ERCOT in 2016: Transition & Continuity

Bill Magness
General Counsel & Sr. Vice-President
ERCOT

Gulf Coast Power Association – Houston Luncheon
November 19, 2015

ERCOT Vision & Mission

ERCOT Vision:

Lead with independent insight on the future of electricity reliability, markets and technology in Texas in order to facilitate grid and market change for the benefit of all stakeholders.

ERCOT Mission:

We serve the public by ensuring a reliable grid, efficient electricity markets, open access and retail choice.

2016 ERCOT Strategic Goals

In support of its mission to serve the public by ensuring a reliable grid, efficient electricity markets, open access and retail choice, ERCOT's goals are to:

1. Strategically adapt to changing resource mix:
    - Generation Resources
    - Demand Response
    - Distribution Level Resources

2. Provide thought leadership in support of continued improvements to operational reliability and markets

3. Deliver channels and tools to stakeholders for enhanced communication and increased transparency and access

4. Continually enhance our cyber and physical security posture

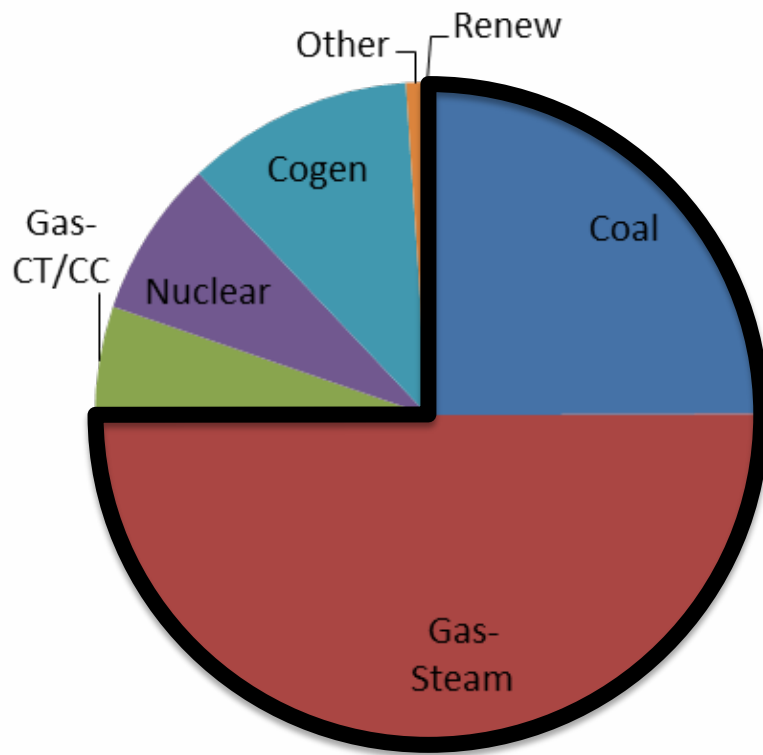5. Develop ERCOT resources – people and technology

