Summary of the report on removing the costs for connecting to the national grid for offshore wind power

This is a summary of the Swedish Energy Agency’s report “Slopade anslutningskostnader för havsbaserad vindkraft”, ER 2018:06.

The Swedish Energy Agency was charged with the task of investigating the removal of the costs for connecting to the national grid for offshore wind power. The assignment was carried out in consultation with Svenska kraftnät (The Swedish National Power Grid) and Energimarknadsinspektionen (the Swedish Energy Market Inspectorate).

Removal of connection costs vs. retaining connection costs

The parameters of the assignment given to the Swedish Energy Agency states that the removal of the connection costs to the national grid be investigated. According to the provisions of the Swedish Electricity Act, the connection costs to the national grid includes the additional investment expenses incurred by Svenska kraftnät as a consequence of connecting new electricity generation capacity and normally comprises a small proportion of the total connection costs when connecting an offshore wind farm to the national grid. Simply removing the connection costs to the national grid would therefore have a very limited effect. Given that the reason for removing the costs is to create equivalent conditions for the development of offshore and onshore wind power, the Swedish Energy Agency has interpreted the assignment to mean that it is the cost of connecting offshore wind power to the national grid which is the issues to be investigated. Additional support for this interpretation is found in a clarification in the assignment parameters, which state that the connection costs includes cables and transformer stations.

The appropriate model depends on the intended objective

There are several possible ways of removing the connection costs for offshore wind power. The most appropriate model depends on what the cost-removal is intended to achieve. The assignment parameters state that the reason for the removal of the costs is to make investments in offshore wind power attractive and to create more equivalent conditions for onshore and offshore wind power in other countries bordering the Baltic Sea.
Removing connection costs through relocation of the connection point to the national grid

One possible model for removing the connection costs that has been examined is to relocate the connection point to the national grid close to each offshore wind development, which would entail designating undersea connecting cables as part of the national grid. This model would entail Svenska kraftnät being responsible for the planning, design, construction, and operation of cables up to the point of connection with offshore wind farms. It would also mean that the entire cost of the connection would be borne by Svenska kraftnät.

In the Swedish Energy Agency’s estimation, such a model would not create equivalent conditions between onshore and offshore wind power. This is because onshore wind power, just as is the case with all other electricity producers and consumers, is responsible for any reasonable connection costs that their connection entails for the grid owner. As the connecting party does not need to bear these costs under this model, it not only represents a deviation from the fundamental principles of the Swedish Electricity Act (1997:857), but also means that there are no incentives for offshore wind power producers to select connection locations that are cost-efficient.

According to general cost estimates based on a number of typical scenarios for offshore wind projects from the Swedish Energy Agency’s previous government assignments related to offshore wind power, the costs of removing the connection costs amount to SEK 0.8-1.1 billion per TWh wind power electricity connected. Experiences from both Germany and the Netherlands, who have implemented a similar model—in which the State is responsible for the grid connection cost without having any control over where expansions take place or at what pace—indicate problems involving limited control over connection costs. If Svenska kraftnät is to assume responsibility for installing the connecting cable, there is an increased risk of inadequate coordination between wind farm developers and the grid operator when connecting wind farms to the grid. Basically, all of the actors involved have emphasised the importance of taking into account the potential problem of coordination when designing the model. One solution to this problem which is preferred by many actors is for the project developer to assume responsibility for the construction of the connecting cable.
Promote cost-efficiency through establishing project-selection criteria or creating a grid development plan

There are, however, opportunities to limit costs in the model involving a relocation of the grid-connection point. This would involve introducing selection criteria and minimum requirements for projects that are to be connected and/or having an advanced grid development plan with agreed expansion goals for offshore wind power, similar to Germany’s current system.

Partial removal of grid-connection costs through subsidies for undersea cables.

Because the Swedish Energy Agency does not believe the model involving a relocated grid-connection point fully meets the conditions of creating equivalent conditions for onshore and offshore wind power development and a cost-efficient energy supply, another model for removing the grid-connection costs has been examined. This model involves the introduction of a subsidy for offshore wind power developers to pay for a portion of the connection cost. This subsidy would cover the costs of an undersea cable and associated transformer. This model would create more equivalent conditions for onshore and offshore wind power and would probably minimize the total cost of removing the connection cost. This subsidy would also require some kind of selection criteria or minimum requirements for projects, or a ceiling on the subsidy amount in order to encourage a cost-efficient expansion of the grid. One advantage of this model is that it would likely retain the current functions in the connection process.

