ERCOT Demand Response

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Long-Term Study Task Force

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Definitions of Demand Response

- **'The short-term adjustment of energy use by consumers in response to price changes or incentives.'** (FERC)

- **'Changes in electric use by demand-side resources from their normal consumption patterns in response to changes in the price of electricity, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.'** (NERC)

- **'A temporary change in electricity consumption by a Demand Resource in response to market or reliability conditions.'** (NAESB)

Definitions of Demand Response

- **The common threads:**
  - Change in Load
  - In response to a signal (economic or operational)

- **3 key questions relative to any DR:**
  1. What is the incentive?
  2. What is the signal?
  3. Who takes the action (pushes the button)?

DR potential in ERCOT

- **FERC estimates >18 GW of DR potential in Texas by 2019**
  - Attributed to high peak demand
  - This would represent 20-25% of total ERCOT peak

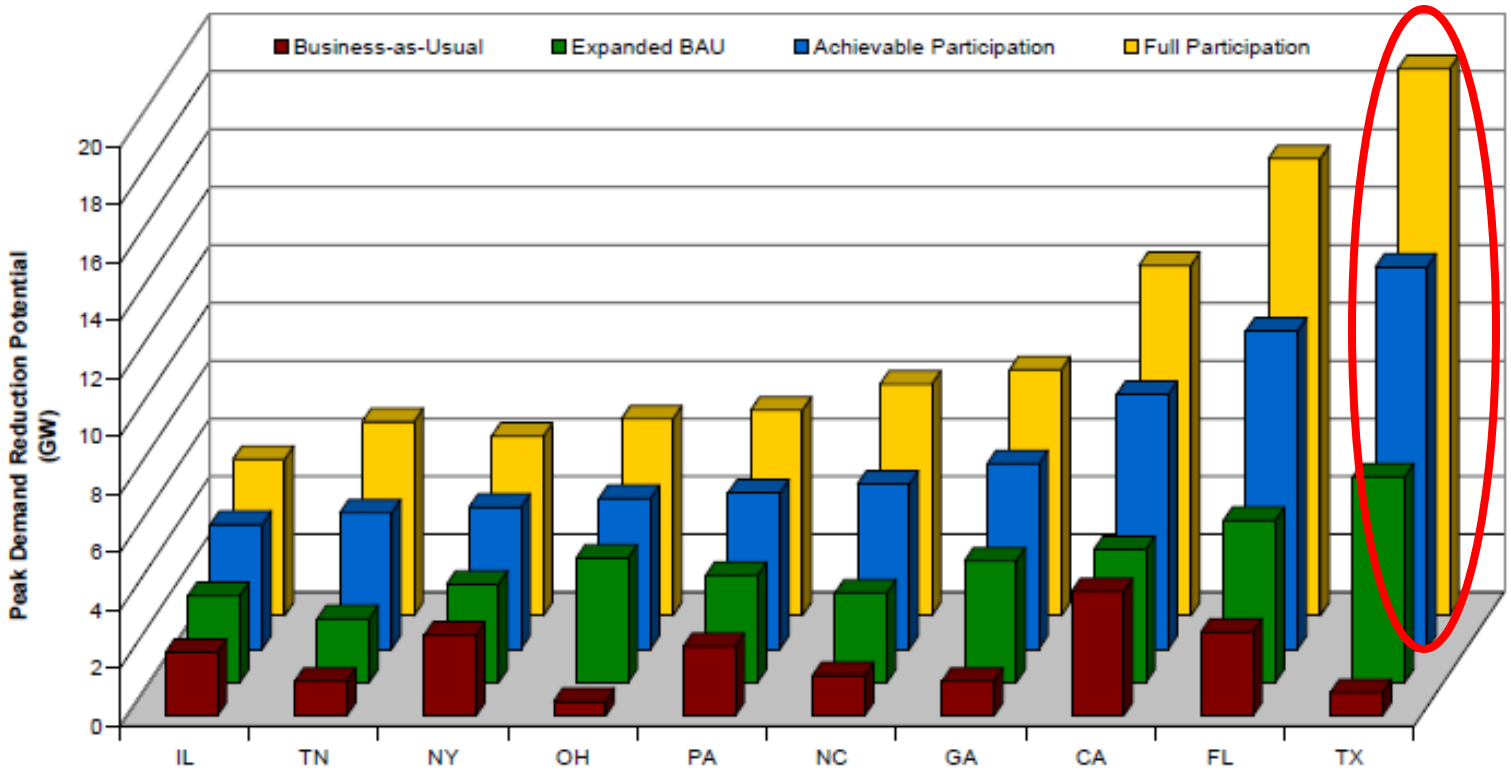
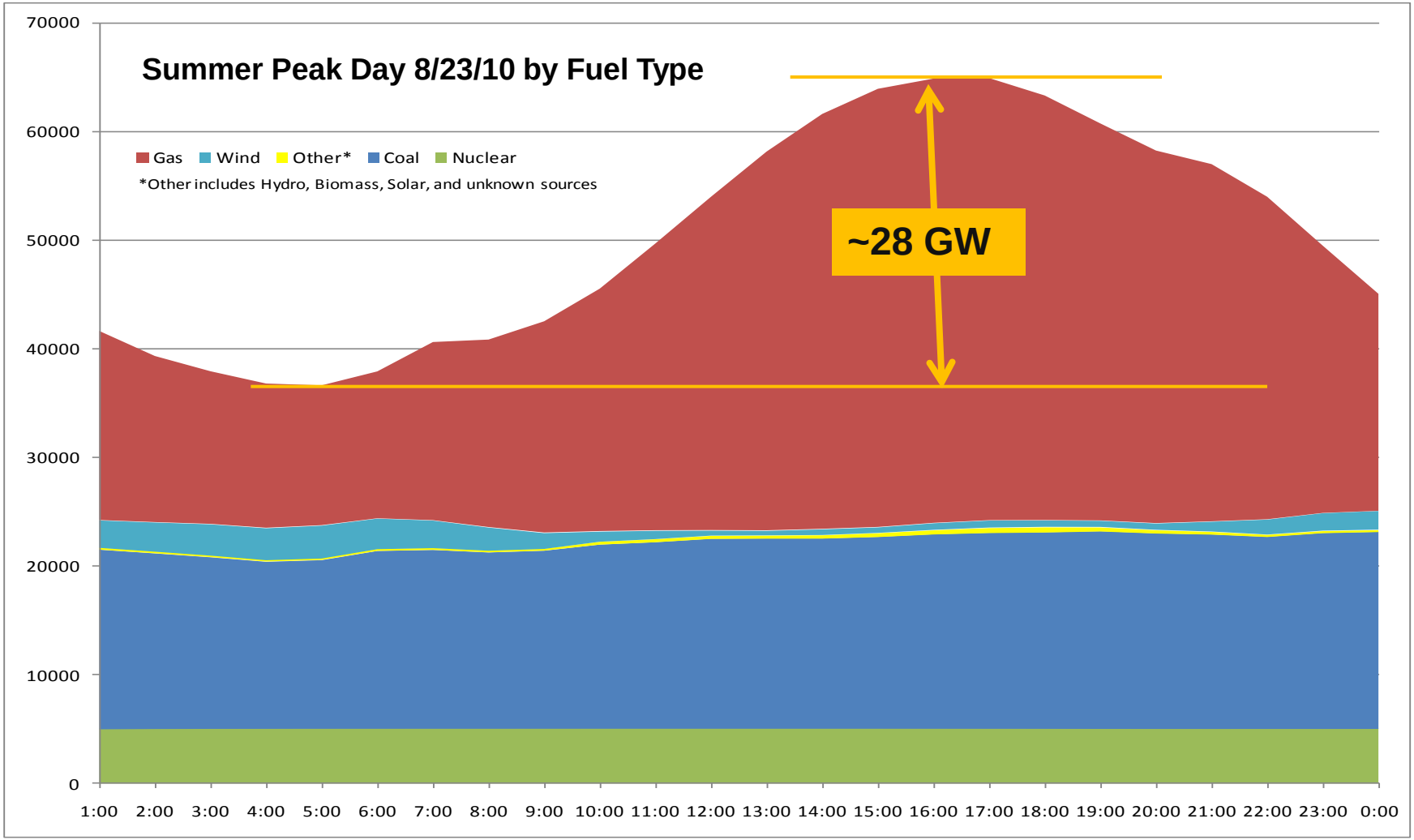


