

A Review of ERCOT's Nodal Market

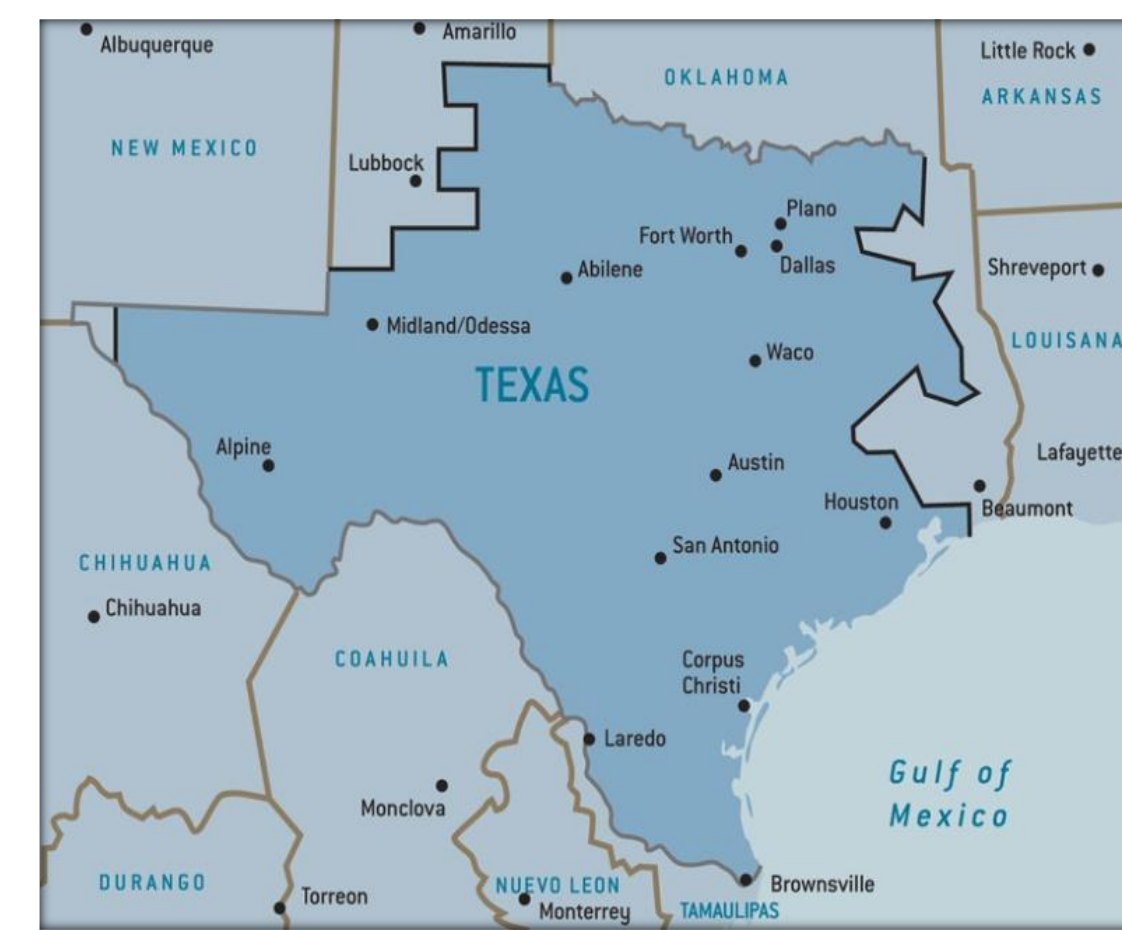
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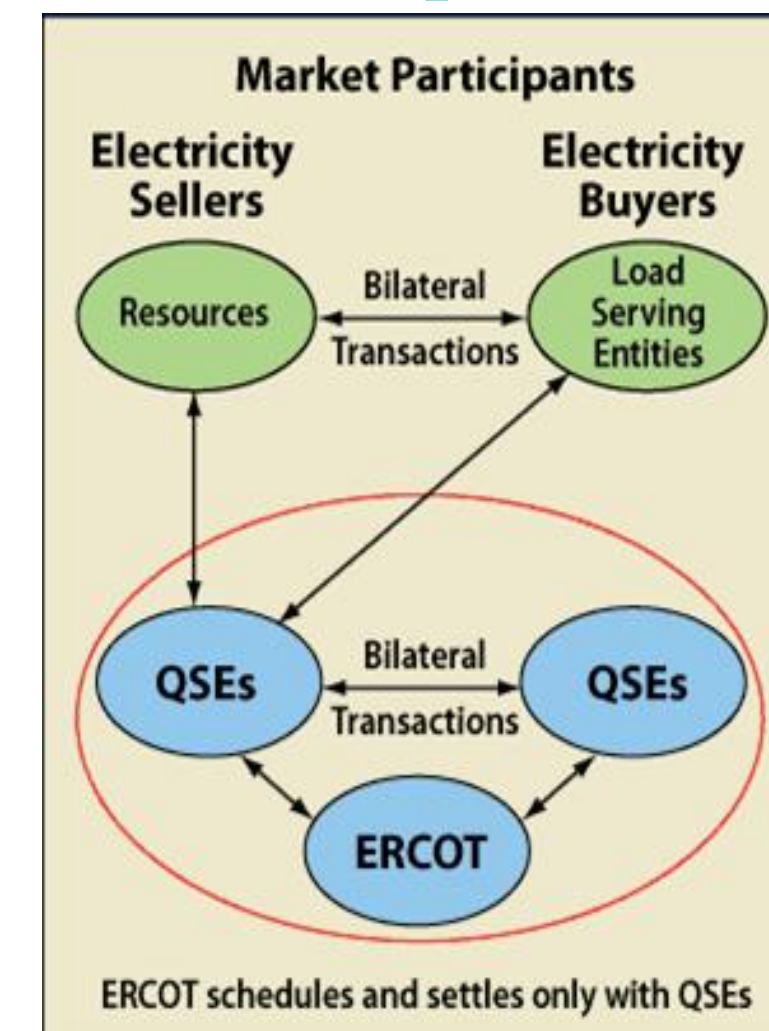
ERCOT Market



