ERCOT--System Planning:

# 2020 RTP Economic Analysis Results

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# 1. Introduction

This document summarizes the economic analysis performed by ERCOT as part of the 2020 Regional Transmission Plan (RTP).

# 2. Study Assumptions and Methodology

ERCOT prepared production cost models for years 2022 and 2025. These models were based on the ERCOT-developed load forecast, existing generation and planned generation meeting the requirements of Planning Guide Section 6.9(1), and the conditioned transmission topology with recently identified reliability projects. The results of recent stability analysis were consulted to determine appropriate interfaces and associated limits to be included in the production cost models. Details on the economic input assumptions used for production cost analysis can be found in Appendix C. The input information used in the start and final economic cases are provided in Appendices D and N, respectively.

Areas of study were selected based on review of the initial congestion pattern, congestion observed in real-time operations, and stakeholder feedback. Section 3 includes details of the analysis conducted for selected study areas, potential transmission improvements evaluated, and recommendations/next steps for further analysis. All capital cost estimates cited were provided by impacted TSPs based on ownership of existing transmission facilities and/or potential endpoints for new transmission facilities.

# 3. Study Results

## 3.1. Lower Rio Grande Valley

Congestion was observed on multiple 138-kV lines in the Lower Rio Grande Valley (LRGV). The first was the 138-kV path from Rio Hondo to Burns to Heidelberg to Weslaco Sub to Weslaco Switch, totaling approximately 31 miles. The second was the approximately 8 mile East Rio Hondo to Rio Hondo 138-kV line. Table 1 includes details of the congestion experienced in the Lower Rio Grande Valley.

*Table 1: Lower Rio Grande Valley Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Rio Hondo to Burns 138-kV line | | | |
| **Most Severe Contingency** | Loss of North Edinburg to Bonilla 345-kV & Loss of Bonilla to South Santa Rosa 138-kV lines | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 189 | 2022 | 5.9 | 5.7 |
| | | 2025 | 9.0 | 11.5 |
| **Congested Element** | East Rio Hondo to Rio Hondo 138-kV line | | | |
| **Most Severe Contingency** | Loss of Paredes Switching Station to Central Avenue 138-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 173 | 2022 | 30.1 | 4.8 |
| | | 2025 | 29.7 | 6.9 |

When wind output at Bonilla and Rio Hondo is low, power flows west to east along the 345-kV path from North Edinburg to Bonilla to Rio Hondo, but when wind output is high, flow reverses, flowing east to west from Rio Hondo to Bonilla to North Edinburg.

Congestion in the area is driven primarily by the loss of the transmission pathway from Rio Hondo to North Edinburg during high wind scenarios. This was evident under the NERC P7 contingency involving the common tower loss of the North Edinburg to Bonilla 345-kV line and the 138-kV line from Bonilla to South Santa Rosa. The primary 345-kV path was removed as part of the contingency, and the result was heavy congestion along the parallel 138-kV path to the west.

One possibility explored was addressing the common tower contingency so that both the North Edinburg to Bonilla 345-kV and Bonilla to South Santa Rosa 138-kV lines were not simultaneously lost. However, that solution was not feasible because the loss of just the North Edinburg to Bonilla 345-kV line produced nearly as much congestion as the original common tower contingency.

UPLAN congestion results showed Rio Hondo to Burns as the most congested element; however, if only that line section were to be upgraded, the congestion would then move on to Burns to Heidelberg, and so on, all the way to Weslaco Switch. Therefore, if a line upgrade were performed, it would likely need to include the entire 30.8 mile pathway from Rio Hondo to Weslaco Switch to realize the most economic benefit.

Wind generation in the East Rio Hondo area was another source of congestion in the LRGV. Under the single 138-kV line loss of Paredes Switching Station to Central Avenue, the wind output from Palmas Wind and Cameron Wind would flow northwards to the 138-kV Rio Hondo station across the East Rio Hondo to Rio Hondo 138-kV line, which was congested when both wind plants were at or near full output.

