

Integrating and Delivering Wind Energy Presentation to WIRES

Rob Gramlich, January 21, 2016





We've all done it before

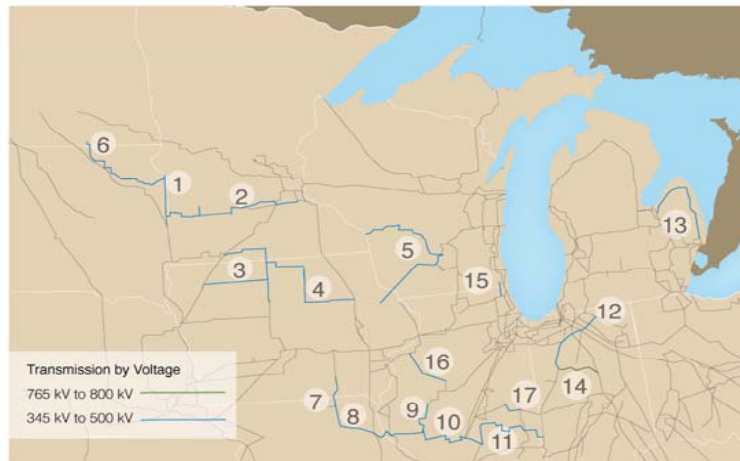
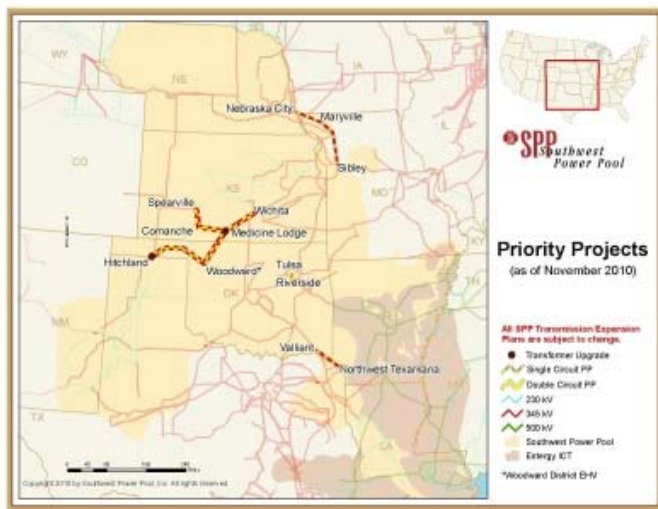


Figure 2-1: MVP Portfolio³



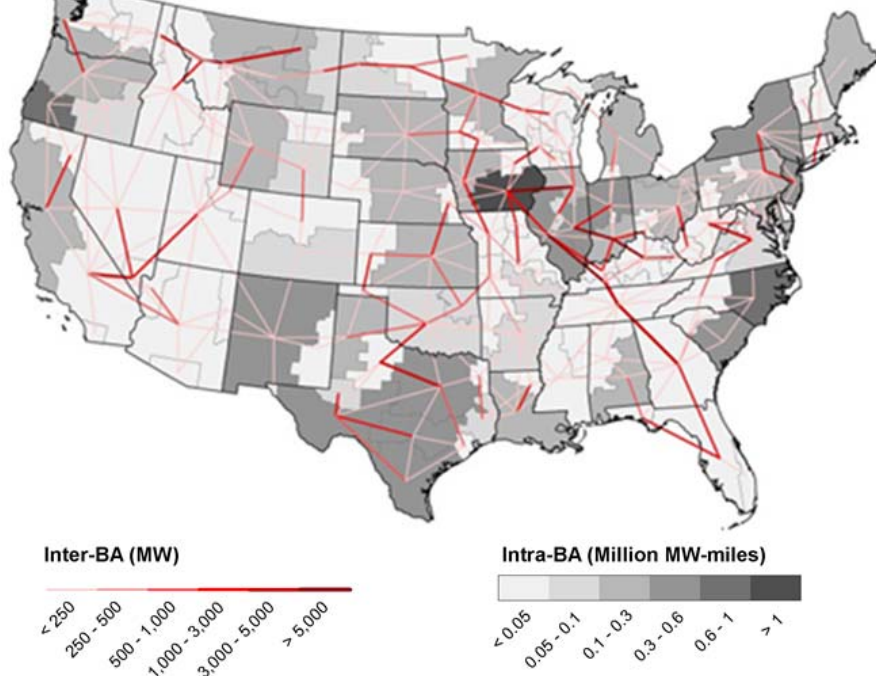
60 GW
worth of
transmission
built or
underway in
SPP, MISO,
CA, Pac NW



