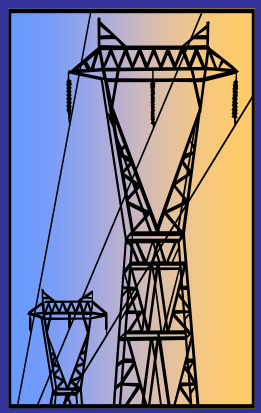
Transmission Expansion: Impact of Projects on Marginal Costs in ERCOT

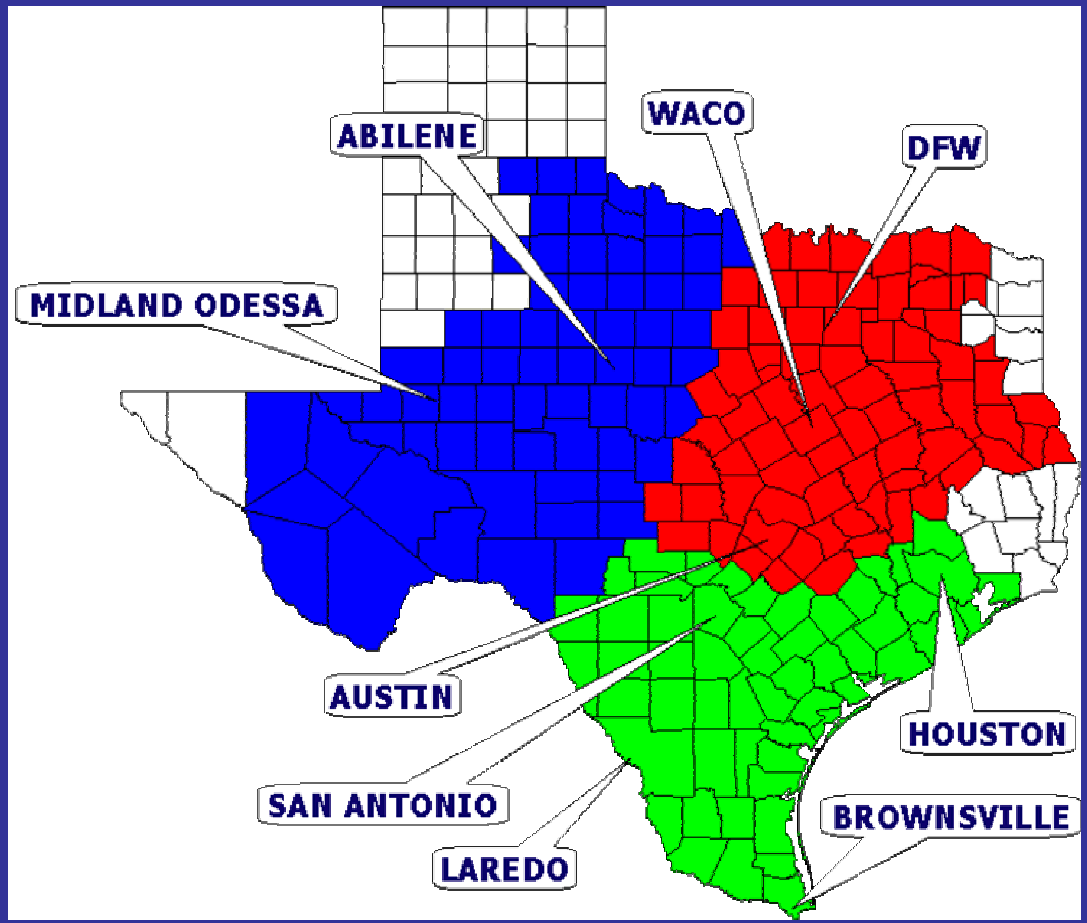
ERCOT Board of Directors
August 16, 2005



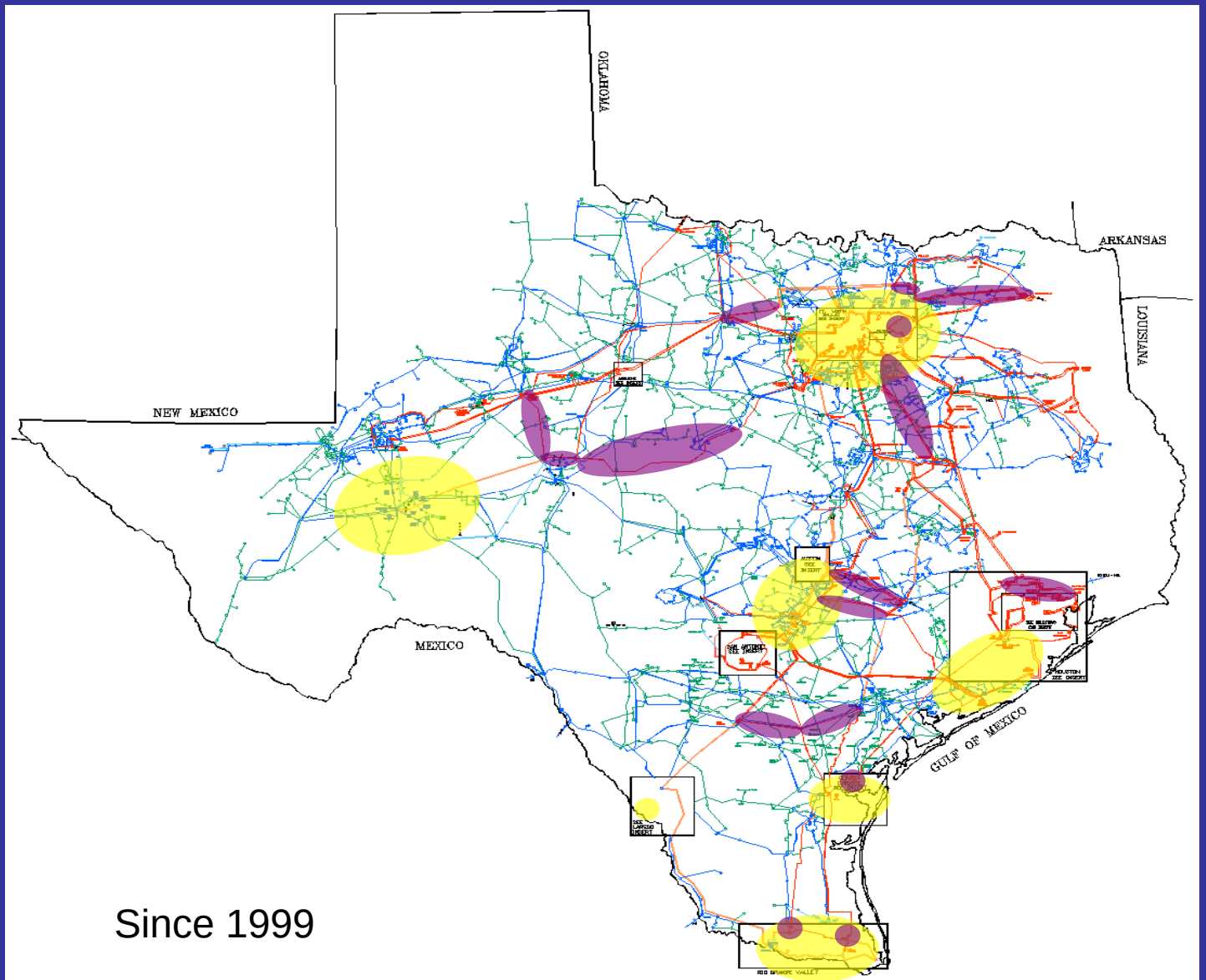
Bill Bojorquez, Director of Transmission Services
Electric Reliability Council of Texas

