ERCOT Demand Response:
How to Maximize Your Revenue and Resilience in America’s Most Interesting Energy Market

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Purpose

Provide our customers and energy decision makers key market information in the ERCOT market. Our goal is to help you better understand this dynamic energy market and maximize your opportunities to be resilient, earn revenue and support the state's grid system.

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Agenda

- Review ERCOT's market design, history, and drivers
- Key market updates for 2020
- Demand Response's role in resilience, reliability and sustainability
- How to participate and maximize your value in ERCOT demand response

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Presenters

Mike Hourihan
Sr. Manager, Market Development
ERCOT

Joe Hayden
Vice President and General Manager
ERCOT

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The Unique ERCOT

- Electric Reliability Council of Texas, Est. 1999
- 90% of the electrical load; 25 million customers
- 46,500 miles of transmission; 650+ generation units
- Overseen by the Public Utilities Council (PUC) and Texas Legislature, not FERC
- Made up of a diverse group of participants
- ERCOT is an energy market -- no forward capacity
- Wind has recently surpassed coal as the #2 energy source for the market.

Energy Markets vs. Capacity Markets

Capacity Markets

- Procure energy years in advance based on current and expected demand needs
- Participants bid into the market in advance to participate

Energy Markets

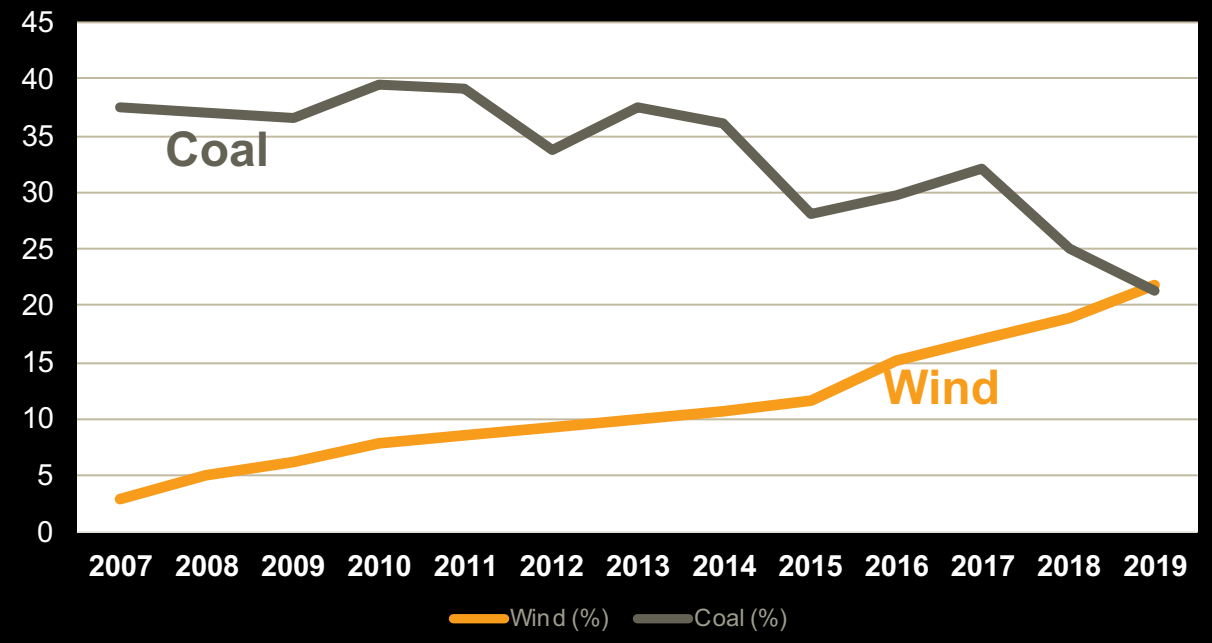
- Procure energy in a day-ahead market
- Utilizes a capacity reserve to maintain the required capacity to support the market in near real time
- Pricing adjustments occur to entice participants to stay in the market

So … Which is Better?