Much of the economic benefit seen in upgrading only the East Rio Hondo to Rio Hondo 138-kV line was offset by the increase in congestion seen along the Rio Hondo to Weslaco Switch path. This occurred because once the East Rio Hondo to Rio Hondo constraint was relieved, more wind flowed out of Rio Hondo to the west. Under the common tower contingency of the North Edinburg to Bonilla 345-kV line and the Bonilla to South Santa Rosa 138-kV line, that additional wind power at Rio Hondo flowed west along the Rio Hondo to Weslaco Switch path increasing that pathway's congestion relative to the base case.

The following transmission improvement options were evaluated to relieve the congestion observed in the Lower Rio Grande Valley:

- Option 1 – Upgrade the 138-kV lines from Rio Hondo to Burns to Heidelburg to Weslaco Sub to Weslaco Switch
- Option 2 – Upgrade the 138-kV line from East Rio Hondo to Rio Hondo
- Option 3 – Combine Options 1 and 2
- Option 4 – Loop the 345-kV line from Palmito to Stewart Rd into La Palma
- Option 5 – Build a new 138-kV line from East Rio Hondo to Laureles
- Option 6 – Build a new 138-kV line from East Rio Hondo to Kelvin to Harlingen Switch
- Option 7 – Convert the East Rio Hondo to Rio Hondo 138-kV line to 345 kV, add a new 345/138-kV transformer at East Rio Hondo, build a new Laureles 345-kV station, and build a new 345-kV line form East Rio Hondo to Laureles

While Options 1 and 2 did not result in significant production cost savings when studied individually, Option 3, which combined the two, showed more savings. However, the results for this option showed moderate congestion on the La Palma to Haine Drive 138-kV line. Option 3 showed significant production cost savings in both 2022 and 2025, but did not result in sufficient societal benefit to meet the economic criteria for

2022. Production cost savings were larger in 2025, marginally exceeding the minimum benefit required. However, since the project did not meet criteria for 2022, Option 3 is not recommended at this time. ERCOT plans to reevaluate Option 3 in the 2021 RTP.

Option 4 was similar to Option 1 in that it addressed only the congestion on the 138-kV path from Rio Hondo to Weslaco Switch. Option 4 did not meet the economic planning criteria.

Options 5 and 6 were similar to Option 2 in that they only addressed congestion on the East Rio Hondo to Rio Hondo 138-kV line. Similarly to Option 3, Option 5 did not meet the economic criteria for recommendation in 2022 but had more savings in 2025. Option 5 is not recommended at this time, but ERCOT plans to reevaluate it in the 2021 RTP economic analysis. ERCOT did not request a capital cost estimate for Option 6 from the TSP.

Though most options that were tested did not resolve both areas of congestion within the LRGV, the results did show that a larger 345-kV project has the potential to do so. Option 7 resolved both congestion issues, but the overall societal benefit was not sufficient to justify the estimated cost. Additionally, AEP confirmed that there is no available space at the Rio Hondo 345-kV station for another terminal, requiring the construction of a new nearby 345-kV station for Option 7. Due to this physical constraint, a full capital cost estimate from all TSPs involved was not requested.

Economic analysis results for the Options evaluated to address congestion in the Lower Rio Grande Valley are included in Table 2.

*Table 2: Lower Rio Grande Valley Economic Analysis Results*

| Option | Study Year | Production Cost Savings (Nominal $M) | Capital Cost Estimate (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|---|
| 1 | 2022 | 0.9 | 32.4 | 6.3% |
| | 2025 | 3.6 | | |
| 2 | 2022 | 1.4 | 8.3 | 12.4% |
| | 2025 | 0.8 | | |
| 3 | 2022 | 4.3 | 40.7 | 11.4% |
| | 2025 | 5.6 | | |
| 4 | 2022 | 0.9 | 34.3 | 5.2% |
| | 2025 | 3.0 | | |
| 5 | 2022 | 1.4 | 15.4 | 13.9% |
| | 2025 | 3.2 | | |
| 6 | 2022 | 3.4 | n/a | n/a |
| | 2025 | 2.9 | | |
| 7 | 2022 | 5.1 | n/a | n/a |
| | 2025 | 5.5 | | |

