



Long-Term System Assessment Transmission Analysis Update

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Specific Focus – LTSA Transmission Analysis

A network simplification tool has been implemented and is being used for the Long-Term System Assessment transmission requirements analysis

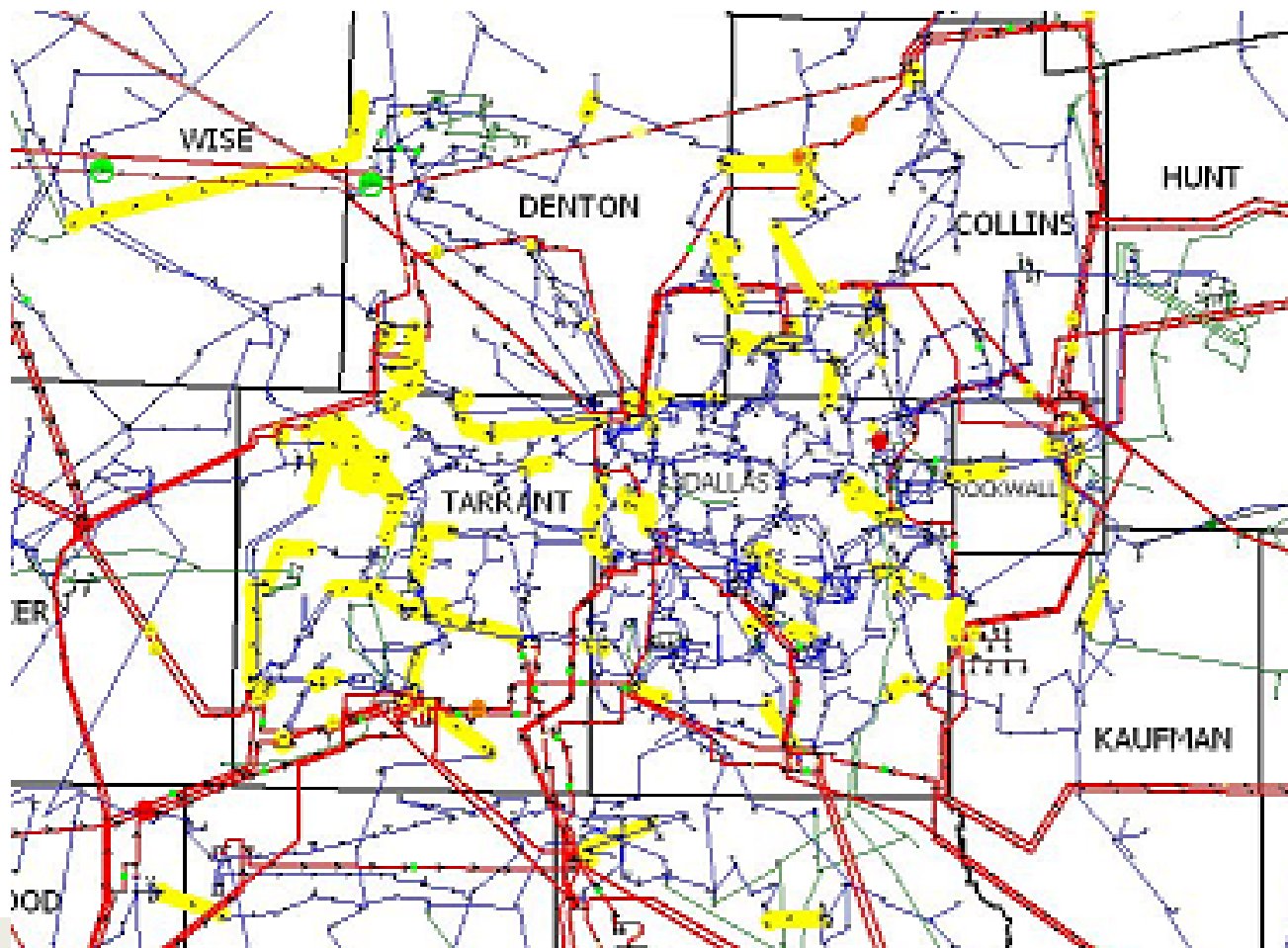
The focus of the LTSA is to identify:

- Long-Lead-Time Projects – projects that may require 5 or more years to bring on-line
- Large Projects – short-term analyses tend to focus on short-term solutions. A long-term perspective can indicate larger projects that both solve short-term issues but also meet long-term system needs more cost-effectively.