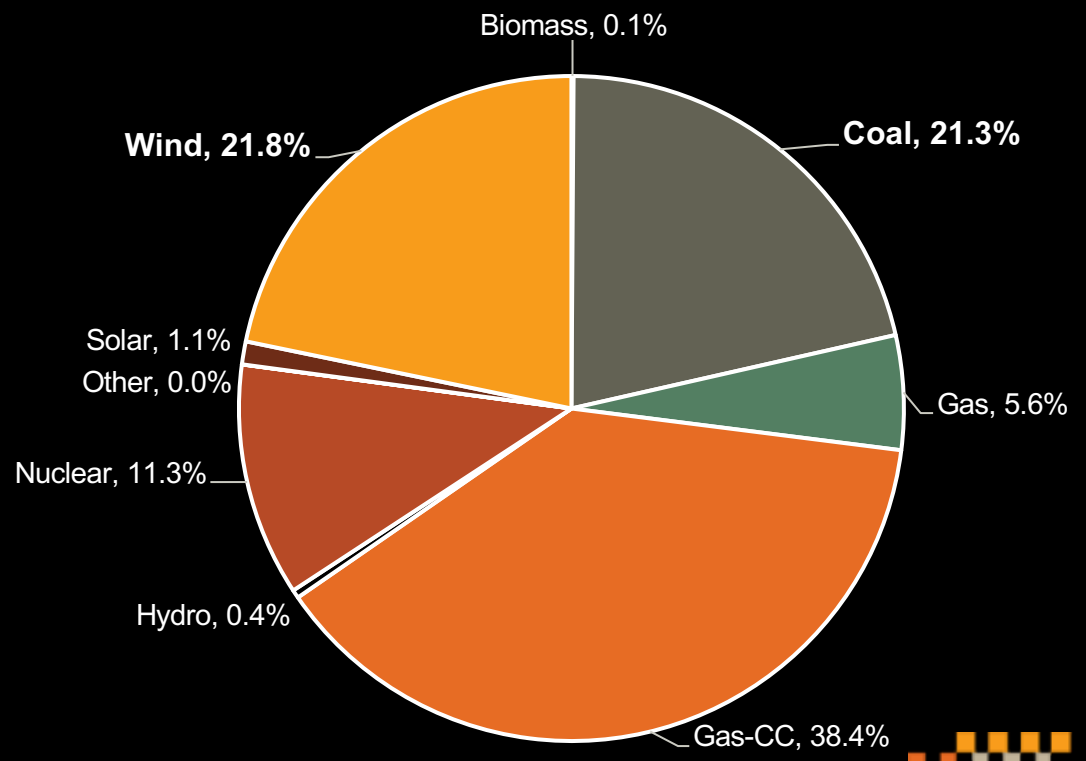
Wind Transformation

Wind is second largest of all fuel sources in ERCOT

2007 – 19 Wind vs Coal Transition (% of total mix)*



2019 ERCOT GWh by Fuel Source*



*Source: ERCOT, data link

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ERCOT Major Changes and Drivers

Declining Reserves Offset by Renewable Penetration

- **Renewable Penetration**
  - Wind is now the second largest fuel source
  - Regulatory, infrastructure, and incentives opening for solar and battery storage

December 2019 CDR Report:

- *1,058 MW of installed capacity has been approved by ERCOT since May*
- *Twenty-two Distributed Generation solar units totaling 143 MW were added to have a combined capacity contribution of 106 MW.*

- **Reserve Margin**
  - Reduction over the past several years
  - Rationale for reduction
    - Economics
    - Lower energy costs

- **Coal Plant Reduction**
  - Alternate means to meet demand are expanding
  - Movement to more renewable energy

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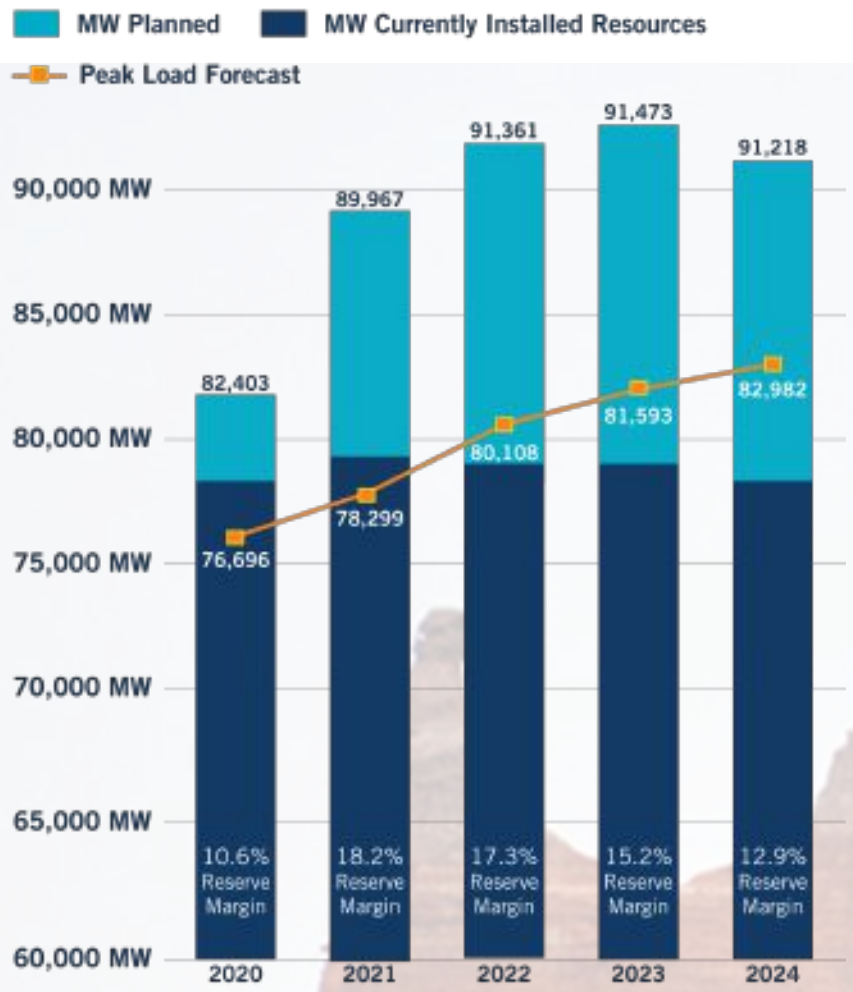
ERCOT Expected to Hit Record Demand

Forecasts Indicate Record High Demand



- Peak Load Forecast from 2020 – 2024 are expected to grow by nearly 10%.
  - With more renewable supply, reserve margins are expected to increase
- Over 7,000 MW of solar is expected to come online by 2022
  - Only 1,650 of solar is currently in the market
- Wind is going to continue to grow
- Will it all actually get built?

"ERCOT is prepared to use the tools and procedures that are in place to maintain system reliability during tight conditions," said ERCOT President and CEO Bill Magness.

