CROSSED WIRES:

TWO TRANSMISSION PROBLEMS IMPERIL US DECARBONIZATION

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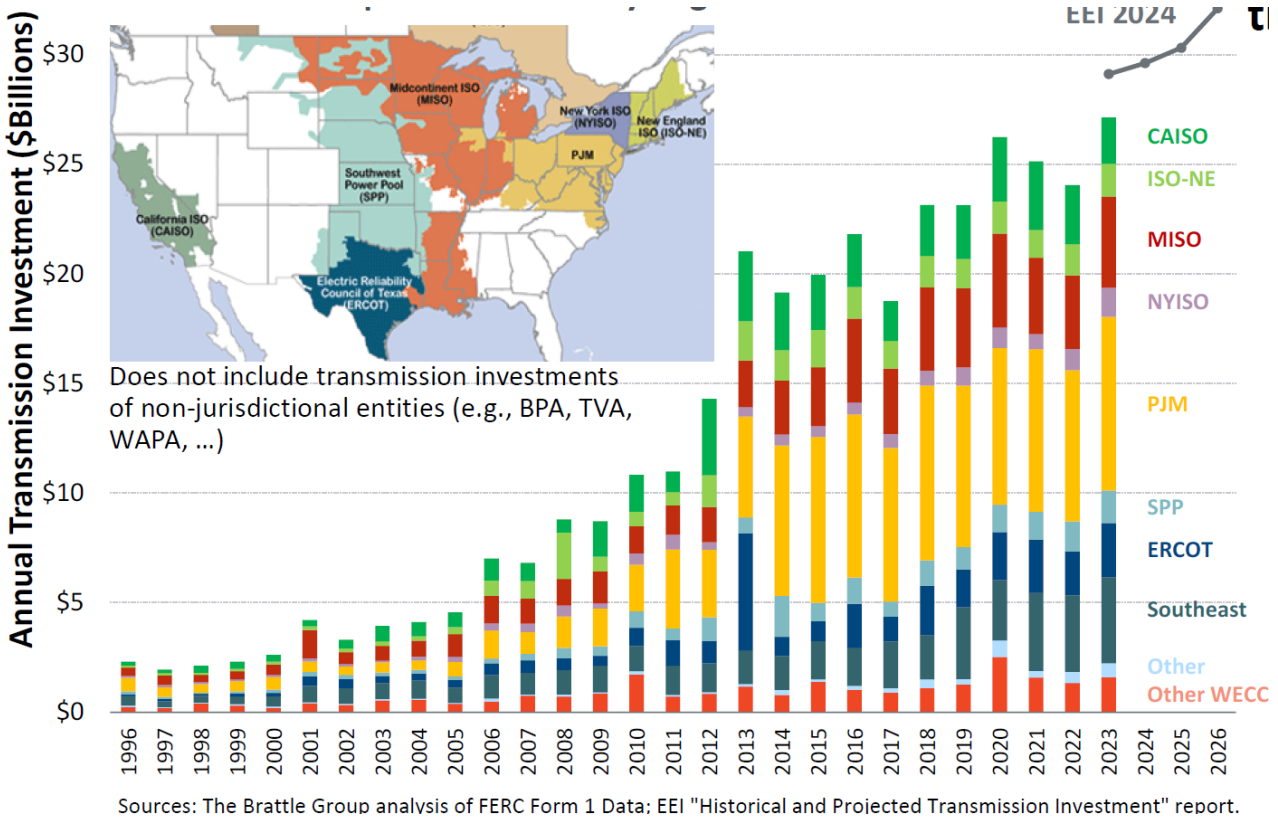
THE TWO SERIOUS US TRANSMISSION PROBLEMS

- To decarbonize the US economy, by decarbonizing electric power and electrifying other sectors, the US must dramatically expand its transmission network
- US transmission investment (mainly with generous regulated returns) *has* increased – from <$5 billion before 2005 to around $25 billion in 2020-23. But most has only produced modest gains in reliability.
- Two substantial, worsening transmission problems imperil affordable decarbonization:
  - Interconnection: Connecting VRE (wind & solar) generators and storage to the grid
  - Long-Distance: Building long-distance lines to link VRE generators to distant loads in order to reduce cost and mitigate VRE variability – planning & permitting issues