Regional Planning Groups

- ERCOT leads three Regional Transmission Planning Groups (North, South and West) in an open process
- Projects or studies can be proposed by any Market Participant, Transmission Owner or ERCOT Staff
- Stakeholders have opportunity to comment on proposals and offer alternative solutions
- ERCOT Staff performs independent review
- ERCOT Staff makes independent recommendations

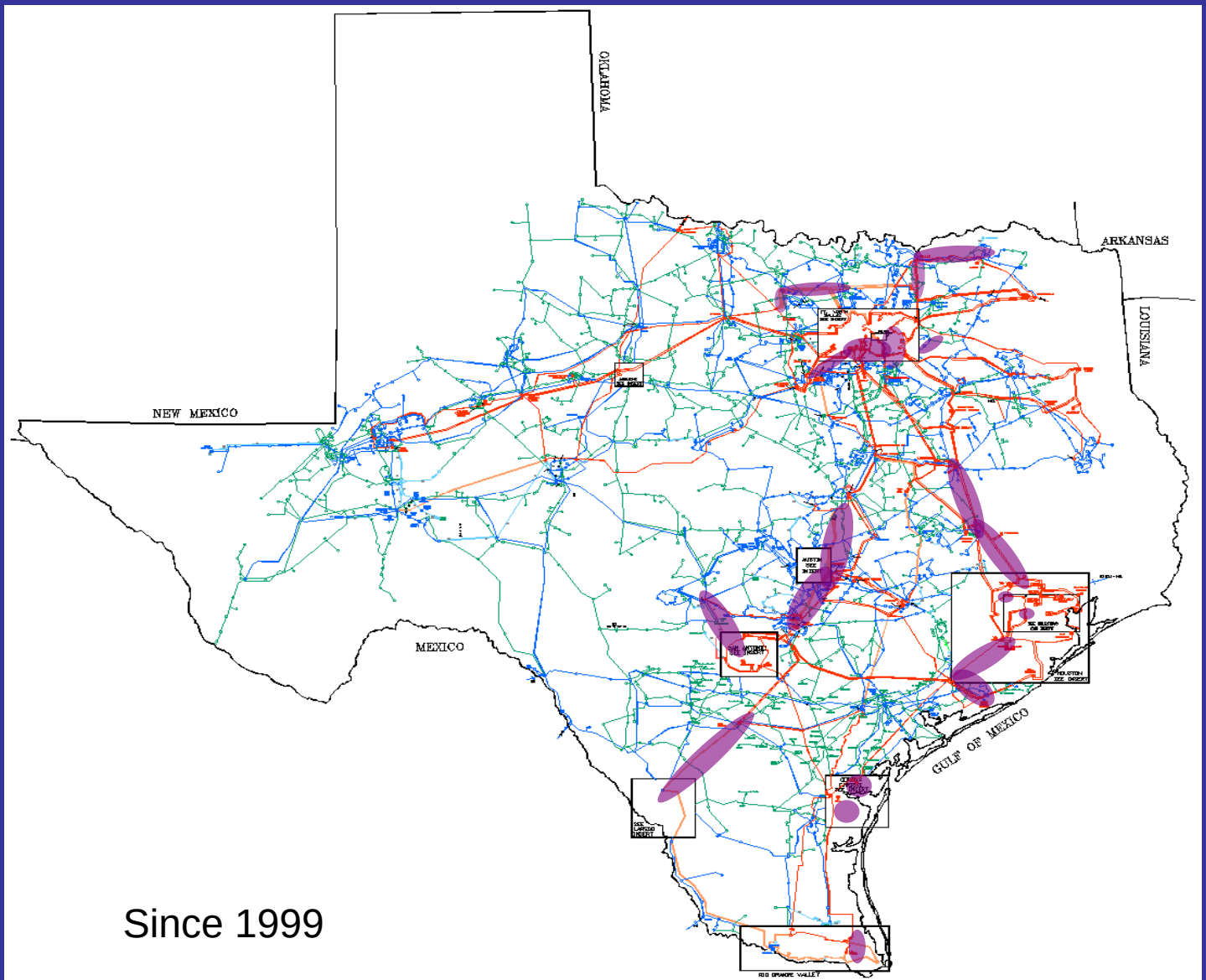


Completed Projects



Since 1999

Additional Planned Major Projects



Since 1999

Major Projects Recommended in 2005

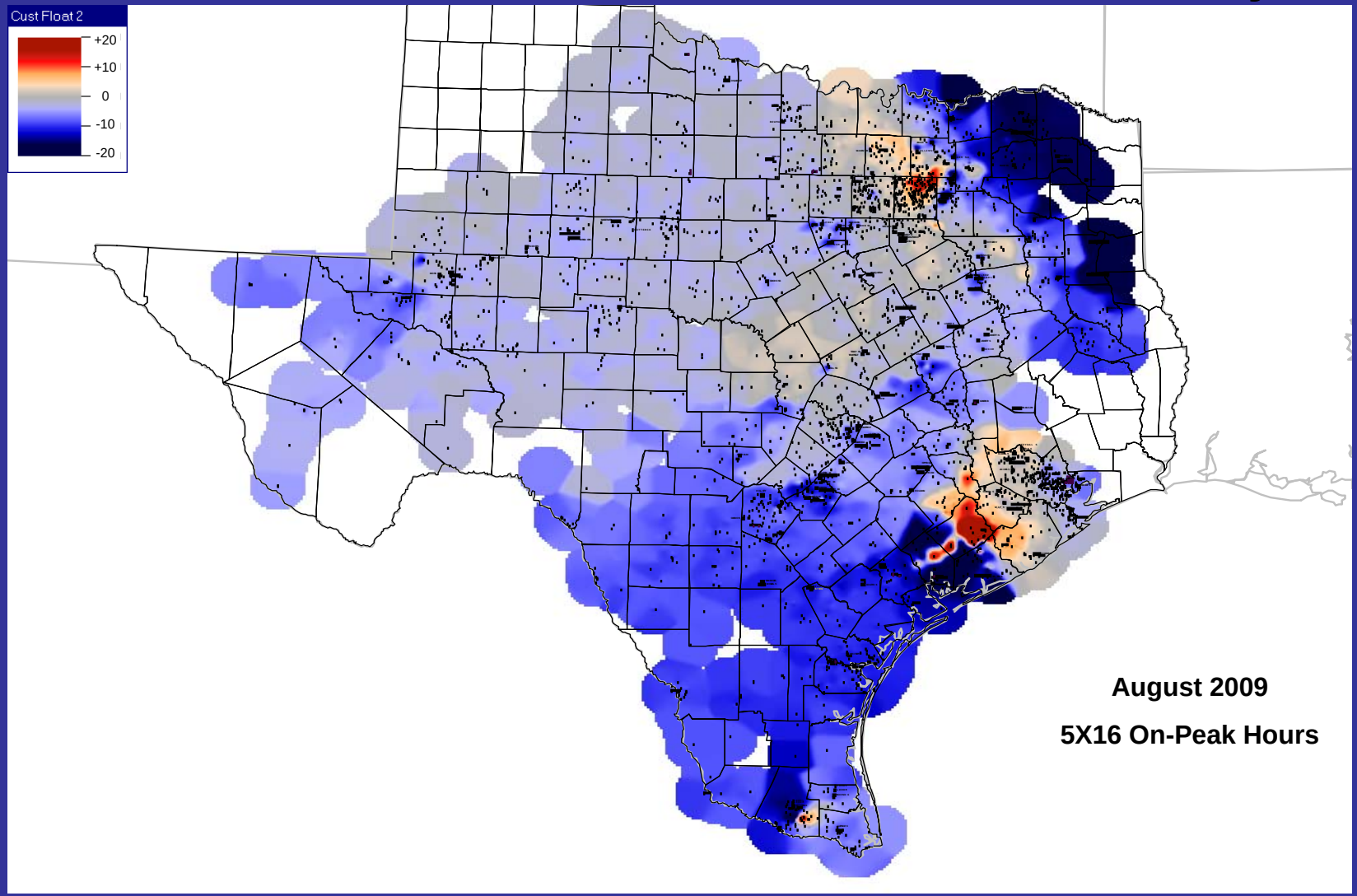
In 2005, ERCOT has recommended the construction of two major sets of transmission projects and several individual projects, primarily:

- Houston Import Projects
  - STP-Hillje-Parish 345kV Line Addition*
  - Jewett-Tomball/TH Wharton 345kV Upgrade
  - Other Transformer and Equipment Upgrades
- DFW 2006 Congestion Reduction Upgrades
  - Ben Davis – Royse 345-kV Line Upgrade
  - Johnson Switch – Venus 345-kV Line Upgrade
  - Centerville Switch – Parkdale 138-kV Line Rebuild
  - Everman - DeCordova 345-kV Line Upgrade
- Blessing-Lane City Reactor

Economic Planning

- Economic Projects: system improvements intended to resolve reliability criteria violations that could be solved with redispatch of generation but are also projected to result in a net economic benefit to the market
- ERCOT has obtained staff and tools to enable the identification and evaluation of these
  - One tool used in evaluation of economics of transmission is the UPlan market simulation model
  - UPlan calculates the security-constrained, least-cost unit commitment and economic dispatch of all generation to serve future load
  - Forecast production costs savings are evaluated for transmission system improvements
- UPlan also calculates the marginal cost of electricity at each bus in each hour