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2019 – DR Saves the Day!

First Two Events in Five Years for ERCOT

- **ERCOT experiences two demand response events in a one-week period in Aug 2019**
  - ERCOT sets new maximum peak demand 74,666 MW (4,747 MW over Aug 2018)
  - 2 emergencies declared for reserves below 2,300 MW (EEA 1)
  - ERS deployed Aug 13 & Aug 15

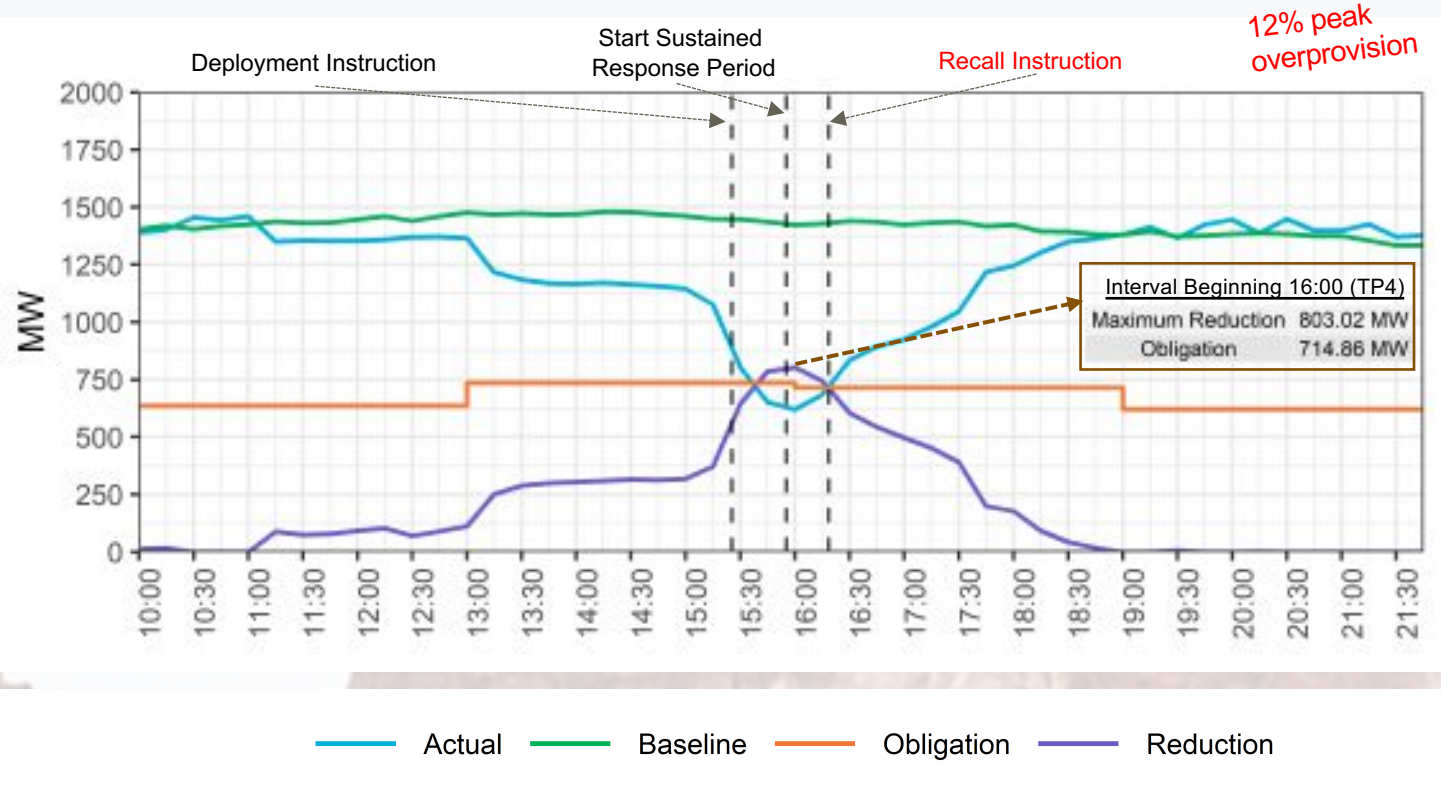
New Peak Demand Drives ERS-10 and ERS-30 Events in August

Source: [ERCOT Aug 2019 Monthly Operational Overview]

Date	Type	Deployment Start	Start of Sustained Response Period	Recall Time	Total Deployment Time	Fleet Obligation (MWs) – Time Period 3 (HE14-HE16)	Fleet Obligation (MWs) – Time Period 4 (HE17-HE19)
8/13/2019	ERS-30	15:25	15:55	16:18	00:23	833	715
8/13/2019	ERS-10	15:34	15:44	15:58	00:14	93	N/A
8/15/2019	ERS-30	15:13	15:43	16:56	01:12	833	715