Electric Reliability Council of Texas (ERCOT) is an **Independent System Operator (ISO)** for majority of Texas.

- Does not own generation or transmission
- Operates** power system reliably
- Manages** energy market

Market Operations



Source: Electric Reliability Council of Texas

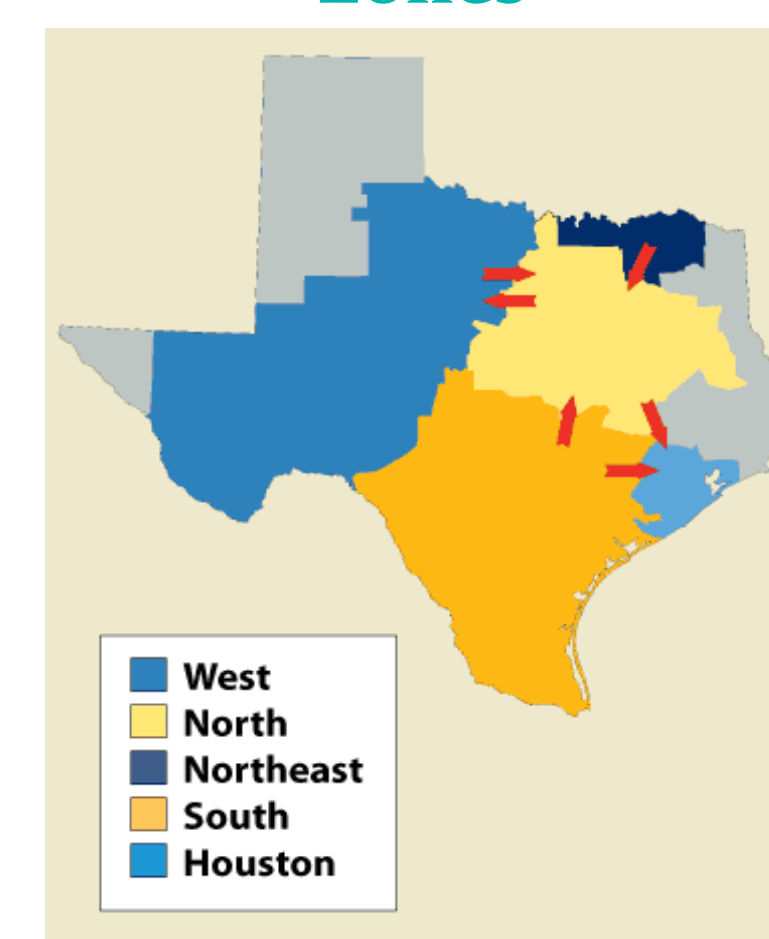
ERCOT is a **bilateral** market.

