

## Interconnection Process vs Project Development Timeline: Offshore Wind

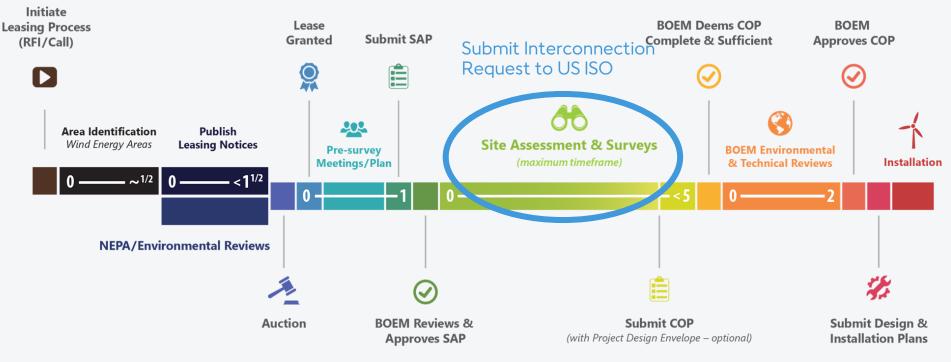
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# When does offshore wind farm design start?

US region specific process

## **US Federal Offshore Wind Process**



Courtesy: Bureau of Ocean Energy Management

### US Offshore wind farm planning and design: An Overview

WTG & transmission technology available

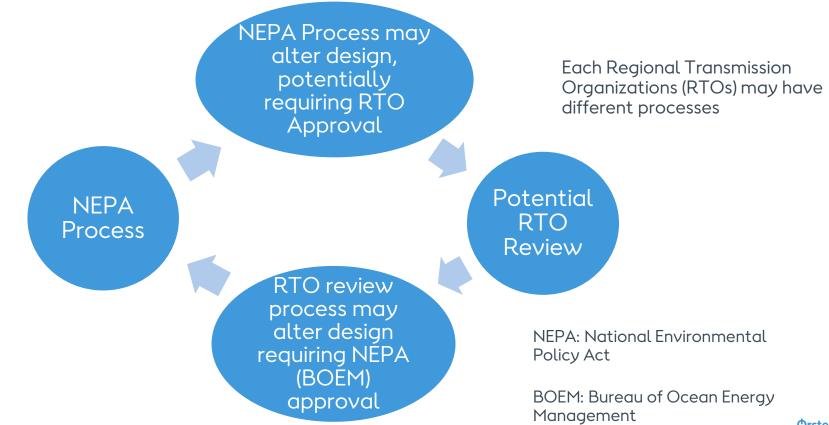
Offshore wind farm planning, design and construction timeline: 6-8 years

Federal, State Permitting process

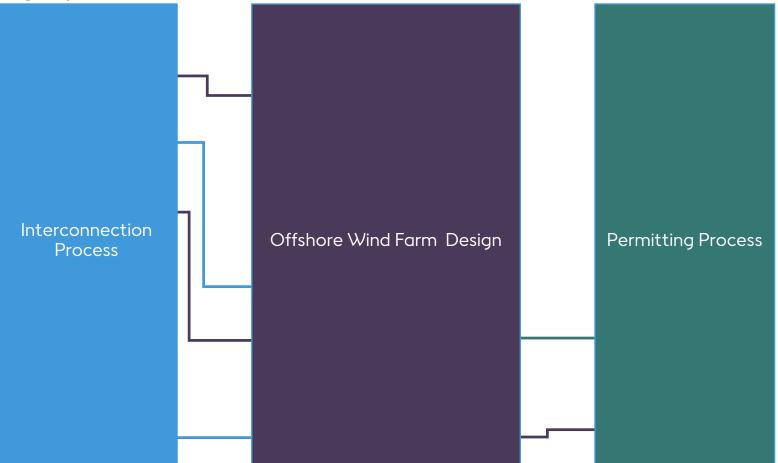
BOEM: Bureau of Ocean Energy Management WTG: Wind Turbine Generator

## Relationship between federal permitting and Interconnection process

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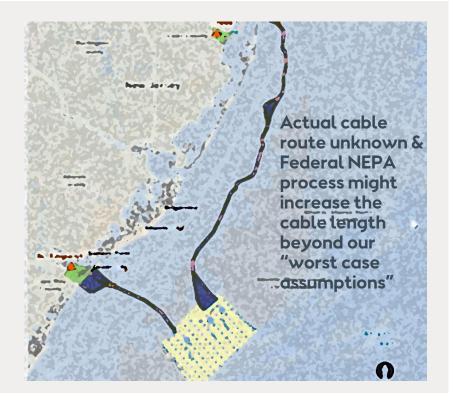


#### **Interplay : Interconnection Process and Federal Process**



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## An example case: Offshore wind farm design & US permitting



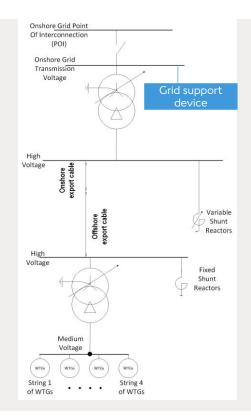
Why does cable length matter?

- Additional reactive power compensation: Will trigger new federal permitting process
- Might decrease the short circuit strength at the WTG terminal, necessitating additional equipment onshore like synchronous condenser. This will require start of new federal permitting process

Federal NEPA process can change WTG rating, number, layout, cable routes, location of reactive power compensation, filter location, etc

## An example case: Offshore wind farm design & US interconnection

- Late stage understanding of grid requirements and stability concerns
  - Most often mitigation requires additional onshore equipment
  - Trigger new federal permits
  - Revised design triggering re-study for the US ISO
  - Challenges in obtaining project specific models from the equipment vendor



### Conclusion

- Accurate transmission grid model/data early reduces offshore wind farm design iterations and minimizes the risk of sub-optimal designs
- Early knowledge of grid code helps mitigate late stage design changes and eliminates the risk of restarting federal permitting process or interconnection process
- Offshore wind farm transmission system plays a vital role in providing grid stability and significantly impacts the plant interaction with the grid.
  - Dynamic device like STATCOM, HVDC converters (if present must be modelled in the planning studies.
  - All other passive balance of plant equipment must be modelled adequately depending on the study type (stability, power quality)
- Coordination between Federal regulatory and interconnection process would reduce the project development cycle time to 5-6years instead of 6-8years.