



Large-scale Transmission Expansion: What's the Prognosis?

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Outline

- Transmission to support decarbonization,
- Is significant build-out cost-effective or even feasible?
- Mitigating issues.
- Could market discipline improve the prognosis?



Transmission to support decarbonization.

- Several proposals for US decarbonization envisage large expansion of transmission:
 - NREL, 2022 discusses potentially tripling US transmission capacity,
 - Jenkins, et al, 2022 finds that an expansion of 40% is necessary to unlock emissions potential of the Inflation Reduction Act,
 - USDOE concurs with the need for significant transmission buildout.
- Much of this would require new corridors. ■ 3



Is significant build-out of transmission on new corridors cost-effective?

- Likely yes for some particularly favorable US sites such as in New Mexico and Texas,
- Similarly, some rural areas in Canada and other countries may also be cost-effective for significant new build-out:
 - Particularly if at least some of the features of the ERCOT CREZ build-out are present,
 - Limited negative externalities.



Is significant build-out of transmission on new corridors cost-effective?

- Less likely for many other US sites because the real cost of renewables continues to *decrease* while the real cost of transmission *increases*, particularly if:
 - externalities of transmission are (as they should be) properly considered or
 - significant undergrounding is required.



Is significant build-out of overhead transmission on new corridors feasible?

- Rapid increase is akin to blitzscaling, necessitating a technology/rollout that can be scaled up rapidly, but
- Transmission build-out on new corridors is a bespoke business since each affected community has its own concerns and requirements that must be addressed.



Feasibility of rapid build-out on new corridors.

- Even the ERCOT CREZ transmission involved individual accommodations for each community/landowner:
 - Detailed rerouting to avoid particular viewsapes,
 - Use of monopoles.
- Blitzscale-like growth is not compatible with bespoke interaction with landowners and communities.



Mitigating issues.

- Several issues mitigate an inability to build overhead transmission on new corridors:
 1. Reductions in renewable costs reduce the need to access the best renewable sites,
 2. Reconductoring allows uprates of existing transmission,
 3. Reduced costs of storage will ameliorate the reduction in diversity due to 1. and 2.,
 4. Underground DC transmission can be built along transport corridors.



Could market discipline improve the prognosis?

- Transmission is:
 - ☐ Planned,
 - ☐ Built,
 - ☐ Remunerated, and
 - ☐ Operated.
- Could any or all of these be subject to market discipline of competition?
- Could this improve the prognosis for large-scale build-out?



Planning.

- Recent trend is towards greater centralization of planning:
 - RTOs facilitate or carry out regional transmission planning for transmission owning entities in footprint (Order 2000),
 - Not evidently susceptible to competitive discipline.
- But some independent developers have been formulating plans for eg DC ties:
 - Competition of ideas could be helpful in developing better plans then “sold” to transmission owners.



Building.

- ROFR rules tend to limit new construction to incumbents,
- Competitive tendering for new construction has obvious benefits in lowering transmission costs:
 - Obvious institutional difficulty of overcoming the interests of incumbents.



Remuneration.

- Rate of return is standard for remuneration of transmission investments:
 - No direct connection to value produced by line,
- Market alternatives would require definition of a property right for transmission, which is particularly challenging for AC transmission:
 - Overall congestion rental generally falls far short of overall cost of service,
- Other approaches such as RPI-X might provide stronger efficiency incentives:
 - US path to implementation unclear.

Operation.

- Coordination of operation of transmission by system operator is necessary to economic dispatch and secure operation.
- Difficult to envisage competitive operations.
- In any case, if large-scale transmission build-outs strengthen links across the US, there will be need for coordinating at a larger geographical scale.

Conclusion.

- Large-scale build-outs as envisaged in several decarbonization plans are unlikely to materialize:
 - Questionable cost-effectiveness when externalities and undergrounding are included, and
 - Infeasibility of building at the pace envisaged.
- Competitive incentives may improve the situation at the margin:
 - Institutional barriers/motivations limit options.



References

- Jenkins, et al, 2022, “Electricity Transmission is Key to Unlock the Full Potential of the Inflation Reduction Act,” September, Available from: https://repeatproject.org/docs/REPEAT_IRA_Transmission_2022-09-22.pdf, Accessed March 3, 2024.



References

- NREL, 2022, “100% Clean Electricity by 2035 Study,” Available from: <https://www.nrel.gov/analysis/100-percent-clean-electricity-by-2035-study.html>, Accessed March 3, 2024.