Optimising Transmission Infrastructure to Deliver Accelerated Offshore Wind

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Introduction

The project aims to develop an optimisation model that analyses onshore and offshore electrical and chemical transmission solutions. The tool produced will enable future projects to be developed with insight into the economic, environmental and technical feasibility. This poster aims to describe the initial methodology and scope of the project with future work leading to model development and results.

Current research in this area includes:

- Offshore cable routing [1]
- Offshore substation optimisation [2]
- Optimisation of offshore wind and offshore hydrogen and ammonia production [3][4]
- Optimisation of gas pipelines [5]

Optimisation of electrical transmission solutions both onshore and offshore is an identified gap in literature that this research aims to address. Developing a single model with capacity to analyse three key areas shown in **Figure 1** is also novel.

Aims

- Design an optimization model that considers cost, environmental impact and technical feasibility for electrical transmission infrastructure.
- Design a tool that can be widely used by the renewable energy industry for future projects.

Objectives

- ❑ Identify cable landfall locations for future grid connections and apply the model to offshore substations.
- ❑ Analyse chemical bulk transfer as an alternative to electrical transmission.

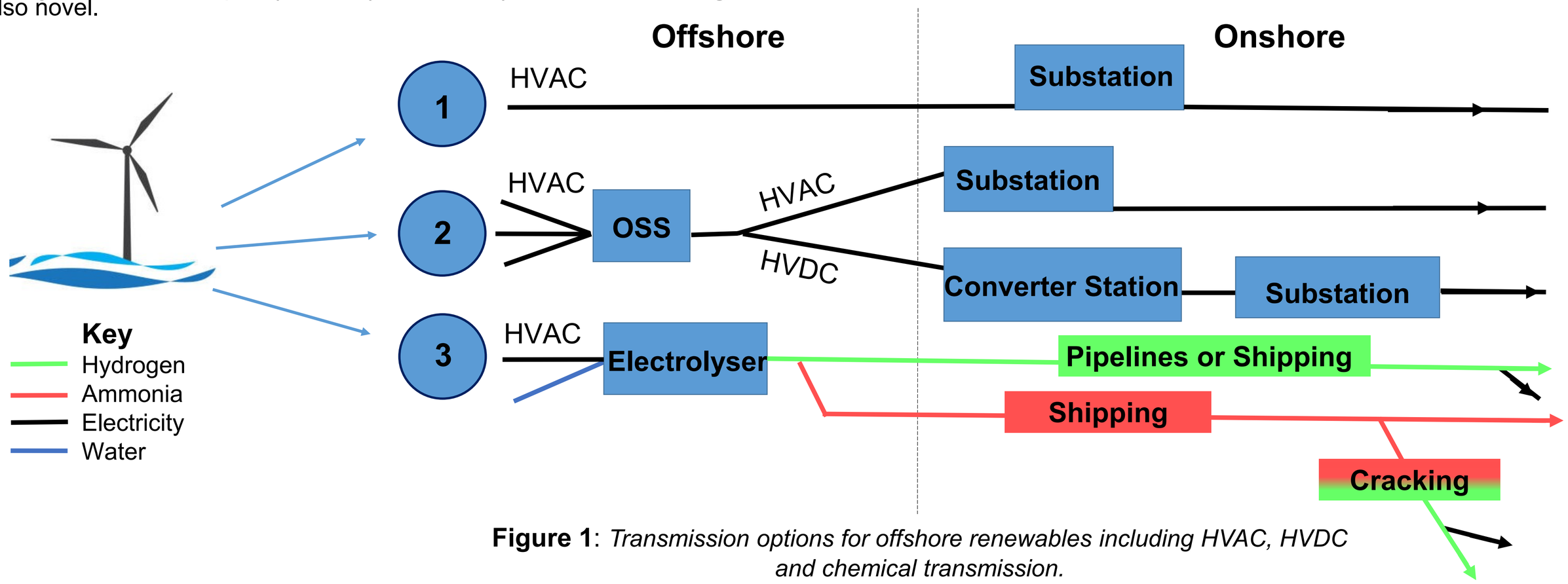
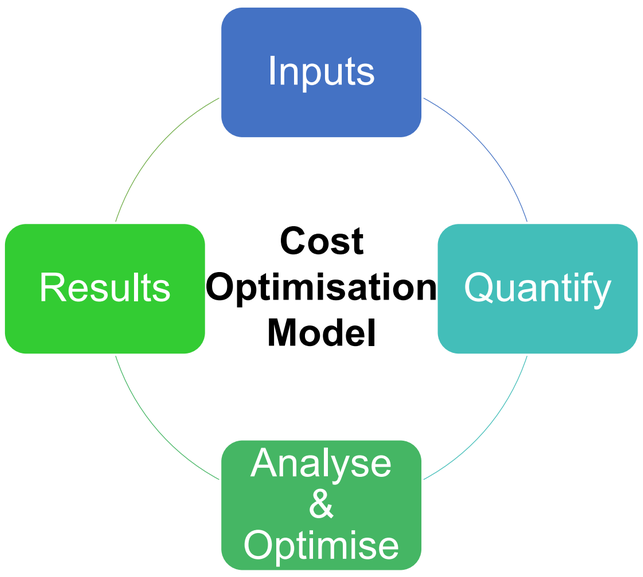


Figure 1: *Transmission options for offshore renewables including HVAC, HVDC and chemical transmission.*

Methodology

The optimisation model is primarily focused on assigning costs to variables under three key options, as shown. These inputs are analysed in the model to produce strategic options optimised in terms of cost, technical feasibility and environmental impact.

Option	Variable
Cable landfall	• Location • Access • Amenity
Offshore substations	• Design • Asset Management • Maintenance
Hydrogen	• End use • Carrier • Transportation



Conclusion

The project scope and methodology have been established to develop an optimisation model that describes functions in terms of minimising cost and environmental impact whilst maximising technical feasibility. The next steps are to develop the model in detail.

Future Work

- Identify input variables and create optimisation functions.
- Build a test optimisation model to validate methodology.
- Create an initial model and analyse results.

References

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