedures.

Day Ahead Market – Outages

DRAFT for DSWG 04-18-08

- **Load Resource Outages are required to be submitted in the ERCOT Outage Scheduler**
- For example, a Load Resource that is committed in a QSE's COP that has a forced outage lasting longer than 2 hours, must submit their outage into the Outage Scheduler.
- Outage Scheduling System is currently being tested and Market Participant QSEs should be participating in the testing currently underway in EDS 4 Release 9.2
- A Market Participant handbook is available on the Texas Nodal Market Implementation Website: http://nodal.ercot.com/readiness/eds4/documents/index.html
- If you have questions send an email to eds4@ercot.com

Lunch Break

Demand Participation in the ERCOT Day-Ahead Market

Tim Carter
Director, Products & Services
Constellation NewEnergy

Voluntary Load Response

DRAFT for DSWG 04-18-08

- **"Voluntary Load Response" refers to a customer's independent decision to reduce consumption from its scheduled or anticipated level in response to price signals**
- **This practice has also been known as "passive load response" and sometimes as "self-directed load response."**
- **Voluntary Loads gain financially from the ERCOT markets by reducing consumption when prices are high however, a Load's ability to receive extra financial compensation depends entirely on its contractual relationship with its REP (and QSE)**
  - Any advanced metering, communication, or curtailment infrastructure required for load participation is a contractual matter between the load and its REP, and does not involve ERCOT
  - The QSE (and thus, REP) are reimbursed by ERCOT only for the energy imbalance and do not receive capacity payments
  - Because the load is not recognized by ERCOT as a resource, it is not subject to being curtailed involuntarily during emergency situations

Why participate in the DAM?

DRAFT for DSWG 04-18-08

- **Day Ahead Market (DAM)**
  - Make money
  - Manage Index exposure
    - Convert to index / different index
    - Limit index exposure
    - Diversify index exposure
  - Speculate on basis
    - Not covered here
    - Potentially significant risks
- **“Elastic Demand” is required for a properly functioning market!**
  - Economic efficiency and system reliability are improved when there is a response to price signals indicating scarcity
    - Reduces market volatility
    - Lowers market prices
    - Reduces stress on system

What is needed to participate in the DAM?

DRAFT for DSWG 04-18-08

- **To participate, you should have:**
  - Interruptible load
  - IDR meter
    - For settlement based interruption
  - Ability to shift or curtail load
    - For physical hedging
  - Relationship with REP that:
    - Includes a contract that passes on value
    - Submits bids/offers on your behalf and communicates results

Considerations to participate in the DAM?

DRAFT for DSWG 04-18-08

- **Potential Barriers to Entry May Include:**
  - Inconvenience, economic loss, or loss of comfort at a facility
  - Conflicts with “just in time” production scheduling or production goals
  - Costs associated with “idle labor” if an interruption in production results
  - The cost of an IDR (if the load isn’t required to have one)
  - Notice time needed in order to respond to a price signal or curtailment request
  - The cost involved in monitoring DAM energy prices
  - Operating back up generation “in synch” with the grid, if it is to be used as a means of reducing purchases from the grid during high prices or curtailment requests
  - Environmental restrictions on the use of back up generators
  - Technical understanding of how much flexibility in energy use the customer may have

- **Energy Trade**
  - DAM Energy-Only Offer
    - “offer for sale”
  - DAM Energy Bid
    - “bidding on eBay”
    - “bid = buy”
  - Financial vs. Physical

Submitting a Bid or Offer

DRAFT for DSWG 04-18-08

- **Must be submitted by QSE by 10:00 a.m. and include:**
  - Settlement Point (likely your LMPZ)
  - Price (within limit of -$250 per MWh and System-Wide Offer Cap)
  - Quantity (minimum of 1 MW)
  - First and last hour of offer
- **Results will be posted by 3:30 p.m.**

Quantity and Price Options

DRAFT for DSWG 04-18-08

- **Submitting price and quantity:**
  - Fixed Quantity Block
    - Single price/quantity for all hours of block
  - Variable Quantity Block
    - Single price and “up to” quantity for all hours of block
  - Curve Indicator
    - Increasing for both price / total quantity (Offer)
    - Increasing total quantity / decreasing price (Bid)
    - No more than 10 price/quantity pairs

DAM Energy-Only Offer, Example 1

DRAFT for DSWG 04-18-08

- **If you were on a Block + LMPZ or a Fixed Price Contract, you could profit by selling the power you've already purchased in the DAM. Example:**