August Events

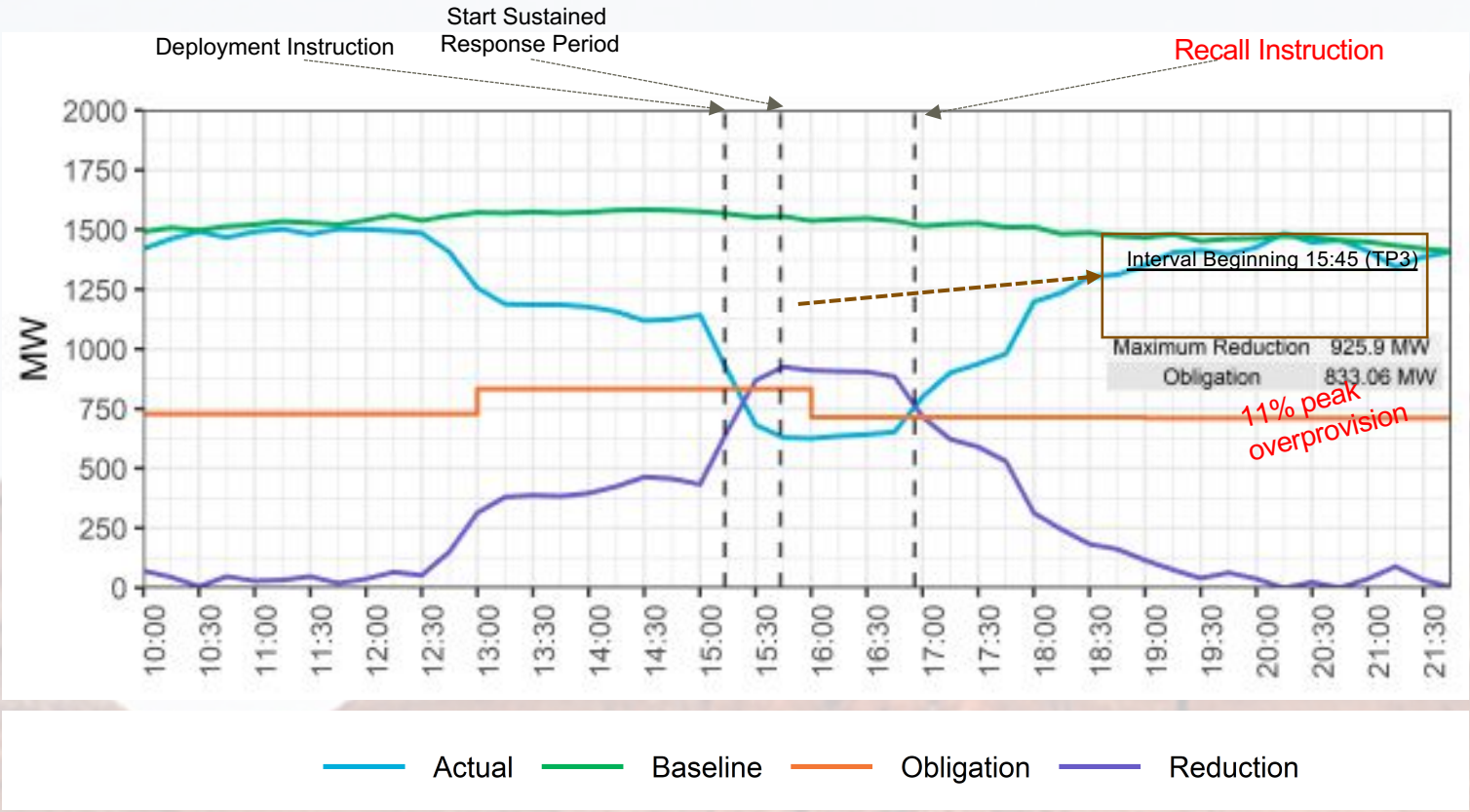
ERS – Aug 13, 2019



Source: Advanced Energy Management Alliance ERCOT ERS, Dec 2019

August Events

ERS – Aug 15, 2019

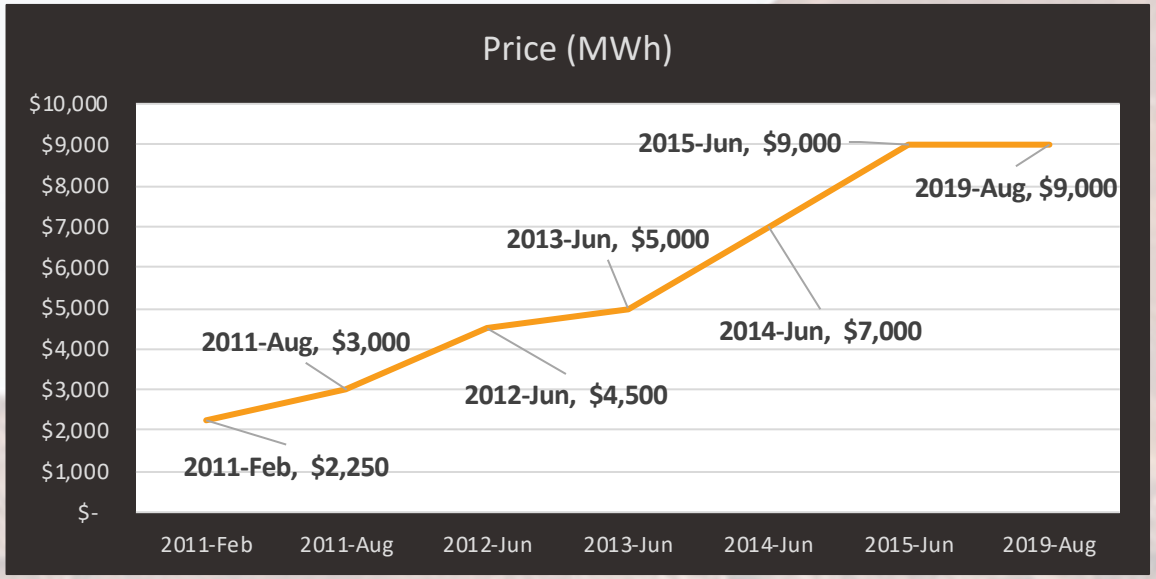


Source: Advanced Energy Management Alliance ERCOT ERS, Dec 2019

Scarcity Pricing Hit & Sustained

$9,000/MWh Delivered for Two Operating Days

- **Scarcity Pricing**
  - Increased price as a result of a scarcity of supply relative to demand
  - A low reserve and high demand day creates the potential for scarcity pricing
  - The Operating Reserve Demand Curve (2014) automatically raises prices in a shortage
  - If you are considering or participating in LR, this scenario is your time to be rewarded