Relative Marginal Costs with Pre-2005 Planned Projects

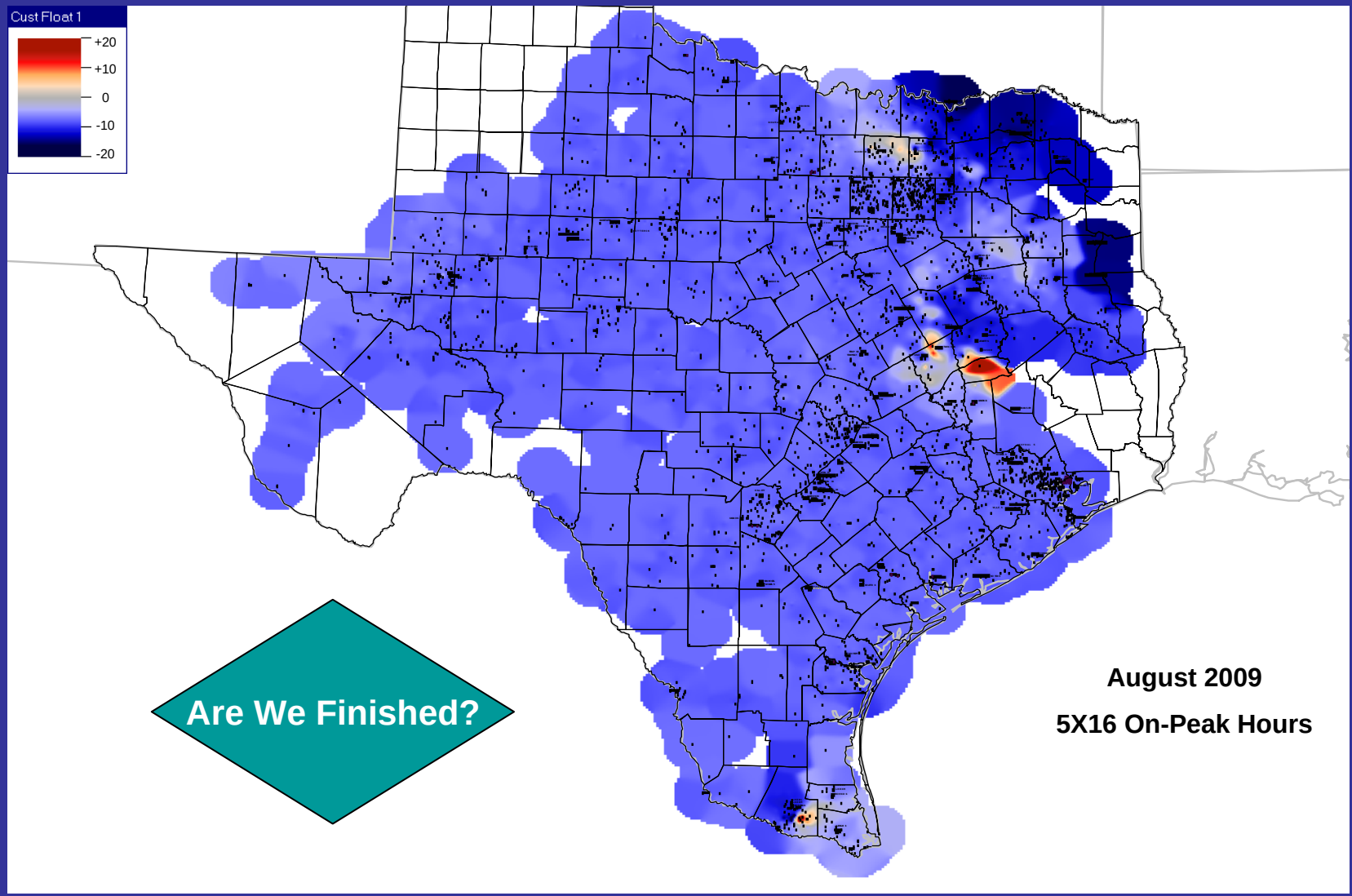


Based on calculated load weighted average marginal costs at each bus

2005 Planned Projects - Criteria

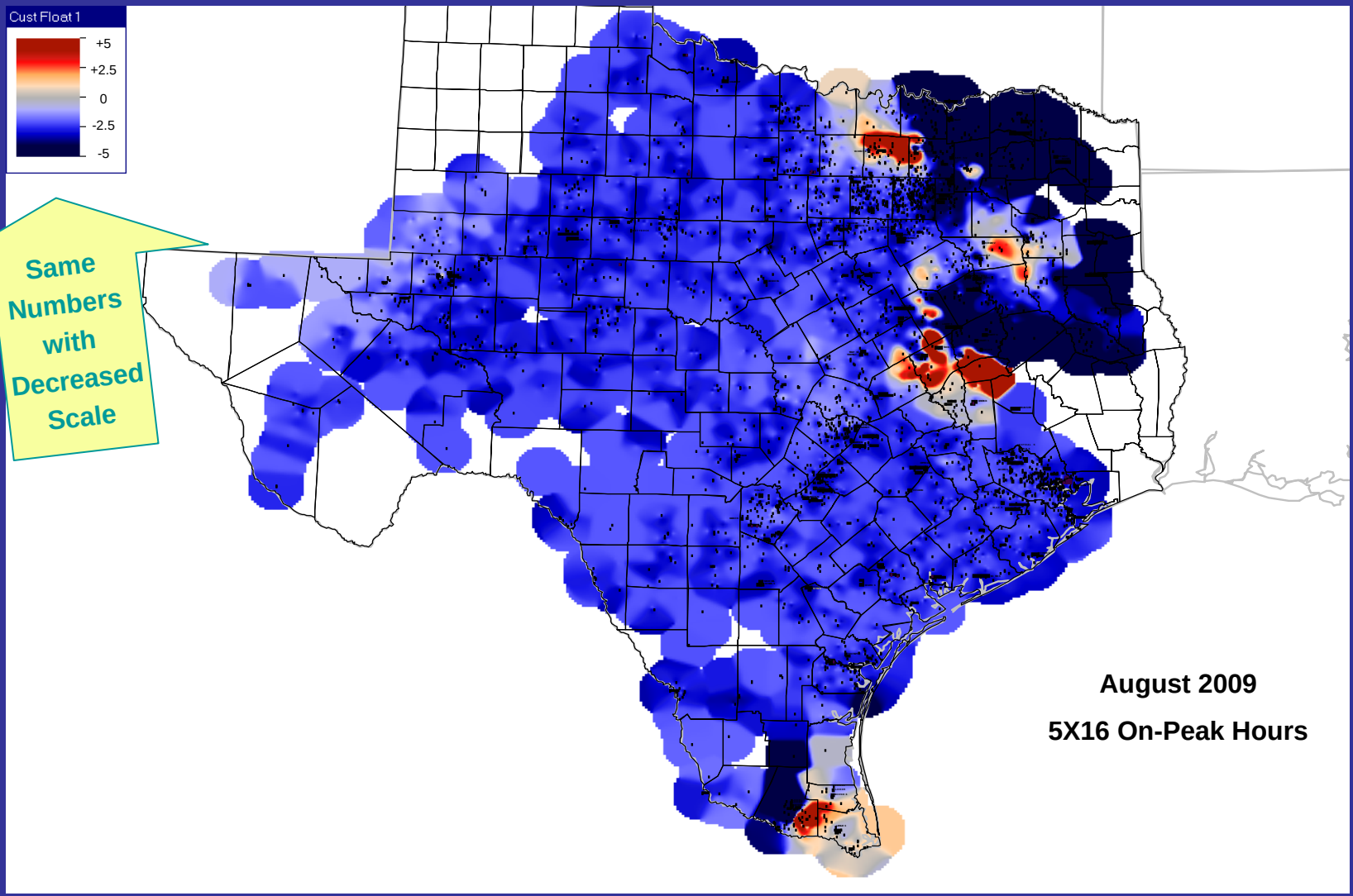
- Transmission projects recommended this year:
  - Houston Import Projects
  - DFW 2006 Congestion Reduction Upgrades
  - Blessing-Lane City Reactor
- These projects were recommended based on their resulting reduction in production costs
- However, these particular projects also have the benefit of reducing high marginal cost differentials