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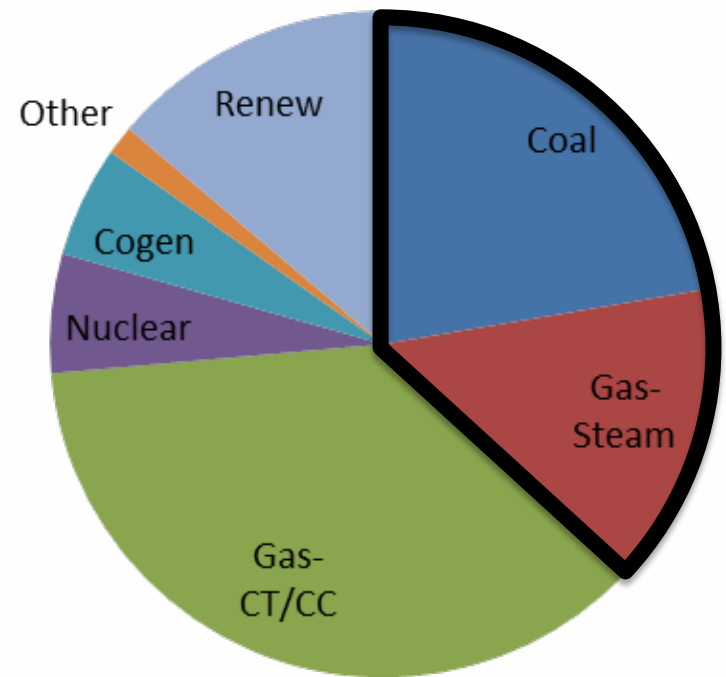
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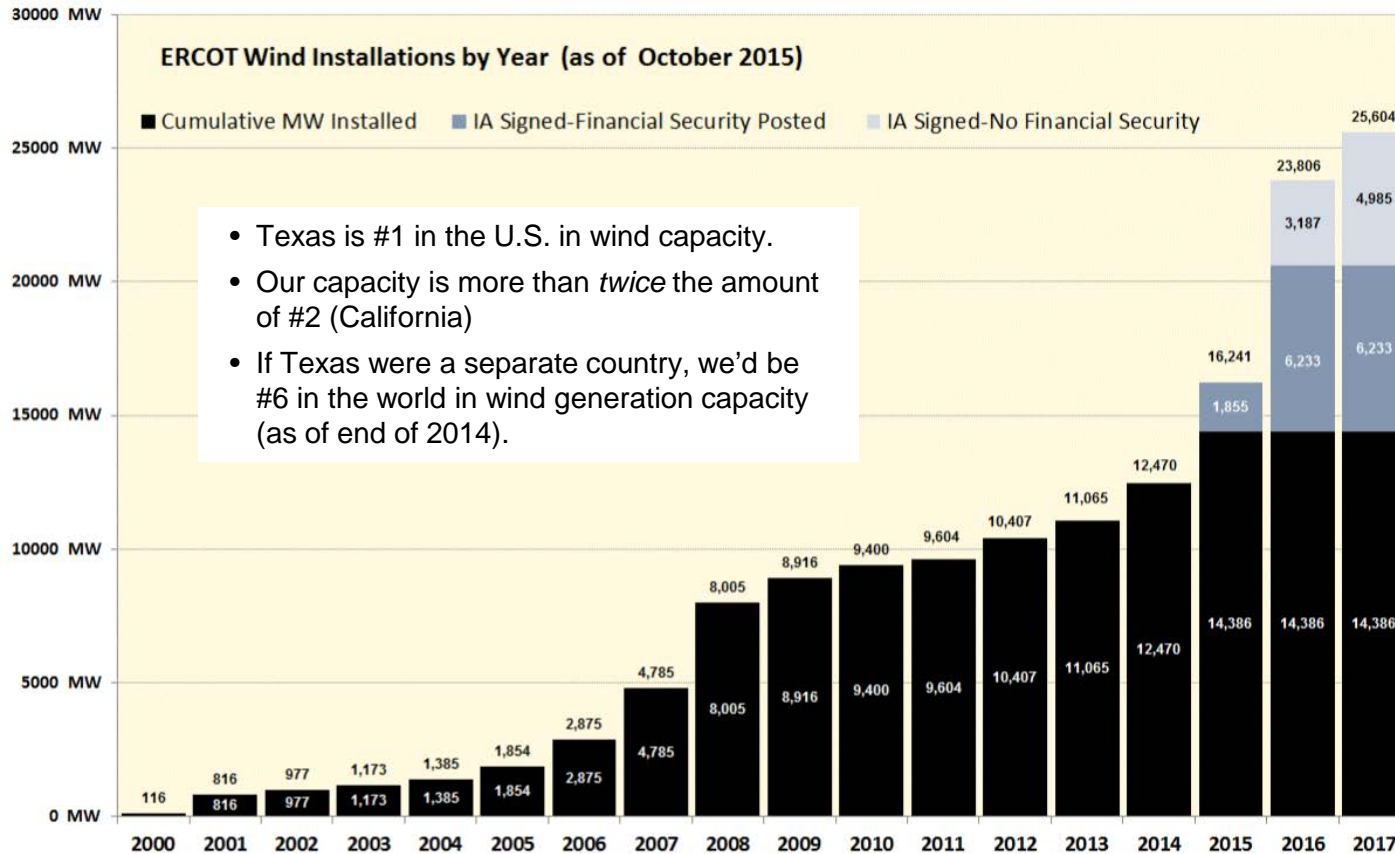
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Changing Resource Mix

Installed Capacity by Unit Type

Late 1990s

2015

ERCOT Wind Installations by Year (as of October 2015)