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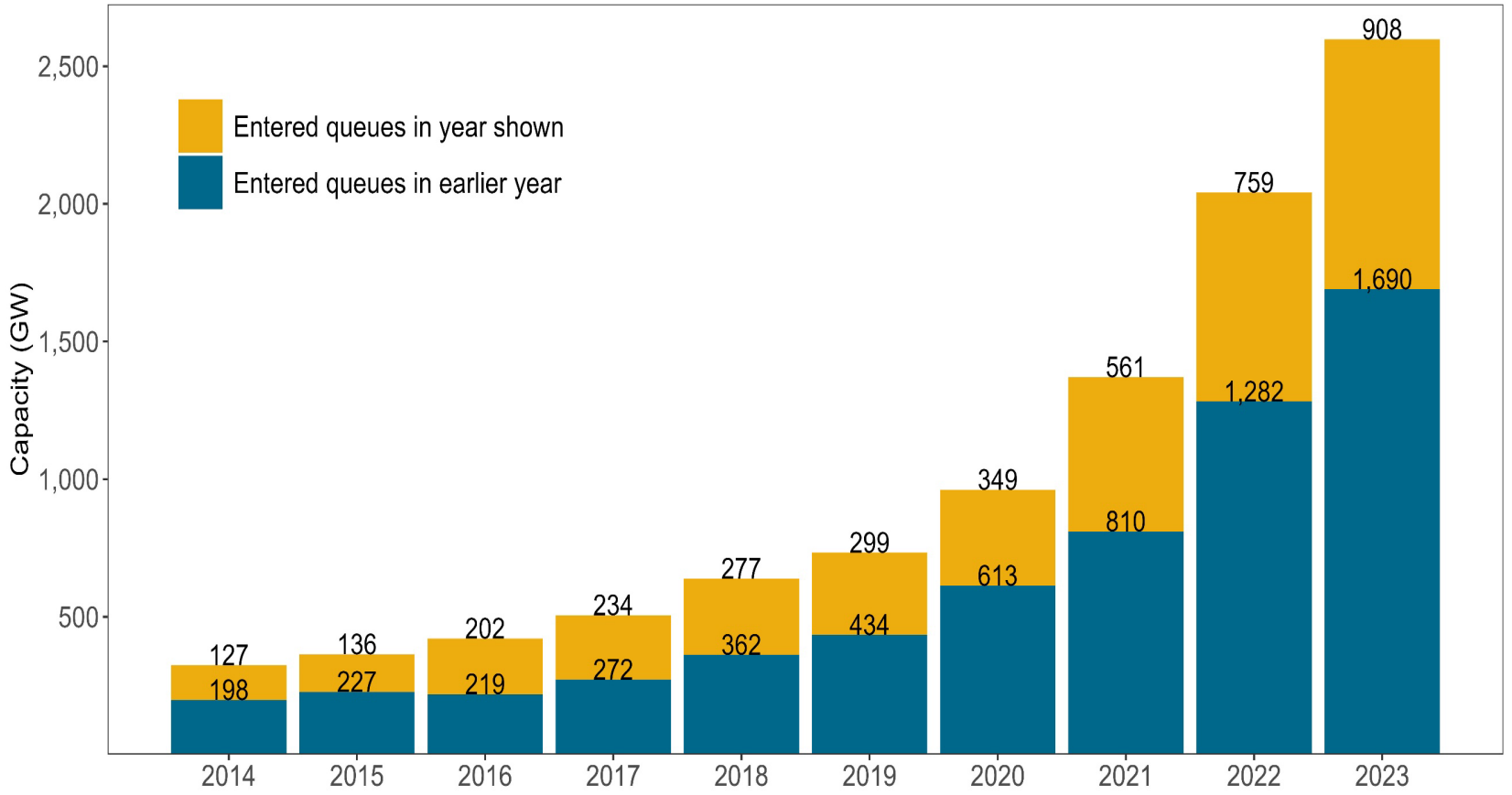
THE INTERCONNECTION PROBLEM



- The capacity of projects waiting to connect to the US grid is 2x the capacity of the US generating fleet
- Basic US, FERC-mandated process: new generation or storage projects bear all associated network costs, and allocating costs to projects is inherently complex
- The CREZ alternative: select good VRE zones, build lines in advance, *all rate-payers bear network costs* -- highly successful
- Similar processes in EU (offshore wind) and Australia -- Why not do CREZ-like load-pays processes everywhere?