- **With EEA Level 1, ERCOT observed two days (Aug 13 & 15) $9,000/MWh Scarcity Pricing**
  - EXAMPLE: A 2 MW customer participating in the market during a scarcity event would have seen:
  - $9,000/MWh x 1.82 hours = $32,760
  - No rolling blackouts issues – DR helps save the grid and generates significant revenue for market participants.

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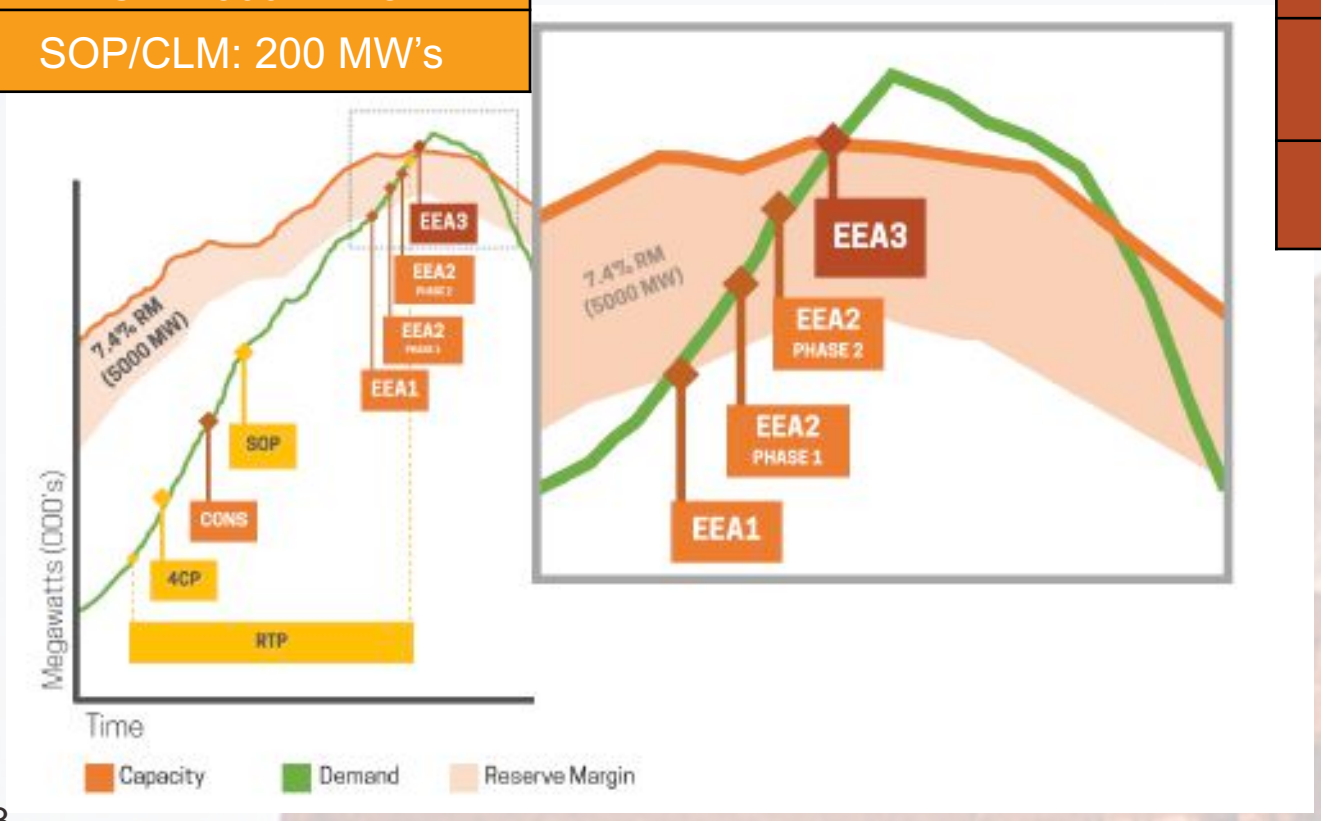
Understanding EEA's

How ERCOT Manages Grid Stability

RTP: $8.13 - $9000 MW/h
4CP: 1500 MW's
SOP/CLM: 200 MW's



Levels	Responsive Reserves	Description
Conservation Alert	< 3,000 MW	ERCOT may call upon consumers to take steps to conserve power by reducing consumption.
EEA 1	< 2,300 MW	Texas Electricity Conservation Needed ERCOT operator's authority to call on all available power supplies. ERS 30 can be called at this point.
EEA 2 Phase 1 & 2	< 1,750 MW	Conservation Critical; Risk of Rotating Outages ERCOT escalates to a Power Warning, which allows ERCOT operators to dispatch Load Resources providing Responsive Reserve Service as well as ERS 30 & ERS 10
EEA 3	Rolling Blackouts	Rolling blackouts to all areas of ERCOT grid If capacity shortage is not relieved using voluntary and contractual demand response, ERCOT will instruct utilities to rotate power outages to prevent statewide blackouts.

