

A photograph of several offshore wind turbines in the ocean. The turbines are white with three blades each. The sky is a clear, light blue, and the water is dark. The turbines are arranged in a line, with one in the foreground and others receding into the distance. The overall scene is a vast, open expanse of water and sky.

Offshore Wind Transmission

2019 NASEO Energy Policy Outlook Conference
Offshore Wind: The Giga Opportunity

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BURNS  **MCDONNELL**

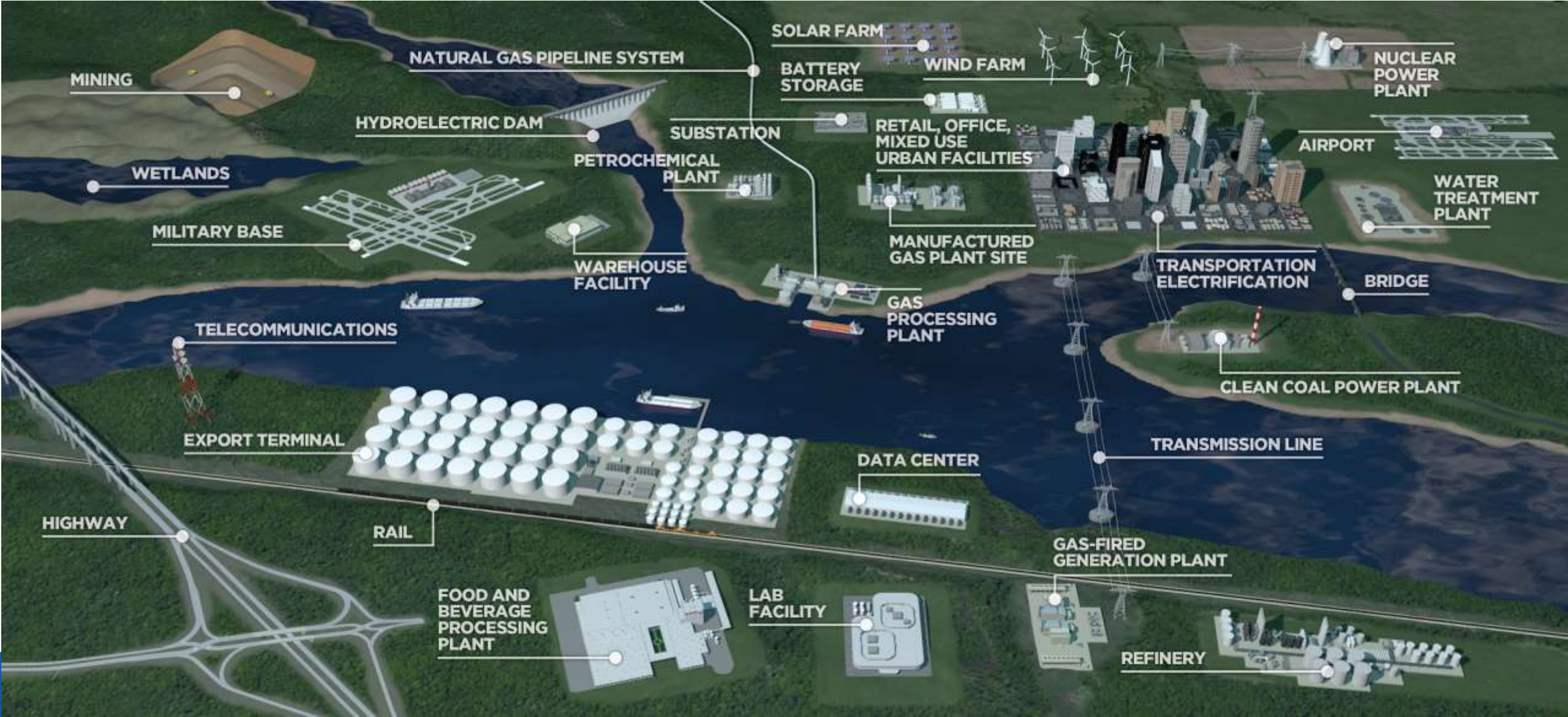
Agenda

- ▶ Burns & McDonnell Overview
- ▶ Offshore Wind Market and the Need to Plan
- ▶ 7 Key Questions for OSW Transmission



Who We Are

Key Industries and Markets We Serve



INDUSTRY SPECIFIC RANKINGS

Engineering News-Record

1

Power

1

**Transmission and
Distribution**

3

Aerospace

3

Cogeneration

5

Airports

Food and Beverage

6

Refineries/Petrochemical

6

Government Offices

7

Nuclear

11

**Site Assessment
and Compliance**

13

A photograph of an offshore wind farm at sea. The image is dominated by a large, detailed view of a wind turbine's support structure in the foreground on the right, showing its complex lattice of steel beams and various platforms. In the background, several other wind turbines are visible, receding into the distance over the dark ocean under a clear, light blue sky. The overall tone is cool and industrial.

