

WIND RESOURCE MANAGEMENT

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Renewable Planning and Operations

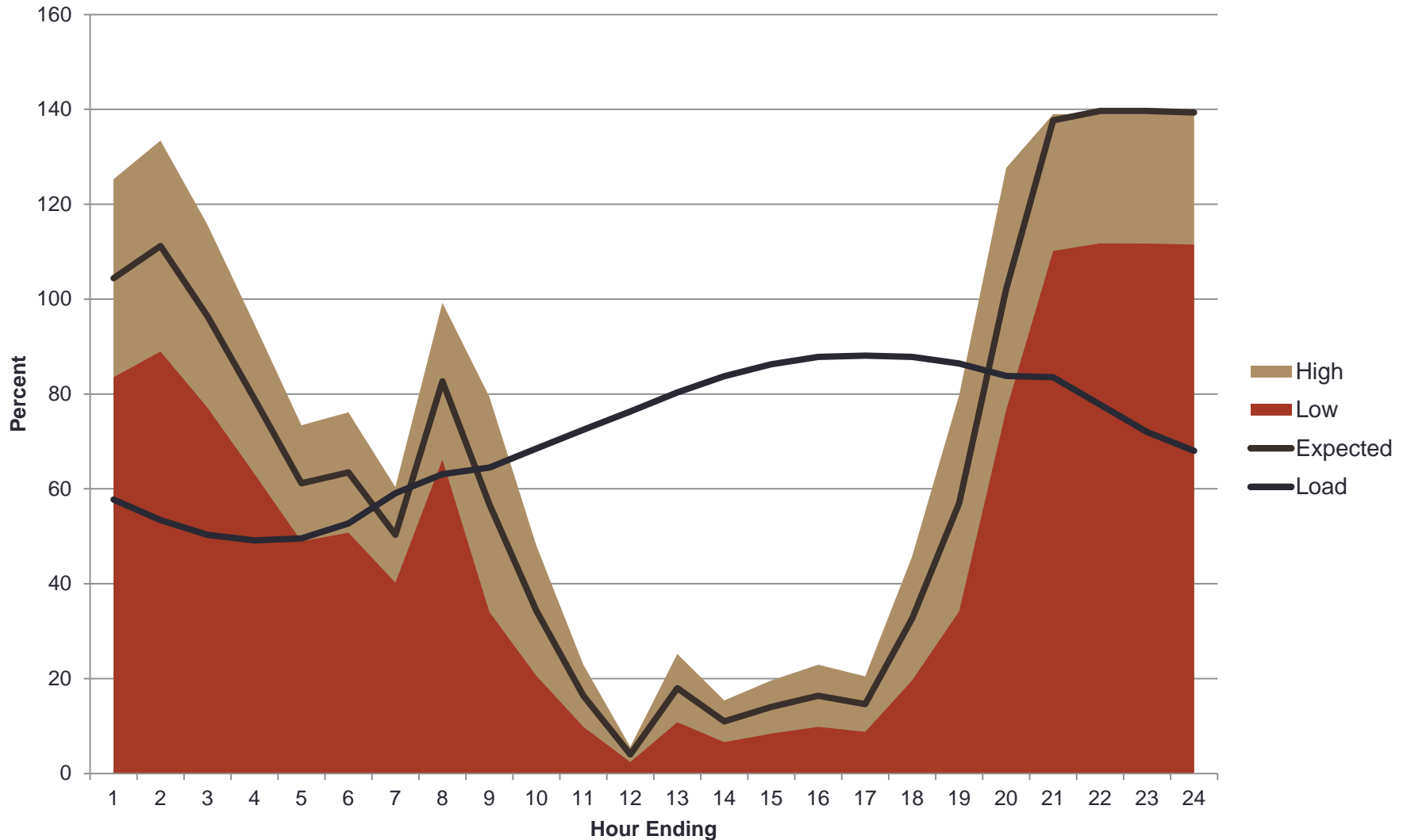
Given that load is variable and resources are intermittent the goal is to create a

“perfect opposition hedge”

