



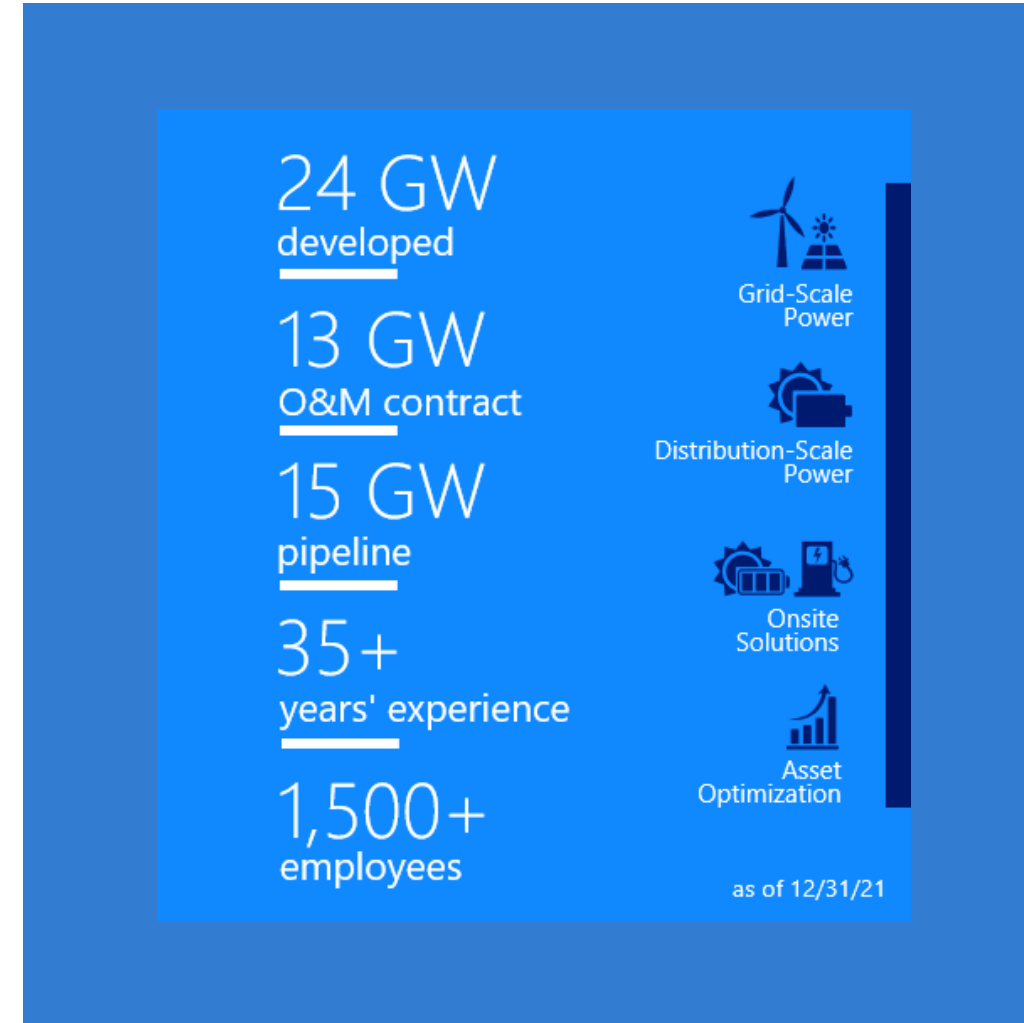
ESIG 2022 FALL TECHNICAL WORKSHOP

October 24-27

Session 1: Congestion Management
Practices, Challenges and Potential
Mitigation

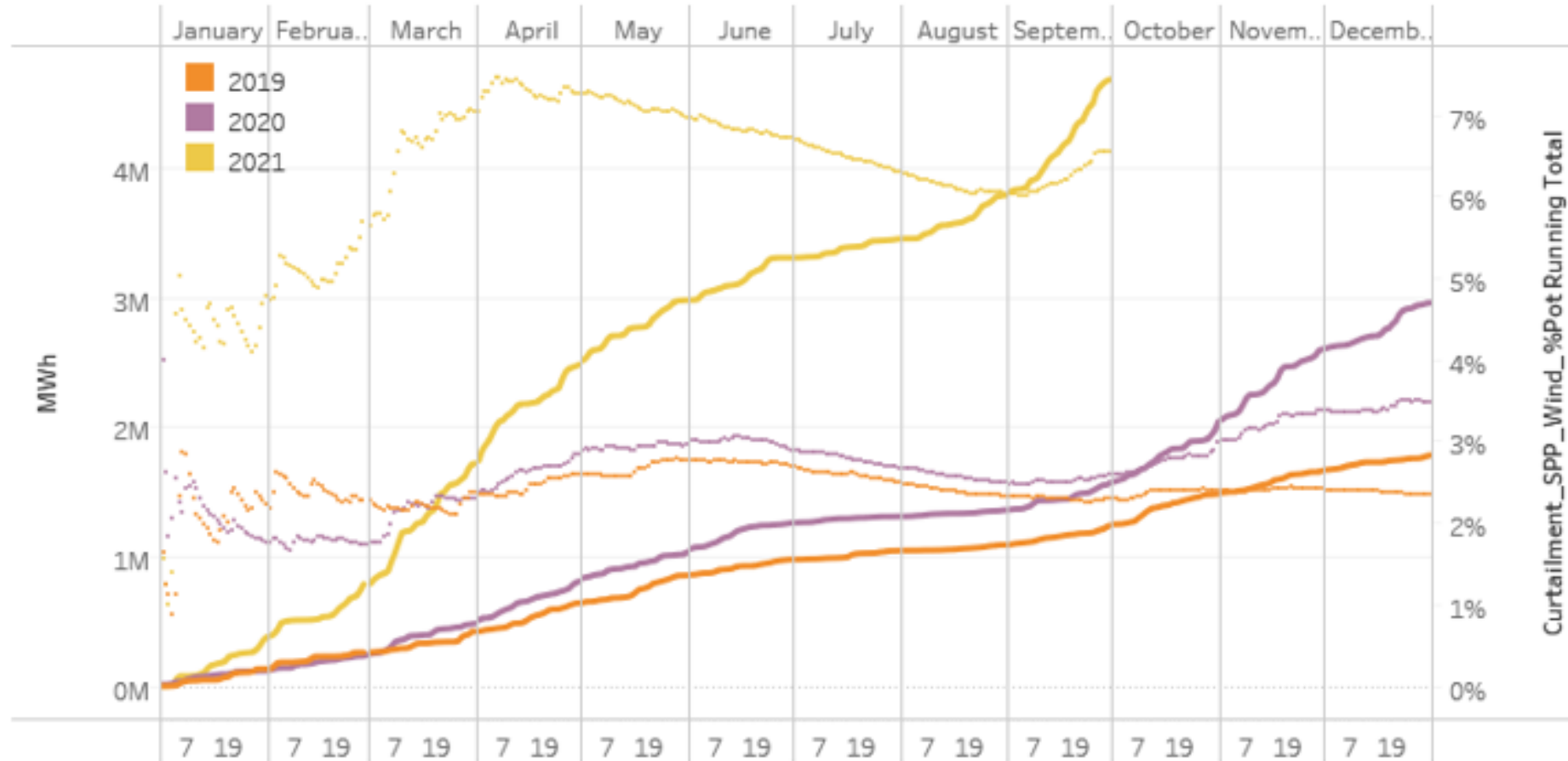
EDF Renewables North America (EDFR)

- A market leading independent power producer and service provider with 35+ years of expertise in renewable energy
- Delivering **grid-scale power**: wind (onshore and offshore), solar photovoltaic, and storage projects; **distribution-scale power**: solar and storage; and **asset optimization**: technical, operational, and commercial expertise to maximize