- When demand approaches what the grid can supply within 3,000 MW's, ERCOT takes action.
- 8 levers are used by ERCOT before they have to call blackouts (BO's).

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HOW DID THEY DO THAT!!!

ERCOT Levers to Reduce Risk and Meet Demand Needs

- **ERCOT's Balancing Levers**
  - **Generators remaining in the market when supply is needed**
    - Price caps: $9,000/MWh where it's closer to $2,000/MWh in other markets
  - **Demand Response and Demand Management:**
    - **Demand Management – 4CP** (Coincidental Peaks) or "peak demand management"
      - Help the grid by reducing peak demand during the hottest and highest demand days
      - Helps customers by reducing electricity charges through lowering the capacity charge
    - **Demand Response – Ancillary Programs**
      - Help the grid by quickly and temporarily reducing electrical demand when the grid is stressed to prevent brownouts and blackouts
      - Helps customers by reducing net energy cost and generating revenue
        - Programs include **LR** and **ERS**.

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Participation in Flux

Fair, but Inaccurate Predictions Reduce Participation

- **Forecasted record demand and heat, low reserves, impacts DR participation**
  - *"There will be more DR calls than I can handle, and it will impact my business"*
  - There *is* the potential for more calls given these conditions; ***however*,**
- **ERCOT has done a remarkable job of meeting demand needs without excess activation of DR**
  - Good planning and infrastructure
  - High price caps
- **High prices (up to the $9,000 cap in ERCOT) have kept generators online**
  - High prices make it worthwhile for power generators remain available
  - Decreasing the need to call Demand Response events
    - Both the Load Resource (LR) and Emergency Response Services (ERS):
      - 2 events in August 2019 – ERS, No LR events
      - First events since 2014

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Weighing DR/DM Participation

Significant Value vs. Excessive Events

- **Question:**
  - Is this (2-events) a new normal for ERCOT?
- **Answer:**
  - Reserve Margin is increasing (~10%); however, as renewable penetration increases it create more varying fluctuations in supply. DR is a key asset in growing renewable resources and bringing balance to the grid.
- **The ERS program has three periods of participation**
- **LR is a year-round program that has 24-hour availability**
  - LR is the last bastion
- **Both programs are standby programs**
  - This means you are paid for being on standby and required to perform one test per year

ERCOT's need for demand response is greater than ever, but the likelihood of events is still fairly small. A win-win for energy consumers.

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Demand Response Program Overview

Load Resource Program

LR Event History

Year	# of System-wide VDI Events	# of System-wide UFR Events	# of Local UFR Events
2008	3	0	1
2009	0	0	0
2010	2	0	2
2011	3	0	4
2012	0	0	3
2013	0	0	3
2014	1	0	1
2015	0	0	1
2016	0	0	0
2017	0	0	0
2018	0	0	0
2019	0	0	0
Avg. #	0.75	0	1.25
Avg. Duration (minutes)	133	0	21

Load Resource Program (LR)

- Program is year-round, 24/7 availability
- Standby
  - You earn revenue even if an event is not called
- Must be able to curtail within 10 minutes
  - Requires an under-frequency relay (UFR)
- How much do you earn
  - $108k/MW-year, without proration

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Proration

Load Resource Program (LR)

- Proration
- What is it?
  - Apr-May (proration = 85% of MWs in the market awarded)
  - Currently (proration = 40% of MWs in the market awarded)
  - Proration is typically higher in the summer

  - Fixed Pricing Model Option
    - Eliminates proration

  - Customized
    - Customized diversification options using fixed LR and index LR to maximize your potential revenues

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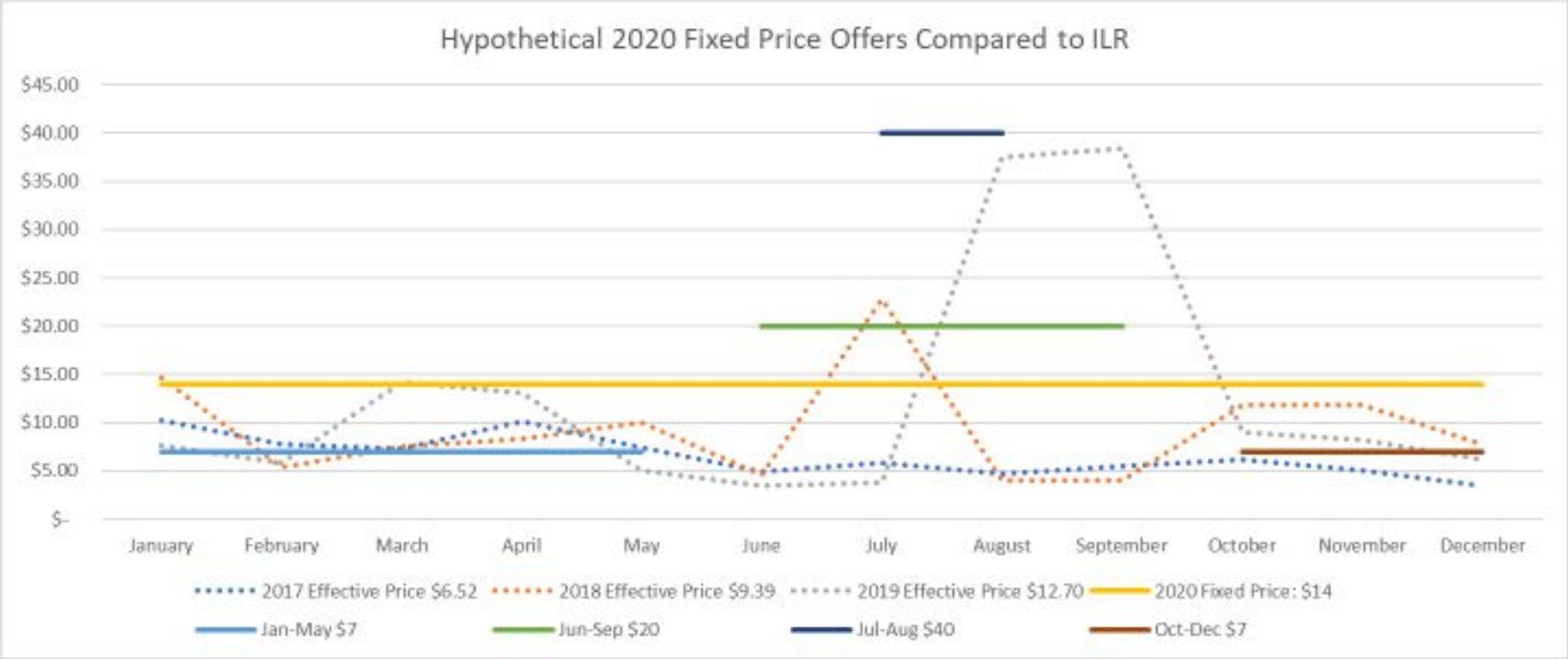
Demand Response Program Overview

