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Appendix A

Requirements concerning the deliveries

**Assessment of technical alternatives to strengthen the
400 kV transmission grid**

Danish Energy Agency

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1. DESCRIPTION OF THE DELIVERIES

1.1 Background

The Danish TSO, Energinet, wants to strengthen the 400 kV transmission grid along the West coast of Jutland, from the city Holstebro to the Danish-German border a distance of 170 km, in order for the grid to be able to manage the large scale implementation of both on- and offshore wind power in the area. Energinet has proposed an overhead line solution; however the Danish Ministry of Energy, Utilities and Climate would like to have a second opinion from international experts whether an underground cable based solution is feasible.

1.2 Deliveries

Energinet has been asked to make a technical statement describing the possibilities for increased cabling and other alternative cabling solutions. The Danish Energy Agency requests the consultant to make an assessment of the technical report from Energinet.

Below is the task description given by Energinet from the Ministry of Energy, Supply and Climate:

“Synopsis of technical report on the use of cable systems in the expansion of the 400 kV grid in Southern and Western Jutland

Background

An adequate and robust electricity transmission grid is necessary for the realisation of the energy policy objectives regarding the integration of renewable energy, security of supply and market development in the energy sector. The electricity transmission grid therefore requires ongoing expansion and adaptation in connection with the introduction of large volumes of renewable energy and the expansion of capacity to trade with neighbouring regions.

The first public phase in connection with the establishment of the 400 kV connection in Western and Southern Jutland between Holstebro and the Danish-German border has given rise to local concerns, calls for full underground cabling, and expressions of doubt in the public sphere as to whether the feasibility of laying underground cables at the 400 kV level is determined by budget, technology or geography. On this basis, a technical report has been requested regarding alternatives to the approved overhead cable connection.

A technical report will be prepared, providing a description and quantifying the total need for expansion and the systematic task to be performed in the future by the electricity infrastructure in Western and Southern Jutland, as regards integration of renewable energy, maintaining security of supply, and facilitating the electricity market at the transmission level. The report will describe the structural composition of the electricity system in Denmark and examine the relationship between the existing system and the need to expand the 400 kV electricity transmission grid. Lastly, the report provides a review of Danish and international practices relating to the use of cables at the transmission level.

The technical report will clarify the potential use of the following technical solutions in connection with the realisation of the identified need for expansion in Western and Southern Jutland:

- *The approved 400 kV overhead line solution (Reference/Alternative A)*
- *The approved 400 kV overhead line solution – with an increased cable share without the need for establishing additional compensation stations (Alternative B)*
- *The approved 400 kV overhead line solution – with an increased cable share and resulting need for establishing additional compensation stations (Alternative C)*
- *Full underground cabling of the current 400 kV connection (Alternative D)*
- *Perspectives for using 150 kV or 220 kV cable systems with full underground cabling (Alternative E)*
- *Perspectives for using direct current connections (HVDC) with the laying of necessary cable systems underground or offshore (Alternative F)*

The technical report must describe technical solutions, including options for the use of an increased 400 kV cable share for the current system project, which can be carried out within the framework of the existing timeline. The report will also describe the consequences of delayed expansion of the transmission grid in Western and Southern Jutland in relation to the approved expansion of the Viking Link connection between England and Jutland, and the related expansion of the 400 kV grid between Northern Germany and Southern Jutland.

The technical report also contains an impact assessment for the potential use of the above-mentioned technical alternatives in the current situation and in relation to the future expansion of the 400 kV grid in Denmark, and its impact on the possibility of realising the energy policy objectives on increased integration of renewable energy, maintaining security of supply, and facilitation of the electricity market.

The technical report must clarify the technical, financial and timeline implications, and the systematic limitations in connection with the potential utilisation of the above-mentioned technical alternatives.

Reporting

Energinet will submit the first draft of the technical report in mid-September 2018, and a final version at the end of September 2018. The technical report will be presented to the Minister for Energy, Utilities and Climate. The Danish Energy Agency will then submit the report for independent assessment by international experts.”

The primary synopsis from Energinet is shown in section 3.

1.3 Time Schedule/Milestones

September 7 th	Publication of tender
September 26 th	Deadline for submission of tender
September 28 th	Publication of final report from Energinet is expected
October 3 rd	The Danish Energy Agency selects a consultant who will be provided with the final report from Energinet
October 8 th	Conclusion of contract
November 8 th	Deadline for submission of report by consultant
Shortly thereafter	Delivery meeting with The Danish Energy Agency
November	Clarification of questions from The Danish Energy Agency

2. MINIMUM- AND COMPETITIVE REQUIREMENTS

2.1 Minimum requirements

During the period from selection of consultant to submission of report the consultant will be given the opportunity to ask questions to Energinet. The consultant also has the opportunity to get a presentation of the report from Energinet.

The product of the consultant’s assessment must be a written report. Prior to submission to the Danish Energy Agency on November 8th the consultant must send a draft report to the Energinet for stakeholder consultation.

Delivery meeting with the Danish Energy Agency, where the outcome of the assessment is presented and where there is scope for in-depth questions on the results. The event may take place via video/Skype.

After the assignment has been submitted, the consultant must be willing to respond to clarifying questions from the Danish Energy Agency during the following month.

2.2 Competitive requirements

The offer will be assessed based on the 3 parameters listed below in priority order:

- Competence within the issues covered in the report, including in particular previous experiences with 400 kV cables, HVAC and transmission systems
- Method of assessment
- Price

3. PRELIMINARY SYNOPSIS OF ENERGINET'S REPORT

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Note: The consultant is asked to review only sections in blue font. Remaining sections constitute either policy background or general information on the Danish power system.

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