Interconnections Seam Study

Aaron Bloom
TransGrid-X Symposium
Ames, Iowa
Continental Power Systems
Continental Transmission Studies

Chicago Tribune
1923
Tying the Seasons to Industry

Bureau of Reclamation
1952
Super Transmission System

Bonneville Power Administration
1979
Interconnection of the Eastern and Western Interconnections

Western Area Power Administration
1994
East/West AC Intertie Feasibility Study

Department of Energy
2002
National Transmission Study
Transmission Principles

• Long distance transmission enables diversity, diversity lowers the cost of maintaining planning reserves.

• Optimal use of generating resources lowers costs for rate payers.

• Lower costs and shared risk make it easier to maintain reliability.
Great Engineering Schools

“The industry should make young people cognizant of the full challenge of modern power systems engineering. Utilities should work more closely with educational institutions to develop and sponsor appropriate research...” FPC, 1967
Early Computer Models

“Digital computers and sophisticated computer programs now make practicable the study of large interconnections, and permit extensive analyses that were impossible only a few years ago.” FPC, 1967
Regional Coordination

“Strong regional organizations should be established for the coordination of planning, construction, operation, and maintenance of individual bulk power supply systems.” FPC, 1967
The US and Canadian Power Systems are Massive
If the value looked that good back then

What about today?
US Hydro Generation Resources
Greatest Solar Resource
It’s Different

This Time
The Impact of Weather is Greater
Daily patterns drive demand and supply

https://www.youtube.com/watch?v=hVymyJ9q5a0
Energy Needs and Supply
Change with the Seasons

https://svs.gsfc.nasa.gov/4452
• Parallel computing environments, complex algorithms, and artificial intelligence offer new capabilities.
• 100,000 node transmission models can be simulated for an entire year, in a single day.
• The dawn of Exa-scale computing
New Technologies

Wind
The single largest source of renewable energy capacity in the US

Solar PV
The fastest growing renewable energy resource

HVDC
Controllable, directional, electricity transmission, with large scale deployment worldwide

HVAC
The backbone of existing American Transmission
An opportunity to design for the future. Current capacity 1,300 MW
See this image come alive at TransGrid-X
Learn more:

July 26, Ames, Iowa
https://register.extension.iastate.edu/transgridx