LR – The Benefits of the Fixed Pricing Model



Fixed pricing models introduce a flexible way to maximize revenue and mitigate participation risks

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Demand Response Program Overview

Emergency Response Services (ERS)

ERS Event History

Year	# of ERS10 Events	# of ERS30 Events
2008	0	N/A
2009	0	N/A
2010	0	N/A
2011	2	N/A
2012	0	0
2013	0	0
2014	1	1
2015	0	0
2016	0	0
2017	0	0
2018	0	0
2019	1	2
Avg.	0.33	0.38

Emergency Response Services (LR)

- Three, (4) month participation periods
  - Feb, Jun, Oct
- Standby
  - You earn revenue even if an event is not called
  - 10-min and 30-min notification programs
- Earnings and payments
  - Paid within 60 days of the completion of a participation period
- You can earn between:
  - $54k/MW-year
  - You CAN participate with LR as well!

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Coincidental Peak (4CP)

4CP Offsets Transmission Charges

DELIVERY CHARGES

2/27/2014 to 3/27/2014	UCM	VOLUME	UNIT PRICE	AMOUNT
Basic Customer Administrative Charages	Each	1.00	38,840000	$38.84
Delivery Point Charge	Each	1.0	1869.150000	$1,869.15
Distribution Charge	Act Dmd Pwr Adj	37,265.10	3.199000	$7,415.75
Nuclear Decommissioning Charge	Act Dmd Pwr Adj	37,265.1	0.002514	$97.41
Stdby Firm Transmission Charge	Act Dmd Pwr Adj	8,550.26	0.064009	$718.30
Lg Ind Non Firm Transition Charge	Act Dmd Pwr Adj	23,970.19	0.734184	$17,598.53
Point to Point Transmission - Firm Schedule 7	**4CP Pwr Adj**	**21,446.9**	**2.0085**	**$43,078.1**
TC2 Stdby Firm Transmission Charge	Act Dmd Pwr Adj	8,565.27	0.172197	$1,473.19
TC2 Lg Ind Non Firm Transition Charge	Act Dmd Pwr Adj	23,970.04	1.986337	$47,612.58
TC3 Stdby Firm Transmission Charge	Act Dmd Pwr Adj	8,562.17	0.073856	$632.37
TC3 Lg Ind Non Firm Transition Charge	Act Dmd Pwr Adj	23,970.28	0.545948	$13,086.48
Energy Efficiency Cost Recovery	kWh	16,333,000.00	-0.000126	($2,057.96)
Transmission charge	**4CP Pwr Adj**	**21,446.9**	**1.718**	**$36,845.77**
Subtotal				$163,406.51

4CP Participation can dramatically offset your transmissions charges. These charges typically make up to 30% of your bill.

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Coincidental Peak (4CP)

Hitting the Summer Peaks is Key

PROGRAM SUMMARY	
Number CP Days	4 (1 for each summer month)
Season Duration	Summer
Season Timing	June - September
Value/MW reduction for 2016/17	TBD (varies by TDSP)

To receive the 4CP reduction:

- Your organization must reduce demand on the four summer peak days in ERCOT.
- There may be more than 4 demand reductions in order to hit peaks

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What is the Best for My Organization?