- Cumulative MW Installed
- IA Signed-Financial Security Posted
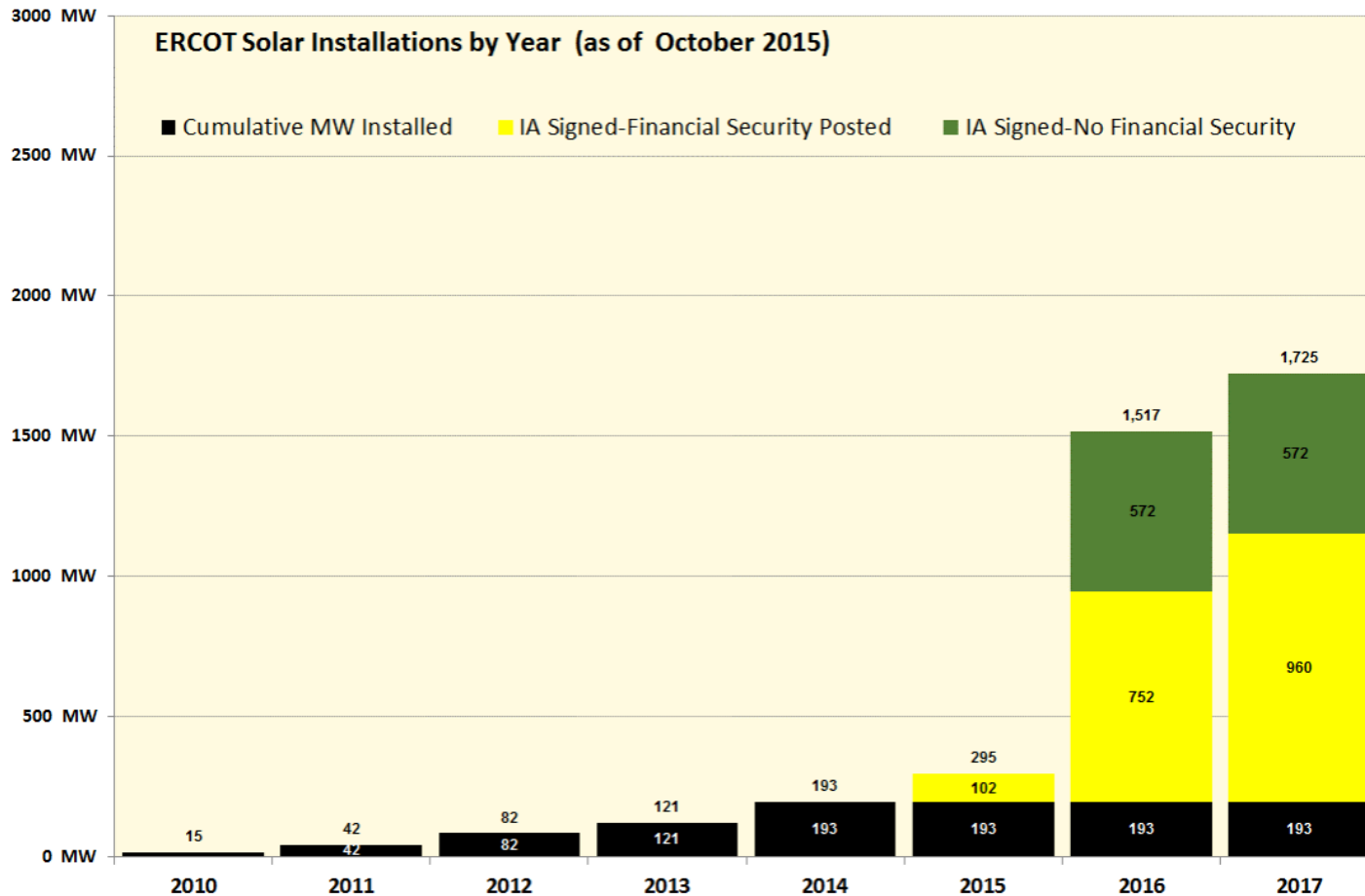- IA Signed-No Financial Security

- Texas is #1 in the U.S. in wind capacity.
- Our capacity is more than *twice* the amount of #2 (California)
- If Texas were a separate country, we'd be #6 in the world in wind generation capacity (as of end of 2014).

The data presented here is based upon the latest registration data provided to ERCOT by the resource owners and can change without notice. Any capacity changes will be reflected in current and subsequent years' totals. Scheduling delays will also be reflected in the planned projects as that information is received. This chart reflects planned units in the calendar year of submission rather than installations by peak of year shown.