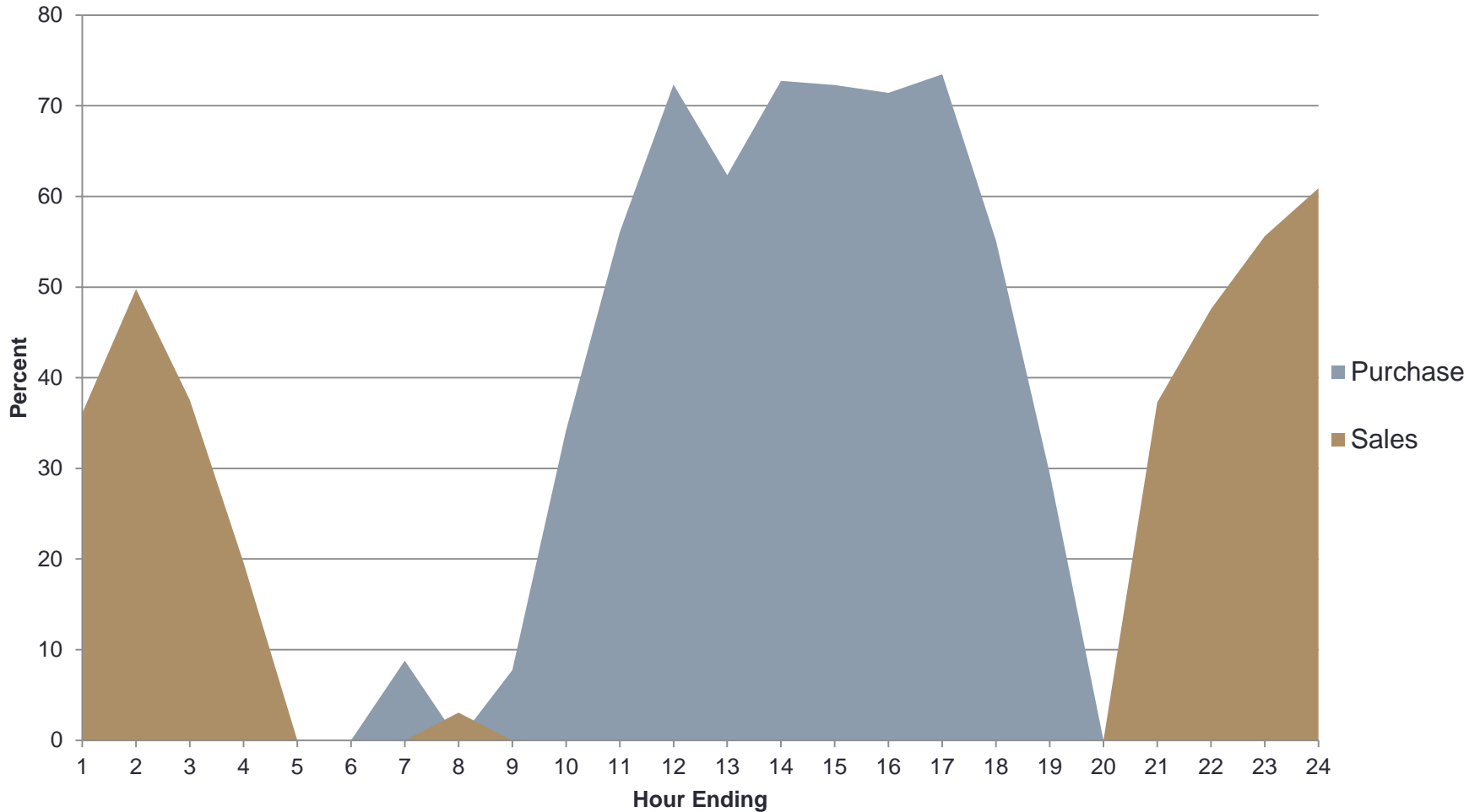
We employ active daily management of renewable resources

- Hourly load forecasting
- Hourly renewable forecasting
- Bids and offers in ERCOT market for firming and surplus disposition
- Bids for monthly CRRs and for hourly Pt to Pt obligation pairs