Relative Marginal Costs with 2005 Planned Projects



Based on calculated load weighted average marginal costs at each bus

Relative Marginal Costs with 2005 Planned Projects

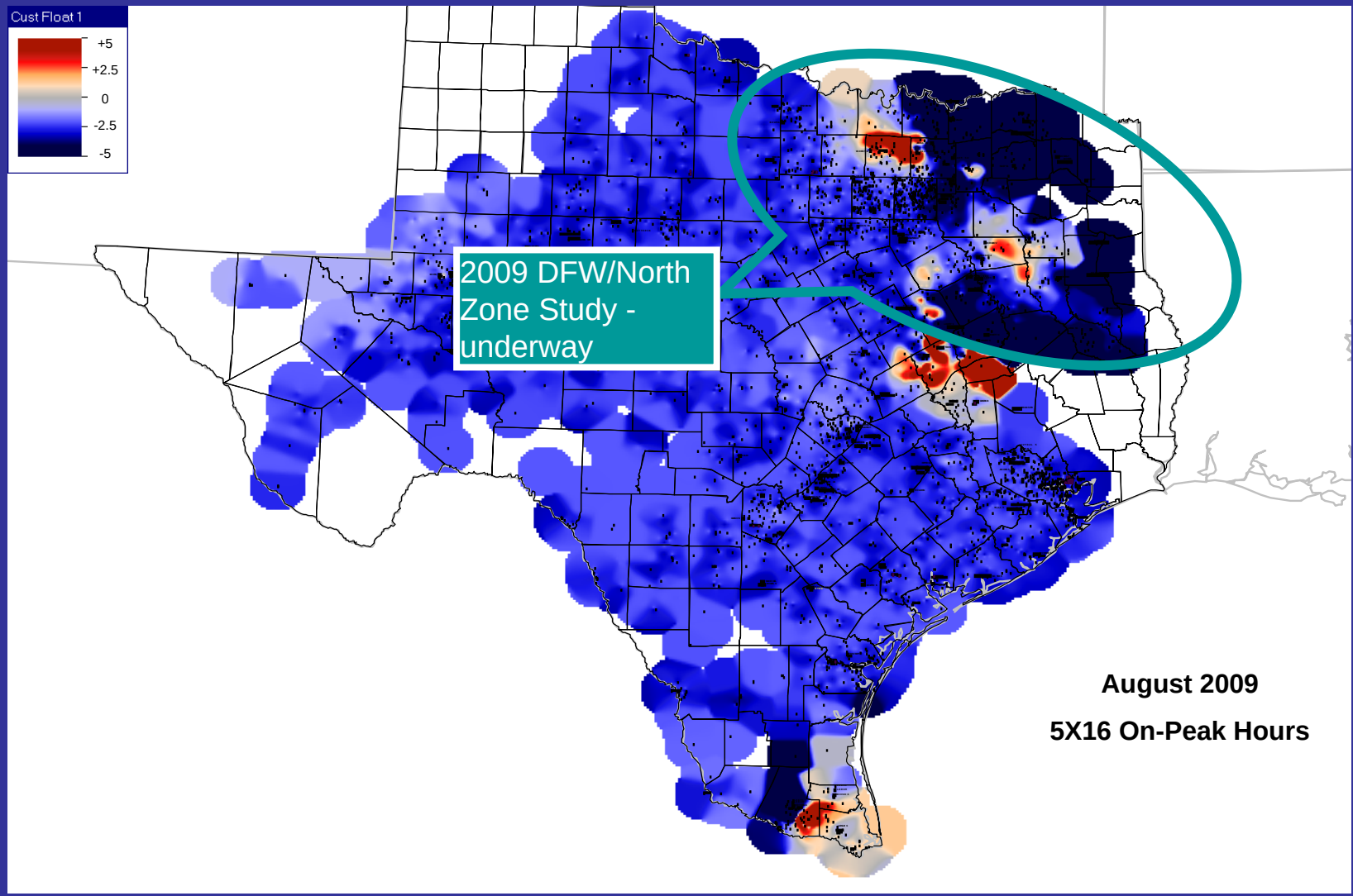


Based on calculated load weighted average marginal costs at each bus

On-Going Planning 2

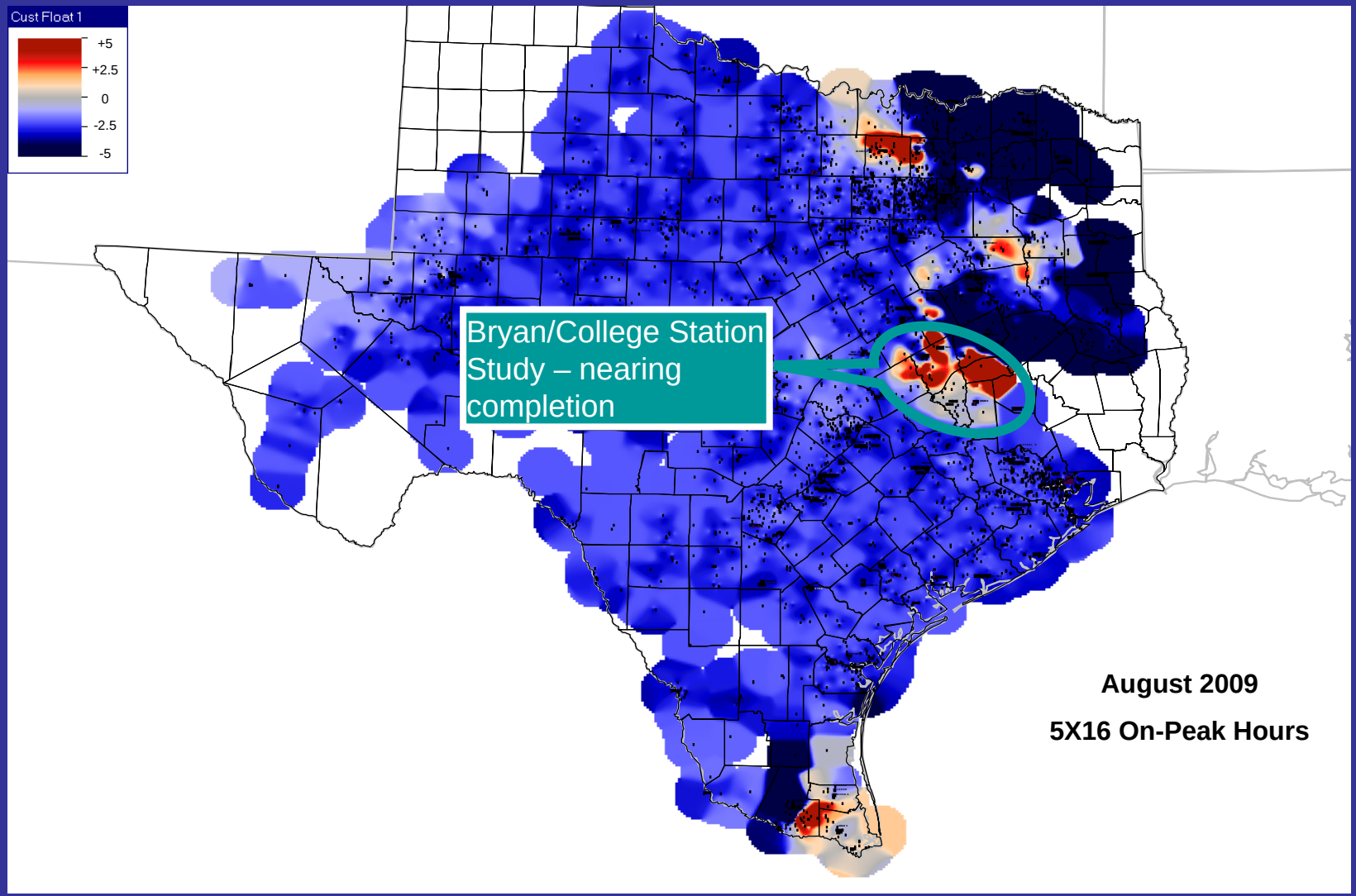
- Several studies are currently underway that will address the congested areas shown on the preceding map