Financial security posted for funding interconnection facilities does not include CREZ security deposits, which are refunded to the Interconnecting Entity when an IA is signed.
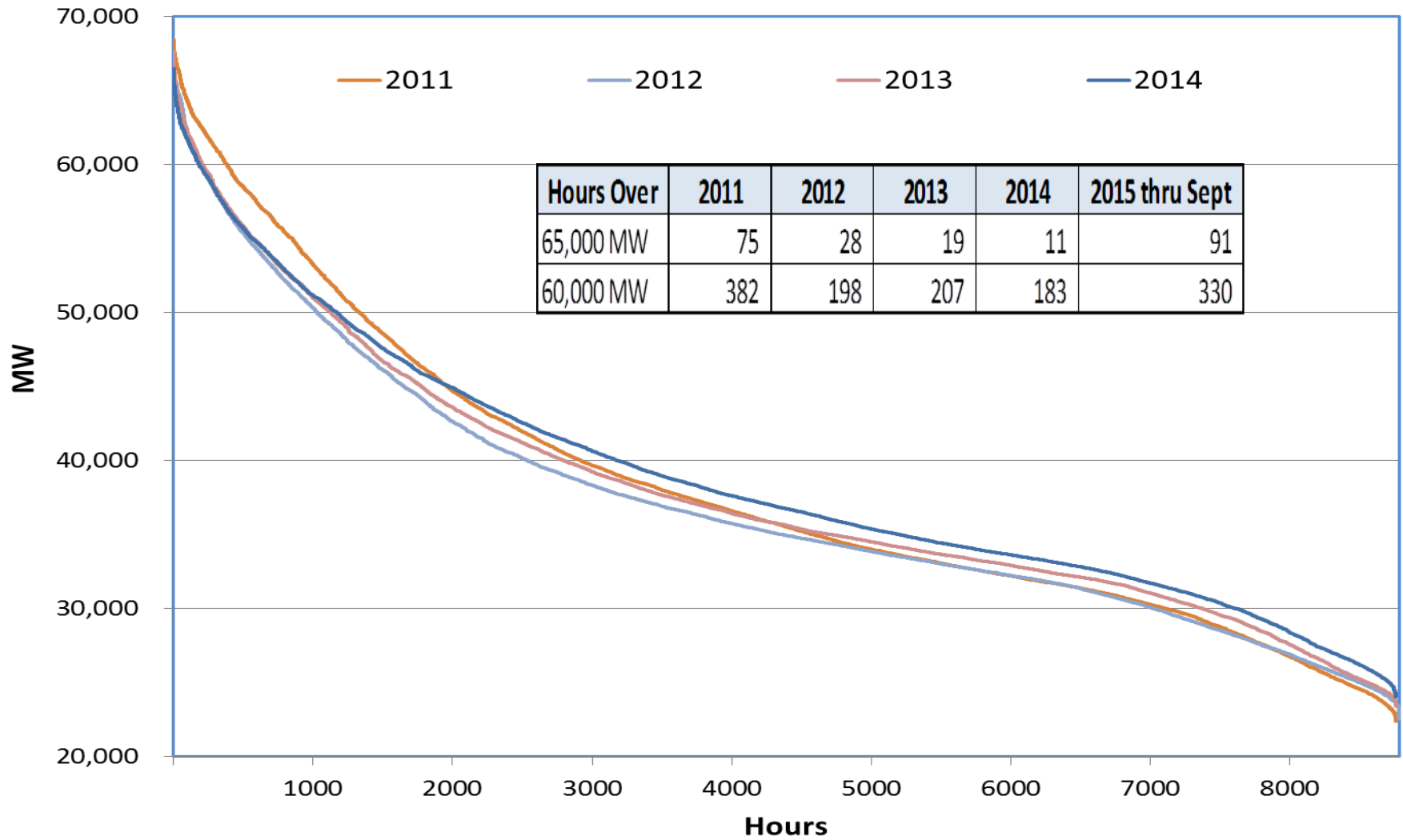
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Utility Scale Solar Generation – October 2015

ERCOT Solar Installations by Year (as of October 2015)

■ Cumulative MW Installed   ■ IA Signed-Financial Security Posted   ■ IA Signed-No Financial Security

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Actual Load Duration Curves – 2011 to 2014

Hours Over	2011	2012	2013	2014	2015 thru Sept
65,000 MW	75	28	19	11	91
60,000 MW	382	198	207	183	330

Examples of Distributed Energy Resources (DERs)

Capable of Providing:

– Backup (emergency) power

– Demand charge reduction (e.g., 4CP)