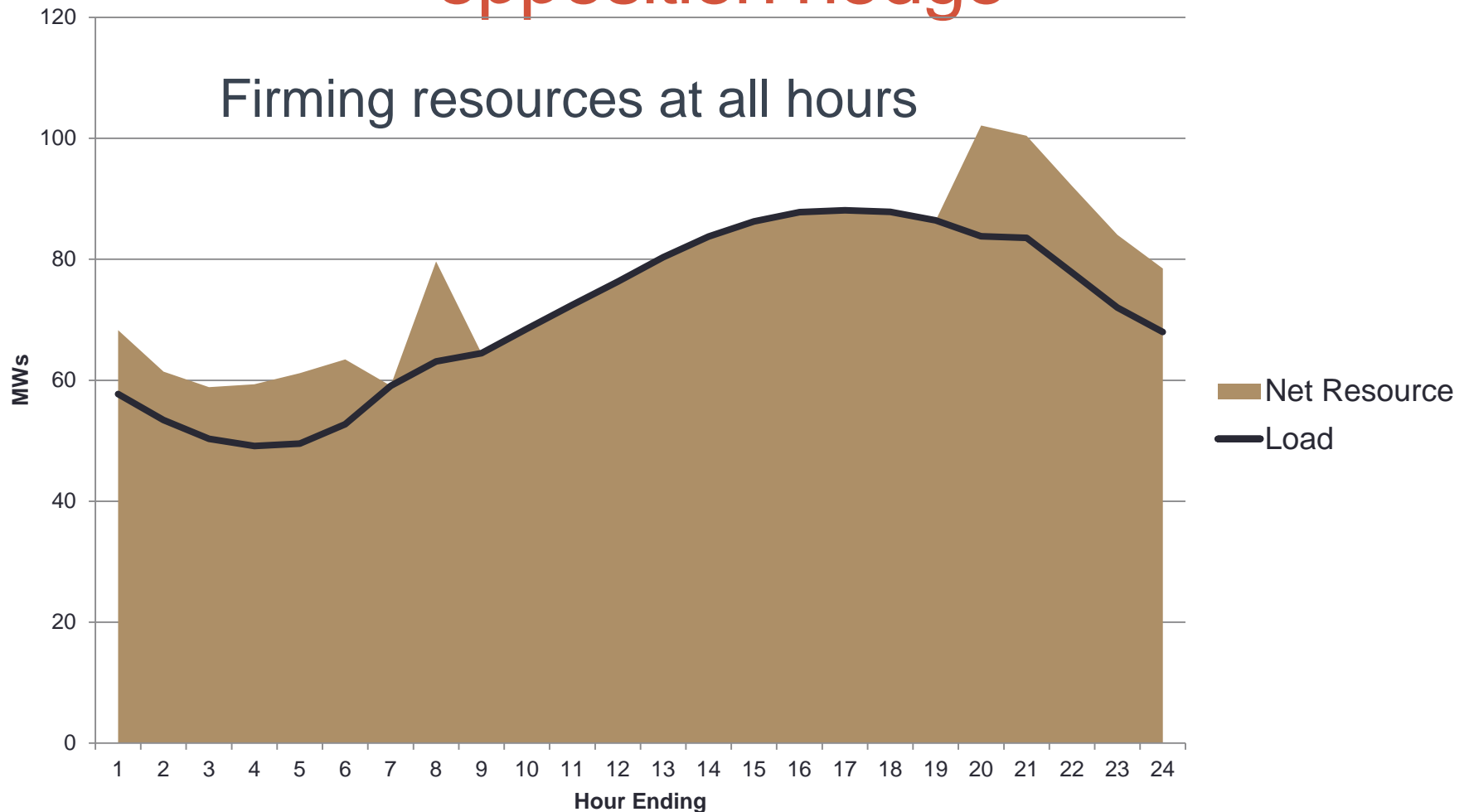
Hourly Load and Resource Forecasts



Hourly Purchases and Sales through ERCOT Day-ahead Market



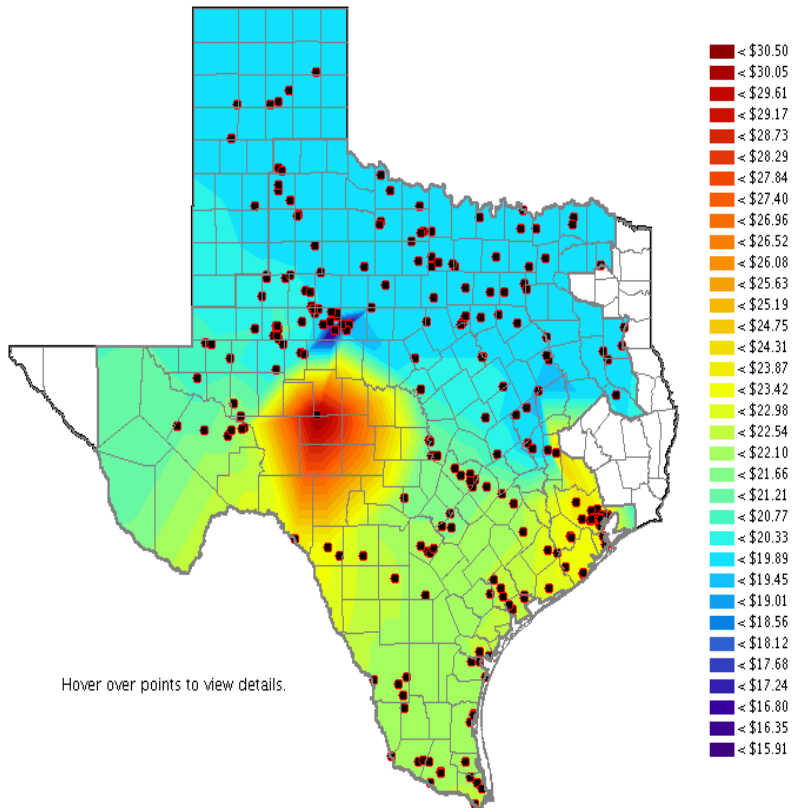
Revised Resource and Load – minimizing error and creating balanced opposition hedge



Pricing Depends on Location and Hour