This network simplification tool will provide a starting point for larger DOE study

Methodology

First Step: Simplify the ERCOT Transmission Network



- **Why needed?**

1. Reduce clutter

- Long range models often become cluttered with overloads.
- Taking a planning case and scaling load up to 2030 levels (~100 GW) results in **1400 N-1 overloads**.

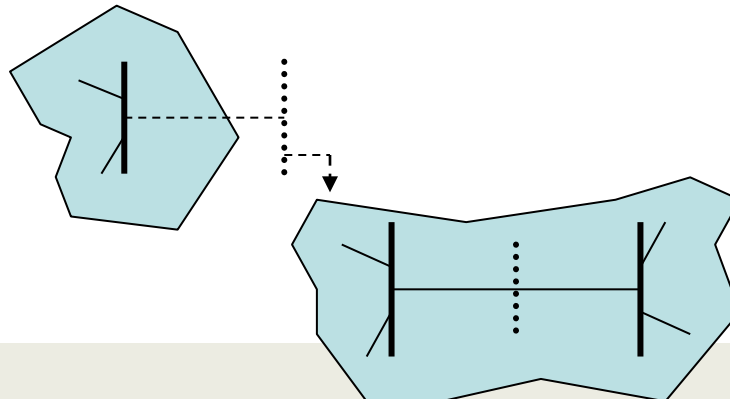
2. Improve Understanding

- Some tools require reduced networks for computational efficiency.
- Sometimes appropriate to make small sacrifices in modeling detail in order to improve understanding and visibility.

- **Simplification Tool:**
 - Provides appropriate visibility for a long-range study
 - De-emphasize problems that are better dealt with in the short term (e.g. short line overloads)
 - Reduce clutter of short-term problems that obscure big project visibility.

Case Simplification Steps

- **Process Code written by Dave Matthews (AEP) and Jonathan Rose (ERCOT)**
- **Remove 69-kV network.**
- **Remove 138-kV radial buses.**
- **Remove 138-kV inline buses.**
- **Raise rating of “short” rural lines.**
 - Definition of “short” is subject to tuning.



Remove 69-kV Network

- **Move all generators to nearest 138-kV bus.**
 - POI bus is also moved, so bus number and name are preserved for recognition.
- **“Move loads”:** Measure flow at the 138 / 69 kV autos and represent these flows by loads at the 138-kV buses.
- **Remove 69-kV network.**