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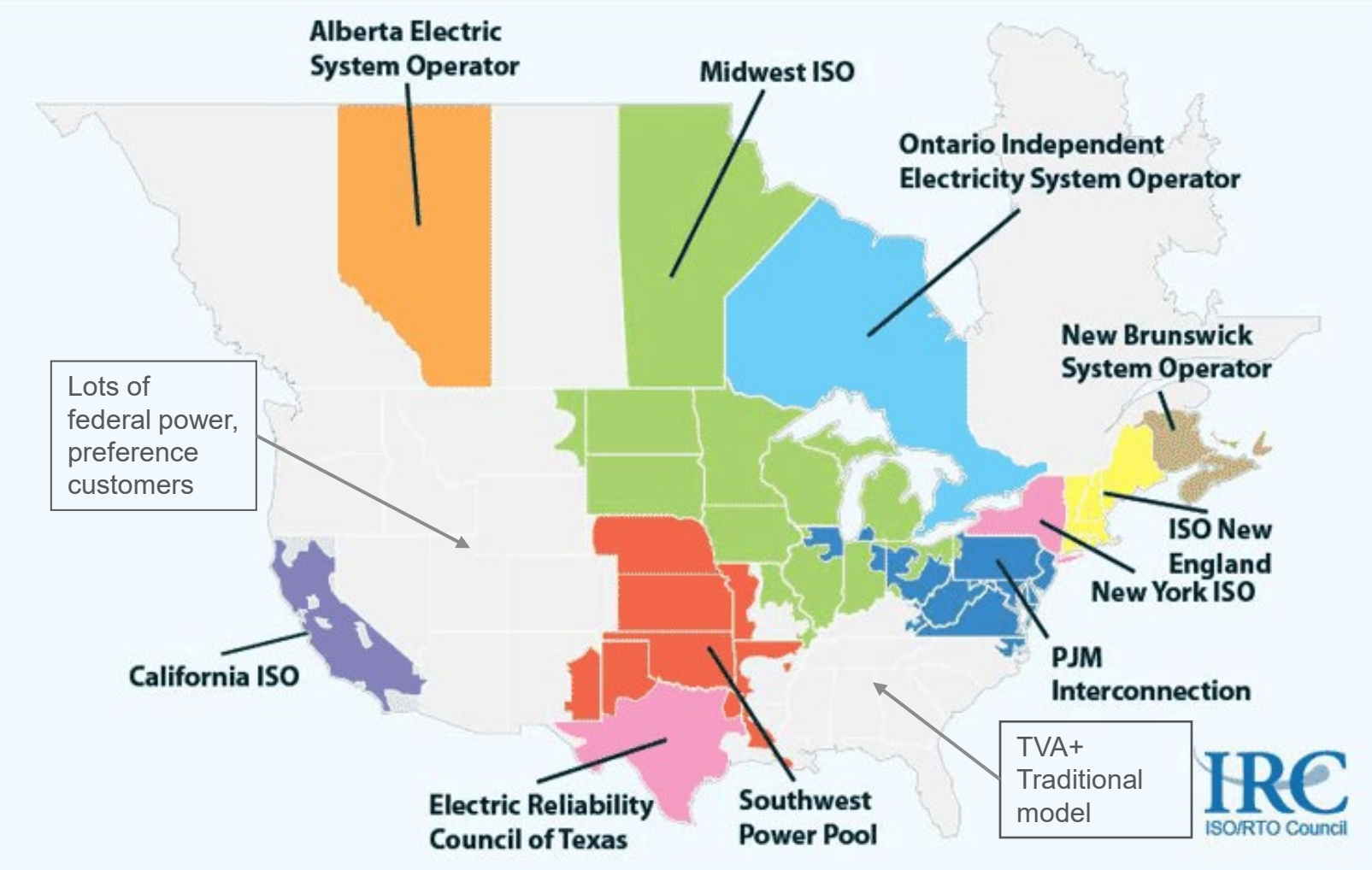
MOST US TRANSMISSION PROVIDERS CAN'T EASILY MOVE TO LOAD-PAYS REGIMES



- FERC regulates transmission except in Texas (ERCOT)
- ISO/RTOs regulate energy markets, do regional trans plans; no assets or ability to tax
- ISOs & non-ISO utilities have trans planning obligations
- Only single-state ISOs – TX, CA, and NY can allocate costs uniformly to rate-payers a la CREZ
- Elsewhere, allocating costs among states involves complex negotiations, esp when parts of states are involved
- FERC's several recent tweaks of the generator-pays model are not likely to solve the problem!