Relative Marginal Costs with 2005 Planned Projects



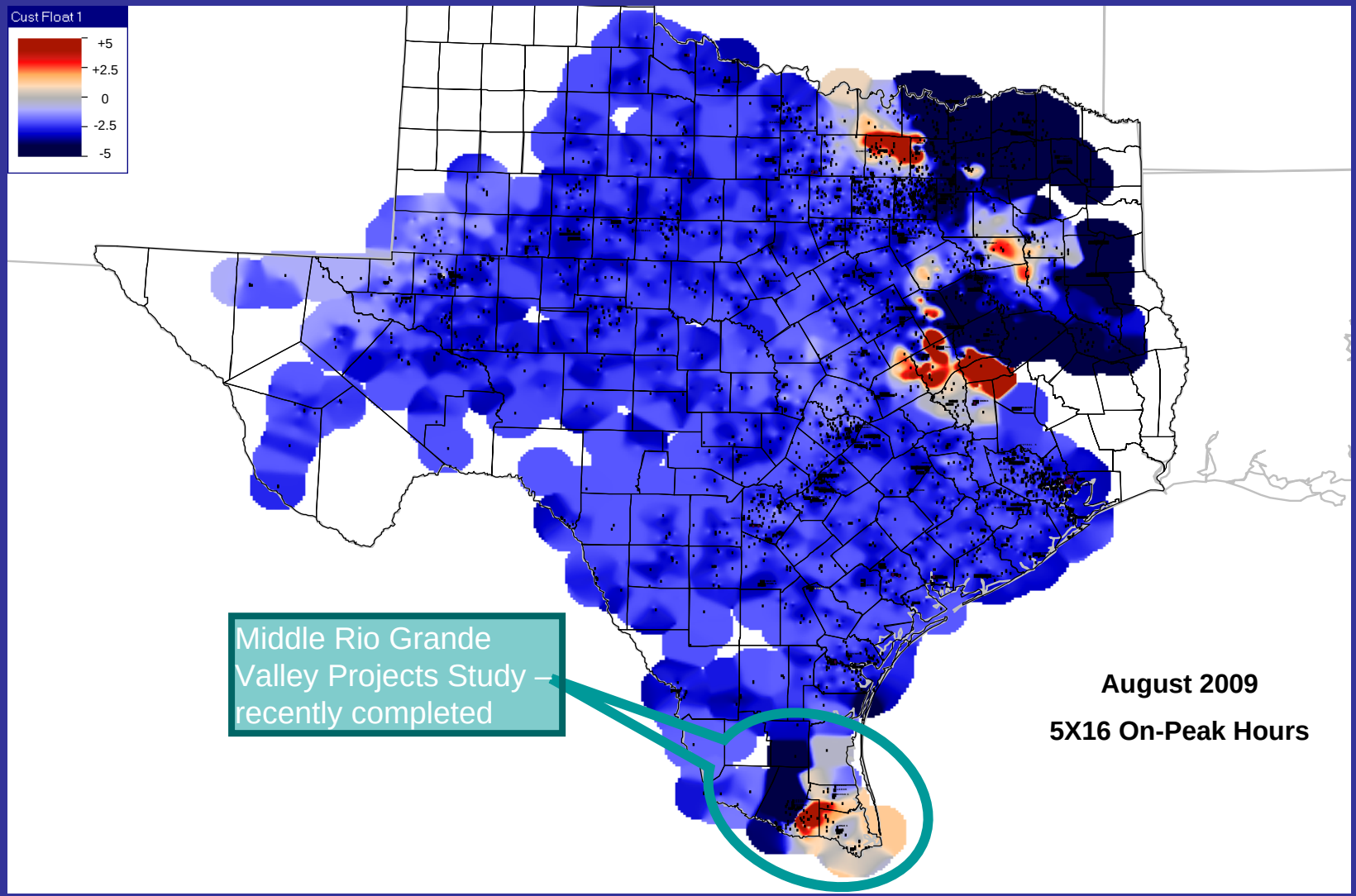
Based on calculated load weighted average marginal costs at each bus