### 3.2. Comanche Switch Area

Analysis showed that power flowing along the 345-kV path from Brown Switch to Comanche Switch to Comanche Peak was redirected to the parallel 138-kV path from Comanche Switch to Stephenville under the contingency loss of the Comanche Switch to Comanche Peak 345-kV line. Post-contingency, the magnitude of the power flow over the 138-kV lines, as well as 69-kV lines in the Hasse area, increased. The largest power flow increase occurred on the Comanche Switch to Comanche Tap 138-kV line section, but there was also increased flow continuing north to Shiloh and Hasse. Table 3 includes details of the congestion experienced in the Comanche Switch area.

*Table 3: Comanche Switch Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Comanche Switch to Comanche Tap 138-kV line | | | |
| **Most Severe Contingency** | Loss of Comanche Peak to Comanche Switch 345-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 179 | 2022 | 19.7 | 8.5 |
| | | 2025 | 17.8 | 24.1 |

The disparity in congestion observed between 2022 and 2025 resulted from the inclusion of multiple nearby 69-kV to 138-kV conversions which are scheduled to be in service by 2025. Conversions at Holder, Rising Star, Downing, south to Hasse, and north to Stephenville increased the overall 138-kV flow in the area, resulting in increased congestion around Comanche Switch.

Upgrading the 138-kV lines from Comanche Switch to Comanche Tap to Shiloh to Hasse, totaling approximately 3 miles, was evaluated to relieve the congestion observed in the Comanche Switch area. Economic analysis results are included in Table 4.

*Table 4: Comanche Switch Economic Analysis Results*

| Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|
| 2022 | 1.8 | 20.0 | 12.4% |
| 2025 | 3.6 | | |

Test cases were also run with the nearby conversions accelerated to 2022, and while the congestion observed was consistent with the results for the 2025 economic case, the overall system economic benefit did not increase significantly when the Comanche Switch upgrades were applied to this sensitivity case. This evidence points to the economic benefit seen in 2025 being more a result of overall system load growth, rather than the local topology changes.

Approximately 360 MW of additional generation nearby to Brown Switch met the requirements of Planning Guide Section 6.9(1) after the cutoff date for inclusion in the 2020 RTP economic cases. This new nearby generation, along with additional renewable generation in the West and Far West regions in general, has the potential to further impact the Comanche Switch congestion. While the upgrade of the Comanche Switch to Hasse 138-kV line did not meet the economic criteria for 2022, ERCOT plans to reevaluate the project in the 2021 RTP.

### 3.3. Bearkat Area / Stanton Loop

2020 RTP economic analysis showed significant congestion on two 138-kV lines in the Bearkat area. The 138-kV line from Polecat Creek Switch to Meyers Drive was congested under the loss of the Morgan Creek to Quail Switch and Longshore Switch to Odessa EHV Switch 345-kV double circuit line, and the from Einstein to Carterville 138-kV line was congested under the loss of the Bearkat to Longshore 345-kV line. Table 5 includes details of the congestion observed in the Bearkat area.

*Table 5: Bearkat Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Polecat Creek Switch to Meyers Drive 138-kV line | | | |
| **Most Severe Contingency** | Loss of Morgan Creek to Quail Switch and Longshore Switch to Odessa EHV Switch 345-kV double circuit line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 186 | 2022 | 17.3 | 14.6 |
| | | 2025 | 30.2 | 84.9 |
| **Congested Element** | Einstein to Carterville 138-kV line | | | |
| **Most Severe Contingency** | Loss of Bearkat to Longshore 345-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 214 | 2022 | 8.7 | 6.8 |
| | | 2025 | 18.8 | 30.2 |

Additionally, 2020 RTP reliability analysis showed multiple X-1+N-1 criteria violations in 2025, with the most significant first-level transformer outage being at Einstein. The reliability analysis indicated the need for additional 345/138-kV transformer capacity along the Stanton Loop near Midland.