Block Purchase Information from REP	
Zone:	***Houston Congestion Zone***
Contract Price:	***$90***
Quantity:	***10 MW***
Time Period:	***1 x 16***
Number of Hours:	***16***
Total Payment:	***$14,400***

Fixed Quantity Block Offer	
Settlement Point:	***Houston Congestion Zone***
Price:	***$300***
Quantity:	***10 MW***
First Hour:	***HE 7***
Last Hour:	***HE 22***
Number of Hours:	***16***
Total Payment:	***($48,000)***

- **For the hours accepted, you would still pay the contract rate to your REP, however, <u>you would be paid</u> the Offer price.**

DAM Energy-Only Offer, Example 1 (cont.)

DRAFT for DSWG 04-18-08

- **By curtailing your company's load during the accepted hours (assuming all 16 hours below), you would be locking in your company's profit.**

Total Profit	
Block Payment:	***$14,400***
DAM Payment:	***($48,000)***
Difference:	*($33,600)*
Cost of Lost Production:	***?***
Total Margin:	***???***

- **With a flexible schedule, your company might be able to perform needed operations, such as maintenance on equipment, safety drills, etc., during this curtailment. Turning on back-up generation for these 10 MW's will have the same affect as curtailing!**
- **If you chose not to curtail, you will likely be billed for volumes consumed at the Real Time LMPZ.**

DAM Energy-Only Offer, Example 2

DRAFT for DSWG 04-18-08

- **If you were on a Day Ahead LMPZ, your contract may have volumetric requirements similar to fixed price contracts.**
  - The reason is simple: Your REP will have to make a commitment in the Day Ahead market on your behalf. If you have the ability to change your consumption pattern due to this known price, your REP will always be in a losing position.
- **By signing an Day Ahead Index deal without a specified 'cap', your REP will essentially make a Day Ahead Energy Bid on your behalf at the System-Wide Offer Cap.**
- **However, your REP may give you the opportunity to sell your volumes in the Day Ahead market at a price that you are unwilling to pay.**
- **Your REP's purchase and your sale will cancel each other out and reduce or eliminate exposure to the Day Ahead Market.**

DAM Energy-Only Offer, Example 2 (cont.)

DRAFT for DSWG 04-18-08

- **The Offer represents a customer of 5 MW's total demand with 1 MW they are unwilling to sell at any price. However, there is an additional 1 MW that is valuable to them but can be sold off at $1,500 and a remaining 3 MW's that is considered less valuable to the customer.**

REP Block Quantity Bid	
Settlement Point:	***North Congestion Zone***
Total Demand:	***5 MW***
Price:	***$2,250***
Quantity:	***5 MW***
First Hour:	***HE 1***
Last Hour:	***HE 24***

Customer Curve Indicator Offer	
Settlement Point:	***North Congestion Zone***
Total Demand:	***5 MW***
Critical Baseload:	***1 MW***
Price 1:	***$750***
Quantity 1:	***3 MW***
Price 2:	***$1,500***
Quantity 2:	***1 MW***
First Hour:	***HE 1***
Last Hour:	***HE 24***

- **If the following were submitted and the clearing price for all hours was under $750 for all hours except HE18 clears at $1,100, what would happen?**

DAM Energy-Only Offer, Example 2 (cont.)

DRAFT for DSWG 04-18-08

Hour	Clearing Price	
HE 10	$	50.00
HE 11	$	89.00
HE 12	$	89.00
HE 13	$	76.00
HE 14	$	85.00
HE 15	$	88.00
HE 16	$	335.00
HE 17	$	182.00
HE 18	$	1,100.00
HE 19	$	100.00
HE 20	$	100.00
HE 21	$	96.00
HE 22	$	81.00
HE 23	$	34.00
HE 24	$	48.00

- **For all hours during the day, you would have purchased 5 MW's at the Clearing Price, including HE 18.**
- **However, you would have also sold 3 MW's during HE 18 for $3,300, resulting in a total purchase of 2 MW's at $1,100 per MWh.**
- **By curtailing 3 MW's consumption and only using 2 MW's during HE 18, you would lock in a total expenditure for that hour of $2,200.**
- **Choosing not to curtail would result in 2 MW's at $2,200 and 3 MW's at…?**