Relative Marginal Costs with 2005 Planned Projects



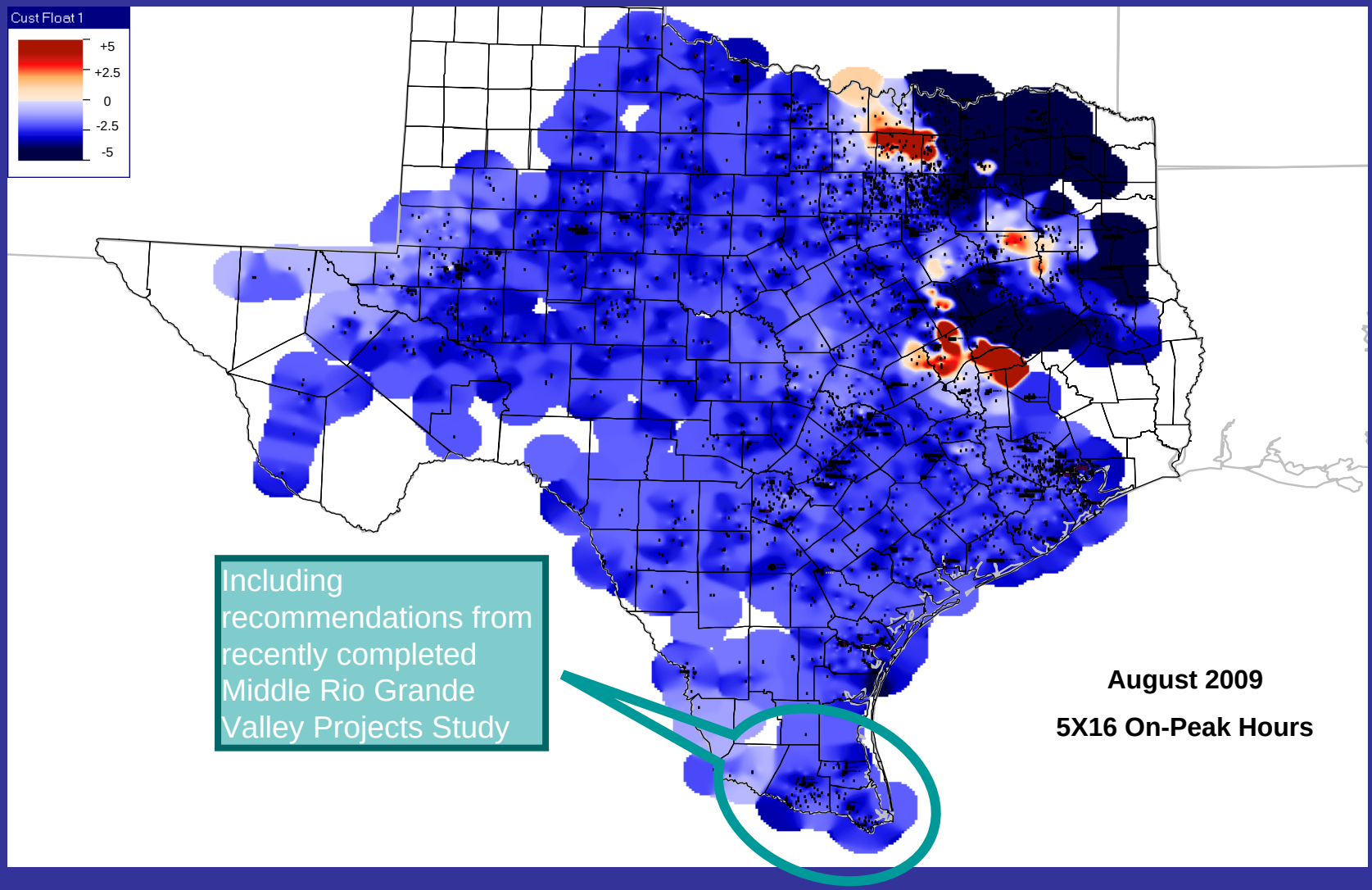
Based on calculated load weighted average marginal costs at each bus

Relative Marginal Costs with 2005 Planned Projects



Based on calculated load weighted average marginal costs at each bus

2009 Nodal Prices with 2005 Planned Projects



Based on calculated load weighted average marginal costs at each bus

Caveats

- Planning is an on-going process
  - Congestion patterns may differ in years prior to 2009, due to construction timeframes
  - Generation additions/retirements, changes in fuel forecast, differential load growth, etc. may change results for 2009
  - Load growth and new generation additions/ retirements will require continuing planning and transmission upgrades
  - Only August on-Peak was demonstrated in this presentation – other months may show different marginal cost differentials

Study is based on best knowledge available today and reasonable assumptions

Top Planned Lines

- **Clear Springs-Salado**
- **Jacksboro-West Denton**
- **West Levee-Norwood**
- **Cagnon-Kendall**
- **Venus-Liggett**
- **Paris-Anna**
- **Houston Import Projects**
  - •STP-Hillje-Parish 345kV Line Addition
  - •Jewett-Tomball/TH Wharton 345kV Upgrade
  - •Other Transformer and Equipment Upgrades
  - •Blessing-Lane City Reactor
- **DFW 2006 Congestion Reduction Projects**
  - •Ben Davis – Royse 345-kV Line Upgrade
  - •Johnson Switch – Venus 345-kV Line Upgrade
  - •Centerville Switch – Parkdale 138-kV Line Rebuild
  - •Everman - DeCordova 345-kV Line Upgrade
- **– San Miguel-Laredo**
- **– Miscellaneous RMR Exit Upgrades**

