

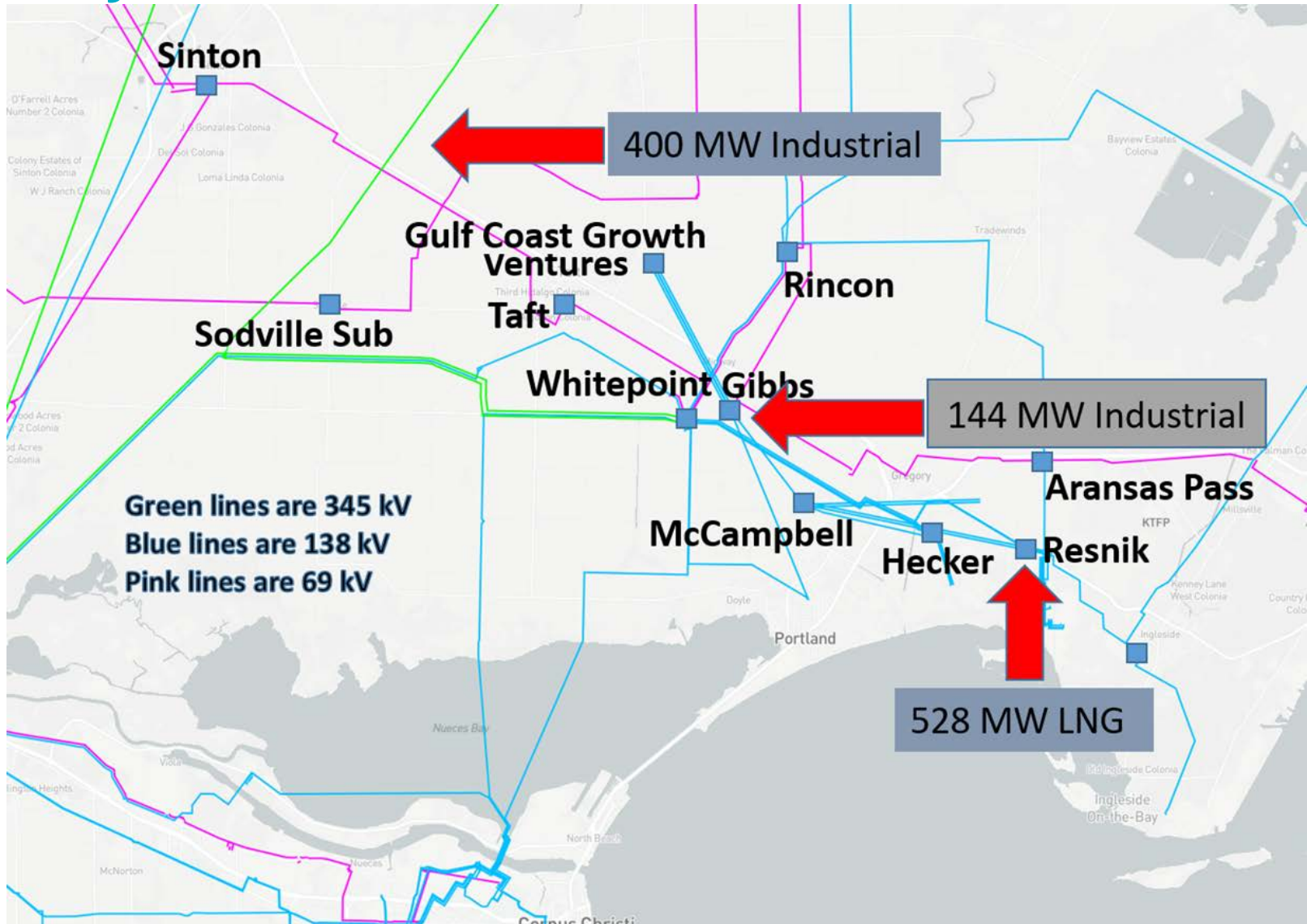


**AEPSC - Corpus Christi North Shore
Project – ERCOT Independent Review
Status**

Ben Richardson

