Texas Demand Response Programs and Generator Emissions Seminar Presentation

June 11th, 2013

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Outline

• Introduction
• ERCOT Resource Adequacy and Reserve Margins
• Demand Response Defined
• Summary of Demand Response Programs
• Curtailment Strategies and Examples
• Financial Proforma
• Generator Emissions Update
• Conclusion
Our Business Model

• We do business under trade name, “Dominion Energy Solutions” to reinforce the Dominion brand that is recognizable to many large commercial and industrial energy users throughout the U.S.

• Dominion Energy Solutions (“DES”) is an energy management services company owned by Dominion Resources.

• We provide energy procurement services for electric and natural gas to large commercial, industrial, and educational clients.

• We are a demand response service provider (e.g. sometimes referred as “Aggregator”) in the ERCOT electric market in Texas. We are registered with ERCOT as a Qualified Scheduling Entity (“QSE”) qualified to aggregate customer load resources into ERCOT sponsored demand response programs.

• In addition, we are a demand response service provider on our proprietary 4CP demand response program which helps clients reduce regulated transmission costs each year.
Client load resources gain on all fronts

- Shared revenue from demand response.
- No gaps in communications.
- **Direct QSE relationship to the ERCOT market with DES.**
- Bid strategy and market intelligence through affiliation with DES.
- First responder to all facilities on ERCOT ERS test notices to run generators.
- DES is committed to our clients
Resource Adequacy is a Major issue in ERCOT

New generation is not being built quick enough to meet demand. Demand response is an interim solution.

Expected Load Carrying Capacity (ELCC) for Wind is 8.7%

Firm Load Forecast + 13.75% Reserve

Firm Load Forecast

Resources


Paul Wattles, ERCOT, Presented at Data Center Dynamics, Dec 11, 2012
Off-peak vs. on-peak load by customer type

Wednesday
March 9, 2011
5:15 PM
ERCOT Load: 31,262 MW
Temperature in Dallas: 64°

3/9/2011 IE 17:15

Residential 27.4%
(~8,500 MW)
Small Commercial 28.9%
Large C&I 43.7%

8/3/2011 IE 17:00

Residential 51.2%
(~35,000 MW)
Small Commercial 25.2%
Large C&I 23.7%

5:00 PM
ERCOT Load: 68,416 MW
Temperature in Dallas: 109°

• Customer class breakdown is for competitive choice areas; percentages are extrapolated for munis and co-ops to achieve region-wide estimate
• Large C&I are IDR Meter Required (>700kW)

Paul Wattles, ERCOT, Presented at Data Center Dynamics, Dec 11, 2012
What is Demand Response

Temporary reduction of power in response to grid reliability and/or economic conditions.
Capital Efficiency of Meeting Peak Electric Demand

>10% of infrastructure costs are spent to meet peak demand that occurs less than 1% of the time.

Annual US Electricity Demand - % of Peak

Demand response is a cost-effective and reliable way to meet peak demand.
Reliability

**Reliability/Security** – DR can be brought to market more quickly and precisely than comparable generation or T&D, giving grid operators resources needed to better manage reliability NOW while paying end-users to tap into existing resources.

Demand response is achieved when end-users reduce their power demand in response to grid reliability issues or peak price signals.
# Demand Response Programs in ERCOT Market

## Programs Summary

<table>
<thead>
<tr>
<th>Program</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
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## Table

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<th></th>
<th>EMERGENCY RESPONSE SERVICE (ERS) 10-MINUTE</th>
<th>EMERGENCY RESPONSE SERVICE (ERS) 30-MINUTE (PILOT)</th>
<th>COMMERCIAL LOAD MANAGEMENT (CLM)</th>
<th>Four Coincidental Peaks (4CP)</th>
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<tr>
<td>RISK</td>
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<td>PERFORMANCE PERIOD</td>
<td>THREE 4-MONTH TRANCHEs</td>
<td>THREE 4-MONTH TRANCHEs</td>
<td>SUMMER 4-MONTHS</td>
<td>SUMMER 4-MONTHS</td>
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<td>PAYMENT METHOD</td>
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<td>NOVEMBER CHECK</td>
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<td>MAX. HOURS OF CURTAILMENTS</td>
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<td>8 HOURS</td>
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<td>AUCTION EVERY 4 MONTHS</td>
<td>3RD QUARTER PREV YEAR</td>
<td>PRIOR TO SUMMER</td>
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<td>MIN. CURTAILABLE LOAD REQ.</td>
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<td>100 kW*</td>
<td>100 KW</td>
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<td>ERCOT</td>
<td>CENTERPOINT</td>
<td>DOMINION ENERGY SOLUTIONS</td>
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<td>EVENTS FEB 2011, AUG 2011</td>
<td>5 EVENTS IN 2012</td>
<td>1 TEST AND 1 EVENT IN 2012</td>
<td>DAILY FORECAST NOTIFICATIONS</td>
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## Summer Peak