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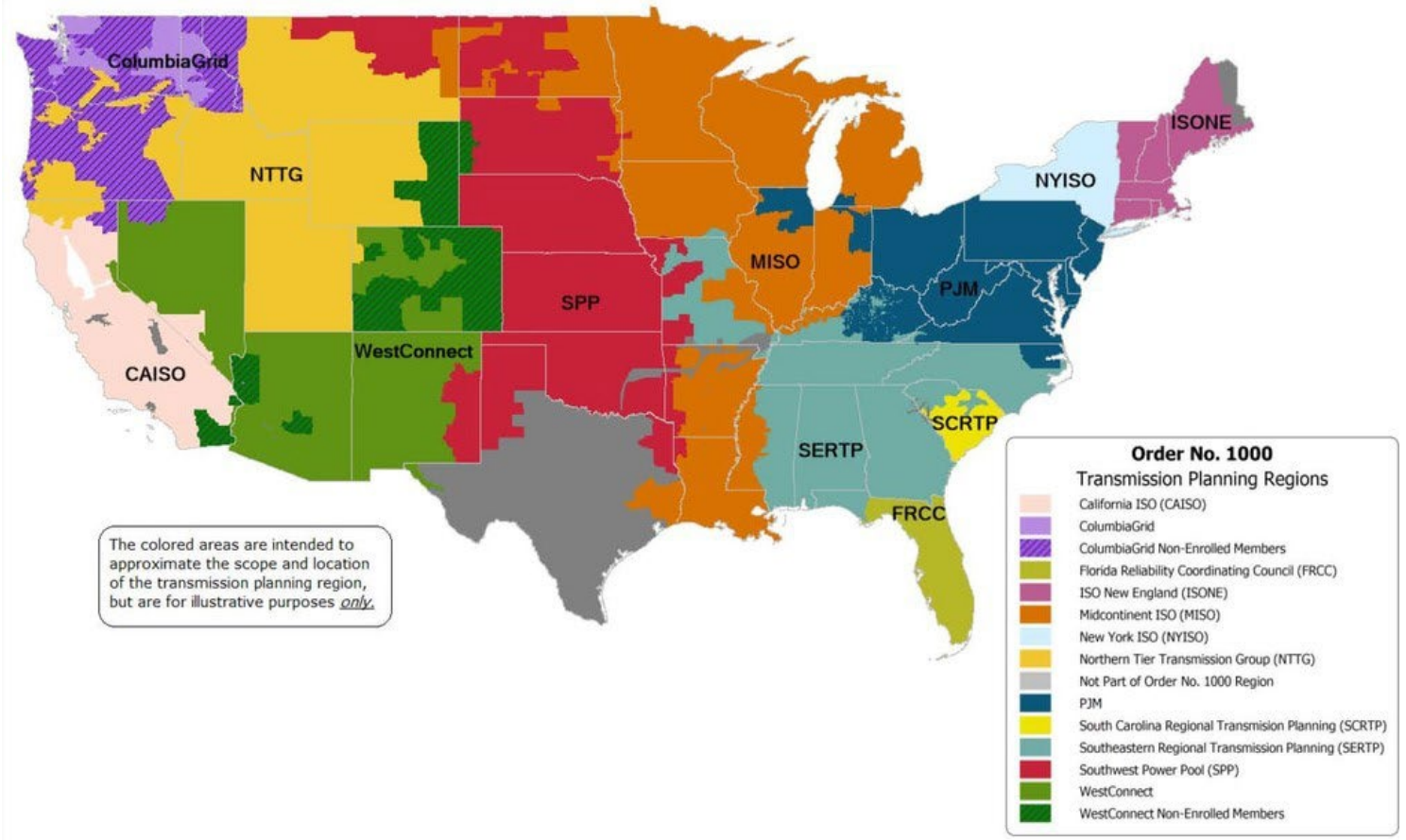
LONG-DISTANCE LINES V. THE US TRANSMISSION PLANNING PROCESS

- FERC requires *in-region* planning (except in ERCOT (Texas))
- Many planning regions contain multiple vertically integrated utilities; most do not track state boundaries
- Quality of in-region planning varies; FERC has no enforcement tools; multi-state cost-sharing negotiations are inherently complex (MISO 2022 a rare example)
- Projects that cross regional boundaries raise more complex cost-sharing issues; serious inter-regional planning is *very rare* (MISO/SPP a rare example)
- No agency has operational responsibility for the *national* grid (DOE leading an impressive national *study*)