STATE-SUBSIDIZED UNDERSEA CABLE

A subsidy for undersea cables has many benefits

In a comparing of how well the two models meet the conditions for the assignment, the Swedish Energy Agency determines that the introduction of subsidies for undersea cables would be more cost-efficient than relocating grid-connection points. If different parameters than those discussed here were to be taken into account, this assessment would, of course, be different.

Both models involve State aid but need to be further analysed

In an overall assessment based on the current legal situation, both of these models would entail the Swedish State, at least in-part, providing subsidizing wind power producers. In regard to how feasible the two models are considering EU regulations on State aid, it has not been possible within the framework of the assignment to conduct a more detailed
analysis of the constitutional aspects of the models for removing grid-connection costs, which would be required in order to assess their feasibility.

**Not possible to create equivalent conditions with other countries**

According to the parameters for the assignment, one of the reasons for removing grid-connection costs is to create equivalent conditions for offshore wind power in other countries bordering the Baltic Sea. The Swedish Energy Agency does not, however, believe that these conditions can be satisfied without major changes to the fundamental dynamics of the electricity market. One of the most important differences is that most of the Baltic Sea other countries have a centralised model in which the State designates areas for offshore wind power, which means that the State has control over where expansion is to take place and at what pace. Sweden has a decentralised model, in which developers select locations for project development, giving the State little control over the choice of location and thereby over the cost of connecting to the grid if the State were to be responsible for the connection costs.

Another important difference compared to other Baltic Sea countries is that they have or are moving over to a tendering system. This means that the question of whether or not the grid connection is included in tenders makes less of a difference in terms of costs from the State’s perspective than in a system with no tenders. In view of the above, simply abolishing the connection costs in a decentralised system such as Sweden’s would not create harmonisation with other countries in the same region as Sweden.

**Concentration on offshore wind power in Southern Sweden not the best solution to the production shortfall**

One positive effect of offshore wind power being expanded as outlined within the parameters of this assignment is that it may create increased production capacity in Southern Sweden, where there is high demand for power. The Swedish Energy Agency does not, however, at present believe that a concentration of offshore wind power in Southern Sweden is the best solution to the problem of a production shortfall in Southern Sweden, even though offshore wind power generally has a greater capacity factor (i.e. the ratio of electricity produced to capacity installed capacity is greater) than onshore wind power. This is because Southern Sweden is in the same weather region as most of the offshore wind farms that have been built in Northern Europe, and Swedish production will therefore vary in the same way as in the rest of Northern Europe. As long as there are limitations in transmission capacity between Northern and Southern Europe, there is a risk that a lot of power will have to be transferred from Southern Sweden to Northern Sweden on windy days with high wind power production throughout the whole area, and from Northern Sweden to Southern Sweden when there is little wind power production. This will also lead to lower revenues from sales of wind power electricity in Southern Sweden compared with the average price of electricity in the Nordic electricity market. It is therefore not certain that the need for investments in the national grid would be reduced or that the variability of the electricity system would be reduced by expanding offshore wind power in Southern Sweden.
Risk factor added for market actors in the electricity certificate system

Removing grid-connection costs will result in changes to the competitive landscape faced by different kinds of electricity generation. This entails increased risks for market actors involved in the electricity certificate system and the risk that other new renewable electricity production may be crowded out of the market. The risk of an excluding effect exists regardless of which model of cost-removal is chosen and depends on how much offshore wind power is built.

Removing grid-connection costs can increase profit-margins in electricity production when there are rapid changes in the electricity system

One potential benefit of removing grid-connection costs is that it would make offshore wind power in Sweden more competitive in a European perspective. As the removal of connection costs would result in an expansion of offshore wind power, it would likely create profit margins in electricity production if there are rapid changes in the market, e.g. if nuclear power is phased out more quickly than expected or there is a sudden drop in acceptance of onshore wind power. This applies for both models, but as the model with relocated connection point is more beneficial for offshore wind power, it is likely that this model would have a greater effect. This will, however, probably not be a challenge until after 2030. If the expansion commences only when the need for additional capacity arises, there is a risk that it will not be possible to bring offshore wind power online in time. This is due to the long lead times required to construct wind farms (according to developers, the first wind farms could be operational by about 2025 if the grid-connection cost removal measure is introduced before 2020). Furthermore, existing wind farm permits expire between 2018 and 2023 (if wind power is not developed in those area or if developers are not granted extensions for development), and it is uncertain whether new permit applications will be submitted or granted, and there are currently long lead times for obtaining both Swedish Environment Code permits and grid concessions.

The short time frame for completing this assignment has resulted in several relevant questions that must still be addressed. These involve the structure of project selection criteria for both models, estimation of a ceiling for the total cost of removing grid-connection costs, financing of the subsidy model, and whether the models are feasible with regard to EU regulations on State aid.