Remove Radials and Inlines

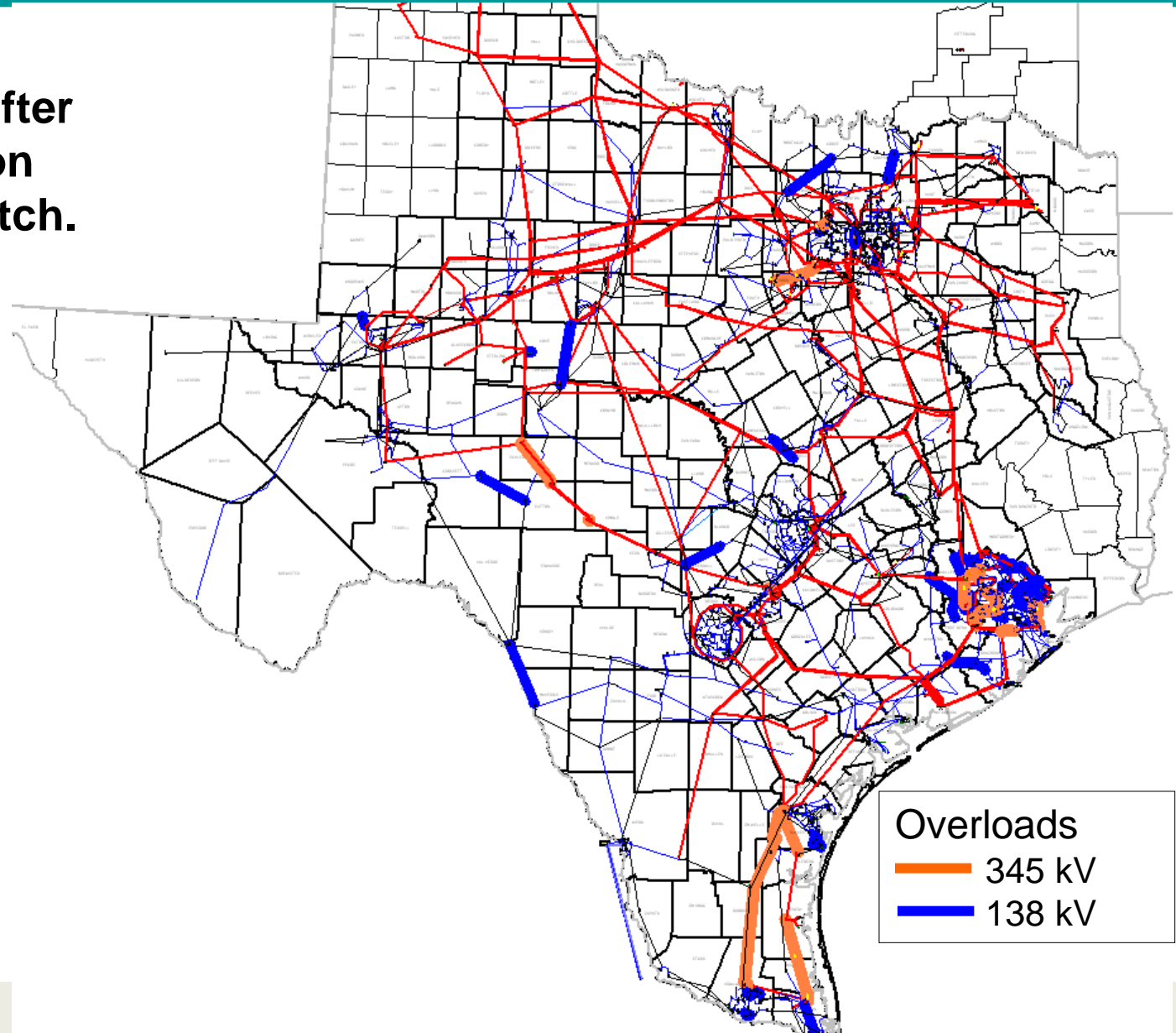
- **Move load and switched shunts to neighboring bus.**
- **Large loads (e.g. >20 MW) are not moved.**
- **Three-winding transformers with a radial leg are converted to two-winding transformers. Radial load and switched shunt moved to high side.**

