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President & CEO
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State Affairs
Texas House of Representatives
April 28, 2016

Current Records – as of April 21, 2016

Peak Demand Record: 69,877 megawatts (MW)

- 69,877 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

Summer 2015 monthly peaks

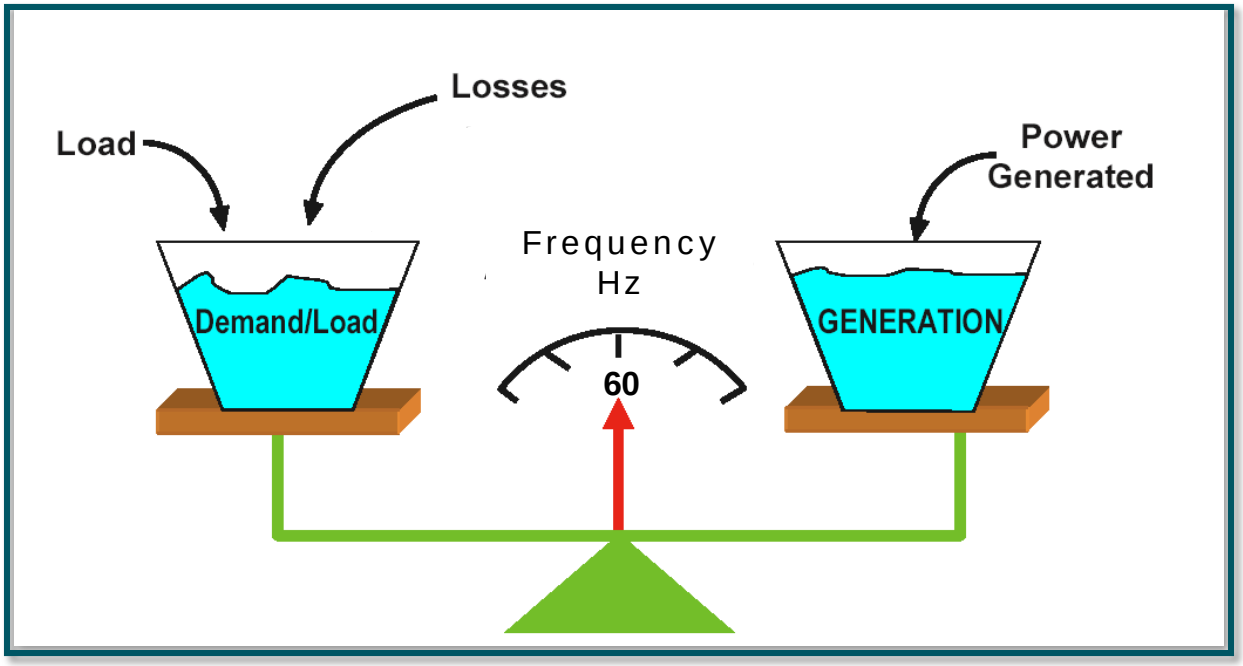
June: 61,732 MW (June 10)
July: 67,650 MW (July 30 – new July record)
August: 69,877 MW (Aug. 10 – new all-time record)

Wind Generation Records (instantaneous)

- 14,023 MW, February 18, 2016, 9:20 p.m.
  - Supplying 39.5% of the load
- 48.28% Wind Penetration, March 23, 2016, 1:10 a.m.
  - Total Wind Output = 13,154 MW
  - Total Load = 27,245 MW

Power Supply (Generation) Must Match Load (Demand)

- The fundamental concept behind ERCOT operations is that generation has to match load at all times



- In other words, a 1 MW reduction in load has exactly the same effect on the grid as a 1 MW increase in generation

Operational Risk Management: Layers of Protection

Prevent

- Plan and operate the system so loss of a single transmission line or generator causes no problems and additional contingencies cause no major problems.
- Reserve enough generation/load resource capacity to maintain frequency when load and generation output vary, up to loss of two largest units.