Regional Planning Group
February 18, 2020

Study Area



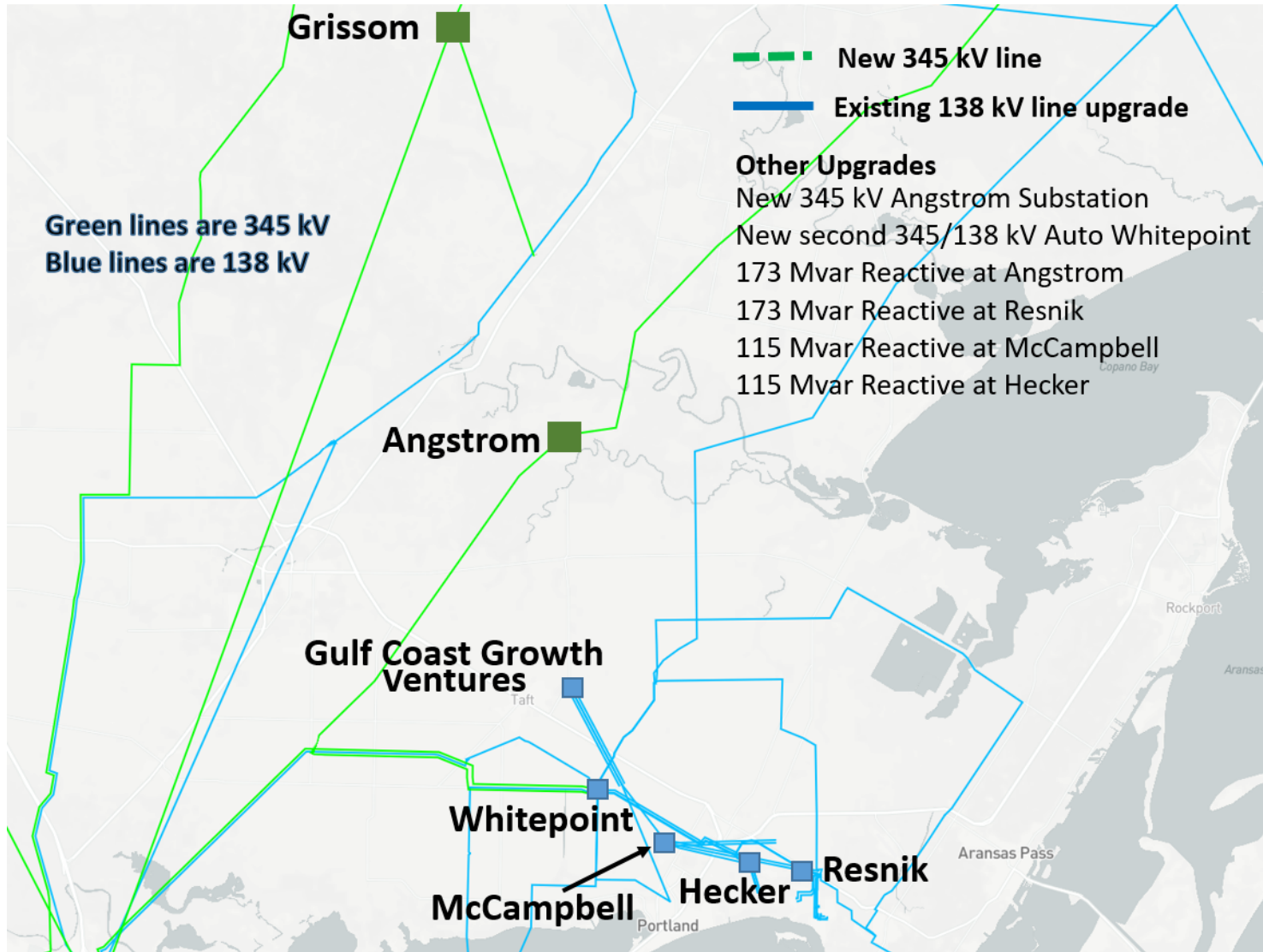
Assessment without Upgrades - Preliminary