ERCOT is working with TSPs to develop a project that addresses both the reliability and economic needs in the Bearkat area and along the Stanton Loop, and analysis will continue beyond the 2020 RTP. There are both reliability and economic placeholder

projects included the 2020 RTP. Further analysis on these and other options is planned to be conducted in the 2021 RTP and future Regional Planning Group (RPG) reviews.

The placeholder reliability project includes:

- Rebuild the 138-kV line sections from Spraberry Switch to Cottonfield Sub, and from Midland Downtown to Cloverdale POD to Fairgrounds POD
- Loop a new 345/138-kV station into the 345-kV double circuit line from Quail Switch to Longshore Switch and Odessa EHV Switch to Longshore Switch
- Add a new 345/138-kV transformer at the new station
- Loop the Spraberry Switch to Cottonfield Sub 138-kV line into the new station

The placeholder economic addition to the reliability project includes:

- Add a second 345/138-kV transformer at the new station
- Loop the South Midland to Pronghorn 138-kV line into the new station
- Build a new 345-kV line from Bearkat to the new station (straight-line distance ~30 miles)

The placeholder economic addition showed preliminary production cost savings of approximately $21.7M in 2025, corresponding to an approximate breakeven cost of $164M.

### 3.4. Kendall Area Congestion

Similarly to the 2019 RTP, significant congestion was seen in the Kendall area. The Kendall to Bergheim 345-kV line, and several 138-kV lines in the Kendall area were congested under the loss of the Kendall to Cagnon transfer path, and the Bergheim 345/138-kV transformer was congested due to the loss of the Zorn to Hays Energy 345-kV double circuit line.

Table 6 includes details of the congestion experienced in the Kendall area.

*Table 6: Kendall Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Tally Road to Medina Lake 138-kV line | | | |
| **Most Severe Contingency** | Loss of Cagnon to Kendall 345-kV and Cico to Comfort 138-kV double circuit | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 220 | 2022 | 13.5 | 38.5 |
| | | 2025 | 15.8 | 51.8 |
| **Congested Element** | Kendall to Bergheim 345-kV line | | | |
| **Most Severe Contingency** | Loss of Cagnon to Kendall 345-kV and Cico to Comfort 138-kV double circuit | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 1099 | 2022 | 9.4 | 17.3 |
| | | 2025 | 6.6 | 13.8 |
| **Congested Element** | Bergheim 345/138-kV Transformer | | | |
| **Most Severe Contingency** | Loss of Zorn to Hays Energy 345-kV double circuit | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 370 | 2022 | 22.2 | 24.8 |
| | | 2025 | 25.4 | 31.8 |
| **Congested Element** | Bandera to Mason Creek 138-kV line | | | |
| **Most Severe Contingency** | Loss of Cagnon to Kendall 345-kV and Cico to Comfort 138-kV double circuit | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 221 | 2022 | 6.2 | 13.1 |
| | | 2025 | 4.9 | 11.5 |

Several options were tested in the 2020 RTP economic cases to resolve congestion in the Kendall area. One option was to reroute one of the Big Hill to Kendall 345-kV lines to bypass Kendall and go directly to Cagnon. This option resulted in approximately $0.5M in production cost savings. The Bergheim 345/138-kV transformer remained highly congested, but congestion on the Kendall area 138-kV lines was largely reduced with the option in place.

Another option tested was to upgrade the Bergheim 345/138-kV transformer. With the Bergheim 345/138-kV transformer upgraded to 672 MVA, there was significantly increased congestion on 138-kV line sections from Bergheim towards Hays Energy. LCRA has indicated that the Kendall to Hays Energy 345-kV and 138-kV double circuit

line, including those 138-kV line sections, will need to be rebuilt based on reliability need. The timing and nature of that rebuild will need to be considered in future economic evaluations of the Bergheim 345/138-kV transformer upgrade.