After Simplification

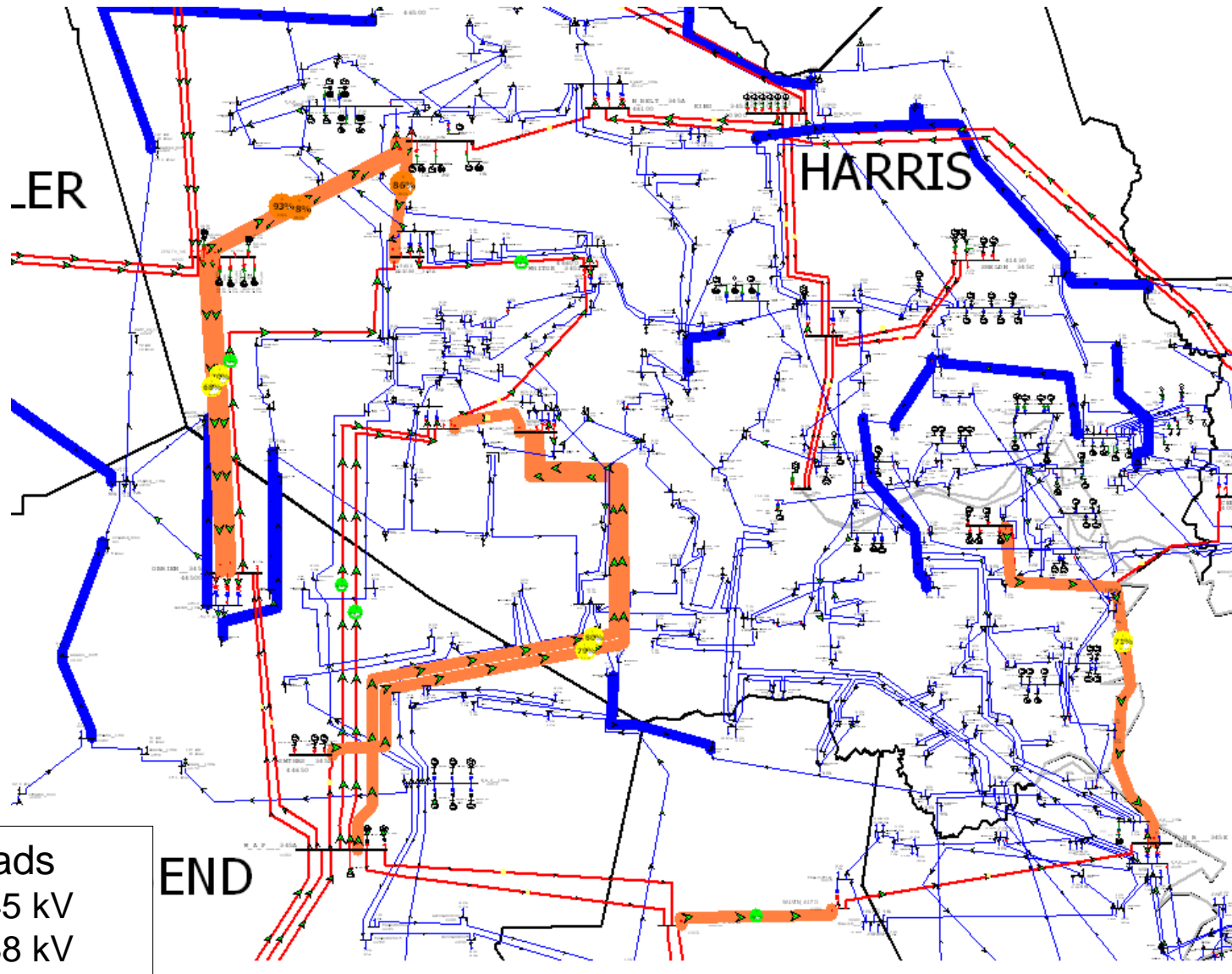
- **Bus count reduced 6,000 → 3,000 (approx)**
- **Line count reduced 6,000 → 3,000 (approx)**
- **Flows on 138-kV and 345-kV bulk transmission network mostly unchanged.**
- **Simplified case has similar N-1 behavior (branch loading and voltages) as full case.**