| | Unsolved Power Flow | Thermal Overloads | Bus Voltage Violation |
|------------|---------------------|-----------------------------------|-----------------------|
| N-1 | 0 | 10 miles 69 kV 32 miles 138 kV | 0 |
| (G-1)(N-1) | 0 | 10 miles 69 kV 80 miles 138 kV | 32 138 kV Buses |
| (X-1)(N-1) | 0 | 10 miles 69 kV 34 miles 138 kV | 0 |
| Total | 0 | 10 miles 69 kV 80 miles 138 kV | 32 138 kV Buses |

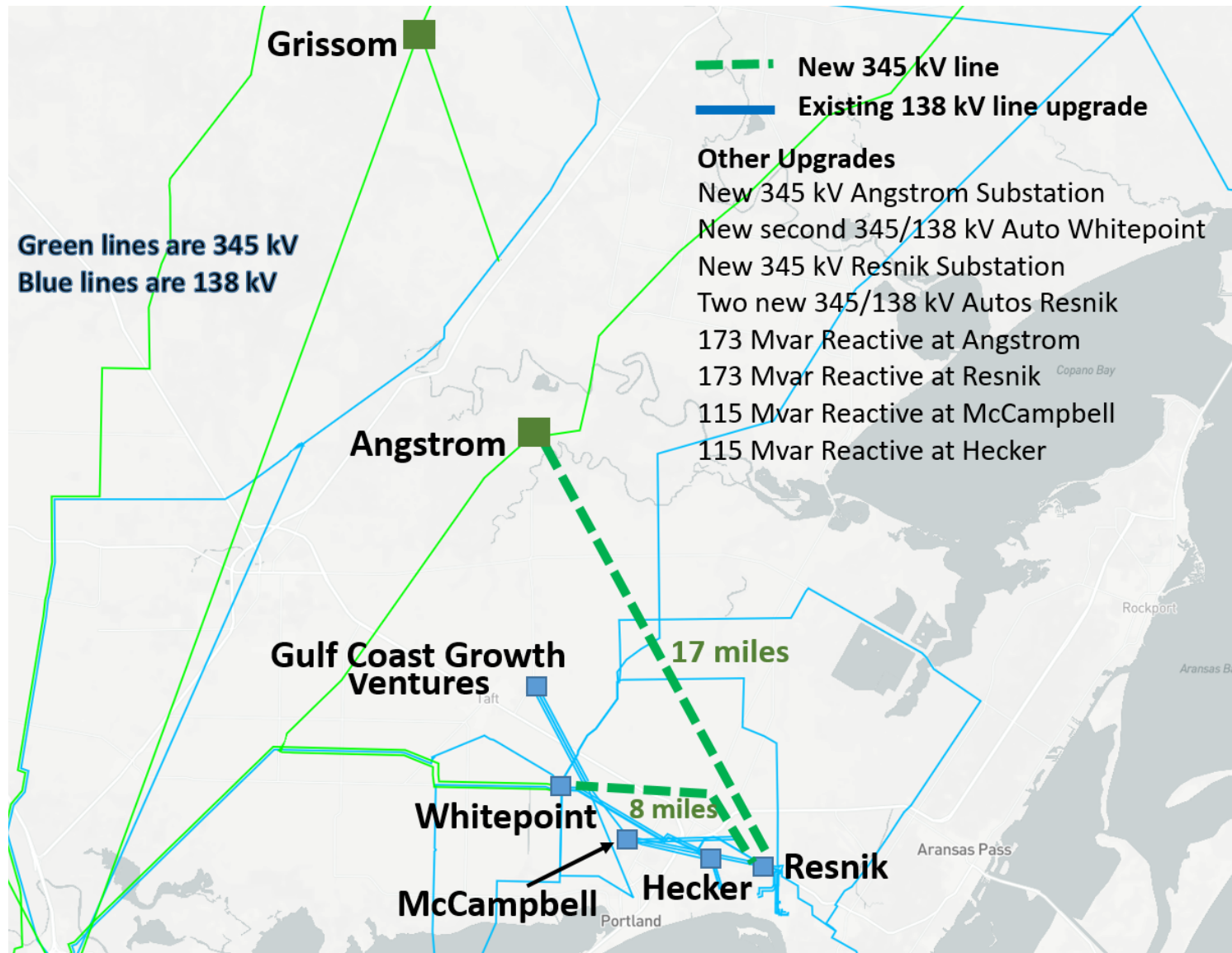
G-1 Tested: Gregory LGE Combined Cycle Plant (CC); Nueces Bay CC; Ingleside CC