*Economic analysis results for the Bergheim 345/138-kV transformer upgrade without the aforementioned nearby line the aforementioned nearby line upgrades are included in*

Table 7. ERCOT will reevaluate this project as part of 2021 RTP economic analysis.

*Table 7: Bergheim 345/138-kV Transformer Economic Analysis Results*

| Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|
| 2022 | 0.4 | 8.5 | 11.4% |
| 2025 | 1.7 | | |

### 3.5. West Texas Export / San Antonio Import

The top congestion observed in both the 2022 and 2025 study years was on the West Texas export interface. Two options were tested in the 2025 case to relieve the West Texas export interface congestion. Option 1 was the test of a new 345-kV path from Big Hill to Howard, including:

- Build a new 345 kV substation at Howard (5230)
- Add two new 345/138 kV transformers at Howard
- Build a new 345-kV double circuit line from Big Hill to Howard (straight-line distance ~170 miles)
- Loop the existing 345-kV lines from Cagnon to Von_Rose/Spruce into Howard 345-kV substation
- Upgrade the 138-kV line from Howard to Leon Creek

A 1 GW increase in the West Texas export transfer limit was assumed with the addition of the new 345-kV double circuit. This option resulted in reduced congestion on the West Texas export interface, and the 138-kV congestion in the Kendall area was resolved. Congestion was also reduced on the Bergheim 345/138-kV transformer, but congestion on paths into Houston increased.

Option 2 was the test of a new 345-kV double-circuit from Brown Switch to Bell County East (straight-line distance ~120 miles). Similar to with Option 1, a 1 GW increase in the West Texas export transfer limit was assumed. Option 2 resulted in decreased congestion on the West Texas export interface and the congestion on the Killeen to Salado 345-kV double circuit was resolved, but congestion on paths into Houston increased.

The combination of both options described above was also tested in the 2025 economic case. Similar to the results observed for the individual options, this scenario resulted in decreased congestion on the West Texas export interface and increased congestion on paths into Houston. Economic analysis results for the options tested are included in Table 8. Further stability and economic analyses of options to relieve the West Texas Export stability limit are being conducted as part of the ongoing Long-Term West Texas Export Special Study, which is expected to be completed in 2021.

*Table 8: West Texas Export Economic Analysis Results*

| Option | Study Year | Production Cost Savings (Nominal $M) | Approximate Breakeven Cost (Nominal $M) |
|---|---|---|---|
| 1 | 2025 | 43 | 326 |
| 2 | 2025 | 31 | 235 |
| 1+2 | 2025 | 65 | 492 |

### 3.6. Yellow Jacket Area Congestion

Table 9 includes details of the congestion observed on the Yellow Jacket to Treadwell 138-kV line.

*Table 9: Yellow Jacket Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Yellow Jacket to Treadwell 138-kV line | | | |
| **Most Severe Contingency** | Loss of Big Hill to Kendall 345-kV double circuit line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 178 | 2022 | 45.1 | 3.3 |
| | | 2025 | 52.8 | 4.1 |

Upgrading the approximately 21 mile 138-kV line from Yellow Jacket to Treadwell was evaluated to relieve the congestion. The project did resolve the congestion on the Yellow Jacket to Treadwell 138-kV line; however, the line upgrade resulted in a significant increase in congestion on the Yellow Jacket to Fort Mason 138-kV line. The increased flow resulting from the 138-kV upgrade also caused new congestion on the nearby 69-kV network, including the Yellow Jacket to Hext 69-kV line.

Economic analysis results for the line upgrade are included in Table 10. No capital cost estimates were requested due to the low production cost savings found in the study. Additional options for congestion in the Yellow Jacket area may be considered as part of the 2021 RTP economic analysis.

