

ESIG Webinar: Multi-value Transmission Planning for a Decarbonized Future	
Question	Answer
How well do variable resources "get along" with HVDC, or does it matter?	This question is certainly relevant for transmission dynamic stability analysis to ensure HVDC and inverter controls are coordinated. This was out of scope for our economic planning, with our assumption being that the HVDC intertie would be reliable. ERCOT did, however, conduct power flow simulations - likely including stability simulations - to answer this question in the recent West Texas Export Study.
What are the primary causes of the LOLE events then?	The primary causes of the LOLE events was a shortage of system-wide capacity due to thermal outages and low wind and solar availability. When these occur, the transmission system - specifically the West Texas Export - is not heavily loaded in the model because wind and solar output from West Texas is low.
Does the optimization-based TEP approach play a role in practice or is it just about screening?	At this point, given computational limitations and the challenge of doing co-optimized transmission and generation planning, I think this is still about screening.
Shouldn't the benefits framework include an estimate of the rent and tax revenues to the rural counties where the renewable resources would be developed?	Yes and no. I agree that a benefits framework should include rent and tax revenues. However for this analysis we assumed the level of renewables was equal across the cases to isolate the impact of the transmission. So in this case it was just the location of the renewables that may have differed, thus the tax revenues / rent are the same, just in different locations. In addition, the transmission projects also provide jobs, tax revenues, etc. to the state and local jurisdictions that can also be quantified, but we did not include that in the analysis because there are secondary effects (like plant retirements) which would reduce those benefits.
When you considered resilience benefits, did you start from systems that show similar LOLP values? (edited)	Yes, we only looked at specific LOLP events that occurred in BOTH the case with and without the transmission line to isolate the benefits from the line.
can you comment on emt versus dynamic phasor measurement for control of grids	That was not evaluated for this study.

<p>Interesting observation that congestion problems do not coincide with reliability impacts. Does this argue that there should be more focus on larger HVDC?</p>	<p>I interpret this question as larger HVDC meaning interregional transmission to neighboring regions. If so, yes that is what we found. The transmission with the most resource adequacy and resilience benefits were projects that accessed interregional load and resource diversity.</p>
<p>When running models do you adjust for the age of transmission systems, with the assumption that age is an indicator of reliability and resiliency?</p>	<p>No we did not consider increasing age of transmission (or generation) systems for the resource adequacy analysis, although this detail would make the analysis more robust.</p>
<p>For neighboring RTOs to evaluate the RA and Resilience benefits of interregional tx, what kind of info would they need to share, what would that process look like?</p>	<p>The information needed is just inputs and assumptions for the model, and most critically the assumptions on the interregional transmission capacity. I generally favor using a technical limit to represent the lines between regions, rather than a historical flows or market-based approach. The key to this analysis is to model the <i>availability</i> of resources and load variability across a wider footprint and model the interregional supply and demand with the same probabilistic resource adequacy approach as planners do in their individual system. The challenge is getting comfortable relying on the <i>probable</i> availability of resources in the same way we do within a single footprint.</p>
<p>do you mind talking a little more about the West Texas export limitations</p>	<p>ERCOT details the West Texas Export in two reports. West Texas Export Stability Assessment: https://www.ercot.com/files/docs/2020/11/27/2020_West_Texas_Export_report_final.pdf and the Long-Term West Texas Export Study: https://www.ercot.com/files/docs/2022/01/14/Long-Term-West-Texas-Export-Study-Report.pdf</p>
<p>V interesting HVDC did not provide RA benefits within Texas. How far one should go east to find diversity in wind and solar profile to start seeing RA benefits?</p>	<p>Really any amount of interregional transmission should help, East, West or North.</p>
<p>Do you have a ballpark sense of the value of diurnal differences in solar profiles across TX to Southern? Would that be hard to add to the analysis? Thx</p>	<p>We did not place a value on this explicitly, but the analysis did use hourly 8760 profiles (across 40-weather years) for each solar plant location (existing and potential) across the state. So this diversity was included in the model.</p>

Thoughts on transmission planning outside of ISO/RTOs?	We considered a case study in ERCOT, but the same planning applies to the vertically integrated utility space as well.
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