DAM Energy Bid, Example 1

DRAFT for DSWG 04-18-08

- **As mentioned, by signing an Day Ahead Index deal without a specified 'cap', your REP will essentially make a Day Ahead Energy Bid on your behalf at the System-Wide Offer Cap.**
  - Is there ever a value to submit a Bid at this cap?
- **Your REP may allow you the ability to modify your Bid rather than submitting an additional offsetting DAM Energy-Only Offer.**

Original REP Block Quantity Bid	
Settlement Point:	***North Congestion Zone***
Total Demand:	***5 MW***
Price:	***$2,250***
Quantity:	***5 MW***
First Hour:	***HE 1***
Last Hour:	***HE 24***

Modified Curve Indicator Bid	
Settlement Point:	***North Congestion Zone***
Total Demand:	***5 MW***
Critical Baseload:	***1 MW***
Price 1:	***$2,000***
Quantity 1:	***3 MW***
Price 2:	***$1,500***
Quantity 2:	***1 MW***
Price 3:	***1 MW***
Quantity 3:	***$750***
First Hour:	***HE 1***
Last Hour:	***HE 24***

DAM Energy Bid, Example 2

DRAFT for DSWG 04-18-08

- **You may have signed a Real Time LMPZ contract with your REP. After a particularly volatile period in the market with no immediate signs of change, you've decided to reduce your exposure to the Real Time market.**
- **If your contract allows, you might decide to diversify your index exposure by purchasing some of your volumetric requirements through the Day Ahead Market.**

Fixed Quantity Block Bid	
Settlement Point:	***South Congestion Zone***
Total Demand:	***8 MW***
Price:	***$2,250***
Quantity:	***4 MW***
First Hour:	***HE 1***
Last Hour:	***HE 24***

Real Time Market: Voluntary Price Response

Jay Zarnikau, Frontier Associates LLC

Why is Demand Response in the Real-Time Market Important?

DRAFT for DSWG 04-18-08

- Reliability can be improved when demand is reduced in response to price increases reflecting scarcity or system problems.
- Real-Time Markets may provide a better indication of actual operational conditions than day-ahead markets. Actual weather and system conditions are reflected in real-time prices.
- Demand Response in real-time may provide energy consumers with opportunities to control their energy costs, if contracts with retail electric providers are structured appropriately.
- It is a check on the market power of generation suppliers who can potentially exercise market power in markets which are imperfectly competitive.
- An efficient market reveals how much consumers really are willing to pay for electricity and service reliability.
- Uneconomical price spikes are mitigated.
- Risk management benefits can be provided to load-serving entities and system operators.

Present Levels of Demand Response in ERCOT

DRAFT for DSWG 04-18-08

Over the past few years, there has been a small but important amount of demand response to near-real-time prices (i.e., balancing energy prices and 4-CP transmission price signals) in the ERCOT market.

- After comparing aggregate load levels of transmission voltage energy consumers between days of likely 4 CP charges and adjacent days, the ERCOT staff identified about 600 MW of aggregate demand response, or about a 1% reduction in demand. (Jones, S, Wattles P, and Krein S, ERCOT Emergency Load Response. PUCT Demand Response Workshop. September 15, 2006. See: http://www.puc.state.tx.us/electric/projects/32853/091506/ERCOT.pdf)
- An analysis of the trend in total ERCOT load during a day of multiple price spikes in the market for balancing energy suggested no discernable response to the price changes during the first couple price spikes and some small but noticeable deviations from trends during some later price spikes. (Wattles, P. "Pricing Overview During ERCOT Events: October 2006 thru March 2007." Presentation to the Long Term Solutions Task Force, April 23, 2007.)

More Evidence of Demand Response

DRAFT for DSWG 04-18-08

- About two of the 20 largest industrial energy consumers in the Houston area respond to prices. (Zarnikau, J, Landreth G, Hallett I, Kumbhakar SC. Industrial Energy Consumer Response to Wholesale Prices in the Restructured Texas Electricity Market. *Energy – the International Journal*. 2007, 32:1715-1723.)
- Analysis of 15-minute data over a 3 year period suggests limited responsiveness to price changes by industrial energy consumers, in the aggregate. The own-price elasticities average -0.000008. This is a measure of the reduction in electricity purchases in response to a 1% increase in price in the same 15-minute interval. All cross-price elasticities are within the range of 0.000015 to -0.00002. These measure how much electricity increases in a 15-minute interval in response to a price change in another 15-minute interval. (Zarnikau, J. and I. Hallett, Aggregate Industrial Energy Consumer Response to Wholesale Prices in the Restructured Texas Electricity Market, *Energy Economics*, 2008.)

