

Subsidy scheme and award criterion for Hesselø Offshore Wind Farm

May 2021

The principles of the subsidy scheme

The concession owner of Hesselø Offshore Wind Farm will receive subsidies in the form of a price premium from the Danish State for a 20-year period. The subsidies will be granted in accordance with a Contract-for-Difference model (CfD-model) which in principle is the same model used for the tender of Thor Offshore Wind farm but adjusted.

The CfD-model used for this tender gives the concession owner certainty for the investment in the long run, but places more short-term risk on the concession owner by exposing the concession owner to market signals. This is done to give a stronger incentive to enhance the socioeconomic value of the electricity production.

The subsidy scheme is a two-way CfD with caps on both the Danish State's payment to the concession owner and the concession owner's payment to the Danish State, which will prevent that neither one carries the full risk of the electricity price developing fundamentally different from the forecast.

The subsidies are given for electricity delivered to the collective electricity grid, where the concession owner themselves must sell the electricity.

20 year subsidy period

The subsidies will be granted for a 20-year period. This period will commence when the last turbine delivers the first kWh, but no later than 31 Dec 2027. It will however be possible to begin the subsidy period sooner if the concession owner should wish so.

The EU state aid regulations stipulate that no subsidies are to be granted beyond the period of depreciation of the expenses for building the offshore wind farm. As a rule of thumb, the DEA has previously used 20 years as this milestone, and this is incorporated in all recent national legislation on subsidies for renewables. This will also be applied in the Hesselø tender and therefore it will not be possible to add on additional months, above the 20 years, to account for the installation process or for hours with no subsidies due to electricity prices being non-positive (i.e. the price is zero or negative).

The price premium and the reference price

The price premium will be calculated as the difference between the offered bid price and a reference price. The offered bid price is a fixed price in "øre/kWh" offered by the concession owner, which will not be indexed.

The reference price is fixed for a period of 12 month and will be calculated by the Danish Energy Agency as a simple average of the electricity prices in the previous calendar year running from 1 January to 31 December. The electricity prices are the hourly spot price in electricity price area DK2 stated by the Nordic electricity exchange, Nord Pool.

The price premium is a fixed amount for one whole calendar year, but may vary in size year by year, depending on the electricity prices in the previous year. The price premium will be calculated in the beginning of each new year.

Hours with prices of zero or below (i.e. non-positive prices) are included in the calculation of the reference price. This is done to ensure that the reference price reflects a measure of the central tendency for the full range of clearing prices in the DK2 electricity market.

Following the state aid regulations, price premium will be discontinued in hours with non-positive prices on the spot market in Nord Pool price area DK2. This means, that in every single hour with non-positive prices, the premium will be discontinued, as opposed to the regulation in some countries, where the premium is only discontinued after six consecutive hours. In Denmark, the 6-hours clause is not used, since it encourages electricity production even when the market price is negative.

The total subsidies in a given hour is the product of the price premium and the output measured for that same hour. Total premium from the State or total payment from the concession owner will be settled on a monthly basis.

The principle in defining the reference price as the simple average of the electricity prices of the previous year instead of the current year expose the concession owner to short-term risk regarding electricity price fluctuations, while the State carries the long-term risks. It is therefore also acknowledged that the increased associated risk may lead to higher offered bid prices and higher overall subsidy costs.

The rationale for letting the reference price in a calendar year be based on the yearly average of the spot price in DK2 the previous year include the following reasons:

1. The use of a reference price fixed for a 12-month period (a calendar year) gives the concession owner an incentive to maximize the market value of the delivered electricity. This is in contrast to an hourly-based “traditional” CfD where the concession owner instead is incentivized to maximize the quantity of the delivered electricity.
2. The rationale for using the previous calendar year’s annual average of the DK2 spot price is twofold: (1) it ensures greater predictability of the annual state budget spending as the premium each year is known and subsidy payment only varies with production; and (2) it further incentivizes the concession owner to consider feasible design solutions of their offshore wind farm that can maximize the market value of the delivered electricity – especially in years of low wind and thus potentially higher average electricity prices.
3. The rationale for the reference prices being based on the spot price is furthermore to incentivize the concession owner to consider feasible design solutions of their offshore wind farm, that may help accommodate any potential long-term increases in cannibalization effects of wind energy production. For example, as wind energy may constitute larger proportions of total electricity production in the region, there could be an increased downward pressure on the electricity prices during periods where wind turbines in Denmark - and possibly neighboring countries - produce electricity. As opposed to this, if the reference price were instead based on the average wind weighted electricity price (i.e. the average electricity price that wind turbine producers sell for, which is generally lower than the average spot price),

the concession owner would not to the same extent be incentivized to accommodate potential long-term cannibalization effects. It can be argued that the concession owner is fit to carry this risk as he can best drive the technical design solutions that can reduce potential long-term cannibalization effects.

It is the DEA's assessment that the subsidy scheme does not lead to any material impacts on the degree of competition in the auction.

The offered bid price will not be indexed

As mentioned above, the offered bid price will not be indexed according to inflation and the tenderers will therefore have to factor in the risk of inflation in the bid price offered. This is in line with previous Danish tenders for offshore wind including Thor OWF. The DEA does not index the offered bid price according to inflation in the interest of avoiding potential adverse adjustments related to a specific choice of indexing methodology.

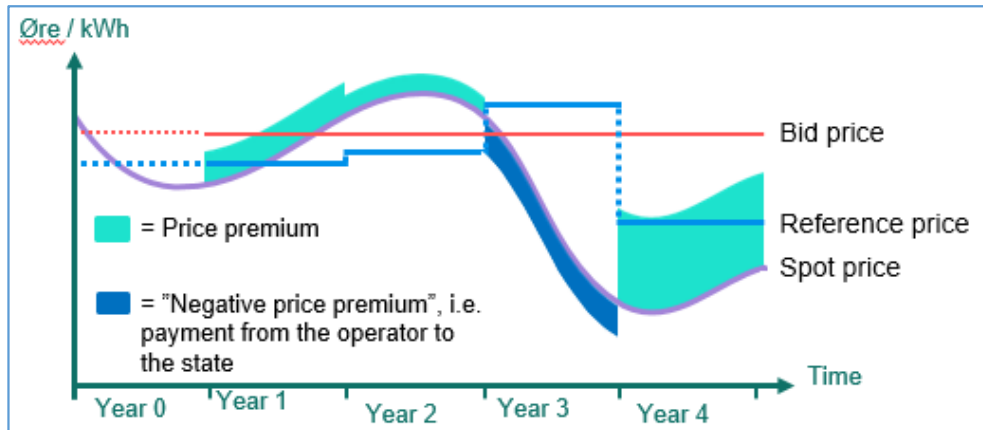
Two-way payment

The CfD model is two-way, meaning that the concession owner receives a price premium in years in which the offered bid price is higher than the reference price, but correspondingly pays the Danish State in years in which the reference price is higher than the offered bid price. The latter will happen if for instance the offered bid price is DKK 0.30 per kWh, while the reference price for a given year is DKK 0.40 per kWh. In this event, the concession owner will be liable to pay the State DKK 0.10 per kWh production delivered throughout the year. There is no opt-out option.

However, the symmetric payment is modified to improve the incentive for the concession owner to produce electricity. This means that in years when the concession owner has to pay the State for electricity production delivered, this requirement will lapse in hours in which the spot price in DK2 on Nord Pool is lower than the size of the concession owner's payment per kWh that year. In the example mentioned above, this will apply in hours when the spot price in DK2 is lower than DKK 0.10 per kWh. This is done to avoid that in years, where the concession owner shall pay the Danish state, periods appear, where the concession owner chooses to stop electricity production even though the electricity price is higher than the concession owner's marginal production costs. This is not considered appropriate from a socio-economic perspective. By having the above mentioned modification to the symmetric payment, the concession owner has an incentive to produce as long as the electricity price is higher than their marginal costs (which is appropriate from a socio-economic perspective), and the Danish state's total revenue is not affected, as the producer without the modification anyhow would have chosen to stop production at lower prices.