LTSA Reliability Analysis

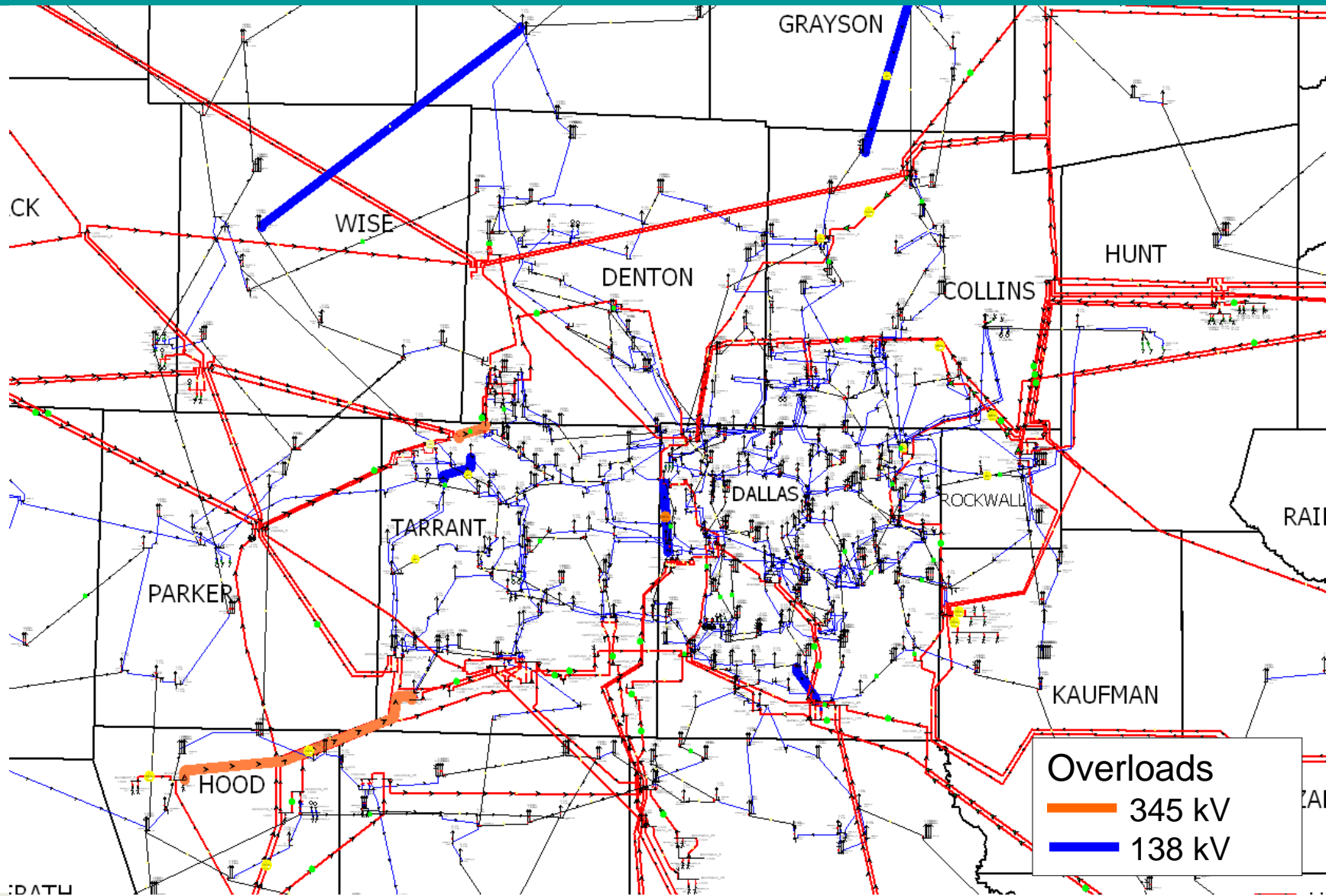
- **Overloads after simplification and redispatch.**



LTSA Reliability Analysis: Houston



LTSA Reliability Analysis: DFW



Summary

- Simplification tool is operational and passes load flow checks.
- First cut of LTSA reliability analysis is nearing completion. ERCOT is in the process of contacting TSPs regarding studied transmission projects.
- LTSA economic analysis is in progress, however no projects have yet been identified.

Questions?