Still More Evidence of Demand Response

DRAFT for DSWG 04-18-08

- Based on a survey of all load-serving entities participating in the ERCOT market to collect further insights into the demand response activities, including pricing programs and load management programs which are operated on a bilateral basis between load-serving entities and energy consumers and not visible to the wholesale market and ERCOT's system operators:
    - Over 12,000 commercial and industrial energy consumers (including over 800 industrials) in ERCOT are served through pricing plans where prices are tied to balancing energy prices or similar arrangements, providing 431 MW of price-responsive load.
    - Additionally, 91 MW of load responds to critical peak pricing.
    - 222 MW of load responds to transmission prices, although it is not clear whether these consumers are also responding to balancing energy prices or critical peak prices.

(Wattles, P. "Load Response Survey: Preliminary Results." Presentation to the Demand Side Working Group, August 10, 2007.).

Will Opportunities to Respond in Real-Time to Price Signals Continue?

DRAFT for DSWG 04-18-08

Yes.

- Large industrial energy consumers will continue to be charged for transmission costs based on their contribution to monthly peak demand in four summer months. This sends a very strong price signal. But you must be able to anticipate the monthly peak demand intervals during summer months. *This has not changed.*
- You will continue to be able to structure a deal with a Retail Electric Provider through which you could earn a credit for purchasing less than a contract amount or pay a premium for consuming more than a baseline amount in any interval. This would provide you with an incentive to reduce consumption during high-price periods and shift it to low-price periods.

But it may become more difficult.

- Prices will not be known in advance!
- Purchasing power through the market on an "unhedged" basis may expose you to certain penalties (e.g., the RUC Capacity Short Charge).

Possible Measures to Increase Your Flexibility

DRAFT for DSWG 04-18-08

- **Rescheduling operations.** Can you reschedule some of your facility's operations within a day from hours of relatively high electricity market prices (e.g., afternoon hours) to hours of lower prices (usually late night hours)? Can operations be rescheduled from high price months (e.g. summer and winter months) to low price months?
- **Maintenance.** Can maintenance activities be rescheduled to coincide with hours of high electricity prices?
- **Curtailments.** How much inconvenience or profit loss would your facility experience if it simply curtailed all or part of its operations during high price hours? Can non-critical electrical loads be identified at your facility? Can controls be installed to automatically reduce electricity purchases when prices rise above the predetermined levels?
- **Standby Generation.** Can you operate backup or standby generation equipment during high price periods?

Possible Measures to Increase Your Flexibility (continued)

- **Energy storage devices.** The installation of energy storage equipment (thermal energy storage devices, chemical batteries, and flywheels) can sometimes prove to be cost-effective if price differentials between different periods of time are large enough.
- **Ability to switch among different energy resources.** In some processes, fossil fuels can be substituted for electricity or a resource mix may otherwise be changed in response to the changing relative prices of resource inputs.
- **Facility automation.** Information age metering and communications technologies can provide energy consumers with real-time load information for a site or specific piece of equipment.
- **How are you planning to change your operations in the future?** Facilities planning to expand or change operations in the future might consider how greater flexibility could be built into their operations.

Response to Real-Time Prices

DRAFT for DSWG 04-18-08

- "Response to Real-Time Prices" or "Voluntary Load Response" refers to a customer's deviation from its anticipated load level or a load level for which the customer has contracted for through the DAM in response to price signals in situations where the customer has not formally offered this response to the market as a "resource."
- ERCOT matches total load with generation through the Security Constrained Economic Dispatch (SCED) model. A REP buys all the load consumed by its customers in each zone at the LMPZ (zonal average of nodal prices).
  - Demand response to high prices by customers can reduce the REP's costs, and some REPs may be willing to pass such savings onto price-responsive customers.
  - Or some REPs might charge customers based on the LMPZs, similar to today's MCPE (market-clearing price of balancing energy) products.
- An energy consumer might also respond passively by curtailing load in anticipation of an ERCOT monthly peak in a summer month. Avoiding the coincident system peak demands in four summer months can result in savings to REPs and their customers.

Q. Will loads (i.e., energy consumers) be settled based on the nodal prices – i.e., the locational marginal prices or "LMPs"?