Respond

- If more severe conditions occur, manually reduce demand to protect the system (localized or systemwide rotating outages).
- If frequency drops to extremely low levels, automated protection systems that reduce demand systemwide provide a safety net.

Recover

- Maintain, and routinely practice, a coordinated “black start” plan to restart the system in unlikely event these responses fail and system collapses.

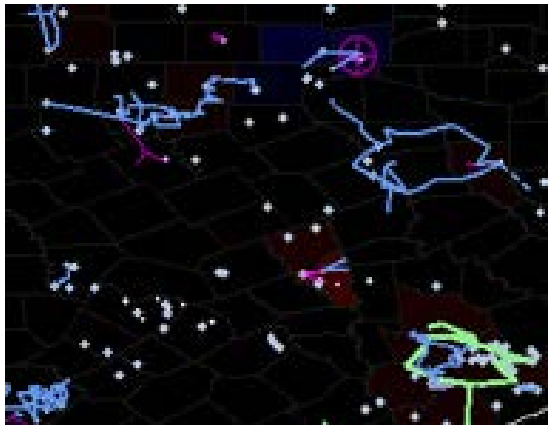
Grid conditions – Protecting the grid, Informing the public

Normal Conditions	• Sufficient generation, all is well.
Conservation Alert	• Potentially tight operating reserves — generation/demand • Don't issue routinely just because hot or cold
Power Watch Conservation Needed	• Energy Emergency Alert (EEA) 1 • Operating reserves <2,300 MW • First stage demand response programs
Power Warning Conservation Critical Risk of Rotating Outages	• EEA 2: Operating reserves <1,750 MW • Load resources, Emergency Response Service
Power Emergency Rotating Outages in Progress Conservation Critical	• EEA 3 • Direct transmission providers to begin rotating outages to reduce demand on system.

Grid Restoration: Preparedness and Practice

Texas has never experienced a systemwide blackout.

- ERCOT has a plan to restore the grid and practices those procedures annually.
- Staff and market participants receive training and often practice disaster scenarios, with operators using realistic simulators.



Black start generation units

- ERCOT contracts with certain units that can start independently.
- Black-start units are tested regularly.
- Black-start units form basis for electrical islands.

Restoring the grid, connecting “islands”

- Electrical islands would be energized in a systematic manner, carefully maintaining system balance with load.
- Transmission operators, under ERCOT coordination, would carefully energize lines to connect islands, eventually restoring entire system.
- Restoration timeline depends on the cause and extent of system damage.

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.

External Collaboration

Federal/National:

US-CERT
UNITED STATES COMPUTER EMERGENCY READINESS TEAM

ICS-CERT
INDUSTRIAL CONTROL SYSTEMS CYBER EMERGENCY RESPONSE TEAM

National Electric Sector Cybersecurity Organization

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

E-ISAC™
ELECTRICITY INFORMATION SHARING AND ANALYSIS CENTER

State:

DIR
Dept. of Information Resources

Industry:

IRC
ISO/RTO Council

Critical Infrastructure Protection Working Group (CIPWG)
Utility Owners/Operators

North American Transmission FORUM

National Labs:

INL
Idaho National Laboratory

Pacific Northwest NATIONAL LABORATORY

Sandia National Laboratories

Argonne NATIONAL LABORATORY

Communicating During Emergencies

Operations coordination and communication

- Established procedures and protocols to ensure shared awareness
- Numerous training opportunities to ensure shared understanding and expectations – preparedness drills conducted at least annually

Crisis communications procedures

- Reviewed and updated at least annually
- Includes guidelines for variety of potential emergencies

Outreach to regulatory agencies, elected officials, other key contacts

- Specific audiences depend on issue, system conditions
- Staff with expertise in regulatory, legal and legislative matters

Media and public communication

- News releases, advisories and interviews (phone and in person)
- Social media channels, mobile app, website and email list
- Coordinated communication through market participants