Figure 1 below shows the price premium as a product of the difference between the 12-months based reference price and the offered bid price.

Figure 1: Illustration of CfD-model with calendar-fixed yearly based reference price and symmetric payment



Note: Subsidy payments begins Year 1, where the reference price is calculated as an average of the hourly spotprice in Year 0.

Figure 1 illustrates the price premium from the State to the concession owner in year 1 and 2, since in those years the reference price is lower than the offered bid price, because of the average spot prices in year 0 and 1. However, in year 2, the spot price on average is higher than the offered bid price, which makes the reference price for year 3 higher than the bid price and therefore, in year 3, the concession owner must pay the Danish State the difference between the reference price and the offered bid price. The table turns again in year 4, where the concession owner again receives payments from the State.

Caps on payment from both the State and the concession owner

Caps have been included on the total net value of the subsidies that the State can pay to the concession owner and the net value of the concession owner's payment back to the State over the 20-year period. The State Cap has been installed to de-risk the project seen from the Danish State and the Danish taxpayers' point of view. And in return the Concession Owner Cap will de-risk the two-way CfD from the concession owner's point of view.

The State Cap is DKK 5 bn. (2018 prices). The Concession Owner Cap is DKK 2.8 bn. (2018 prices).

The values of the subsidies or the payment from the concession owner will be settled on a yearly basis. The values of both caps are based on real prices (i.e. 2018 prices) and the subsidy payments will therefore be adjusted for inflation every year to their 2018 value.

It should be noted that both caps are net caps. This means, that in situations where the subsidy payments have ceased because the ceiling of the State Cap has been reached, and the concession owner in subsequent years make payments to the State, the value of these payments will be subtracted from the accumulated subsidy payments by the State.

This means that the concession owner is eligible to receive future subsidy payments from the State corresponding to that value. Suppose for example that the State Cap of DKK 5bn (2018 prices) has been

exceeded and the concession owner in subsequent years pays a total of DKK 0.5bn to the State in years where the reference price has been higher than the offered bid price. Then the State Cap is no longer considered to be exceeded and the State is obligated to pay subsidies of a maximum of DKK 0.5bn (2018 prices) in subsequent years where the reference price is lower than the offered bid price.

Award criterion

The award criterion is “Price”.

The tenderer must submit a tender for Hesselø Offshore Wind Farm with a statement of which capacity between 800 and 1,200 MW is offered to be established as well as offer a price in “øre” per kWh.

The concession contract will be awarded to the bid with the lowest offered price per kWh if the bid is within the budget evaluation threshold (see below). If the bid is not within the budget evaluation threshold, awarding of the concession requires the approval of the parties to the Climate Agreement of June 2020. In case the parties to the Climate Agreement decide that the total subsidy costs are too high, the DEA will not award the concession, and the tendering process will be forfeited.

If two or more bids have the exact same offered price per kWh, and these are the bids with the lowest price per kWh, the bid with the highest capacity (MW) will be chosen. If the bids have the exact same offered price per kWh and the exact same capacity, the winning bidder will be chosen through lottery.

Budget evaluation threshold

As is the case with the tender of Thor OWF, the tender of Hesselø OWF has a budget evaluation threshold. For Hesselø OWF, the budget evaluation threshold is “net subsidy expenditure for the Danish state over the 20 year period of zero in 2018-prices [€/DKK 2018 0]”.

This means that a bid is within the budget evaluation threshold if at the time of evaluating the bids it is expected that the offered price and the amount of electricity generated due to the capacity of the wind farm, over the 20 years will lead to subsidy expenditures in the two-way CfD for the Danish state of zero or less.

The budget evaluation threshold of net zero subsidy expenditure for the Danish state over the 20-year subsidy period is only relevant when the bids are evaluated. It has no influence on the actual value of subsidies paid out over the 20-year-period.