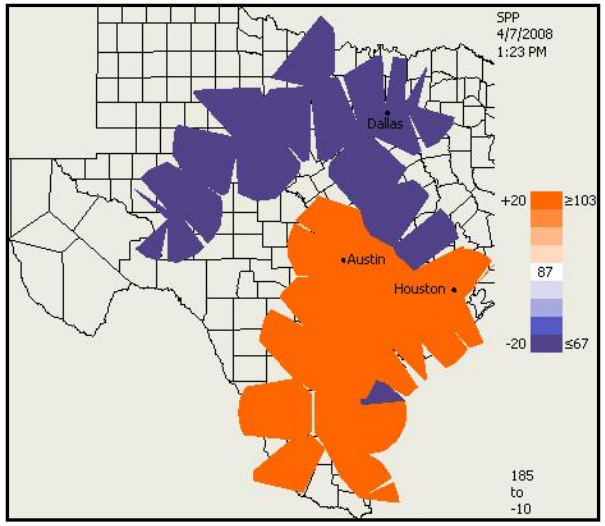
A. Loads (actually, the scheduling entity or QSE representing a load or group of loads) will be settled based upon the weighted average of all of the LMPs in the relevant zone. This weighted average zonal price is referred to as the LMPZ.

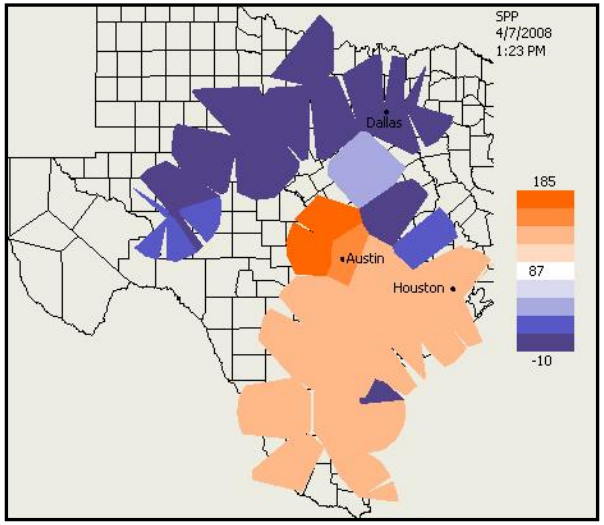
Q. How often will nodal prices (LMPs) be calculated?

A. Roughly every 5 minutes.

Q. How will the 5-minute prices be presented to the market?

A. Notice is provided to the market when the Security Constrained Economic Dispatch Model (SCED) calculates all of the LMPs. This notice includes a graphical map (like color radar) showing where prices are higher than other areas. Whenever SCED is run (it will likely be every 5 minutes, but could be faster) another set of LMPs is provided to the market.





(Samples only – actual screen shots from EDS SCED runs expected to be available week of April 21.)

Q. Will the LMPs calculated every 5 minutes be used in market settlement?

A. The 5-minute prices will be converted into 15-minute prices. Since energy consumption is recorded into 15 minute intervals, this conversion allows ERCOT to better match prices and quantities.

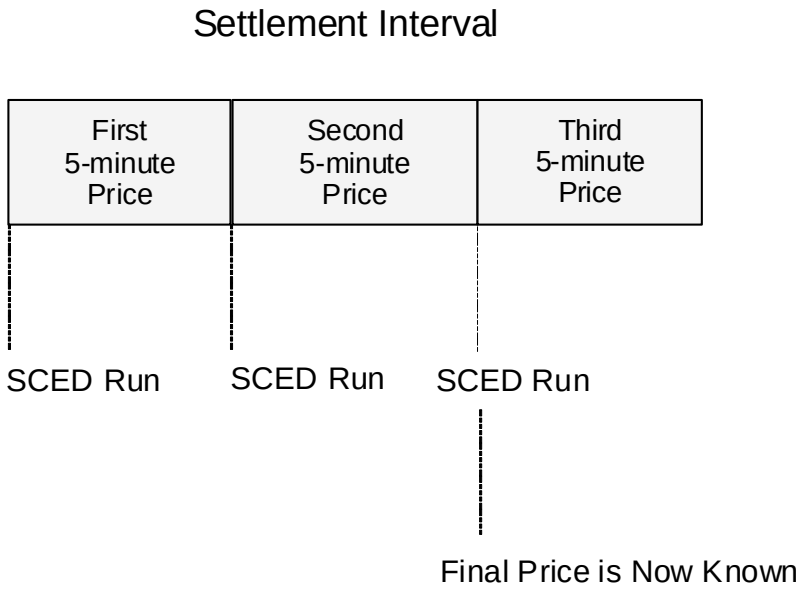
In order to convert the (roughly) 5-minute prices into 15-minute prices, the LMPs calculated by the SCED model are “time weighted” to make a 15 minute Settlement Point price at Resource Nodes and for the Load Zone (LMPZ).