- Contracts** between power generating companies and load serving entities (LSEs)
- Schedules** power purchased and reports it through Qualified Scheduling Entities (QSEs)

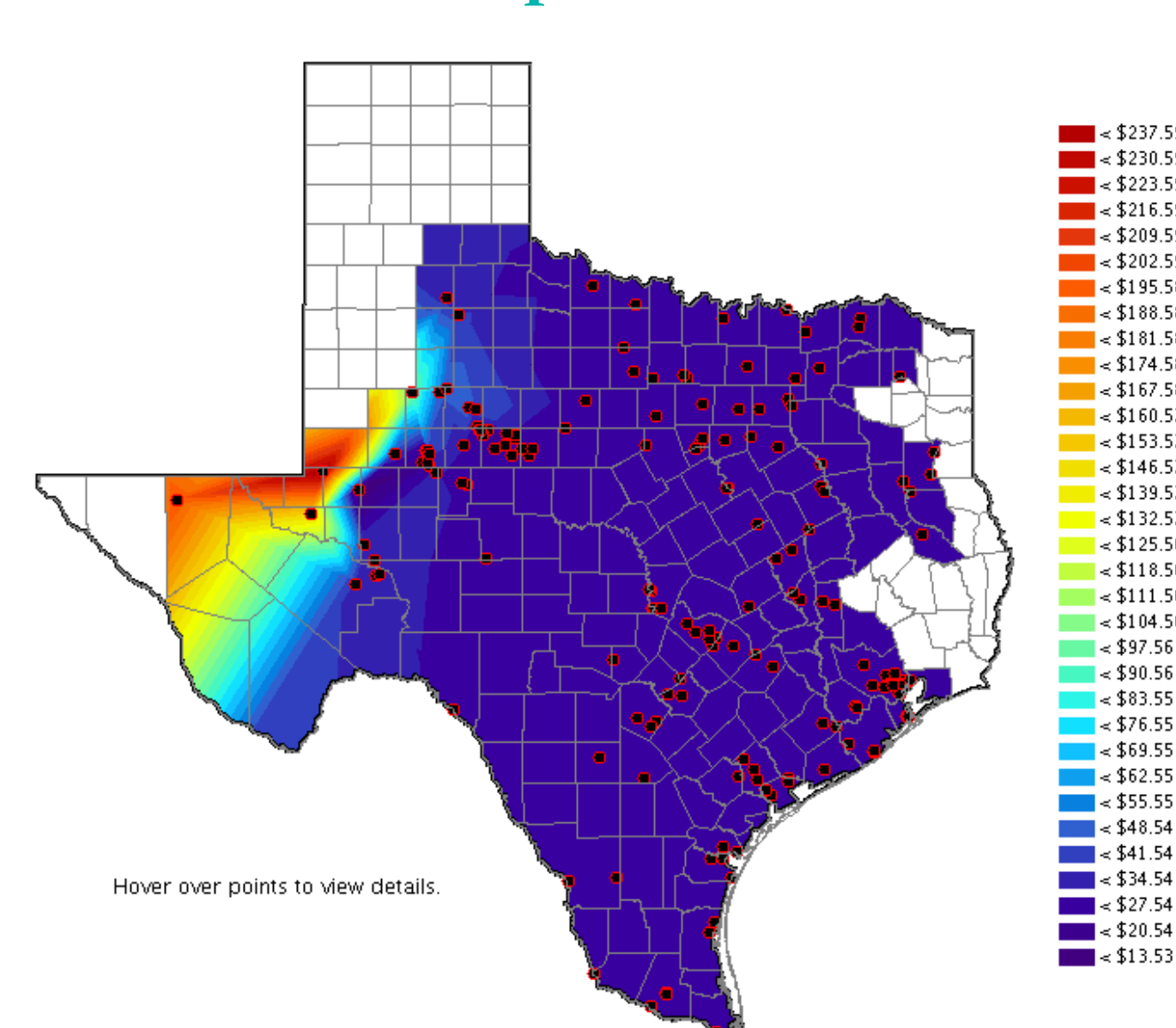
ERCOT, until December 2010 operated on a **Zonal Market Model**. In this design, the market is divided into **Congestion Management Zones (CMZs)** and these zones are defined by **Commercially Significant Constraints (CSCs)**.