*Table 10: Yellow Jacket Economic Analysis Results*

| Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|
| 2022 | 0.8 | n/a | n/a |
| 2025 | -0.2 | | |

### 3.7. Pelican to Whitepoint 138-kV Upgrade

The 138-kV line from Pelican to Whitepoint is scheduled to be upgraded by 2024 as part of the RPG-approved AEP Corpus Christi North Shore Transmission Improvement Project and, as such, was included in the 2025 economic start case for the 2020 RTP. However, congestion on the Pelican to Whitepoint line was observed in the 2022 economic case.
Table 11 includes details of the congestion experienced.

*Table 11: Pelican to Whitepoint 138-kV Line Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Pelican to Whitepoint 138-kV line | | | |
| **Most Severe Contingency** | Loss of Lon Hill to Whitepoint 345-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 421 | 2022 | 24.7 | 24.8 |

*The upgrade of the line was evaluated in the 2022 economic case, and the economic analysis results are included in*

*analysis results are included in*
Table 12.

*Table 12: Pelican to Whitepoint 138-kV Line Upgrade Economic Analysis Results*

| Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|
| 2022 | 3.9 | 3.5 | 110.6% |

Moving the in-service date of the Pelican to Whitepoint 138-kV line upgrade up to 2022 met the economic planning criteria. The feasibility of the change in in-service date has been confirmed by the TSP.

## 3.8. Dallas-Fort Worth Area

Congestion was observed on multiple transmission lines in the Dallas-Fort Worth area, specifically the 345-kV line from Alliance to Hicks switch and the 138-kV line from West TNP to TI TNP. Table 13 includes details of the congestion experienced in the Dallas-Fort Worth area.

*Table 13: Dallas-Fort Worth Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Alliance to Hicks Switch 345-kV line | | | |
| **Most Severe Contingency** | Loss of Roanoke Switch to Hicks Switch 345-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 1631 | 2022 | 17.7 | 99.9 |
| **Congested Element** | West TNP to TI TNP 138-kV | | | |
| **Most Severe Contingency** | Loss of Carrollton Northwest to Lewisville Switch 345-kV double circuit line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 210 | 2022 | 12.3 | 28.3 |
| | | 2025 | 21.6 | 102.0 |

The upgrade of the 345-kV line from Alliance to Hicks Switch was identified as a reliability project needed by 2025 in the 2019 RTP, which is why congestion on that line was only observed for the 2022 study year in 2020 RTP economic analysis. However, additional reliability needs around Hicks Switch and Roanoke Switch were observed in the 2020 RTP reliability analysis. ERCOT and TSPs are evaluating options to meet the reliability needs in the northwest Dallas-Fort Worth area. A placeholder project is currently included in the 2020 RTP reliability cases for study years 2023 through 2026, and the economic case for study year 2025. The placeholder project includes the following transmission improvements:

- Add new South Rhome 345-kV station south of the existing Rhome 138-kV station
- Loop the existing 345-kV double circuit line from Willow Creek Switch to Hicks Switch into the new South Rhome station
- Add new East Roanoke 345-kV station east of Roanoke Switch
- Loop the existing Roanoke Switch to West Denton/Lewisville Switch 345-kV double-circuit line into the new East Roanoke station

- Add a new 345-kV double circuit line from new South Rhome station to new East Roanoke station
- Convert the Alliance 345-kV station into a 345/138-kV station
- Add two new 345/138-kV transformers at Alliance
- Add a new 138-kV capacitor bank at Alliance
- Add a new 138-kV line from Alliance to Heritage
- Add a new 138-kV line from Alliance to Keller
- Upgrade the 138-kV lines from Keller to Heritage

The current reliability placeholder project resulted in increased congestion on the 138-kV line from West TNP to TI TNP, and potential new congestion on the 345-kV line from Roanoke Switch to Lewisville Switch under the contingency loss of the 345-kV line from Krum West Switch to Lewisville Switch. ERCOT plans to evaluate the placeholder project and other options in the 2021 RTP. Future RPG submittals for projects to address the reliability needs and congestion in the area are expected.