Q. Will the LMPZs (the weighted average of the prices within a zone) be provided to the market at the same time as the LMPs for individual nodes or locations in the network?

A. Yes.

A. Will real-time prices be provided to the market in advance of a settlement interval?

Q. A. No. The final price used in the settlement process will not be known in advance, since it will be based on calculations performed within each 15-minute settlement interval.



Q. *What actions could be taken by energy consumers (with the ability and incentives necessary to respond to wholesale prices) or REPs with demand response programs in order to respond to real-time price signals?*

A. Loads and REPs that wish to respond to prices must watch LMPs in real time and ERCOT's reserves (updated every 10 seconds *-- we hope*) and make a judgment regarding whether the prices will stand. If they believe they will, then the load or REP should interrupt.

It will require some decision-making to determine whether you believe the prices will stay high.

Q. What information will be available to the market to assist loads and REPs to determine whether a price spike is likely to be sustained?

A. In the nodal market, we will be providing much more information on the forecasted reserves by hour. ERCOT will forecast the future reserves in the system for each hour of the next 168 hours updated every hour. Information pertaining to actual reserves will be updated every 10 seconds. If a generation unit is "forced out," you can receive a forecast indicating whether that outage will make ERCOT short.

Also, the stakeholders are working on a protocol to meet the requirements of 25.505(f) which requires disclosure of offers and bids. This rule will produce an aggregate supply curve after 48 hours and also disclose all offers and bids used in Day-Ahead Market (DAM) and SCED after 60 days. Analysis of these offer curves will provide insight to the "tipping" points where prices are likely to jump high.

Q. Will ERCOT provide any sort of real-time forecasts of prices?

A. No.

Q. Are there other means through which loads can respond to real-time prices?

A. Yes. Loads can "bid" in the Day-Ahead Market to purchase their power. They can submit "up limit" bid curves. If prices rise above their tolerance for price, then they can go on notice to interrupt in real time. If indeed real-time prices are high, they can interrupt and avoid paying high prices. However, this will still require some price forecasting by the load or its REP, since the actual real-time price for the interval will not be known until the interval is over.

Working With a REP

DRAFT for DSWG 04-18-08

- Make sure that any REP that you deal with understands your degree of flexibility and ability to endure curtailments, and ensure that the REP knows how to value these attributes.

- The manner in which any bill credits, payments from the market, or transmission cost savings are shared among participating energy consumers, their Retail Electric Providers (REPs), and their qualified scheduling entity (QSE) is a contractual matter among those parties.

- The contract with your REP must clearly describe how any payments or credits from the market, energy cost savings, or transmission cost savings will be shared.

Emergency Interruptible Load Service

Nelson Nease, Nucor Steel
Paul Wattles, ERCOT Staff

- **Emergency Interruptible Load Service is required by PUC Substantive Rule §25.507**
  - Initial Rule approved and ERCOT Protocols adopted April 2007
  - Early solicitations failed to attract sufficient demand resources to meet 500 MW minimum requirement
  - Rule was amended Nov. 1, 2007 by order adopting PUC Staff proposal under Project No. 34706:
    - ERCOT granted additional flexibility in contracting
    - 500 MW floor removed
    - Annual cost cap increased from $20M to $50M
    - Reference to the development of a “long-term solution” removed from rule

- **PRR 746 implemented the amended Rule for the Zonal market**
  - Approved by ERCOT Board Dec. 11, 2007

What EILS is:

- **Service provided by Loads (customers) willing to interrupt during an electric grid emergency in exchange for a payment**
- **Deployed ONLY in the late stages of a grid emergency as a last resort prior to firm load shedding (rotating outages)**
  - Step 3 of Emergency Electric Curtailment Plan (EECP)
    - Deployed after Load Resources providing Responsive Reserves
    - 10-minute curtailment requirement
    - ERCOT can skip Step 3 if frequency decay justifies such action (will deploy EILS after firm Load in such cases)