OFFSHORE WIND MARKET & THE NEED TO PLAN

National Renewable Energy Laboratory

- ▶ Potential to produce more than 2,000 gigawatts of capacity (double the nation's current electricity use)

Supporting Transmission System

- ▶ Grid for this offshore wind generation has yet to be master planned
- ▶ Federal Energy Regulatory Commission & North American Electric Reliability Corporation mandating this planning
- ▶ Estimated to take decades to build this transmission system

Planning is Critical

- ▶ Let's learn from onshore case studies
 - Electric Reliability Council of Texas (ERCOT)'s Competitive Renewable Energy (CREZ) Project
 - Southwest Power Pool (SPP)'s Priority Projects
 - Midcontinent Independent System Operator (MISO)'s Multi-Value Project portfolio

A photograph of several offshore wind turbines in the ocean. The turbines are white with three blades each. The sky is a clear, pale blue, and the water is dark. The perspective is from a low angle, looking up at the turbines. The text "7 KEY QUESTIONS FOR OSW TRANSMISSION" is overlaid in the center in a bold, white, sans-serif font.

7 KEY QUESTIONS FOR OSW TRANSMISSION

Where will offshore generation connect to the onshore grid?

- ▶ Limited number of ideally suited locations in the United States
 - Ex: Soon-to-be-shuttered nuclear power plants
- ▶ Prioritization and wise allocation is key
 - Who will make the decision? Government vs. free market.
- ▶ Discussions on connection should impact system design
 - Hub-and-scope concept
 - Backbone trunk line
 - Hybrid option

How will the offshore grid integrate with the onshore grid?

- ▶ Understand the benefits of offshore wind transmission
 - But, how will it impact the onshore grid?
 - There is not infinite capacity at each location

Who will be responsible for transmission development?

- ▶ What is happening today?
 - The first wave of offshore developers build new wind turbines & construct interconnecting power lines and related equipment
 - Developers sell power through State sponsored offshore wind renewable energy certificate (OREC) programs or similar vehicles
- ▶ Is it sustainable for tomorrow?
 - Offshore grid
 - Should other transmission-only entities be invited to the market?
 - Is a combination of wind-developer-developed and owned transmission for certain generate assets and transmission-developer developed and owned transmission for certain offshore grid assets?

Who will manage the design, construction & interconnection process?

- ▶ Due to lack of U.S. energy policy, multistate solicitations and cost allocation will present major challenges
- ▶ States will work with multiple agencies and stakeholders to develop common goals and strategies
- ▶ Framework to guide the decision making process will need to define and memorialize roles and responsibilities
 - Address issues that may arise when transmission is split from generation

How will states and regional organizations coordinate together?

► Challenges:

- Track record of northeastern states and their lack of effort to address interstate coordination of offshore wind transmission
- Independent system operators and regional transmission organizations crossing multiple states

► Outlook:

- The variations in individual state energy policies and stakeholder priorities
- It will be essential to develop a coordination plan

How will offshore transmission be regulated?

▶ Current state

- Owners of wind power generation have the right to develop transmission along with their generation projects

▶ Dozens of what-if scenarios

▶ Rules of engagement

- A master plan for offshore transmission must include rules of engagement
- Framework to define and clarify roles for all stakeholders
 - DOE, FERC, NERC, ISO/RTOs, state commissions, state executive and legislative branches, U.S. congress and President
 - Bureau of Oceanic and Energy Management – responsible for leasing underwater lands for energy production
 - Non-governmental agencies

How will transmission projects be financed?

- ▶ Master plan needed to address role of financial sector
- ▶ Private financing requirements
 - Demonstrate good, bankable projects
 - Acceptable return on investment



CREATE AMAZING.