Pattern

# Transitioning the World to Renewable Energy

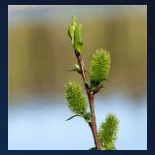
## Options to address stability limits through the ERCOT Regional Planning Process

ERCOT Planning Working Group
October 19, 2020
Mark Bruce (Consultant for Pattern) and Karan Joshi Sr. Manager Transmission

# Pattern

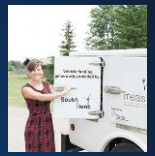
# Global Portfolio and Company Values

June 2020



## Environment

We aim to exceed industry standards in mitigating environmental impacts and advancing best practices.

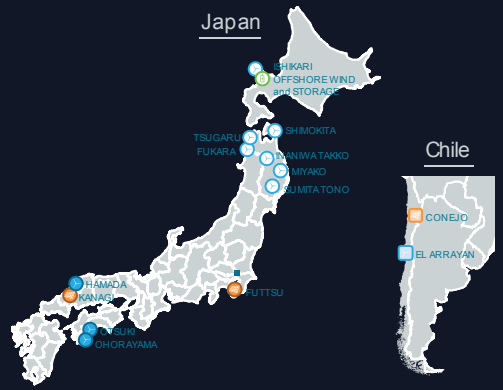


## Community

We participate in and contribute to our local project communities.

## Safety

Our top priority is protecting the safety of the public, our employees, and everyone who works with us.





Projects and Facilities

| | WIND | SOLAR | STORAGE | T-LINE |
|---|---|---|---|---|
| OPERATIONAL | ● | ● | ● | ● |
| DEVELOPMENT | ● | ● | ● | ● |
| ASSET SOLD TO THIRD PARTY | ● | ● | ● | ● |

Corporate Offices
- Headquarters
- Office

## Pattern Energy

Pattern Energy is one of the world's largest privately-owned developers and operators of wind, solar, transmission and energy storage projects. Its operational portfolio includes 28 renewable energy facilities that use proven, best-in-class technology with an operating capacity of 4.4 GW in the United States, Canada and Japan. Pattern Energy is guided by a long-term commitment to serve customers, protect the environment, and strengthen communities.

Projects shown are only those under construction or in advanced public stages, and maps do not represent the full extent of Pattern Energy's project pipeline. Pattern Energy retains whole or partial ownership of most of its operational facilities. Some transmission projects including Western Spirit and SunZia are owned by third-party development partners. Maps are for illustration purposes only, countries are not drawn comparatively to scale.

# Outline

I. Assumptions

II. Observations

III. Options
   A. Status quo
   B. Methodology
   C. Criteria
   D. Process
   E. Resources

IV. Next steps

# I. Assumptions

- The root causes of stability constraints are likely to continue for the foreseeable future:
  - IBR penetration
  - Remote resource siting
  - Long-distance transmission lines

- ERCOT's current approach to stability constraints in system planning will likely continue to fail to produce recommended projects to mitigate system risks.
  - Economic threshold is not met for mitigation, which leads  GTCs to remain on the system .
  - This means system stability challenges, which have been growing in number and complexity in recent years, are likely to grow more numerous and more complex before any meaningful solution can be devised and implemented.
  - ERCOT's concerns about the growing complexity of GTCs and GTC impacts on critical operations planning functions and situational awareness are well founded and should be addressed.

- Within the ERCOT stakeholder process, the universe of possible solutions or mitigation strategies is limited by external rules (PURA and PUC Rule).

# II. Observations

- "… GTCs are used to monitor flows between areas of the ERCOT Grid and control those flows using market-based mechanisms in order to maintain stability and other non-thermal reliability limits that ***would not otherwise be considered in market mechanisms***." (emphasis added) [GTC white paper, p. 1.]

- "This ***translation*** of non-thermal limits into GTCs, ***and then the use of market mechanisms*** to control the GTCs ensures that the stability and other non-thermal constraints on the system are managed in an efficient manner." (emphasis added) [Ibid.]

- GTCs are primarily used to manage stability limits but also other forms of non-thermal constraints. The different types of limits have, "the same underlying conditions, most notably heavily loaded high-impedance transfer paths," *i.e.*, a lack of transmission. [Ibid.]