"Controlled interruption of prepared customers vs. uncontrolled interruption of unprepared customers"

When EILS may be needed:

- **Emergencies can occur at any time:**
  - Cold weather months (due to natural gas curtailment & higher forced outages)
  - Shoulder months (due to unforeseen weather events & large amounts of scheduled maintenance)
  - Traditional summer peaks
  - Anytime, as may be caused by:
    - generation outages (scheduled, forced or both)
    - transmission outages beyond likely contingencies
    - extreme weather events
    - multiple simultaneous contingencies

DRAFT for DSWG 04-18-08

- **ERCOT Operations orders an EILS deployment via a phone call to the all-QSE hotline**
- **10-minute deployment period begins when QSEs have received the instruction in this call**

  - **QSEs must then contact their committed EILS Resources (clock is ticking)**

- **EILS Resources must shed at least 95% of their committed load within 10 minutes of QSEs' receipt of the instruction**

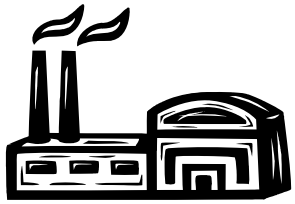
Release (Recall)

DRAFT for DSWG 04-18-08

- **EILS Resources must keep their committed load off until released**
- **ERCOT Operations will release EILS Resources after LaaRs have been recalled and generation providing Responsive Reserves has been restored**
- **EILS Resources have 10 hours to return to service after release**

Eligibility: Who can participate?

DRAFT for DSWG 04-18-08



- **INDIVIDUAL EILS Resource**
  - Must have 15-minute interval metering

- **AGGREGATED EILS Resource (multiple load sites)**
  - Each member of the aggregation must have 15-minute interval metering or a non-IDR measurement & verification program approved by ERCOT

- **All EILS Resources must have:**
  - At least 1 MW of interruptible Load
  - Capability of interrupting on 10 minutes notice at any time during the committed hours
  - Representation by a QSE with a wide-area network agreement with ERCOT
    - Must have 24/7 operations that can receive the verbal dispatch instruction
    - QSE (not ERCOT) is responsible for notifying the customer

Payment for EILS

DRAFT for DSWG 04-18-08

- **Loads are paid capacity payments ($ per MW per hour), as-bid, selected by ERCOT**
- **Cost of EILS is capped at $50 million per year per PUC Rule**
- **Costs are uplifted to QSEs representing Load based on Load Ratio Share during the Contract Period**

- **ERCOT's only financial relationship is with the QSE**
  - QSE submits bid
  - If bid is accepted, QSE is paid by ERCOT
- **Payment to the EILS Resource (customer) is a private contractual issue between the customer and the QSE**

Contract Periods & Time Periods

DRAFT for DSWG 04-18-08

- **ERCOT procures up to 1,000 MW of EILS 3 times per year, for 4-month block commitments**
  - February thru May; June thru September; October thru January
- **Participants must have their interruptible load available during all hours of any committed time period**
- **Spring Time Periods:**

Business Hours	**8 AM – 8 PM** Monday-Friday except ERCOT Holidays
Non-Business Hours	**All Other hours**

- **Summer Time Periods:**

Business Hours	**8 AM – 1 PM** Monday-Friday except ERCOT Holidays
Peak 1	**1 PM – 4 PM** Monday-Friday except ERCOT Holidays
Peak 2	**4 PM – 8 PM** Monday-Friday except ERCOT Holidays
Non-Business Hours	**All Other hours**

- **Participants may bid to provide the service for one or more Time Periods**

- **Current (Feb.-May) Contract Period awards :**

Business Hours (1,020 hrs.)	**262 MW**
Non-Business Hours (1,880 hrs.)	**185 MW**

- **Total cost of $5.34 million**

- **Next Contract Period (June-Sept. ’08) bids due TODAY (May 9)**

EILS in the Nodal Market

DRAFT for DSWG 04-18-08

- **NPRR 107 (filed by ERCOT Staff) transitions EILS from the Zonal market to the Nodal market**
- **NPRR 107 parachutes all EILS provisions into the Nodal Protocols with no material changes**
- **EILS is and will continue to be administered manually by ERCOT Staff**
  - No Capital Projects required for Zonal or Nodal
  - No effect on Nodal project rollout

- **Questions?**