That Depends

A Few Questions to Consider:

- **What are our energy goals?**
  - Lower electricity bill costs? Create a revenue stream? Offset total energy costs?
  - Increase resiliency? Promote grid reliability? Drive a sustainability initiatives?
  - Implement distributed energy resources including onsite generation?
- **What assets do I have that can be monetized?**
  - Do we utilize a under frequency relay (UFR)
  - Generators, DERs
- **How long and how often are we able to activate assets?**
  - Are we able to adjust operational activities, shift schedules, flex process without business disruption – CPower can help.
- **Does this help show value to your organization?**

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Selecting Demand Management Options

Considerations for Program Participation

Organizational Situation and goals	Program Option
Direct Electricity Cost Savings	4CP ERS or LR – offset cost through revenue generation
Generate revenue to fund energy projects or bottom line	ERS or LR
Resiliency and Grid Support	ERS (10) and/or LR leveraging DERs, Gens
Under frequency relay in place	LR
Monetize assets for upgrades or installations of new energy assets	LR or ERS
Better prepared and trained on how to deal with potential power outages	LR, ERS
Corporate citizenship – helping your community maintain lower energy costs & environmental impact, and improve grid reliability	LR, ERS, 4CP

If You're Doing 4CP …

You Should Be Doing ERS/LR – Same Financial Impact Without Disruption

Case Study: The Value of ERS and LR over 4CP

- An organization doing only 4CP
  - Would potentially curtail 6 times (July 2019) at 3 hours each time
    - 18-hours of disruption to your business
    - Missing peaks results in proportional lost savings
  - Performing in ERS guarantees revenue earnings
    - Your maximum commitment is limited to your scheduled time periods
    - Up to 8-hours per season

ERS/LR – Less Disruption, More Revenue

- 4CP will require more events to hit peaks
- ERS/LR will have far fewer calls
- Revenue earned will be greater than savings obtained, with lower risk to fail

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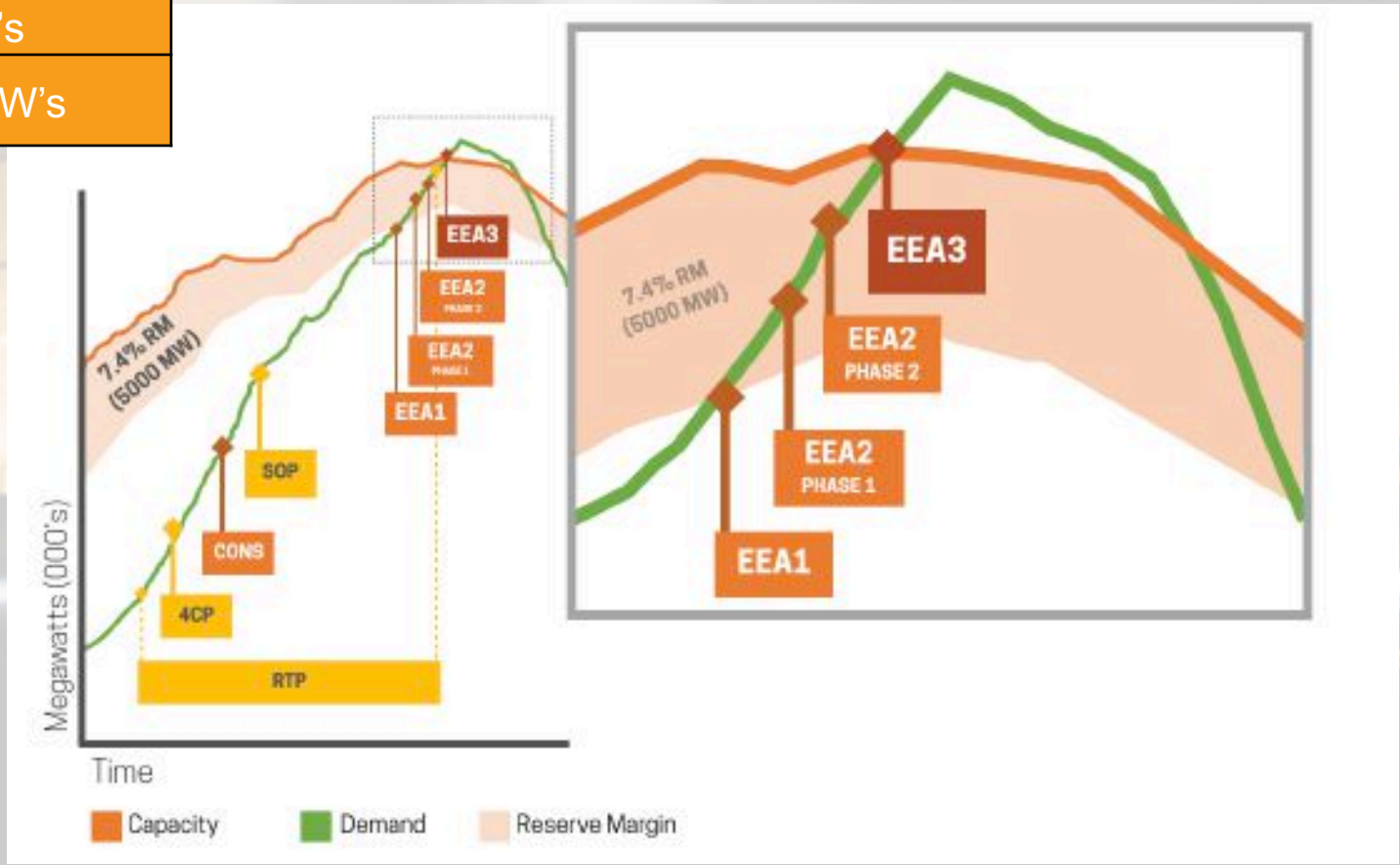
Summary

RTP: $8.13 - $9000 MW/h
4CP: 1500 MW's
SOP/CLM: 200 MW's



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Timelines & Participation

- ERS Enrollment
  - Next enrollment: Feb. 1, 2020
  - Deadline to enroll: Jan 10, 2020
- LR Enrollment
  - Can enroll at any time

Questions?

CPower Energy Management
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