WHEN TRUST MATTERS

Planned, Flexible & Innovative Integration of Offshore Wind in New England

New England States Transmission Initiative Technical Meeting

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FOCUS:
Three key elements of the Regional Transmission Initiative RFI

Planning & Coordination

Development of HVDC Transmission Solutions

Flexible & Innovative System Design

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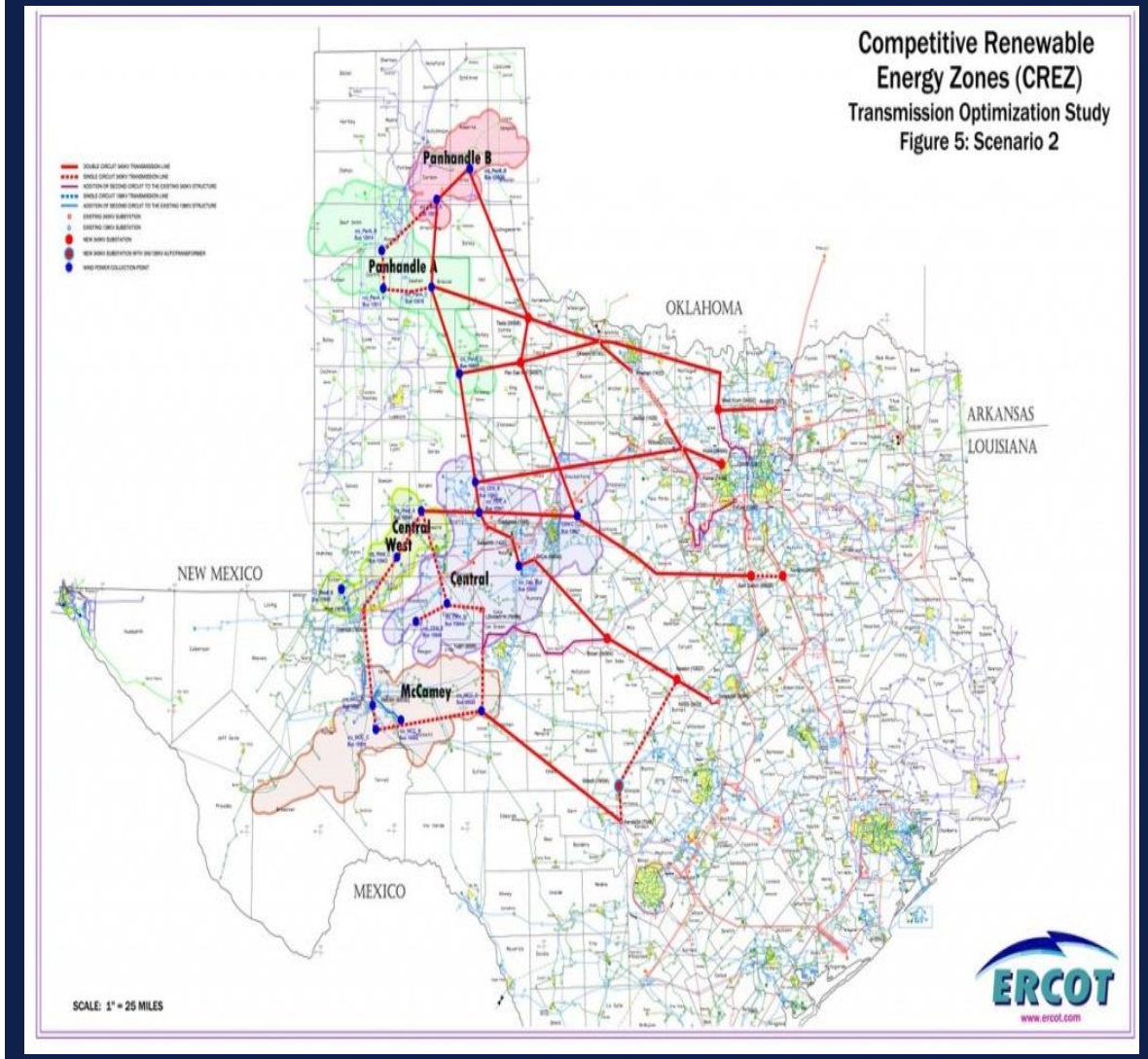
“Planned, regional investment for OSW integration”

Example: Texas **Competitive Renewable Energy Zones (CREZ)**

- Expanded ERCOT transmission system to deliver renewable resources to population centers.
- Relied on a **targeted, purpose-driven** transmission planning process.
- NESCOE/ISO-NE **2050 Transmission Study** advances this planning approach.



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“The Participating States are actively considering HVDC transmission solutions in 1,200 MW increments through 2040.”

HVDC Advantages for New England OSW Transmission

- Cost-effective and low-impact technology for **high capacity** and **long-distance** transmission
- Fully controllable
- Well-suited for grid integration of remote large-scale renewables
- Offers opportunity to **reinforce existing onshore grids**

HVDC solutions have evolved along with OSW development

Radial multi terminal China

Meshed multi terminal China

Radial multi terminal Europe

HVDC GIS Europe

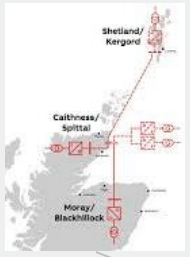
Full-bridge converters Europe

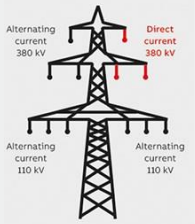
Standardization Modularization Coordination Europe

Meshed multi-terminal grids & islands Europe

Combination with hydrogen Europe

Offshore & multi-terminal HVDC US





EUROBAR

North Sea Wind Power Hub

2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033

160 kV 240 MW
Three-terminal radial
Na'nao system
China

200 kV 400 MW
Five-terminal radial
Zhoushan system
China

500 kV 3 GW
Five terminal meshed
Zhangbei system
China

320 kV 1200 MW
Three-terminal radial
CMS system,
Scotland, UK

320 kV 900 MW
HVDC Gas insulated switchgear
Borwin 5 & Dolwin 6 projects
Germany

380 kV 2 GW
Three-terminal FB
ULTRANET, Germany

2 GW 525 kV
HVDC Multi-terminal
readiness & HVDC GIS
IJmuiden Ver, Netherlands

525 kV 3x2 GW
Meshed offshore grid
Windstrom-Booster &
Heide HVDC hub
Germany

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The RFI's design guidance fosters **innovation** that will:

- Encourage expandable systems that maintain future grid extension option value
- Support the modularity and standardization that reduce costs and de-risk technical choices and scheduling
- Attract federal support based on specific BIL and IRA objectives.

"The relevant operational infrastructure, and specifically HVDC converters, should be designed in a manner that future transmission lines can connect in a meshed manner and share landing points. HVDC transmission topologies that include offshore converters that enable inter-area transfers of OSW generation to various network points within ISO-NE and potentially beyond, are encouraged."

DNV

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