During off peak hours like HE 1 wind resources from the North and West Texas are discounted because of limited transmissions capacity. There is an even bigger difference for on peak hours like HE 17

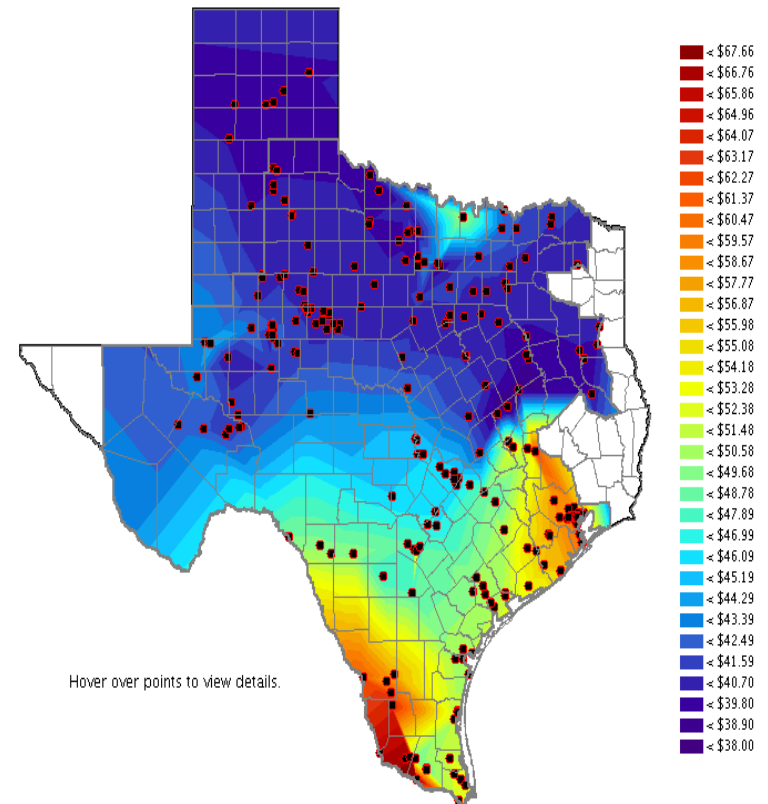
HE 1:00



Hover over points to view details.