X-1 345/138 kV Tested: Whitepoint; Lon Hill

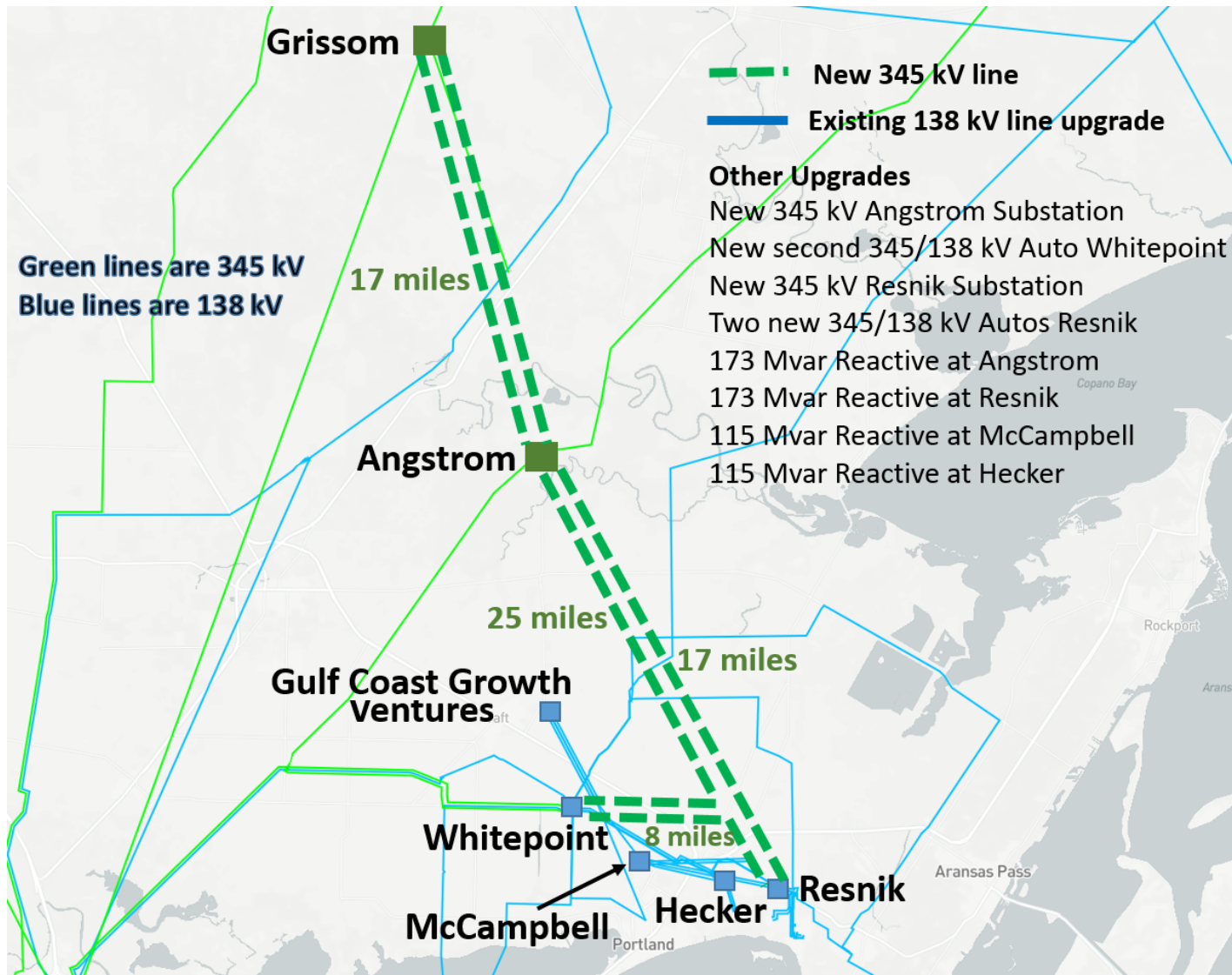
Option 1



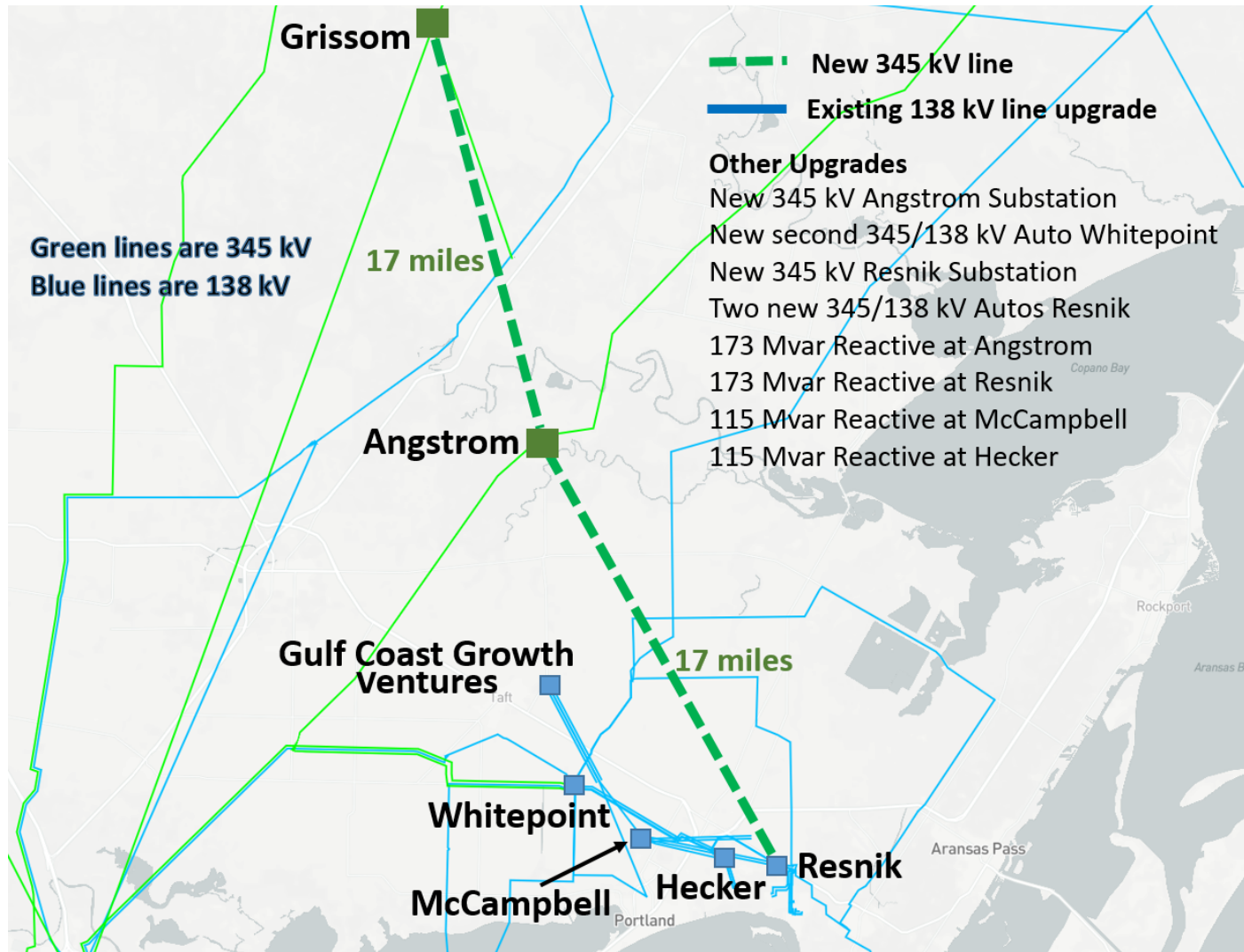
Option 2



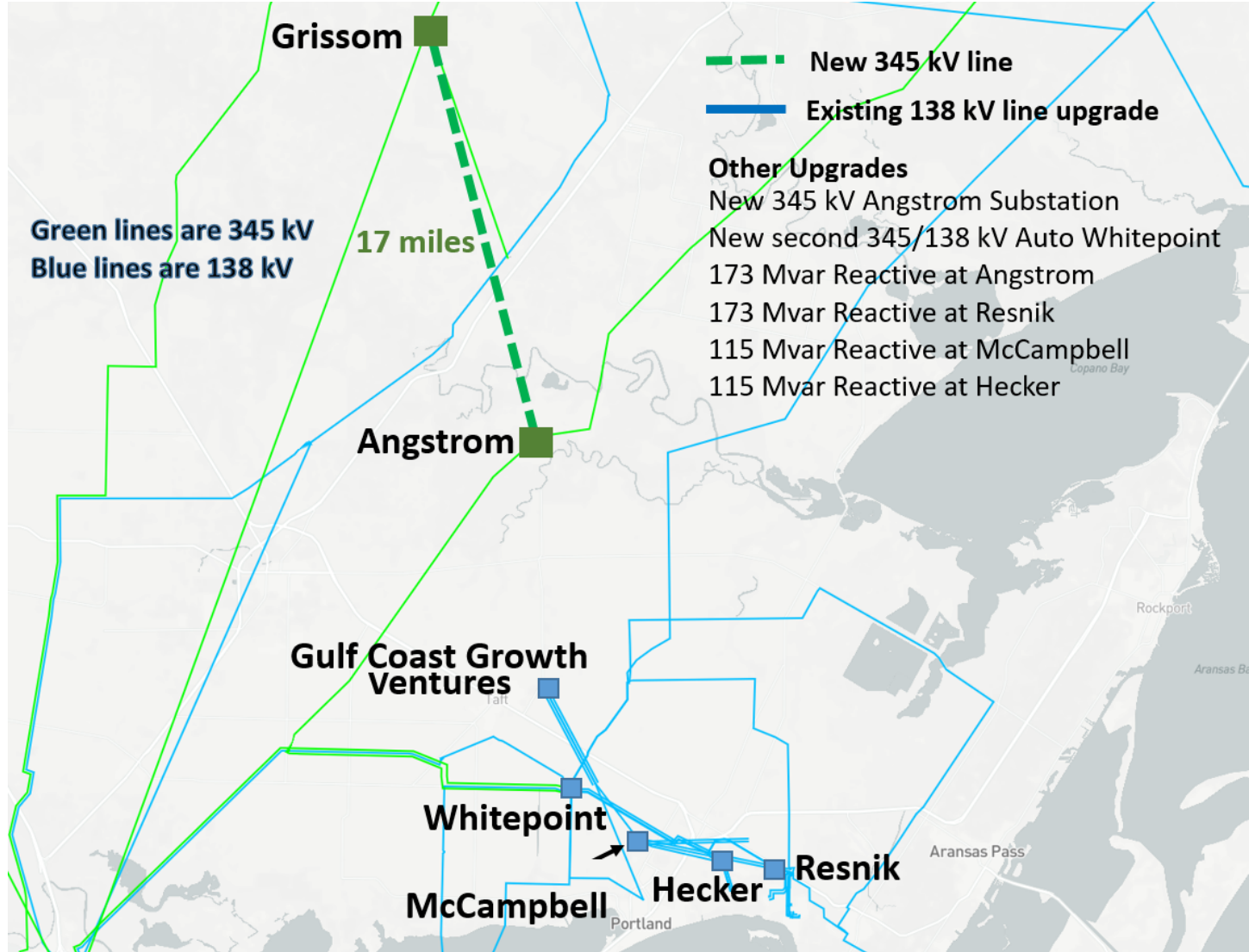
Option 3



Option 4



Option 5



Results

| | N-1 | | X-1 N-1 | | G-1 N-1 | |
|----------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | Thermal Violations | Voltage Violations | Thermal Violations | Voltage Violations | Thermal Violations | Voltage Violations |
| Option 1 | No | No | No | No | No | No |
| Option 2 | No | No | No | No | No | No |
| Option 3 | No | No | No | No | No | No |
| Option 4 | No | No | No | No | No | No |
| Option 5 | No | No | No | No | No | No |

Planned Maintenance Scenario

