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Shared Landfall and Cable Route Infrastructure

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BACKGROUND

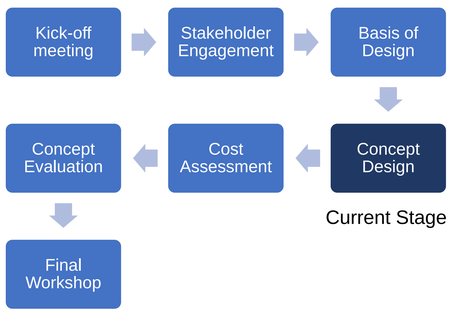
Transmission cables from offshore wind farms in the US such as the New York Bight lease areas are likely to make landfall in congested and sensitive areas where space is scarce and ample constraints exist, causing conflicts between projects, and leading to increased costs and schedules especially for later projects. Furthermore, onshore cable installation is costly, causes environmental disturbance from construction works, and can carry permitting schedule risks, increased costs, and in a worst-case scenario, potential permit approval denial.

OBJECTIVE

An approach for shared infrastructure to accommodate and co-locate cables at landfall and key onshore transmission corridors is proposed to increase cost efficiency and de-risk this element for projects.

The aim of the proposed research is to develop a conceptual design for offshore, landfall, and onshore cable infrastructure that could be shared by two or more different projects. The feasibility of the concept will be evaluated quantitatively and qualitatively with advantages, disadvantages, risks, opportunities, and recommendations for further work identified.

TASKS



RESULTS SO FAR

Basis of Design

A “reference location” was selected for which to base the concept design upon, though a key aim is for the premise of the concept to be universally applicable to other locations. New York Harbor and the Narrows was selected as it is understood to be a key potential pinch point for export cables for New York Bight projects looking to connect to NYISO Zone J.

The Basis of Design was formulated on this basis with the following key points:

- Concept will facilitate cables for at least six circuits. This is based on offshore wind farm projects of approximately 1.2 GW, each connected with a ±320 kV HVDC single-circuit systems. This is a plausible case for the NY Bight projects.
- Each circuit is assumed to be a symmetric monopole HVDC system, with each of two HVDC power cables carrying a maximum of about 2,000 A.

Stakeholder Engagement

The reference location and initial concept design was presented to potential stakeholders including developers and regulatory bodies. The stakeholders showed support and interest in the project. Developers were interested in the following topics:

- Reliability and system redundancy, and treatment by reliability councils.
- Structuring of deliverability, reliability, and performance guarantees.
- Physical security.
- Ownership and development models.
- Number of projects and cables that can be accommodated.
- Cable thermal considerations.
- Permitting process.
- Ability for cables to be accessed and maintained.

These identified topics will be addressed in the concept evaluation task.

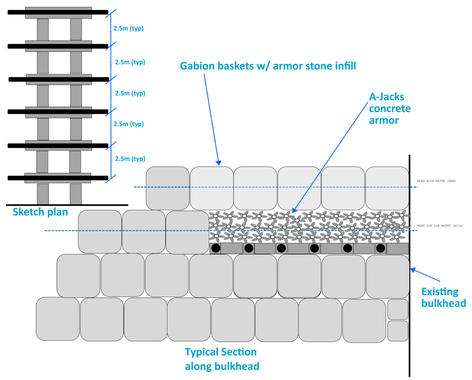
Concept Design

From the reference location selection, the work must address and provide example solutions for both offshore and onshore route constraints, and not just landfall alone.

The initial concept was determined based on three export circuits. The concept uses separate lockable chambers to provide physical security and segregation between assets of different wind farms. The concept provides a potential solution for the offshore route constraints by building up the existing sea defense revetment.

Through the Basis of Design process, we subsequently revised the design to aim to accommodate six export cable circuits. An initial set of thermal calculations were undertaken to understand cable spacing requirements and impact of concrete thermal resistivity. We are building a finite element analysis thermal model and will iterate the design with the results of this model. Currently we are working to refine the concept design through a process where the electrical design and civil design teams work closely together. We aim to develop the infrastructure in a way that enables separation of circuits from a thermal, maintenance, and reliability perspective.

The concept design will be based on an example cable route through the Narrows with landfall in Brooklyn



This revised concept design accommodates six projects (or circuits) and utilizes individual lockable chambers

NEXT STEPS

The concept design task will result in a full package of CAD drawings and visualizations, supported by civil and electrical engineering calculations.

Although the concept design is still underway, we have started the cost assessment task. For this task, we will perform a cost-benefit analysis to fully ascertain the potential cost savings of using such infrastructure in addition to the additional up-front investment required.

The concept evaluation task will be a largely qualitative undertaking to describe construction requirements and cable installation requirements associated with the concept. We will address issues such as electrical redundancy, planning and development, environmental impact, ownership and funding models, permitting framework, and power systems regulatory framework. We will perform a risk and opportunities evaluation as well. This task should address the topics of interest raised by the stakeholders.

The above tasks will be captured in a final report.

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