Figure 16: Top Ten States by Achievable Potential in 2019 (GW)

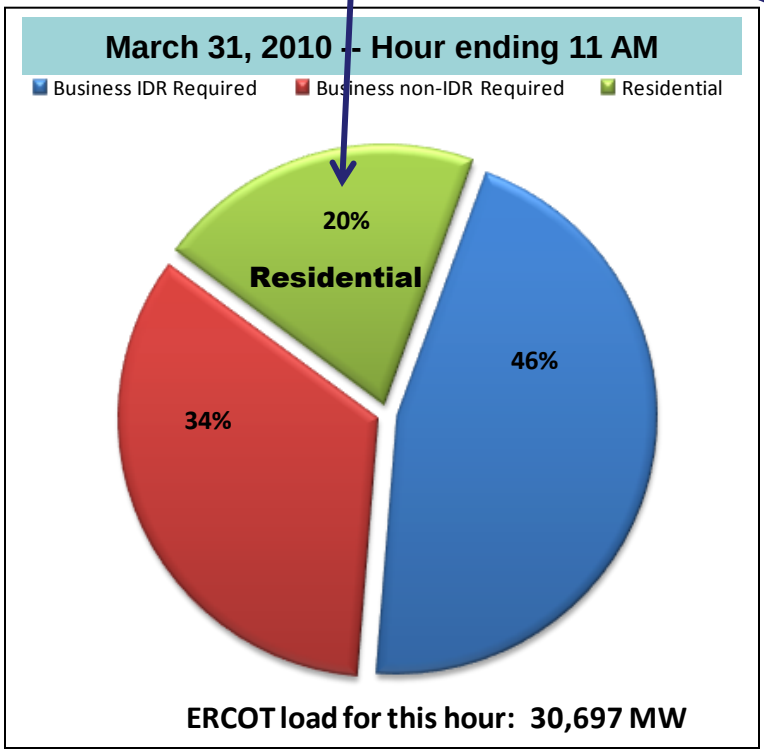
Source: FERC 2009 National Assessment of DR, page 42