- "Most GTC exit alternatives require significant transmission upgrades." [GTC white paper, p. 9.]

# II. Observations (cont.)

- "Operational limits use current system conditions and topology to the extent possible given available inputs and tools. Since inputs are less certain in the planning timeframe, ***these planning studies intentionally are performed using stressed conditions***." (emphasis added) [GTC FAQs, Answer 5.]

- Stability limits arise from inadequate transmission, but we've created a feedback loop that imports the operating environment "workaround" into the planning process which originally created the need for the workaround. This practice limits our ability to resolve a fundamental system planning problem through the system planning process.
  - The end result is a permanent need for "band-aid" solutions in the operating environment.

# III. Options

- There are at least 5 options available within the current constraints of external rules to address stability challenges within the planning process:

A. Status quo – While maintaining the status quo is not a “do nothing” option (since ERCOT can continue to improve the tools and processes it uses to manage GTCs), this approach is not likely to resolve stability limit challenges. It is akin to treating the symptoms rather than the disease. Some of these improvements are addressed in the Solar Prime presentation.

B. Methodology – As noted in the EDFR & Pattern presentation, there is flexibility in the PUCT rules and the ERCOT market rules to consider additional benefits within the economic evaluation criteria. This is perhaps the simplest approach to a solution although stakeholder agreement on which benefits are legitimate and how to quantify them could be challenging and, in the end, the PUCT must agree with the analysis.

# III. Options (cont.)

C. Criteria – Stability limits are a reliability problem but ERCOT has not developed a reliability standard to address its concerns about GTC proliferation and complexity. A regional standard imposing some limit on total GTCs, GTC "nesting," or other "bright line" criteria would provide a backstop for the feedback loop that currently exists in the economic evaluation process. This would provide an avenue to endorse a particularly beneficial GTC exit proposal as a reliability, rather than an economic, project.

D. Process – The current regional planning process as set forth in Protocols Sec. 3.11 and Planning Guide Sec. 3 and 4 do not fully support all of the options available to the PUCT for new transmission facility certification.

- Possible resolution: ERCOT's process could be extended to enable the endorsement of beneficial projects that do not meet the existing strict reliability criteria or economic threshold but that, nonetheless, could be approved by the PUCT under existing rules.

# III. Options (cont.)

- As stated in Nodal Protocols Sec. 3, the purpose of the ERCOT regional transmission planning process is to support the PUCT's certification of transmission facilities.

**3.11 Transmission Planning**

***3.11.1 Overview***

(1) Project endorsement through the ERCOT regional planning process is intended to support, to the extent applicable, a finding by the Public Utility Commission of Texas (PUCT) that a project is necessary for the service, accommodation, convenience, or safety of the public within the meaning of Public Utility Regulatory Act, TEX. UTIL. CODE ANN. § 37.056 (Vernon 1998 and Supp. 2007) (PURA) and P.U.C. SUBST. R. 25.101, Certification Criteria.

# III. Options (cont.)

**§25.101. Certification Criteria.**

(b) **Certificates of convenience and necessity for new service areas and facilities.**

(3) **Electric transmission line.**

(A) Need:

(i) Except as stated below, the following must be met for a transmission line in the ERCOT power region. The applicant must present an economic cost-benefit study that includes an analysis that shows that the levelized ERCOT-wide annual production cost savings attributable to the proposed project are equal to or greater than the first-year annual revenue requirement of the proposed project of which the transmission line is a part. Indirect costs and benefits to the transmission system may be included in the cost-benefit study. The commission shall give great weight to such a study if it is conducted by the ERCOT independent system operator. This requirement also does not apply to an application for a transmission line that is necessary to meet state or federal reliability standards, including: a transmission line needed to interconnect a transmission service customer or end-use customer; or needed due to the requirements of any federal, state, county, or municipal government body or agency for purposes including, but not limited to, highway transportation, airport construction, public safety, or air or water quality.

(ii) For a transmission line not addressed by clause (i) of this subparagraph, the commission shall consider among other factors, the needs of the interconnected transmission systems to support a reliable and adequate network and to facilitate robust wholesale competition. The commission shall give great weight to:

(I) the recommendation of an organization that meets the requirement of PURA §39.151; and/or

(II) written documentation that the transmission line is needed to interconnect a transmission service customer or an end-use customer.