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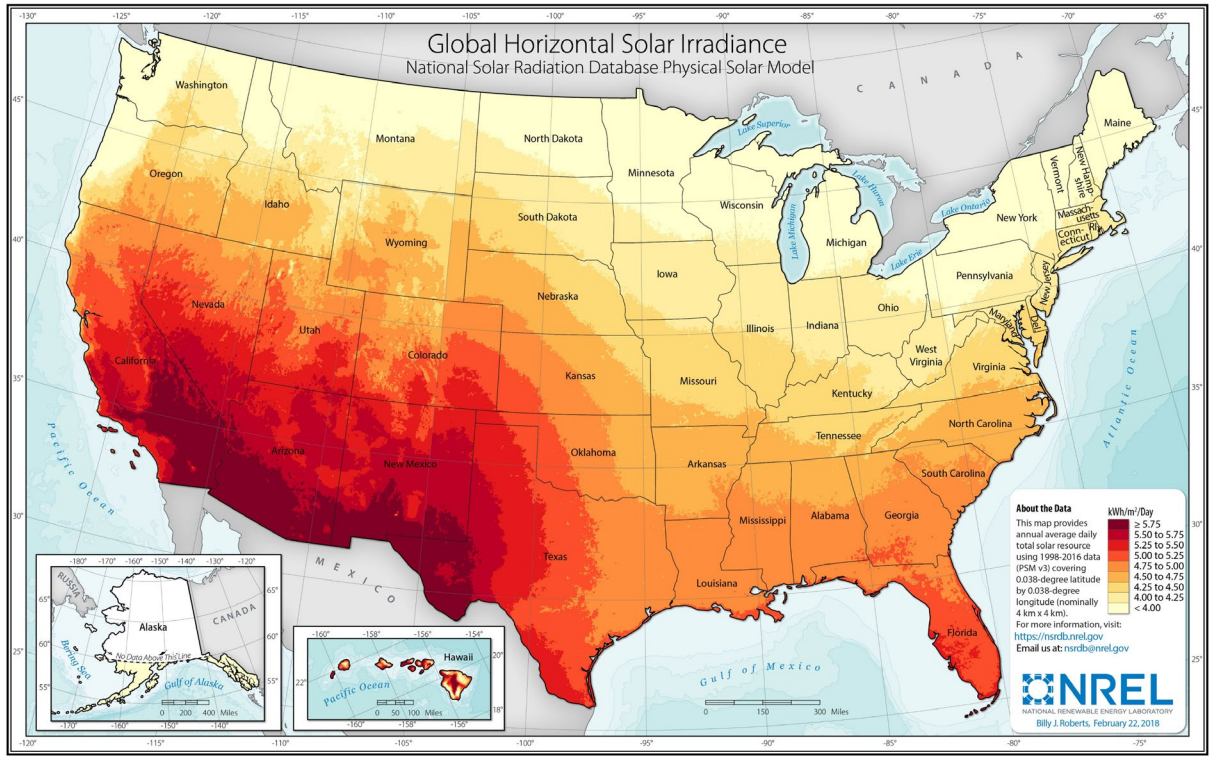
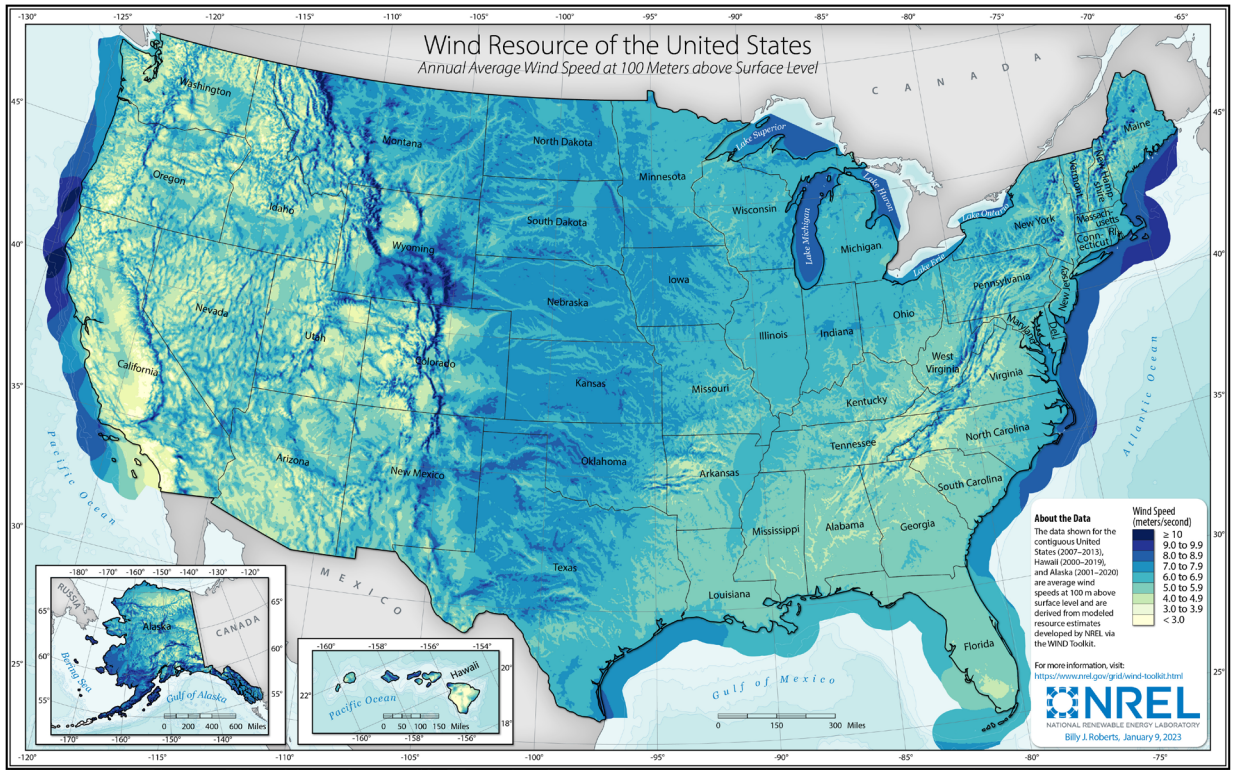
IN PART BECAUSE WE CAN'T PLAN LONG-DISTANCE LINES, EVEN THOUGH THE BEST WIND & SOLAR SITES ARE FAR FROM MAJOR LOADS…