Assumptions:

1. Off-season peak load (South weather zone summer peak load scaled to 94%)
2. Non-conforming loads excluded from scale
3. Entire Gregory Power Plant(GPP) LGE combined-cycle (CC) train offline due to GPP-LGE seasonal mothball status
4. Individual prior outages of the follow key 345 kV and 138 kV lines:
 - 1) STP to Angstrom 345 kV line
 - 2) Angstrom to Whitepoint 345 kV line
 - 3) Whitepoint to Lon Hill 345 kV line
 - 4) Whitepoint to Portland 138 kV line
 - 5) Whitepoint to Rincon 138 kV line
 - 6) Portland to Gibbs 138 kV line
5. All P1, P7 run for each prior outage case

Preliminary Results - Planned Maintenance

| | Unsolved Power Flow | Planned Maintenance Outages Study | |
|----------|---------------------|------------------------------------|--------------------|
| | | Thermal Violations | Voltage Violations |
| Option 1 | 0 | 39 miles 69 kV 153 miles 138 kV | >50 |
| Option 2 | 0 | 10 miles 69 kV 59 miles 138 kV | No |
| Option 3 | 0 | No | No |
| Option 4 | 0 | No | No |
| Option 5 | 2 | 68 miles 138 kV | >50 |

Load Serving Estimate

Assumptions:

1. Options 1, 2 and 5 did not improve operational flexibility for maintenance scenarios and therefore did not make the short list for load serving estimate
2. Based on (G-1)(N-1) for entire Gregory Power Plant (LGE) combined-cycle (CC) train offline as worst case G-1 plus all P1 and P7 contingencies
3. Assume upgrade of 4.5 mile Victoria Dupont Switch to Big Three 138 kV line because this is the most limiting element for both of the remaining options
4. Based on scaling up the loads served by the following 6 substations per “Study Area Load Growth” Section of AEP Corpus Christi North Shore Report and input from AEP: Resnik, Angstrom, Gibbs, Cheniere, Hot Ion, and TPCO (McCampbell)
5. Exclude/Ignore limiting element within 138 kV Corpus Christi North Shore network defined as 138 kV between Ingleside Dupont and Whitepoint due to location uncertainty of “known prospective load”
6. Voltage instability is assumed when voltage at any 100 kV and above bus in the area reaches 0.8 p.u.