– Response to wholesale market prices

– ERCOT Emergency Response Service

– An offset to energy consumption

– Ancillary Services

Photos courtesy Acclaim Energy

Current Records – Nov. 17, 2015

Peak Demand Record: 69,621 megawatts (MW)

- 69,621 MW, August 10, 2015

Weekend Record

- 66,530 MW, Saturday, August 8, 2015

Winter Peak Record: 57,265 MW

- 57,265 MW, February 10, 2011

Wind Generation Records (instantaneous)

- 12,641 MW, November 16, 2015, 9:36 p.m.
  - Non-Coastal Wind Output = 11,077 MW
  - Coastal Wind Output = 1,564 MW
  - Supplying 33.14% of the load
  - Active Wind Capacity = 15,645 MW
- 40.58% Wind Penetration, March 29, 2015, 2:12 a.m.
  - Total Wind Output = 10,308 MW
  - Total Load = 25,400 MW

Summer 2015 monthly peaks

June: 61,732 MW (June 10)

July: 67,650 MW (July 30 – new July record)

August: 69,621 MW (Aug. 10 – new all-time record)

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Integrating & Managing Renewables

- Wind generators started to assist in frequency control for ERCOT after 2009, having an automatic response to frequency deviations

- Started real-time monitoring of inertia in 2014

- Enhancements to improve the performance of wind forecast
  - Added 7-day wind forecast
  - Addressed large forecast errors caused by icing by adding new capability to manually overwrite the forecast

- Started a project for utility-scale solar forecast in 2015

- New ancillary service design to meet the need of the future power grid with low inertia and high variations in "net-load"

Peak Average Wind Capacity Percentages		
Report	Coastal	Non-Coastal
Summer and Fall Seasonal Assessments	56%	12%
Winter and Spring Seasonal Assessments	37%	18%
Capacity, Demand and Reserves (10-year outlook)	56%	12%

Potential Impacts of Environmental Regulations

In December 2014, ERCOT reviewed potential impacts of new and pending environmental regulations on grid reliability.

- Included CSAPR, MATS, Regional Haze, Clean Water Act Section 316(b), Ash Disposal Regulations & Clean Power Plan (as proposed)

In October 2015, ERCOT updated its analysis of the Clean Power Plan based on the final rule released on August 3, 2015. The results indicate:

- At least 4,000 MW of coal-fired generation capacity is likely to retire due to the Clean Power Plan alone. When Regional Haze is also considered, there could be additional unit retirements, likely to occur before the Clean Power Plan compliance timelines.

- Retirement of units serving urban areas may result in localized reliability issues.

- Growth in renewable resources may require development of new or additional generation and transmission facilities and technologies to manage operational issues (e.g., ramping, inertia, etc.).

- Costs of compliance could drive up consumer energy costs as much as 16%.

   o Does not include costs of transmission upgrades or other investments to support grid reliability

Planning Summary – October 2015

- ERCOT is currently tracking 269 active generation interconnection requests totaling 63,026 MW. This includes 24,753 MW of wind generation.

- ERCOT is currently reviewing proposed transmission improvements with a total cost of more than $1.02 Billion.

- Transmission Projects endorsed in 2015 total $413.3 Million.

- All projects (in engineering, routing, licensing, and construction) total approximately $6.74 Billion.

- Transmission Projects energized in 2015 total about $652.9 Million.

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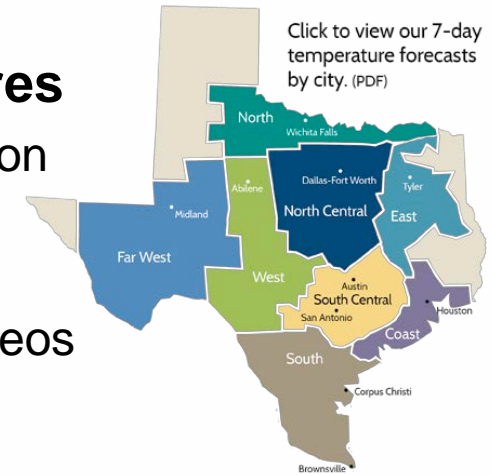
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Improving Communication Channels
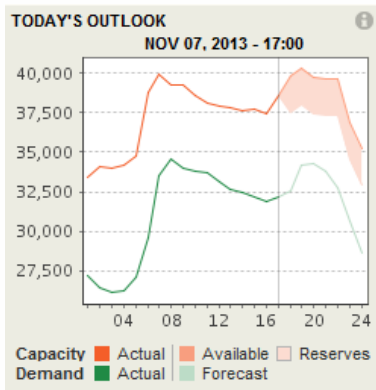
ERCOT website – added features
- **Today's Outlook:** Actual generation and load information
- **Weather page:** Daily, seasonal updates; seasonal and holiday videos

