Reservation price for Sørlige Nordsjø II

Additional advice regarding reservation price and inflation adjustments

To: The Ministry of Oil and Energy
From: Vista Analyse and Guidehouse
Date: 04.05.2023

1 Background

The Ministry of Oil and Energy published the tender documents for the auction for offshore wind for Sørlige Nordsjø II (henceforth SNII) on 12th April 2023.

In this document the reservation price is set at 66 øre/kWh. There is a worry that this is too low. This reservation price has been calculated by the Ministry based on the LCOE estimated by NVE, with an additional margin of 15 percent. This method is in accordance with our advice given in the report for task 3 and 4. There are three reasons why the reservation price chosen by the Ministry may nonetheless be too low:

1. The LCOE estimate used was calculated in 2021. In the period since then, the inflation in Norway has been high. The exchange rate for the Norwegian kroner has also been very weak (contributing to the high domestic inflation), which is probably of equal relevance for bidders with costs in other currencies.
2. The LCOE estimate by NVE is a real price, whilst the reservation price is a nominal price and the CfD-price will not be inflation-adjusted for the duration of the support period. In our report from task 1 we recommended that the CfD price should be inflation-adjusted, which was consistent with using a real LCOE price as basis for the reservation price. However, in the report from task 3 and 4 the advice was changed to having a nominal CfD-price during the support period, in line with common practice, and this contributes to the challenges which we will investigate in this memo.
3. The LCOE estimate is sensitive to the discount rate chosen, and it may be advisable to choose the LCOE estimate from NVE that is based on the higher discount rate.

Each of these factors are independently reasons to raise the reservation price. The total effect of taking alle of these into account is described in the last section of this memorandum.

Before discussing these two issues in the next sections, it is useful to briefly refer to what considerations are relevant in setting the reservation price. The report from task 1 states that the reservation price "should be seen as a safeguard against the risk of inadvertently awarding the project to very high-priced bidders, not as the mechanism by which RE prices are driven downwards – that should be achieved through competition". Use of an estimate of the LCOE plus a considerable margin is simply a method to achieve this aim. Since the LCOE is uncertain, a margin is needed to ensure that the reservation price is not set too low. With sufficiently robust competition there is little downside to setting a high reservation price. A too low reservation price could however lead to the auction failing.

2 Inflation adjustment and the reservation price

2.1 Inflation between LCOE calculation and start of inflation adjustment

There are several related issues concerning inflation and the reservation price. The first and simplest is the effect of inflation between the calculation of the LCOE by NVE and the announcement of the auction rules. NVE calculated the LCOE in 2021 as a real price. Between 2021 and March 2023, the total CPI inflation in Norway has been 9.9 percent (according to Statistics Norway – SSB). This alone removes much of the margin between the estimated LCOE and the reservation price. NVE has provided several different estimates of the LCOE, with low, basis and high estimates and two different discount rates. We understand that the Ministry has used NVE's high estimate with the lower discount rate, which gives an LCOE of 57 øre/kWh (and 65.55 including a 15 percent margin). Adjusting for the accumulated inflation since 2021 of 9.9 percent gives an LCOE of 63 øre/kWh, which removes most of the margin.

In the description of the support system in appendix 5, it is specified that the contract price will be inflation adjusted from the first quarter of 2024 to the time production starts. This means that inflation during the rest of 2023 is also relevant. SSBs prognosis for the level of inflation for 2023 as a whole is 5 percent. This means that the total inflation between NVEs estimate of the LCOE and the point at which the inflation adjustment of the contract price will start will be approximately 15 percent. Based on this alone, there is potentially no margin left between the reservation price and the LCOE.

If one uses the same LCOE estimate as the Ministry but takes into account the total expected inflation from the time NVE estimated the LCOE for SNII to the first quarter of 2024, and adds the 15 percent margin, the reservation price should be set at approximately 75 øre/kWh. Note that this is only based on taking into account the effect of inflation prior to the start of inflation adjustment alone. Other elements will be discussed in the following paragraphs.

2.2 Inflation during the project period

The second issue relating to the reservation price and inflation stems from the fact that there will not be any inflation adjustment of the contract price after the start of production. This is in line with the advice given in the report for task 3 and 4.