Preliminary Results - Load Serving Estimate

| | Incremental Import Limits (MW) | |
|----------|--------------------------------|-------------------|
| | Thermal | Voltage Stability |
| Option 3 | 72 | 1,216 |
| Option 4 | 426 | 1,035 |

Next Steps

- **Project Evaluation**

- ERCOT may perform the following studies

- Brownsville area LNG load impact
 - Dynamic stability impact
 - Refine options

- SSR vulnerability assessment per Protocol Section 3.22.1.3(2)

- Generation sensitivity analysis per Planning Guide Section 3.1.3(4)(a)

- Load scaling sensitivity analysis per Planning Guide Section 3.1.3(4)(b)

- **Congestion Analysis**

- Congestion analysis will be performed to ensure that the identified transmission upgrades do not result in new congestion within the study area

Deliverables

- **Tentative Timeline**

- Status updates

- March 2020

- Complete the ERCOT Independent Review by Q1 2020



Stakeholder Comments Also Welcomed to Sun Wook Kang:
skang@ercot.com

APPENDIX

Option 1

- New 345 kV Angstrom substation
- New second 345/138 kV transformer at Whitepoint
- Reconductor 69 kV line from Blessing to Palacios (2.9 Miles)
- 172.8 Mvar reactive device at Angstrom
- 172.8 Mvar reactive device at Resnik
- 115.2 Mvar reactive device at McCambell
- 115.2 Mvar reactive device at Hecker

Option 2

- New 345 kV Resnik substation
- Two new 345/138 kV transformers at Resnik
- New 345 kV Angstrom substation
- New 345 kV line from Angstrom to Resnik (17 Miles)
- New 345 kV line from Resnik to Whitepoint (8 Miles)
- New second 345/138 kV transformer at Whitepoint
- 172.8 Mvar reactive device at Angstrom
- 172.8 Mvar reactive device at Resnik
- 115.2 Mvar reactive device at McCambell
- 115.2 Mvar reactive device at Hecker

Option 3

- New 345 kV Resnik substation
- Two new 345/138 kV transformers at Resnik
- New 345 kV Angstrom substation
- New double-circuit 345 kV line from Angstrom to Grissom (17 Miles)
- New 345 kV line from Angstrom to Resnik (17 Miles) on double-circuit tower with New (2nd) 345 kV Angstrom to Whitepoint (25 Miles)
- New 345 kV line from Resnik to Whitepoint (8 Miles) on double-circuit tower with remainder of New (2nd) 345 kV Angstrom to Whitepoint (25 Miles)
- New second 345/138 kV transformer at Whitepoint
- 172.8 Mvar reactive device at Angstrom
- 172.8 Mvar reactive device at Resnik
- 115.2 Mvar reactive device at McCambell
- 115.2 Mvar reactive device at Hecker

Option 4

- New 345 kV Resnik substation
- One new 345/138 kV transformer at Resnik
- New 345 kV Angstrom substation
- New 345 kV line from Grissom to Angstrom (17 Miles)
- New 345 kV line from Angstrom to Resnik (17 Miles)
- New second 345/138 kV transformer at Whitepoint
- 172.8 Mvar reactive device at Angstrom
- 172.8 Mvar reactive device at Resnik
- 115.2 Mvar reactive device at McCambell
- 115.2 Mvar reactive device at Hecker

Option 5

- New 345 kV Angstrom substation
- New 345 kV line from Grissom to Angstrom (17 Miles)
- New second 345/138 kV transformer at Whitepoint
- Reconductor 69 kV line from Blessing to Palacios (2.9 Miles)
- 172.8 Mvar reactive device at Angstrom
- 172.8 Mvar reactive device at Resnik
- 115.2 Mvar reactive device at McCambell
- 115.2 Mvar reactive device at Hecker