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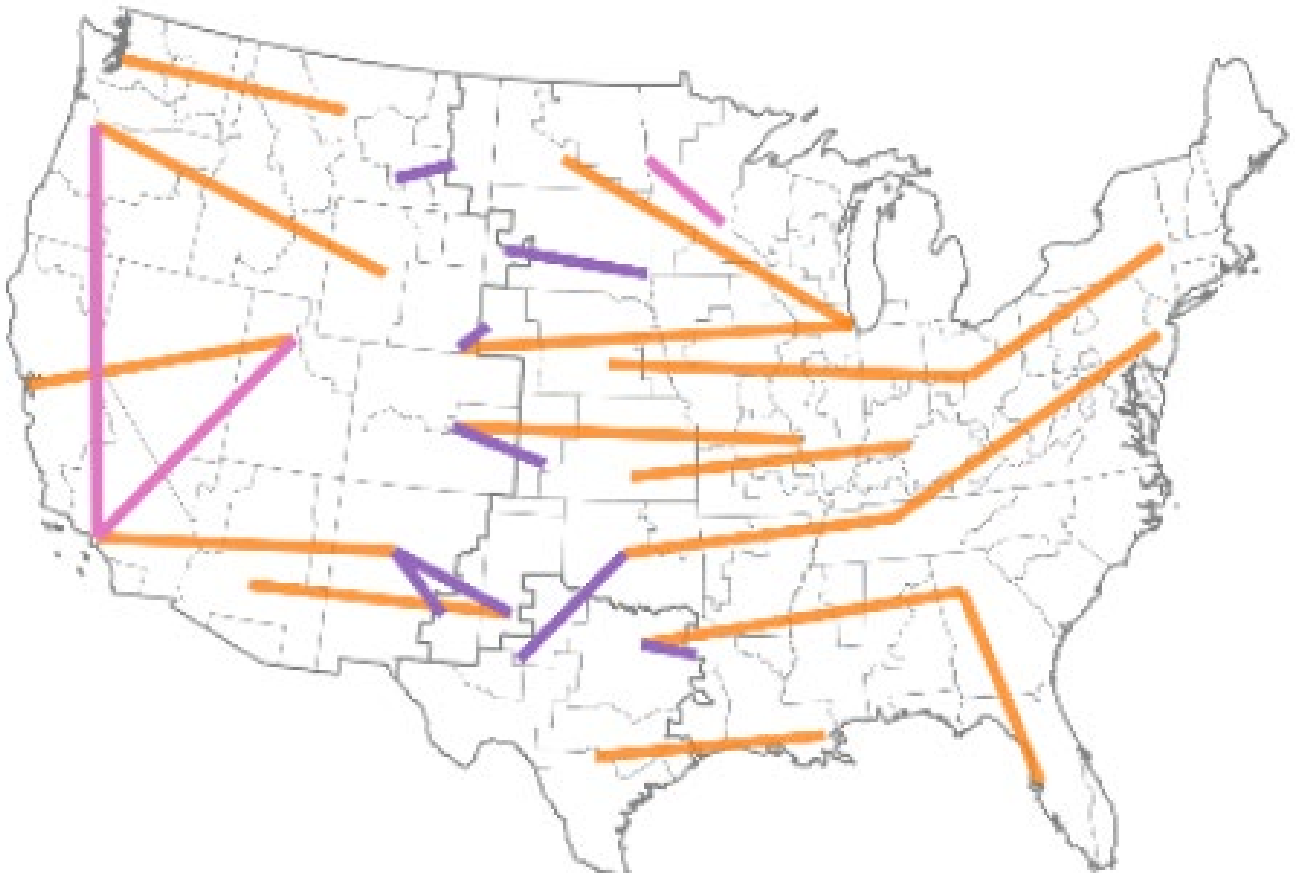
...AND LOTS OF STUDIES SHOW THE VALUE OF LONG-DISTANCE TRANSMISSION...

One illustrative example HVDC scenario from DOE's ongoing National Transmission Study