1 **Economic project**

2 **Reliability project**

3 **Other project**

# III. Options (cont.)

- P.U.C. Subst. R. 25.101(h)

(h) Commission authority. Nothing in this section is intended to limit the commission's authority to recommend or direct the construction of transmission under PURA §§35.005, 36.008, or 39.203(e).

# III. Options (cont.)

- PURA Sec. 39.203(e)

(e) The commission may require an electric utility or a transmission and distribution utility to construct or enlarge facilities to ensure safe and reliable service for the state's electric markets and to reduce transmission constraints within ERCOT in a cost-effective manner where the constraints are such that they are not being resolved through Chapter 37 or the ERCOT transmission planning process. The commission shall require an electric utility or a transmission and distribution utility to construct or enlarge transmission or transmission-related facilities for the purpose of meeting the goal for generating capacity from renewable energy technologies under Section 39.904(a). In any proceeding brought under Chapter 37, an electric utility or transmission and distribution utility ordered to construct or enlarge facilities under this subchapter need not prove that the construction ordered is necessary for the service, accommodation, convenience, or safety of the public and need not address the factors listed in Sections 37.056(c)(1)-(3) and (4)(E). Notwithstanding any other law, including Section 37.057, in any proceeding brought under Chapter 37 by an electric utility or a transmission and distribution utility related to an application for a certificate of public convenience and necessity to construct or enlarge transmission or transmission-related facilities under this subsection, the commission shall issue a final order before the 181st day after the date the application is filed with the commission. If the commission does not issue a final order before that date, the application is approved.

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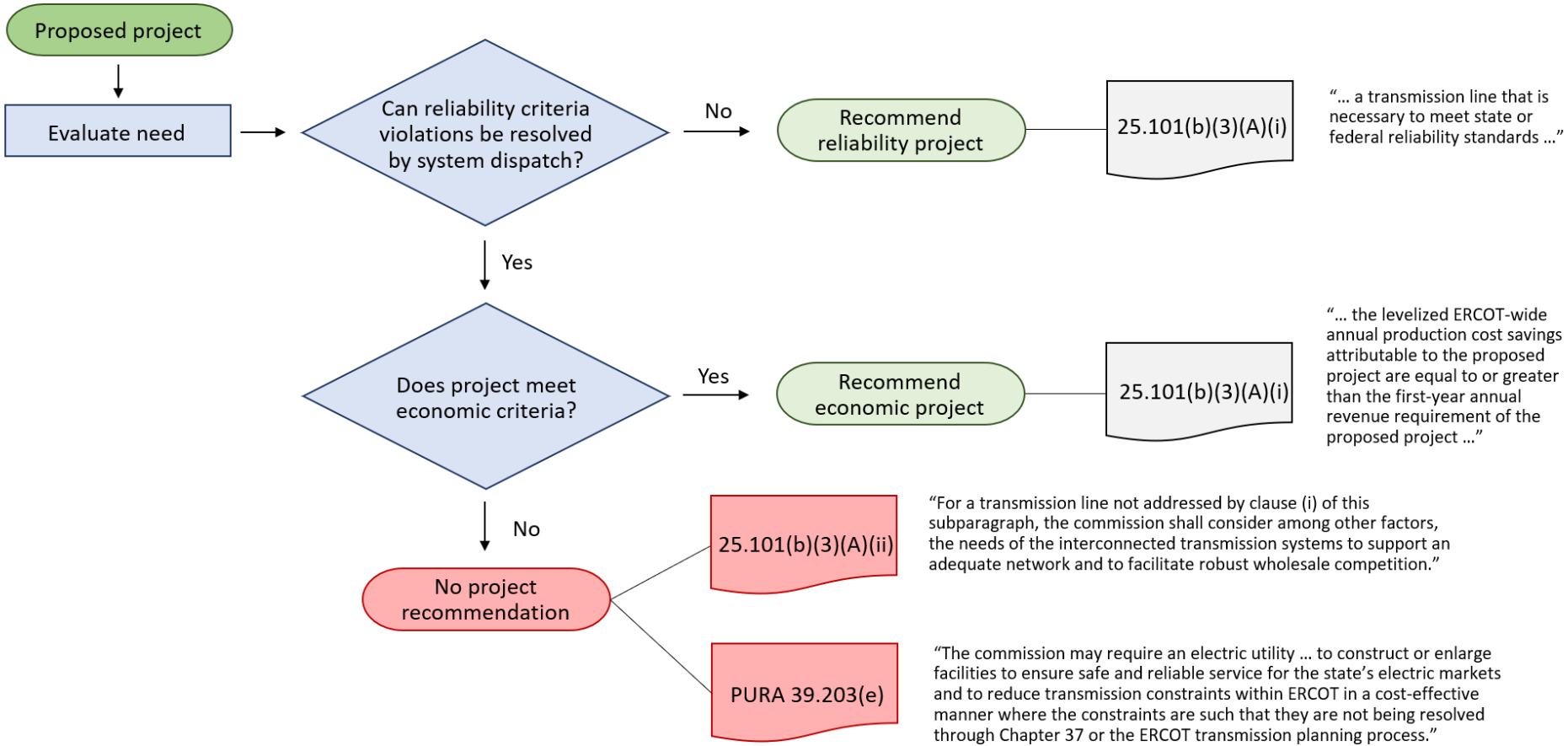
**Unresolvable project**