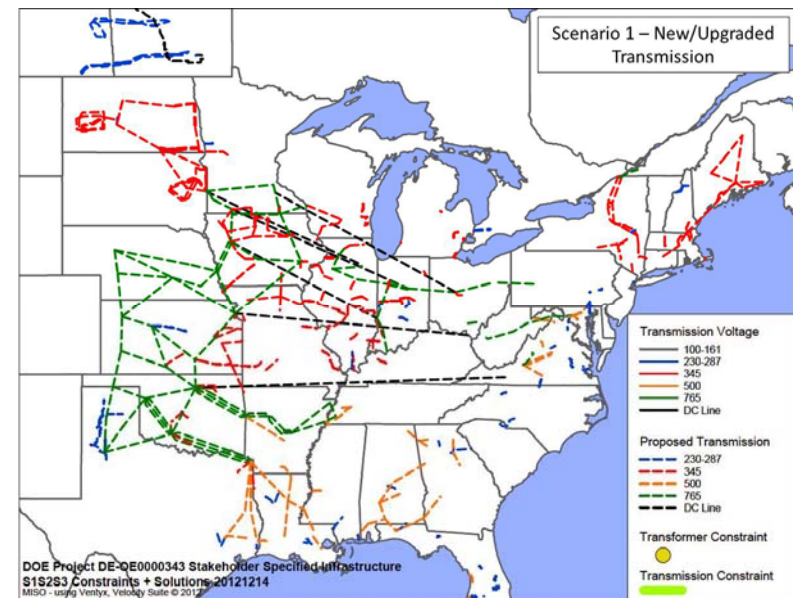


Much More Needed

WindVision 2050 case



Eastern Interconnect Planning Collaborative



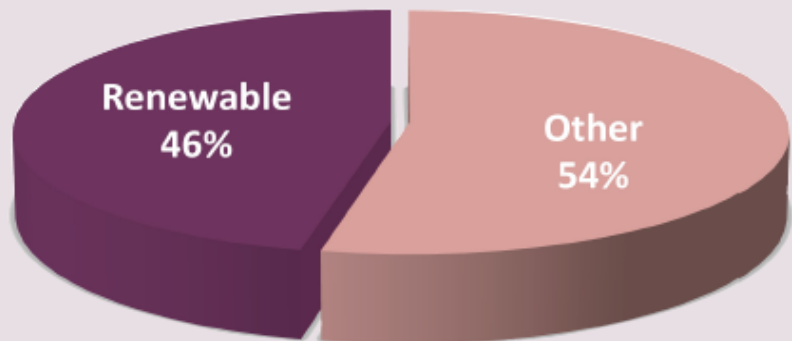
(Need to re-model incorporating CPP-driven retirements and demand do for 2025-30)



Renewables Driving Transmission

EEI members' planned transmission for renewables:

These projects support the integration of renewable resource generation. Renewable energy technologies include: wind power, solar power, hydroelectricity, geothermal, biomass and biofuels. Highlighted projects that facilitate the integration of renewable resources reflect the addition or upgrade of 6,450 miles of transmission with an accompanying investment cost of approximately \$22.1 billion in this report (nominal \$).



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|---|--|--|
| <ul style="list-style-type: none"> • Badger Coulee • Big Stone South – Brookings County • Big Stone South – Ellendale • Brookings County – Hampton • CAPX2020 Transmission Plan • Cardinal – Hickory Creek • Centennial II Project • Central Valley Transmission Upgrade Project 230 kV • Coolwater – Lugo Transmission Project • Couderay – Osprey 161 kV Line | <ul style="list-style-type: none"> • Grand Rivers Projects • Great Northern Transmission Line • Hassayampa – North Gila 500 kV Project • Hitchland – Woodward 345 kV Transmission Line • ITC Holdings Multi-value Projects 3 & 4 • Kansas V Plan • Los Vientos III Wind Power Project • Michigan Thumb Loop Transmission Project • Nebraska City – Sibley Line • New Bethel Energy Center 345 kV Transmission Line • Northern Pass Transmission Project | <ul style="list-style-type: none"> • Palo Verde – Delaney – Sun Valley – Morgan 500 kV Projects • Path 42 • Pawnee – Daniels Park 345 kV Transmission Line • Pinal Central to Tortolita 500 kV Project • Pioneer Transmission • Prairie Wind Transmission • Tehachapi Renewable Transmission Project • Tehachapi Wind Energy Storage Project • Tuco – Woodward District 345 kV Transmission Line • West of Devers • Zephyr Power Transmission Project |
|---|--|--|



3 P's of Transmission

Planning (Pro-active)

Paying (broad cost

Permitting (streamlined

AWEA-SEIA white paper at
<http://www.awea.org/GreenPowerSuperhighways.pdf>