For related numbers, see MIT CEEPR WP 2024-13, August 2024



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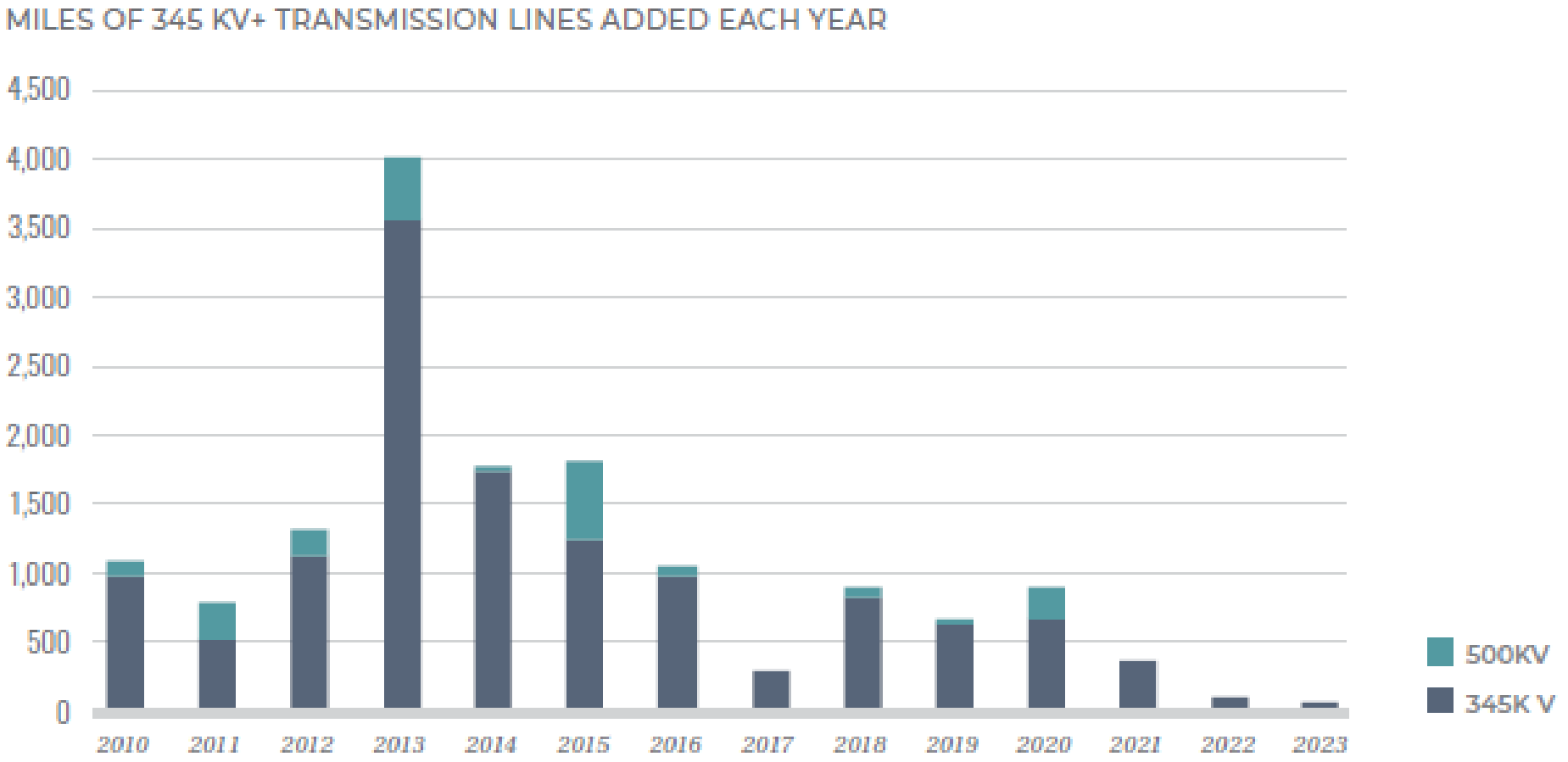
...THE US HAS ESSENTIALLY STOPPED BUILDING HIGH-VOLTAGE TRANSMISSION LINES