- Zonal Congestion**
 - Congestion costs assigned to zones
 - Shared by participants in a zone
- Local Congestion**
 - ERCOT resolved congestion with specific generating unit deployment
 - Costs shared by consumers of that electricity
- Prices only **based on zonal congestion**

Congestion Management Zones



Example of LMP



ERCOT now operates on the **Nodal Market Design**. In this design, the market is divided into **4,000** pricing points, points of **electricity entry or exit**.

Congestion costs are essentially assigned to those who caused it known as **Locational Marginal Pricing (LMP)**.

Day-Ahead Market

- Voluntary** financial market that ensures reliability of the transmission grid
- Allows **QSEs to bid/offer** energy or Ancillary Services
- Participants can **purchase/sell** energy Early **snapshot** of operating day

Reliability Unit Commitment (RUC)

This ensures there is sufficient generation capacity in the correct locations to service expected load and transmission congestion.

- Day - Ahead RUC: Run daily for the following day
- Hourly RUC: Run hourly

Real - Time Market

This feature is to **balance** the system efficiently and it clearly differentiates the zonal and nodal market:

Zonal Market

- QSEs report every **15 minutes** in each CMZs
- Congestion managed through portfolios

Nodal Market

- Security Constrained Economic Dispatch (**SCED**) report every **5 minutes**
 - Most **economical** dispatch
- All congestion is managed using individual resources
- Generation** will be **settled** based on **LMP** of the node where the generator is located
- Load** will be settled based on a **load price zone**
 - Load Price Zone = load **weighted average** of the LMPs in the load zone

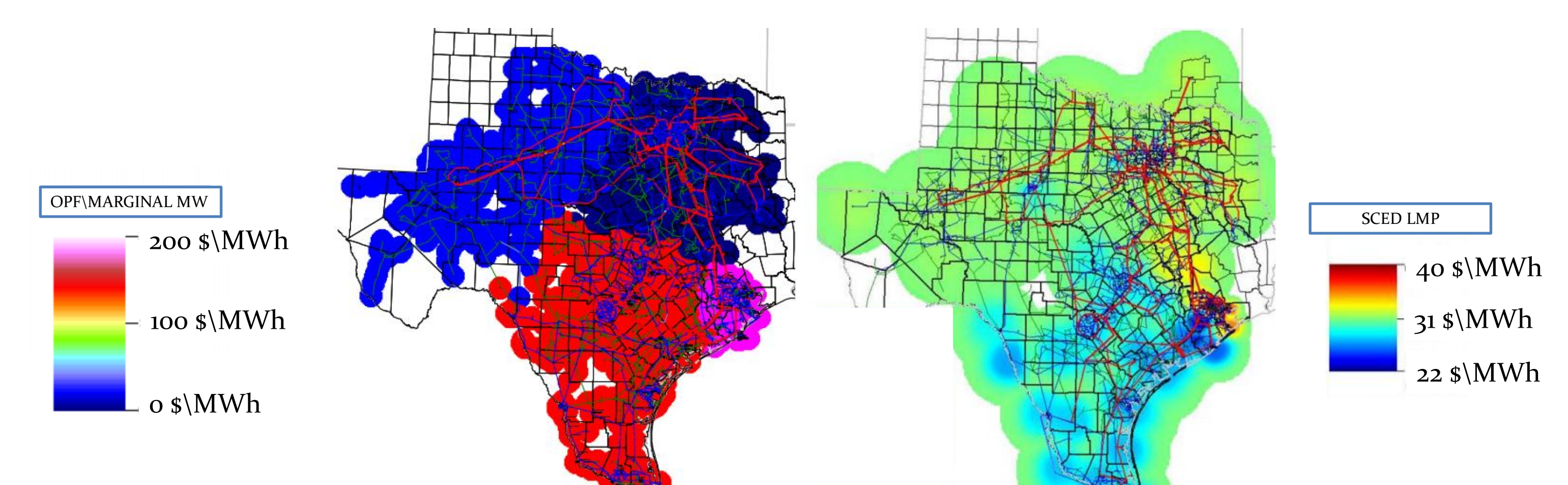
Congestion Revenue Rights (CRRs)

CRRs are a financial instrument.

- Defined by MW amount, settlement point of injection and settlement point of withdrawal
- CRR owner gets paid or pays the LMP difference between CRR injection and withdrawal points

Nodal's Performance

2008 Zonal vs 2010 Nodal



References:

- www.ercot.com (Board Meeting Reports, Understanding Nodal Handout, Nodal Protocols)
- Potomaceconomics.com (Market Monitor Reports)
- Window on State Government: Susan Combs Texas Comptroller of Public Accounts about Electricity Market