# Gaps between ERCOT process and PUCT criteria



# III. Options (cont.)

- Although the economic project evaluation criterion contained in P.U.C. Subst. R. 25.101(d) sets the threshold for determining need for an economic-driven transmission facility, the statute from which the rule was derived (as amended by HB 971 in 2011) does not require proposed project to meet this threshold. It only requires the PUCT to establish economic evaluation criteria and include findings on any such criteria in an order approving or denying a CCN for a new facility.

- PURA Sec. 37.056(d)

(d) The commission by rule shall establish criteria, in addition to the criteria described by Subsection (c), for granting a certificate for a transmission project that serves the ERCOT power region, that is not necessary to meet state or federal reliability standards, and that does not serve a competitive renewable energy zone. The criteria must include a comparison of the estimated cost of the transmission project and the estimated cost savings that may result from the transmission project. The commission shall include with its decision on an application for a certificate to which this subsection applies findings on the criteria.

# III. Options (cont.)

E. Resources – At least part of the challenge posed by stability limits is the complexity and inter-related nature of limits on numerous transmission elements and the iterative nature of the process used to identify potential solutions. Is it possible that more planning engineers with more time to run more studies will be able to identify more economic proposals to mitigate stability limits?

- This is an ERCOT management and budget issue and, therefore, not squarely addressed through the normal stakeholder process. However, stakeholders, through their segment representatives on the Board of Directors, do have a role to play in the development of ERCOT's strategic plan and budgeting process.

- If the root causes of stability limits will be with us for the foreseeable future, supplementing ERCOT's resources focused on the problem is probably advisable no matter which stability limit mitigation options we pursue going forward

# IV. Next steps

- The “5 options” presented herein could perhaps be better categorized as “5 paths” and Pattern suspects a thoughtful approach to mitigating GTC-related risks may dictate walking multiple paths simultaneously.
  - For example, Pattern supports the current ERCOT-sponsored process of stakeholder education on stability constraints and efforts by Solar Prime and others to improve existing GTC tools, processes, and market participant communications. This is where we will find the “low-hanging fruit” for near-term improvements.
  - Also, Pattern is working with EDFR and others on a proposal to modify the economic evaluation criteria to include additional benefits related to GTC risk mitigation and plan to bring concepts to the Nov. PLWG meeting for stakeholder discussion and feedback.
  - Pattern will also work with APA and others to develop reliability criteria concepts and modified planning process proposals for stakeholder discussion at the Nov. PLWG.

- Because much of the stability analysis process is necessarily restricted from market participant view, it would be informative to future PLWG discussions for ERCOT to provide a high-level estimate of the economic costs and value of operational risk for the current trajectory of GTC study, implementation, and management.

# IV. Next steps (cont.)

- There may be additional “options” or “paths” worthy of stakeholder exploration, such as re-thinking the siloed nature of much of the planning process related to generation interconnection. However PLWG decides to organize this discussion going forward, Pattern welcomes the opportunity to work with ERCOT, PUCT Staff, and all interested stakeholders on the GTC risk mitigation concepts that arise through this stakeholder process.

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