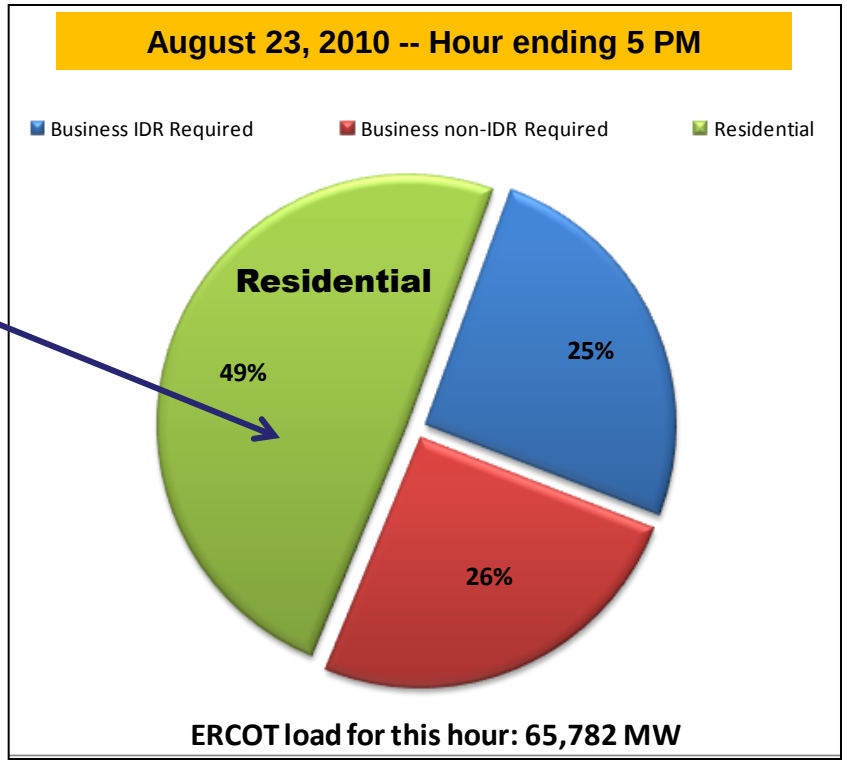
Summer day load shape with fuel mix



Peak vs. off-peak

26,000 MW of residential summer peak load





- Both days were weekdays
- Customer class breakdown is for competitive choice areas (used as proxy for NOIE areas)
- IDR meters are required at >700kW

DR incentives, signals and actions

DR Type	Incentive	Signal	Action-taker
Load Resources providing RRS	Day-ahead Ancillary Service market clearing prices	ERCOT dispatch (EEA or frequency recovery), UFR trip	QSE (via SCADA), UFR (automatic), Load personnel
EILS	4-month capacity payment	ERCOT dispatch (EEA)	QSE (via SCADA), Load personnel
4CP Response	TCOS avoidance	Probability of a 4CP interval	Load personnel or 3rd party
Real-Time Pricing	Energy price avoidance	Probability of high LMPZ -- signal provided by LSE or 3rd party	Load personnel or 3rd party
Critical Peak Pricing	$ incentive from LSE	Real-time LMPZs above a contracted level	Load personnel, LSE or 3rd party

DR incentives, signals and actions (continued)

DR Type	Incentive	Signal	Action-taker
TDSP Load Mgmt. Std. Offer Programs	Capacity payment	Instruction from TDSP (EEA, congestion mgmt.)	Load personnel
Time of Use	Potential to save by using lower priced off-peak power	Prices change at known time of day	Load (behavioral shift)
Direct Load Control	LSE load management or avoidance of spot prices	Deviation from day-ahead position or probability of high LMPZ	LSE or 3rd party contracted to LSE
	NOIE LSE avoidance of 4CP charges	Probability of a 4CP interval	

DR in ERCOT today

- **Operational DR (these MW we know):**
  - 181 Load Resources with 2382 MW of registered DR capacity
    - Participation in Responsive Reserves capped at 1150 MW
  - 475 MW of participating EILS from ~900 Load sites
  - ~150 MW enrolled in TDSP Load Management SOPs
    - Summer peak hours only; some overlap with EILS
- **Economic DR (these MW we don't):**
  - Load curtailing in anticipation of 4CP intervals
    - 11,000+ IDR-metered Loads subject to tariffs
    - Behavior is well-baked into ERCOT load forecasting
  - Real-time & critical peak price response
  - Time of Use
  - LSE direct load control

Peak load reduction

- **Unlike programs in other ISOs, ERCOT DR is not designed to reduce summer peak demand**
- **DR is needed round-the-clock**
- **Of 18 Load Resource deployments since 2006:**
  - 3 occurred during summer peak hours (3-7 PM weekdays, June through September)
  - 6 occurred during winter months
  - 8 occurred during non-business hours (overnights or weekends)
- **The single EILS deployment began at 5:49 AM on Feb. 2 and lasted 28 hours**