Calculation of the expected subsidy costs of tenders

For any bid on MW-capacity (K) and a CfD price (b), the DEA will calculate the bid’s associated expected subsidy expenditures based on the following parameters: an assumption about when the 20-year subsidy period begins; average annual full load hours (FLH), DEA’s chosen electricity price forecast over the subsidy period (p); and inflation forecast (r), which is used to calculate the discount factor, or deflator d_t , for each period in order to convert nominal prices to 2018-prices. Those of the parameters decided by the DEA that are not given at this point in time, will be made public with the tender conditions in Q3 2021 and will not be changed thereafter.

The Net Present Value of the expected profile of subsidy payments for each bid is calculated in order to compare it to the budget evaluation threshold using this formula:

$$NPV E = \sum_{t=1}^{20} \frac{(b - \bar{p}_{t-1}) \times K \times FLH}{d_t}$$

Here \bar{p}_{t-1} refers to the average spotprice in the previous year and d_t refers to the discount rate for the relevant year.

The tender material to be published in Q3 2021 will include an annex with examples of bids and their calculation, where tenderers can calculate the total subsidy costs over the 20-year period using the above formula and comparison with the budget evaluation threshold can be made.

Other issues

Costs to be included in the bid price

Besides the tenderer's own expenses to the project itself, the tenderer should take account for the following expenses in the bid:

- The establishment costs of Energinet's substation at the point of connection at Hovegård are to be paid by the concession owner. The figure is expected to around DKK 250 mill. (excluding VAT), corresponding to approx. EUR 33 mill. in current 2021-prices. The figure can be updated in the final tender material in 2022.
- The cost of site-investigations (geo-technique and geo-physics, MetOcean and environmental surveys) undertaken by Energinet are to be paid by the concession owner. This bill is currently expected to be DKK 236 mill (excluding VAT), corresponding to approx. EUR 31.5 mill. in current 2021-prices. The concession owner shall not pay for the undertaking of the Strategic Environmental Assessment (SEA), which is not included in the mentioned figure.

Please also be aware of the following expenses to be included as part of the concession owner's own expenses

- Any cost associated with procuring the rights of landuse for the approx. 50 km onshore cables from shore to the point of connection at Hovegård.
- The expenses for the feed-in tariffs for electricity delivered to the collective electricity grid at Hovegård. The concession owner will not be compensated for the feed-in tariffs. Currently the feed in tariff is DKK 0.003/kWh, but it may be adjusted in the future. Please consult Energinet's page on tariffs here: <https://en.energinet.dk/Electricity/Tariffs>
- Cost associated with balancing. The owner of Hesselø Offshore Wind Farm is allowed to optimize imbalances across their assets within DK2, since imbalance settlement is done on a portfolio basis separately for each price zone (i.e. Western Denmark (DK1) and Eastern Denmark (DK2), cf.

“Regulation C2: The balancing market and balance settlement”, section 3.4. The market regulation C2 can be downloaded here: <https://en.energinet.dk/Electricity/Rules-and-Regulations/Archive-Market-Regulations>

License for electricity production

The license and authorization relevant for the operation phase will be given for 30 years, with the possibility of 5 years prolongation if allowed at that point in time.

Renewable Energy Certificates

The concession owner can apply for issuing of RECs (Renewable Energy Certificates, in Danish “Oprindelsesgarantier”) at Energinet for electricity delivered to the collective electricity grid at Hovegård. Issuing etc. of REC’s is regulated in Executive Order no. 1323 of 30th November 2010, amended by Executive Order no. 138 of 10th February 2012.

Electricity used to produce hydrogen is not expected to be eligible to receive RECs, cf. new regulation, which is still under consideration and planned to enter into force on 30 June 2021. The new legislation will change the rules in the Executive Order mentioned above. According to this new legislation, the hydrogen produced is expected to be eligible to receive RECs if fed into a gas grid. Possible further regulation on RECs for hydrogen which is not fed into a gas grid is under consideration and might enter into force by 1 January 2022.