performance of generating projects. The company's PowerFlex subsidiary offers a full suite of **onsite energy solutions**: solar, storage, EV charging, energy management systems, and microgrids
- EDF Renewables North America is a subsidiary of EDF Renouvelables, the dedicated renewable energy affiliate of the EDF Group



Watts the problem? Congestion risk for a renewable project never ends, curtailment levels and congestion costs have been increasing

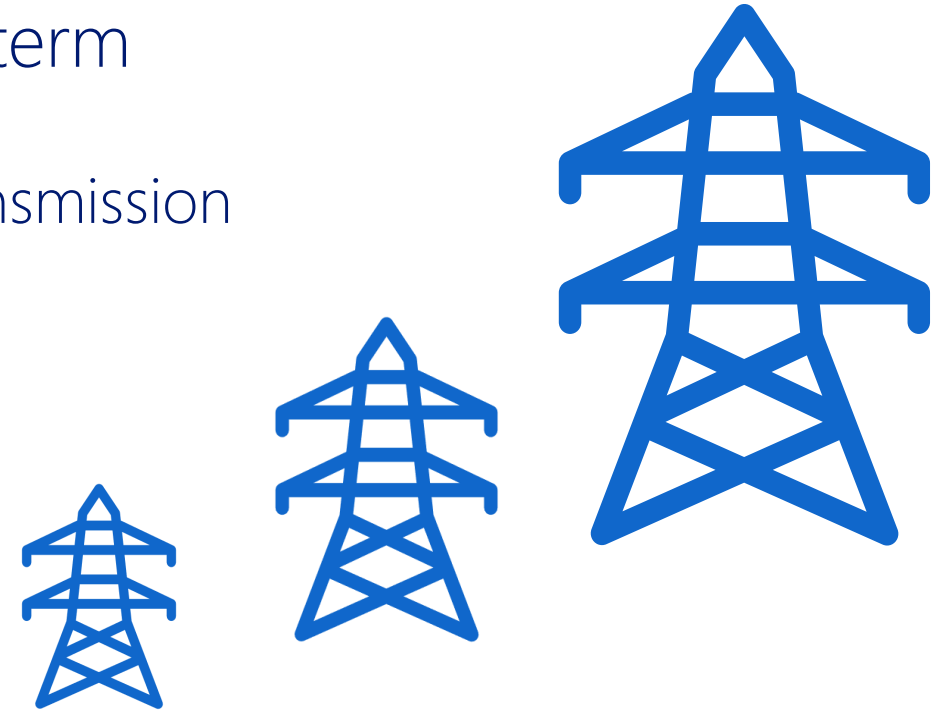
SPP Total Wind Curtailments (line) and Curtailments as % of Total Wind Potential (circles)
Running Total by Year