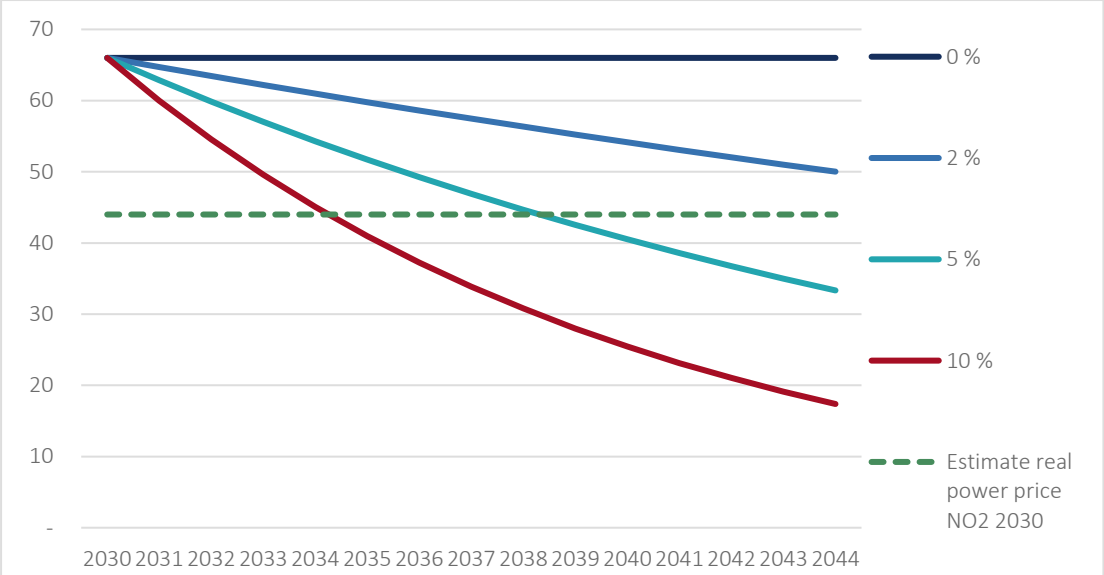
This means that the bidders must discount the future payments from or to the government using a nominal discount rate, i.e. a discount rate equal to the sum of the real discount rate and the expected inflation.

However, NVEs estimate for the LCOE does not take into account inflation. The LCOE estimate is the *real price* throughout the lifetime of the wind park, which leads to break-even. But the actual nominal price which the wind park will have to receive to break-even, which is the relevant figure for comparison with the reservation price when the contract price is not inflation-adjusted, is higher.

A higher discount rate due to the effect of inflation during the project period, will reduce the present value of the income generated. This means that the reservation price must be set higher. How much higher depends on the expected inflation rate during the project period. The current Norwegian inflation target is 2 percent. If this target is seen as credible by the bidders, it could be sufficient to add 2 percent to the discount rate used. This alone would raise the LCOE plus 15 percent margin and inflation adjustment to approximately 90 øre/kWh.

There is however a risk that the current high level of inflation causes bidders to expect or fear higher inflation, especially early in the production phase. Inflation early in the production phase would have an outsized impact on the profitability of the plant, as it would erode the value of all future payments.

Figure 2.1 Real value of the reservation price in fixed 2023-kroner (øre/kWh), with different rates of inflation.



Source: *Vista Analyse*

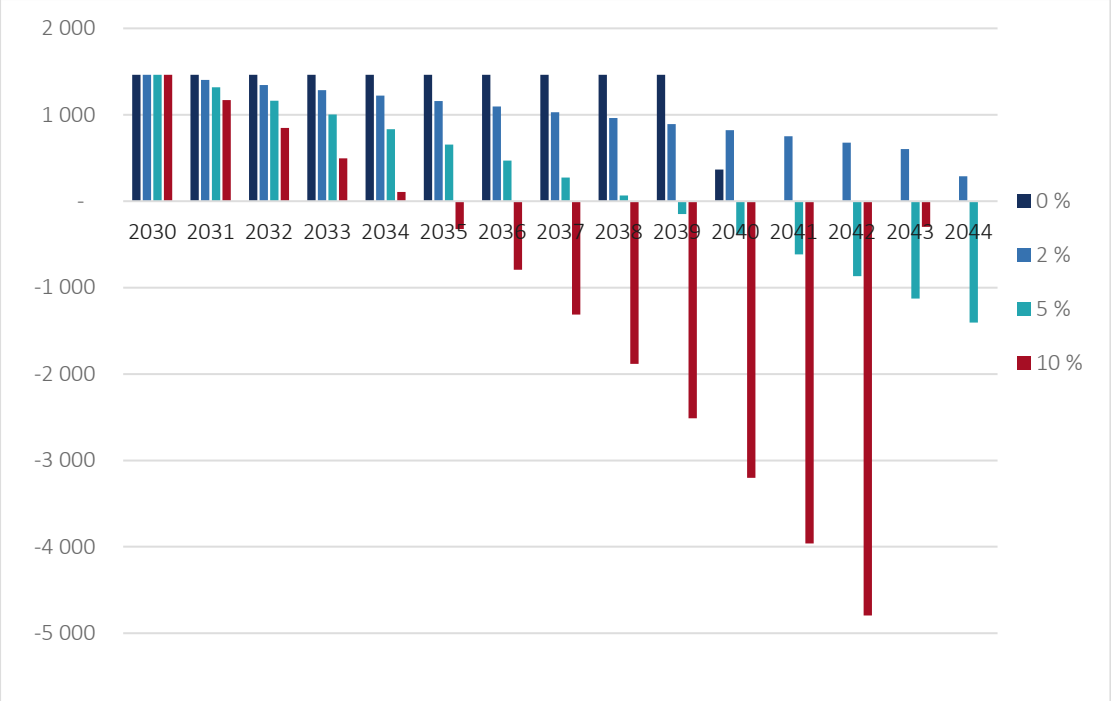
Figure 2.1 illustrates the effects of inflation on the real value of a non-inflation adjusted reservation price. The dark blue line shows the real value of the reservation price, with no inflation. In that case the real value is fixed. With 2 percent inflation, the value drops gradually and in 2044 at the end of the 15-year support period, the real value of the reservation price, expressed in fixed 2023-kroner is 50 øre/kWh. With an inflation of 5 or 10 percent, the real value becomes quite low, quite rapidly, and is as low as 33 and 17 øre/kWh respectively in 2044 at the end of the support period. This means that any bid that expects a high level of inflation, must bid at a high level, in order to get sufficient income in the first years of operation to make the project profitable.