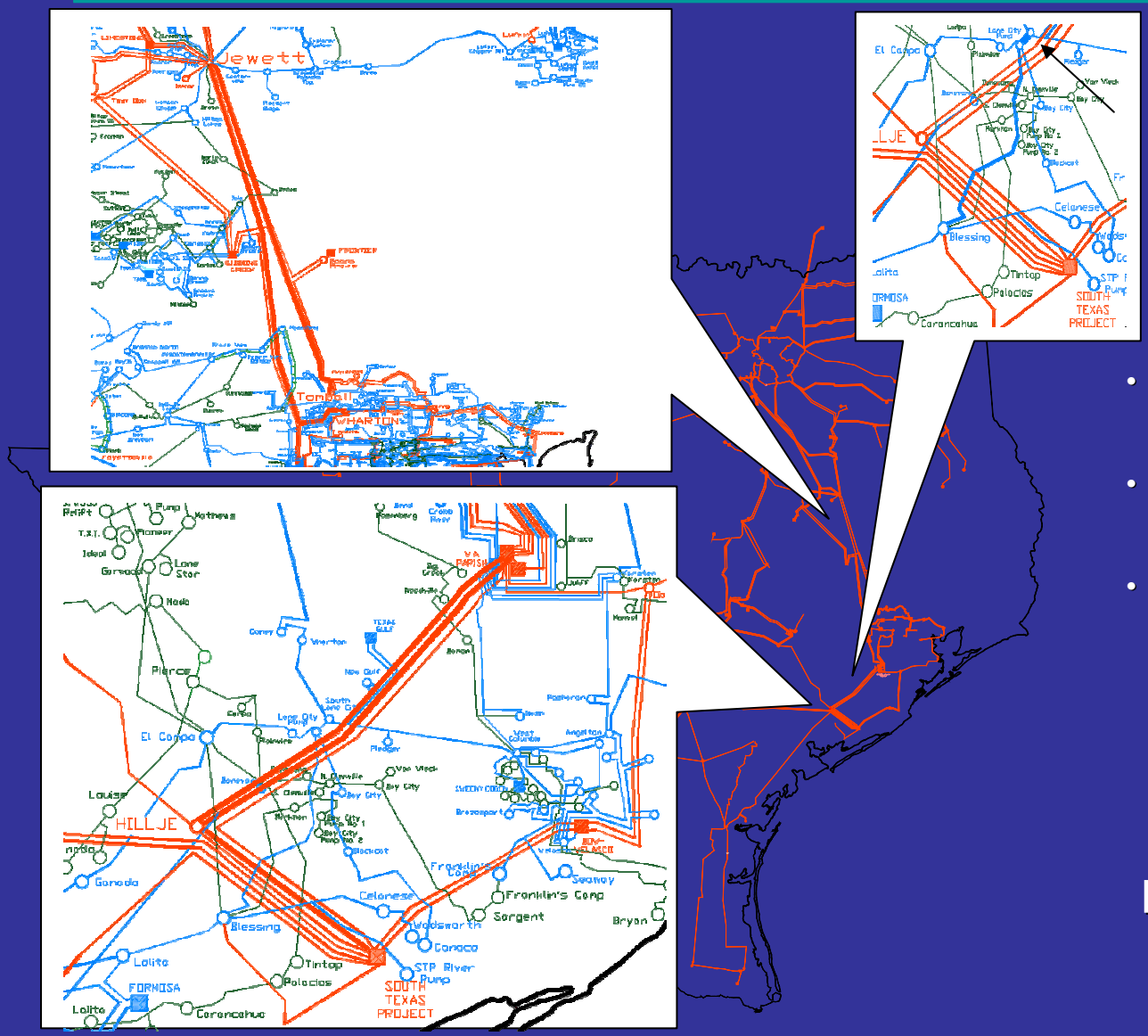
AND - Additional lines to be determined in DFW/North Zone 2009, Bryan/College Station and Middle Rio Grande Valley Area studies

The order of the projects above is not intended to indicate importance

Questions?

Backup Slides

Houston Constraint Mitigation Project



ERCOT BOD Approved 3/05

Centerpoint/TXU Project

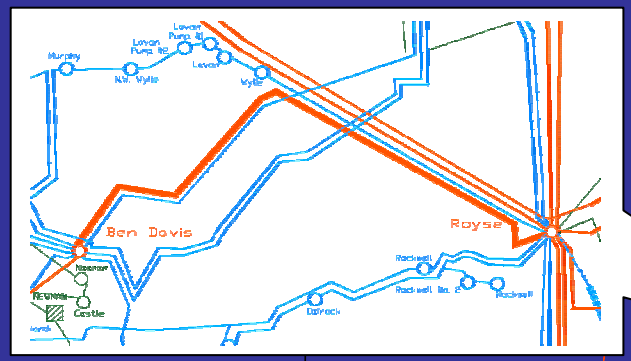
- Jewett-Tomball/TH Wharton 345-kV Upgrade ($9.5M)
- STP-Hillje-Parish 345-kV line and station addition ($98.5M)
- Blessing-Lane City Reactor -AEP ($.5 M)
- Other Transformer and Equipment upgrades ($14M)

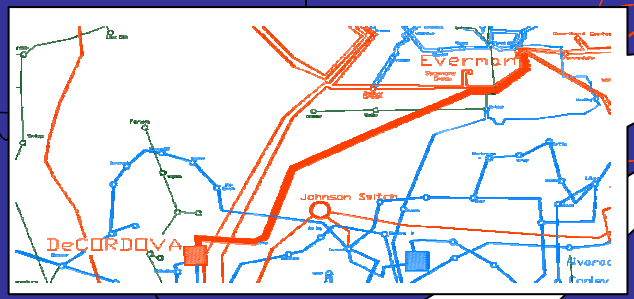
Cost - $122.5 million

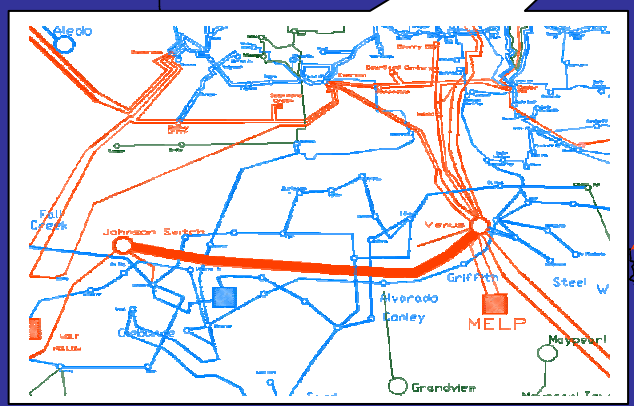
In Service date 6/08

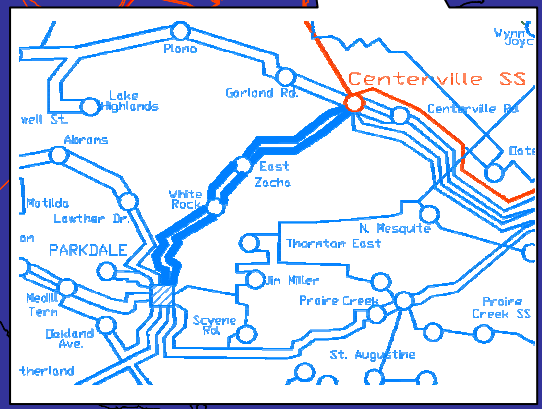
Projected Production Cost Savings of $63M Annually

DFW 2006 Congestion Reduction Project









ERCOT Endorsement 6/05

TXU and TMPA projects

- Ben Davis – Royse 345-kV line upgrade
- Everman – DeCordova 345-kV line upgrade
- Johnson Switch – Venus 345-kV line upgrade
- Centerville Switch – Parkdale 138-kV line rebuild

Cost - $43.7 million

Projected Production Cost Savings of $19.3 million Annually

In Service date

6/06