<table>
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<tr>
<th>Program</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
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<td>CLM</td>
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<tr>
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<td>X</td>
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Overview of 4CP

• In deregulated ERCOT, client’s electric bill has two main sections:
  • Supply costs (i.e. the rate per kWh a client pays for electricity) which is procured via a competitive supplier such as TXU.
  • Regulated charges assessed by the Transmission Distribution Service Provider (i.e. AEP, Oncor, Centerpoint,) for the physical delivery of the electricity.

• Two components of the “4CP” (Four Coincident Peaks) tariff appear on each monthly bill under:
  • Transmission
  • Transmission Cost Recovery Factor (TCRF)

• Large end-users can reduce, or mitigate all together, their 4CP charges through participation in Dominion Energy Solution’s proprietary 4CP demand response program.
How 4CP is calculated

The 4 CP kW applicable under the Monthly Rate section shall be the average of the Retail Customer’s integrated 15 minute demands at the time of the monthly ERCOT system 15 minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer’s average 4CP demand will be updated effective on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous history on which to determine their 4 CP kW will be billed at the applicable NCP rate under the “Transmission System Charge” using the Retail Customer’s NCP kW.

<table>
<thead>
<tr>
<th>SEC</th>
<th>PRI</th>
<th>TRANS</th>
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<tbody>
<tr>
<td>ONCOR</td>
<td>$2.550483</td>
<td>$2.548630</td>
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<td>CENTERPOINT</td>
<td>$2.553659</td>
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<td>AEP</td>
<td>$2.426300</td>
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<tr>
<td>TNMP</td>
<td>$2.656781</td>
<td>$2.597929</td>
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| COSERV | $2.568840 | $2.568354 | $2.636809 |

In other words, the average of the client’s demand during the 4CP times is multiplied by the respective tariff and assessed monthly, the entire calendar year following the 4CP season.

>50% increase vs. 2007
These rates have increased YOY, and can increase 3x per year…
Data Center Performance on 4CP Demand Response

Data center client eliminated over $45,000 in annual regulated transmission costs
What factors make an ideal client for demand response?

- Minimum of 100 kW (formerly 1,000 kW) peak demand
- Interval Data Recorder (IDR) or Smart Meter measures demand 15 min intervals
- Preferably operate multiple shifts of operation (7x24 is most preferable).
- Ability to curtail/reduce load quickly
  - Within 10 min for ERS 10
  - Within 30 min for ERS 30
  - Within 30 to 60 min for CLM
  - Within 150 min for 4CP
- Desire to reduce costs and generate revenue. Contribute towards meeting corporate financial goals and budgets.
- Desire to become more energy efficient
- Dedicated and committed to performing demand response
- Good business relationship with existing Cirro client.
- Meets target vertical segments (see next page).
Client Benefits

**FINANCIAL**
- ERS provides cash payments multiple times per year, even if there are no unscheduled events.
- 4CP provides savings on regulated utility charges for entire year.
- CLM provides cash payments 1 to 2 times per year, even if there are no unscheduled events.

**OPERATIONAL**
- Early warning of potential grid failure
- Opportunity to help stabilize grid which stabilizes your business
- Opportunity to get on highest quality and most reliable power (e.g., generator) with grid as backup

**ENVIRONMENTAL**
- Demand response acts as a capacity resource, helps offset need for incremental generation, reducing emissions
- Helps stabilize grid, less emissions vs. rolling black outs
**Demand Response Proforma for 1 MW Curtailable Load**