Social media – join us!
- Twitter: @ERCOT_ISO
- Facebook: Electric Reliability Council of Texas
- LinkedIn: ERCOT

ERCOT Energy Saver mobile app
- System conditions – Real-Time updates
- Wholesale pricing information – Hubs and Load Zones
- Information sharing options and more

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ERCOT Cyber & Physical Security Program

- ERCOT has a dedicated and integrated cyber/physical security organization and established strategy

- ERCOT uses layered cyber and physical security architectures known as a defense-in-depth strategy along with careful monitoring

- ERCOT is committed to external collaboration with relevant government agencies, law enforcement, industry and national labs to enhance its and the industry's security posture
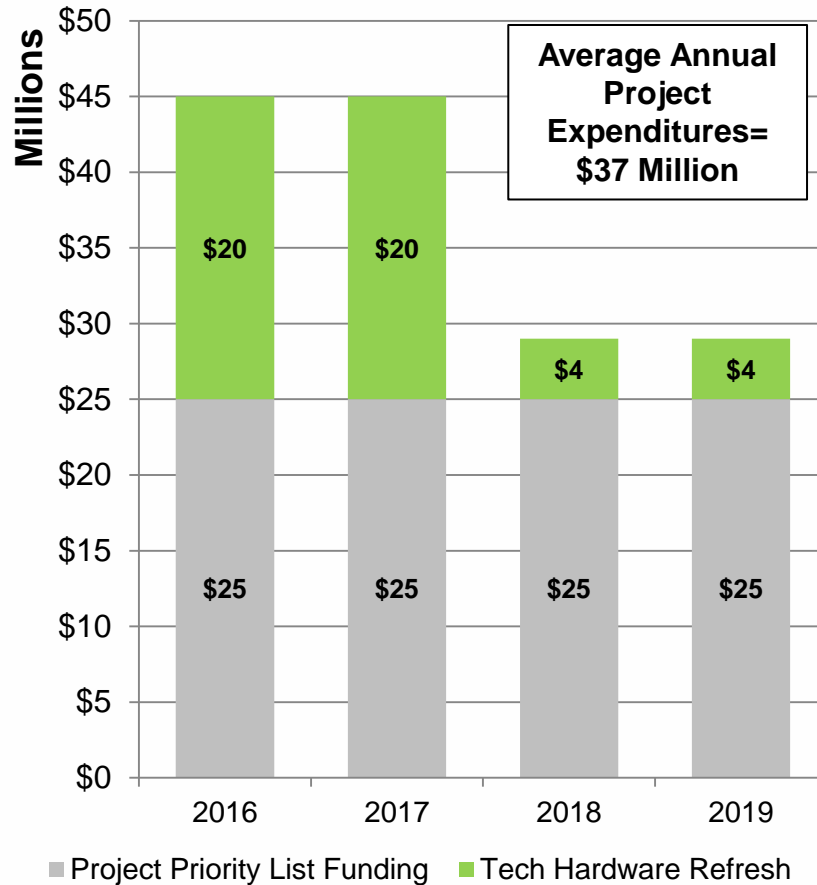
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Funding Technology Initiatives

Average Annual Project Expenditures= $37 Million

Chart values by year:
- 2016: Project Priority List Funding $25, Tech Hardware Refresh $20
- 2017: Project Priority List Funding $25, Tech Hardware Refresh $20
- 2018: Project Priority List Funding $25, Tech Hardware Refresh $4
- 2019: Project Priority List Funding $25, Tech Hardware Refresh $4

Legend: ■ Project Priority List Funding ■ Tech Hardware Refresh

- Tech Hardware Refresh drives project expenditures increase

  - Required to replace obsolete, aging infrastructure in order to maintain reliable systems

  - Commission has approved a funding mechanism to support on-going technology infrastructure needs

- Project Priority List Funding

  - $25 Million average annual project expenditures

  - Consistent with recent years

The Best Strategy is Great People

Project Recognition
Stacy Wozny
Successful 2015 Operator Training Seminar

Special Recognition
Bryan Hanley
Director of IT
Infrastructure

The Best Strategy is Great People

2015 IEEE Conference Presenters and Attendees from ERCOT

Settlement System Upgrade Team Replaced the aging system with modern tools