Congestion management practices and potential mitigation

Long-term, medium-term, and short-term

- Long-term (4+ years)
 - Large system upgrades, e.g., build transmission
 - Flow changes
 - Market response
- Medium-term (1-4 years)
 - System upgrades
 - Flow changes
 - Market response
- Short-term (less than 1 year)
 - System coordination
 - Generation redispatch
 - System optimization, e.g., transmission reconfiguration, GETs



GETs – Under watt conditions do GETs make sense?

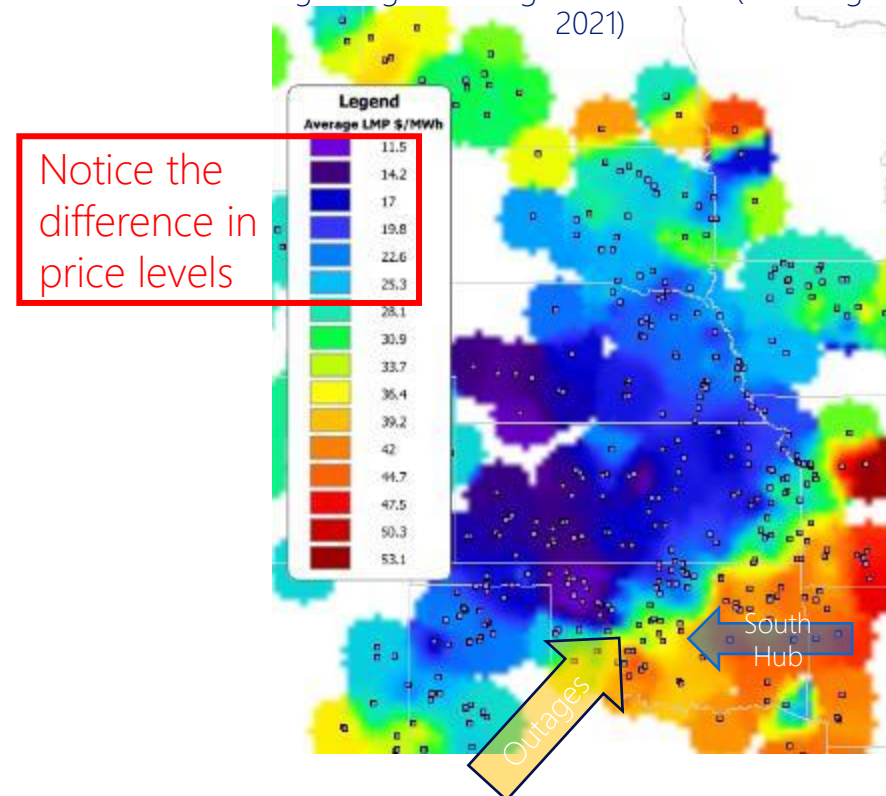
Smaller overloads can often be addressed with GETs and while GETs may not solely address large overloads, which usually require traditional backbone upgrades, GETs can assist until the upgrade is available.

Example to consider:

- SPP congestion is highly sensitive to wind resource and grid outages
- Significant 345kv outages occurred in 2021 with significant impact on LMPs across a wide region
- Could a GET have helped?

Average LMP at all generator nodes in SPP

During outages and high wind season (mid-Aug to Dec 2021)



EDF Renewables and GETs

- For last few years, EDFR has become a strong proponent of GETs as result of their ability to improve market efficiency/ address congestion
- Based on observations and GET studies commissioned by EDFR and in the industry
 - GETs can be implemented for binding constraints in operations and short-term planning
 - GETs can mitigate impact of grid outages
- There will always be grid outages, including multi-month outages related to grid upgrades
- Traditional grid planning processes usually wait on constraints binding severely enough for a solution to be considered
 - GETs can be a bridge solution, pending traditional grid upgrades
 - GETs can be used in combination with traditional upgrades
 - GETs can be implemented very fast (e.g., reconfiguration solutions could be implemented in matters of days)

Challenges for getting GETs

- Based on EDFR's experience with GETs advocacy, key challenges for deployment and implementation include:
 - Lack of business practices, specifically related to GETs in interconnection, planning and operational processes
 - Lack of mandates and incentives for GETs
 - Strict Reliability versus Market Efficiency mindset
 - The mindset that market redispatch provides an optimal solution even if it comes with a congestion cost--ultimately born by ratepayers--that in some cases could be materially reduced or eliminated if GETs were implemented
 - Lack of familiarity with GETs technologies and their benefits



Thank You!



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