**Jun13-Sept13**

<table>
<thead>
<tr>
<th>Bid Period Hours</th>
<th>Hours</th>
<th>MW</th>
<th>Price</th>
<th>Gross Payment</th>
<th>Net of QSE</th>
<th>DES Fee</th>
<th>Equipment &amp; Install Cost</th>
<th>Comm Fee</th>
<th>Net to Client</th>
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</thead>
<tbody>
<tr>
<td>Bus Hours (0800 - 1300 M-F)</td>
<td>420</td>
<td>1.00</td>
<td>$8.15</td>
<td>$3,423.00</td>
<td>$2,396.10</td>
<td>$1,026.90</td>
<td>$1,026.90</td>
<td>$1,026.90</td>
<td>$1,026.90</td>
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<tr>
<td>4CP - Mon-Friday 3-5PM</td>
<td>1.00</td>
<td>$30.95</td>
<td>$30,950.00</td>
<td>$20,736.50</td>
<td>$10,213.50</td>
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<td>-</td>
<td>$64,550.20</td>
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<tr>
<td>CLM - Mon-Friday 1-7PM</td>
<td>1.10</td>
<td>$35.00</td>
<td>$38,500.00</td>
<td>$30,800.00</td>
<td>$7,700.00</td>
<td>-</td>
<td>-</td>
<td>$64,550.20</td>
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<tr>
<td>Non-Bus Hours (All other hrs incl sat sun)</td>
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<td>1.00</td>
<td>$7.90</td>
<td>$15,168.00</td>
<td>$10,617.60</td>
<td>$4,550.40</td>
<td>-</td>
<td>-</td>
<td>$64,550.20</td>
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</table>

**Gross Payment**: $88,041.00

**Net of QSE**: $64,550.20

**Net to Client**: $23,490.80

**Notes**: ERS compensation paid in cash

**CLM compensation paid in cash**

**Equipment & Install Cost**: $135,263.00

**Total DES Year 1**: $97,605.60

**Total Net to Client year 1**: $37,657.40

**Total**

**Notes**: ERS compensation paid in cash

**CLM compensation paid in cash**

**4CP savings is reflected and realized on monthly electric invoices from REP**

**EILS BID PERIOD**

**Oct13-Jan14**

<table>
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<tr>
<th>Bid Period Hours</th>
<th>Hours</th>
<th>MW</th>
<th>Price</th>
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<th>Equipment &amp; Install Cost</th>
<th>Comm Fee</th>
<th>Net to Client</th>
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<tbody>
<tr>
<td>Bus Hours (0800 - 1300 M-F)</td>
<td>420</td>
<td>1.00</td>
<td>$8.15</td>
<td>$3,423.00</td>
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<td>$1,026.90</td>
<td>$1,026.90</td>
<td>$1,026.90</td>
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<tr>
<td>Peak 1 Hours (1300 - 1600 M-F)</td>
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<td>1.00</td>
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<td>-</td>
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<tr>
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**Gross Payment**: $23,899.90

**Net of QSE**: $16,729.93

**Net to Client**: $7,169.97

**ERS**

**Feb14-May14**

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<th>MW</th>
<th>Price</th>
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<th>DES Fee</th>
<th>Equipment &amp; Install Cost</th>
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<th>Net to Client</th>
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<td>$16,325.47</td>
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**Gross Payment**: $23,322.10

**Net of QSE**: $16,325.47

**Net to Client**: $6,996.63

**Notes**: ERS compensation paid in cash

**CLM compensation paid in cash**

**4CP savings is reflected and realized on monthly electric invoices from REP**

**Hypothetical 1 MW DR Capacity in ERS, CLM, and 4CP demand response programs**
Emissions Rules Related to Emergency Power Generation and Demand Response

If anyone has questions PLEASE contact us via email/phone and we will respond accordingly.
Appendix
(Back-Up Slides)
EPA finalized amendments to the RICE NESHAP in 2010 that established standards for certain existing engines.

After promulgation of the 2010 amendments, EPA received several petitions for reconsideration, petitions for judicial review, and other communications regarding several issues with the final rules.

On January 30, 2013 (78 FR 6674), EPA finalized amendments to the NESHAP to address the petitions.
  - Amendments effective April 1, 2013
  - Minor amendments/clarifications also made to NSPS

One of the major issues addressed in final Amendments included Emergency Engine operation for demand response and peak shaving.
Emergency Engine Operation Limitations

- Emergency engine operation limited to:
  - Unlimited use for emergencies (e.g., power outage, fire, flood)
  - 100 hr/yr for maintenance/testing and emergency demand response
  - 50 hr/yr of the 100 hr/yr allocation can be used for:
    - non-emergency situations (if no financial arrangement)
    - local reliability (existing RICE at area sources of HAP only)
    - peak shaving until May 3, 2014

Note: EPA did not finalize the proposed 50 hour provision for peak shaving until April 2017
Emergency Engine Operation Limitations