The 138-kV line from West TNP to TI TNP has already shown significant congestion in real-time operations. The upgrade of this line was analyzed in both the 2022 and 2025 economic cases. And the economic analysis results are included in Table 14.

*Table 14: West TNP to TI TNP 138-kV Line Upgrade Economic Analysis Results*

| Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|
| 2022 | -0.8 | n/a | n/a |
| 2025 | 3.7 | | |

The upgrade of the 138-kV line from West TNP to TI TNP did not meet the economic planning criteria for 2022, but showed higher production cost savings for 2025. ERCOT may continue to evaluate this line upgrade in future economic planning studies, including the 2021 RTP.

### 3.9. Laredo Area

Congestion was observed on the 138-kV line from Las Cruces to Laredo VFT North in the Laredo area. The line was mainly congested under the contingency loss of the 345-kV line from Fowlerton to Lobo. Table 15 includes details of the congestion experienced in the Laredo area.

*Table 15: Laredo Area Congestion Details*

| | | | | |
|---|---|---|---|---|
| **Congested Element** | Las Cruces to Laredo VFT North 138-kV line | | | |
| **Most Severe Contingency** | Loss of Fowlerton to Lobo 345-kV line | | | |
| | **Capacity (MVA)** | **Study Year** | **% of Time Congested** | **Congestion Rent ($M)** |
| | 256 | 2022 | 27.6 | 24.7 |
| | | 2025 | 26.6 | 28.4 |

The following transmission improvement options were evaluated to relieve the congestion observed in the Laredo area:

- Option 1 – Move the Holcomb - North Laredo 138-kV line to the other side of the phase shifter
- Option 2 – Upgrade the 138-kV line from Laredo VFT North to Las Cruces to Milo
- Option 3 – Upgrade the 138-kV line from Laredo VFT North to Las Cruces to Milo to Mines Road

Option 1 did not result in any significant production cost savings. Under Option 1 the most severe congestion in the area was the 138/69-kV transformer at Bruni Sub under the 345-kV line outage of Fowlerton to Lobo.

Economic analysis results for Options 2 and 3 are provided in Table 16. Option 2 resulted in congestion moving downstream to the 138-kV line from Milo to Mines Road. The production cost savings that resulted from Option 3 were slightly lower than those resulting from Option 2 despite the fact that Option 3 includes further 138-kV line upgrades.

*Table 16: Laredo Area Economic Analysis Results*

| Option | Study Year | Production Cost Savings (Nominal $M) | Capital Cost (2022 $M) | Savings / Capital Cost (Levelized) |
|---|---|---|---|---|
| 2 | 2022 | 2.17 | n/a | n/a |
| | 2025 | 2.01 | | |
| 3 | 2022 | 3.76 | n/a | n/a |
| | 2025 | 1.93 | | |

Over all option 2 had the best system cost savings compared to project costs. But congestion was found in the downstream line after the Option 2 upgrade. Another path might be needed in this area to fully relieve the congestion.

# 4. Conclusion

The results of 2020 RTP economic analysis include the following noteworthy items:

- Accelerating the in-service date for the RPG-approved Pelican to Whitepoint 138-kV line upgrade to 2022 met the economic planning criteria.
- A placeholder economic project to resolve congestion in the Bearkat area is included in the final 2025 economic case. This placeholder project is related to the Midland Area Transmission Improvement Project identified in the 2020 RTP reliability analysis. Multiple options showed sufficient production cost savings to meet the economic planning criteria. ERCOT and the affected TSPs are continuing to evaluate options that address both the economic and reliability needs identified in the 2020 RTP analysis. Future RPG submittals related to this work are expected.
- Analysis of several study areas did not result in projects that met the economic planning criteria for 2022, but resulted in more production cost savings for 2025. While ERCOT is not making any project recommendations for those areas as part of the 2020 RTP, specific project options have been identified for reevaluation in future economic planning studies, including the 2021 RTP.