Smart Grid initiatives

- **Municipals and Co-ops (24% of ERCOT Load) have a number of existing and developing smart grid initiatives**
  - AMI deployments
  - Smart thermostats
  - Other DLC
- **Investor-owned TDSPs serving competitive-choice areas are halfway toward eventual deployment of 6 million-plus advanced meters**
- **As of early April:**
  - TDSPs had installed 2.97 million advanced meters
  - ERCOT keeping pace, settling 2.7 million of those meters on 15-minute data
- **Robust TDSP features:**
  - Meter-reads-on-demand enhance retail switching
  - Automatic outage detection
  - Remote connect/disconnect

AMI and the retail market

- **Smart Meter Texas portal has a very low sign-up rate among customers with advanced meters**
- **Customer education initiatives and dynamic price offerings are scarce**
  - Vast majority of AMI customers are still buying flat-priced electricity
- **Home Area Networks are still in pilot stage**
- **Low participation by REPs and aggregators in the AMIT process**

- **REP investments in customer smart-grid tools subject to:**
  - Risk of losing the customer to switching
  - Lack of financial incentives due to low flat electricity prices
    - $4 natural gas

Path to the Smart Grid

TDSP Back Office

15-minute Settlement

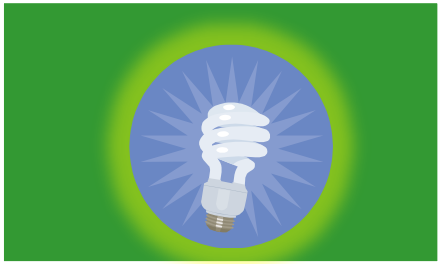
REP Back Office

Customer Education

Incentives

Home Area Network

Load Control Equipment



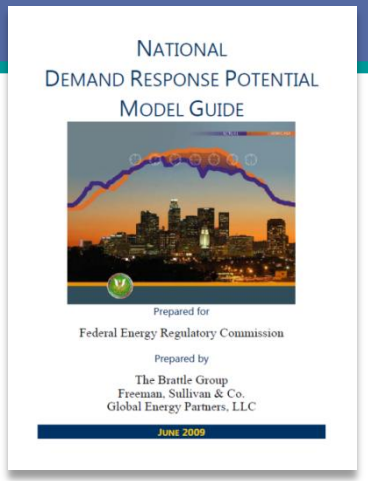
Relevant questions

- **How many REPs will build AMI DR portfolios?**
  - Does DR capability = smarter energy consumers = enhanced customer loyalty?
- **How much mass market DR potential is out there?**
  - FERC estimate is simply a calculation of peak demand, not a projection of adoption rates
- **How fast will it develop?**
- **Who is most likely to push the button?**
  - Customer, REP, third party?
- **Will shortage/scarcity conditions result in high prices?**
- **Will the signals all be economic?**
  - What energy prices (i.e., natural gas) are needed to stimulate DR?
  - Will mass market AMI customers enroll in ERCOT DR services?

How to quantify DR in the Long-Term Study

- **Goal of the Task Force should be to incorporate meaningful consideration of DR into the Long-Term analysis**
- **Big picture objectives:**
  1. Understand interrelationships between ERCOT DR, market actions and policy drivers
     - What forces will drive DR?
     - What programs/products will develop?
     - What's the value and how will it be channeled to participants?
     - What will the supply curve look like?
  2. Evaluate the impact DR can have on long-term system transmission & operational needs
     - Need to develop DR scenarios

How to quantify DR in the Long-Term Study



Brattle Group; Freeman, Sullivan & Co.; Global Energy Partners LLC, June 2009

- **One option could be to use the methodology contained in the FERC National Demand Response Potential Model Guide:**
  - The demand response potential model used to generate the estimates contained in this report is available from FERC.
  - It was developed with the idea that state and utility policy makers may wish to use the model with different input data and assumptions to develop alternative, state-specific demand response potential estimates.
  - http://www.ferc.gov/industries/electric/indus-act/demand-response/NADR-guide.pdf
- **Other options?**
- **Please provide comments and suggestions so we can discuss options in the next meeting**

More questions?