Select Data DAM-SPP View As High Gradient Hour Ending 01:00

HE 17:00

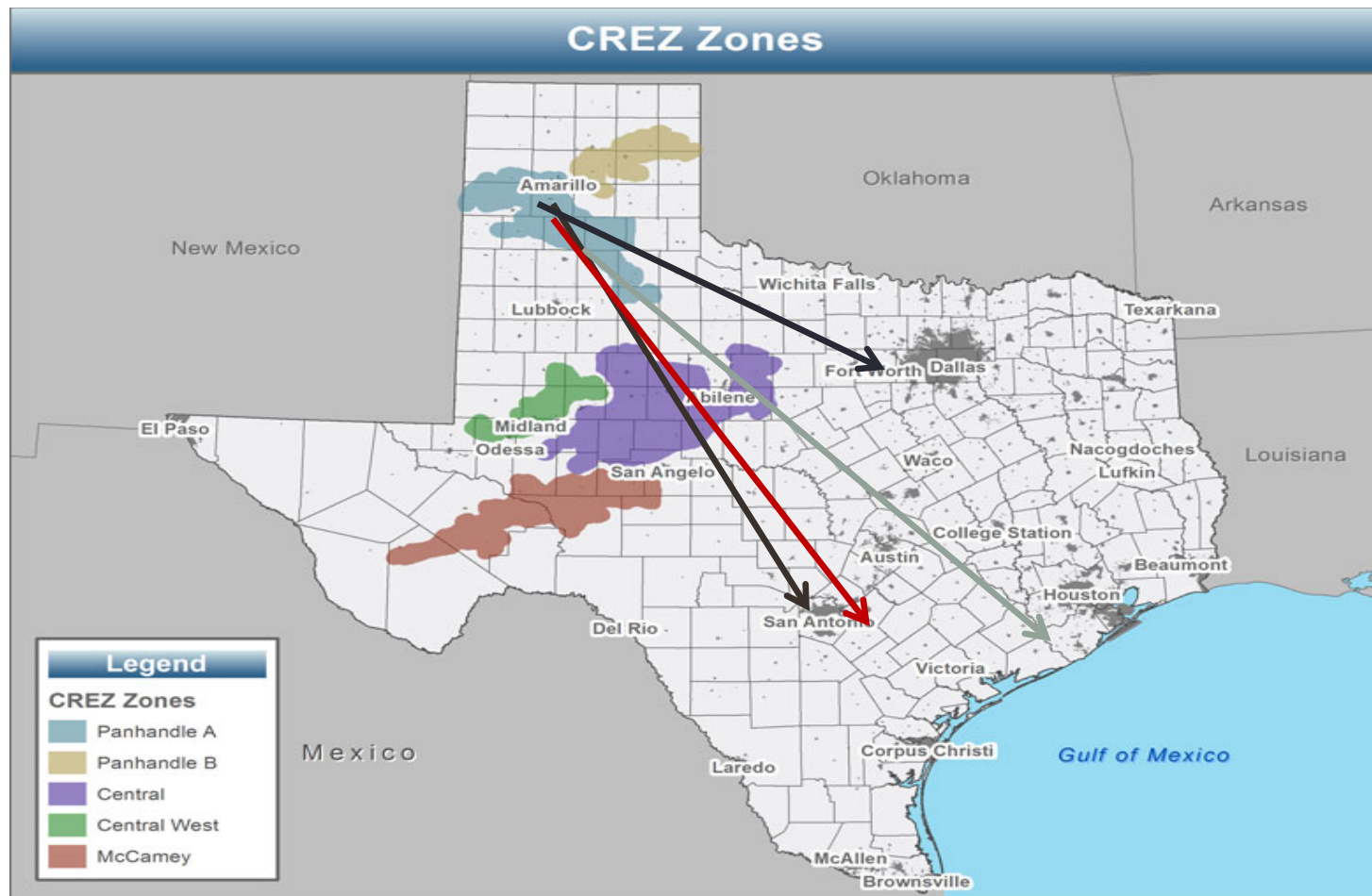


Hover over points to view details.

Select Data DAM-SPP View As High Gradient Hour Ending 17:00

Panhandle CRR Basis Hedge

Choosing the delivery point from a resource region to a HUB or Load Zone



Plausible CRR Pairs

Selection based upon antecedent conditions

Relationship of wind resources to resource planning to assure firm delivery

KEY Concepts

- Minimizing opposition hedge error through the DAM.
- Duration changes in resources (retirements, ending PPA).
- Wind can substitute for energy hedge when coupled with an implied heat rate.
- Power Hedge when coupled with a real or financial option in the DAM.

ERCOT Congestion Costs from the West are expected to rise back to 2012 levels in 2017

Real-Time Congestion Costs