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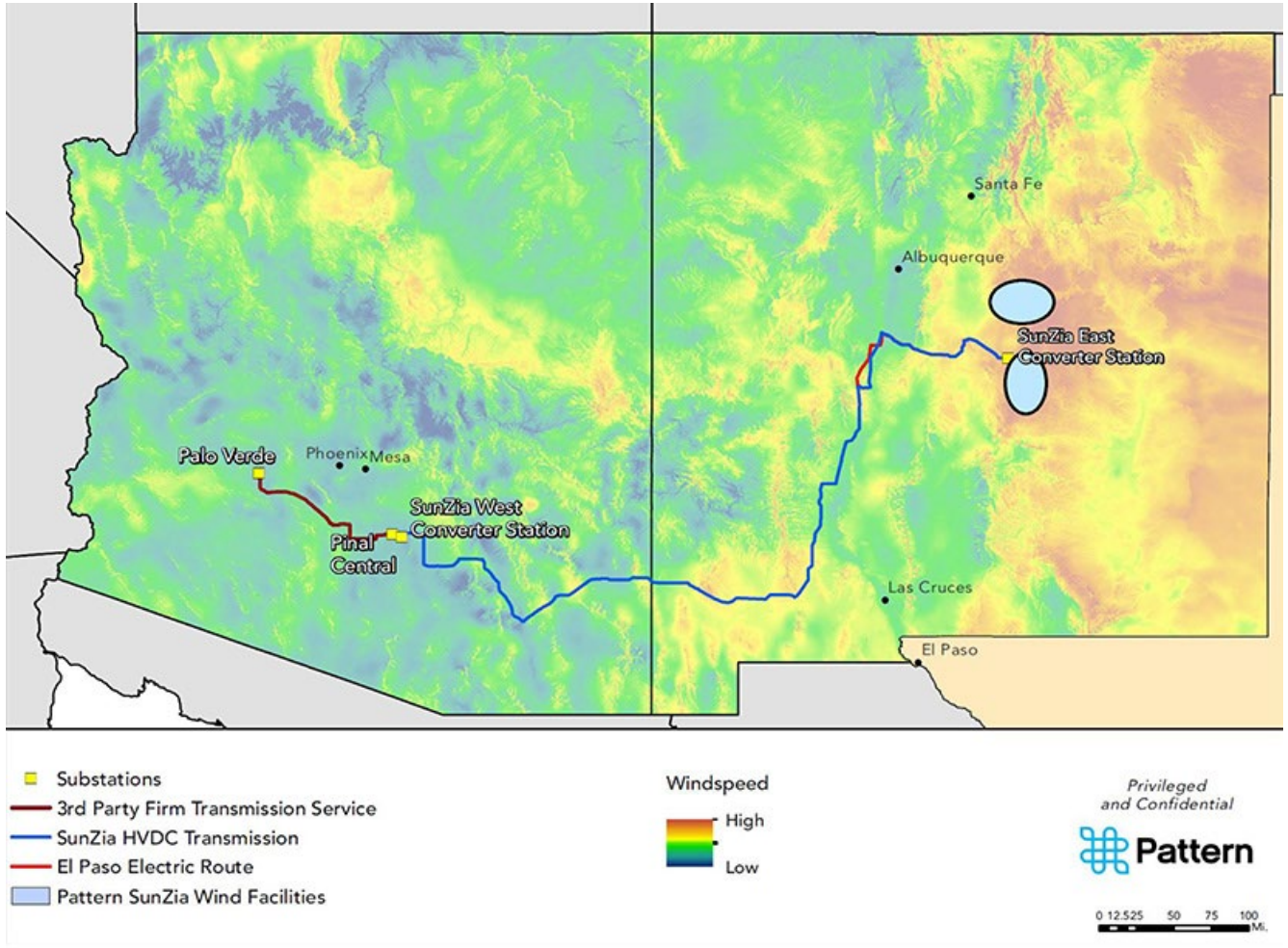
PLANNING IS NOT THE ONLY PROBLEM: GETTING ALL NECESSARY PERMITS TO BUILD *MERCHANT* LINES CAN TAKE DECADES



- Independent entities can propose power lines apart from the planning process, but many entities – states, local govts, tribes, NGOs – can sue to block infrastructure on enviro & other grounds in court & before federal agencies, with no effective time limits
- FERC has been able to approve routes for interstate natural gas pipelines since 1938, but no federal agency has comparable authority to approve routes for transmission lines; and gas pipelines also have permitting problems
- E.g., the SunZia project, with a merchant line, was proposed in 2006; it *may* have gotten all necessary construction permits in early 2024, after MANY challenges
- Worth noting that even if the permitting problem didn't exist, because of externalities, there is no reason to think that a set of profitable merchant lines would constitute an efficient overall grid

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RECENT EFFORTS TO MITIGATE THE LONG-DISTANCE PROBLEM

2021: FERC gets authority to site lines blocked by states, but only in NIETCs (6/24 proposal shown). Doesn't solve the permitting problem.

2023: MOU among federal agencies makes DOE the lead agency to coordinate project reviews. Important in the West

2024: FERC requires 20-year transmission plans, hoping to encourage building to good VRE zones

2024: MOU among 10 Northeastern states (in 3 IOUs) to coordinate trans planning & development. Effect unclear.

2024: Lots of legislative proposals aimed at enhancing planning (incl inter-regional) and streamlining permitting. Problems recognized; no consensus on solutions.

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IS THE US PERMANENTLY STUCK?

- Solving the interconnection problem seems to require moving away from project-pays, and the FERC, which doesn't regulate retail rates, lacks the authority to compel this.
  - With state support, single-state ISOs can do this, and MISO shows it is technically possible to do it elsewhere, but I fear that only (unlikely) federal legislation can solve the cost-sharing problem nationally.
- DOE seems to be moving in the direction of planning the national network, but the increase in federal power necessary to make such plans matter would be strongly resisted.
  - The recent MISO/SPP joint proposal shows that boundary-crossing plans are not impossible, but it covers a very special situation. Bilateral negotiations between planning areas seems unlikely to lead to an efficient national network.
- While there is lots of bipartisan interest in Washington in planning and permitting reform, consensus on reforms has yet to emerge. Enviros oppose broad infrastructure reform, and permitting reform would not be enough to produce an efficient network.
- We may not be *permanently* stuck, but coming unstuck seems likely to take too long to make our climate goals feasible.