- Operation for emergency demand response allowed if:
  - Energy Emergency Alert Level 2 declared by Reliability Coordinator, or
  - Voltage or frequency deviates by 5% or more below standard
- Operation for local reliability allowed if:
  - Engine is dispatched by local transmission/distribution system operator
  - Dispatch intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads
  - Dispatch follows reliability, emergency operation, or similar protocols that follow specific NERC, regional, state, public utility commission, or local standards or guidelines
  - Power provided only to facility or to support local distribution system Owner/operator
**TCEQ Emissions Rules and Changes**

- TCEQ stands for “Texas Commission Environmental Quality”
- Title 30 TAC Chapter 106.511, Permit by Rule (PBR)
- §106.511. Portable and Emergency Engines and Turbines.
- Internal combustion engine and gas turbine driven compressors, electric generator sets, and water pumps, used only for portable, emergency, and/or standby services are permitted by rule, provided that the maximum annual operating hours shall not exceed 10% of the normal annual operating schedule of the primary equipment; and all electric motors. For purposes of this section, “standby” means to be used as a “substitute for” and not “in addition to” other equipment.
- Per the TCEQ, “If a generator is run when directed by ERCOT as part of the ERS declared emergency at Step 2/3 of their EECP, they will be in compliance with the intent of PBR 106.511”
TCEQ Rule Changes for ERCOT ERS
Rule 2012-025-117-AI

Summary of what the rulemaking effective 5/2/2013 will do:

• The adopted rulemaking amends Chapters 101 and 117 to update references to ERCOT protocols and reflect changes to ERCOT’s new ERS program. The adopted rulemaking amends §101.379 and the definition of emergency situation in §117.10 to reference the version of the ERCOT nodal protocols effective June 1, 2012. The adopted rulemaking also amends the definition of emergency situation in §117.10 to reflect changes made by ERCOT to promote reliability during energy emergencies by allowing the operation of generators for purposes of selling power to the electric grid under limited circumstances. The amendments to Chapters 101 and 117 will be submitted to the United States Environmental Protection Agency (EPA) as a revision to the state implementation plan.

Effect on the:

• **Regulated community:** The adopted rulemaking will prevent ERS program participants from potentially losing exemption status under Chapter 117 if they provide power to the electrical grid during an ERCOT-declared energy emergency. Eliminating this potential disincentive may improve reliability of electric service in the ERCOT region while also promoting participation in the ERS program.

• **Public:** The adopted rulemaking will prevent ERS program participants from losing exemption status under Chapter 117 if they provide power to the electrical grid during an ERCOT-declared emergency. Eliminating this potential disincentive may help promote participation in the ERS program and improve reliability of electric service in the ERCOT region.
TCEQ Rules/Changes

• Under §106.511 PBR, standby use of generators must occur only as a substitute for other equipment
• Historically the TCEQ has not allowed “peak shaving” under §106.511 PBR
• Rules that govern the submission of permit applications:
  – Title 30 TAC Chapter 116, Control of Air Pollution by Permits for New Construction or Modification
  – Depending on the location of your emergency generators they may also be subject to other TCEQ regulations including Title 30 TAC Chapter 117, Control of Air Pollution from Nitrogen Compounds.
• Additional information can be found at http://www.tceq.texas.gov/rules
Emergency Generation Emissions and Demand Response

- RICE NESHAP
  - Regulates HAP emissions from stationary RICE at both Major and Area sources of HAP (ALL SIZE ENGINES COVERED)
  - Only engines not subject: existing emergency engines located at residential, institutional, or commercial are sources used or obligated to be available no more than 15 hr/yr for emergency demand response and not used for local reliability

- Emergency Engine Operational Limitations
  - Emergency Engine operation limited to:
    - Unlimited use for emergencies
    - 100 hr/yr for maintenance/testing and emergency demand response
Important Take Away’s

• No change in NESHAP compliance dates for existing non-emergency engines
  – May 3, 2013 – CI engines
  – October 19, 2013 – SI engines
  – Extension request deadline has passed for CI engines

• Still only 100 hours per calendar year for certain non-emergency operations and testing/maintenance
  – Emergency demand response no longer limited to 15 hours per year

• Limited allowances for engines operated for emergency demand response and that are dispatched by local authority for system reliability
  – Engines that operate or must be available for more than 15 hrs/year for emergency DR must burn ULSD and report to EPA the date, time, and situation for operation

• Peak shaving allowance modified from proposal
  – Up to 50 hours per calendar year through May 3, 2014
  – Applies only to existing emergency engines at area sources

• Definitions in NSPS and NESHAP may be different than State regulations and programs under regional transmission authorities
  – Emergency and Non-emergency engines
  – Emergency DR