This is further complicated by the possibility of payments to the state from the operator later in the period due to the value of the contract price falling below the market price as inflation drives up the nominal market price. The dotted green line in the figure shows NVEs estimate of the power price in NO2 in 2030, marked as a fixed real price. With 5 or 10 percent inflation, the reservation price ends up

being below this estimate of the expected market price by 2039 or 2037. This means that even a bid at the reservation price, will result in payments from the bidder to the state.

Figure 2.2 shows the expected annual payments from the state to the operator each year of the support period (with negative values indicating payments from the operator), with a winning bid at the current reservation price of 66 øre/kWh, a real average power price at the level estimated by NVE for NO2 in 2030 (44 øre/kWh), at different levels of inflation. It is assumed that the nominal power price in the market increases in line with the inflation rate. The figure takes into account the nominal cap of 15 billion NOK on total net payments in either direction.

Figure 2.2 Expected annual nominal payments (in Mkr) with bid at reservation price, and power price at NVEs estimate for NO2 in 2030, adjusted for inflation



Source: Vista Analyse

Figure 2.2 shows that with an inflation rate of 5 or 10 percent, there will be significant net payments from the operator to the state towards the end of the support period. With 10 percent inflation, the cap on payments from the operator to the state of 15 billion NOK is reached early in the second last year of the support period. The net present value of the support payments in 2030 is 2.5 billion NOK and -0.9 billion NOK for 5 and 10 percent inflation respectively (calculated with a discount rate of 6 percent plus the inflation rate). Note that the negative net present value of the payments does not necessarily make the project unprofitable, as the net revenue is the market value of the production plus the support payment. It does however illustrate that with a sufficiently high expected inflation, even a bid at the reservation price entails a payment from the bidder to the state in present value terms.

With inflation at 2 percent, there are payments to the operator every year of the support period, but the cap of 15 billion NOK is reached during the last year of operation. The net present value of the support payments is 9.4 billion NOK. With zero inflation, the cap is reached in the tenth year of the support period, and the net present value is 11 billion NOK.

This shows that if the inflation is close to, or at the current inflation target of 2 percent, the effect on the operator's expected revenue is modest. If the bidders' expectation is that inflation will be under

control during the support period, this issue will not adversely affect the auction. If inflation nonetheless ends up running high during the construction phase, before the support period starts, this could lead to the winning bidder either wanting to drop the project or delay its start until the inflation diminishes to avoid the adverse effects of high inflation in the beginning of the support period. This is an issue the Ministry should be aware of in the project phase. A possibility could be to announce an intention to open up for ad hoc inflation adjustments early in the support period if the inflation becomes unexpectedly high. Regardless of where the reservation price is set, the closer the winning bid is to the expected market price, the more important inflation becomes for the bidder as the risk of payments to the state late in the support period solely caused by inflation increases.

In the task 1 report the advice given on the cap on payments was that it should be set high enough for it to be unlikely to be reached. The possibility of reaching the cap could adversely affect the auction result. The calculations shown in Figure 2.2 demonstrate that the cap could potentially be reached.

3 Choice of discount rate

NVEs calculation of the LCOE from 2021 shows two different sets of numbers, one calculated with a discount rate of 4 percent, and one calculated with a discount rate of 6 percent. It is our understanding that the Ministry has based its choice of reservation price on the LCOE calculated with a discount rate of 4 percent. It is the Norwegian state's position that private companies should consider future payments from the state that they are legally entitled as risk free, and therefore discounted at a low rate. This has been an issue in inter alia, the Norwegian petroleum tax. Since the CfD guarantees a fixed price for the duration of the support period, one could argue it follows from the position the state has taken on the appropriate discount rate for state payments that a low discount rate of 4 percent is appropriate.

There are however risks for the operator with regards to the payments of the CfD that go beyond whether the state will honour its commitment. The total payment depends also on the level of production, it can be affected by the cap, and as we have shown in the previous section, it is highly dependent on a low and stable inflation rate. These risks could be an argument for a higher discount rate being used. 6 percent is in itself not a particularly high discount rate for investments in the private sector. The LCOE calculated by NVE with a 6 percent discount rate is 68 øre/kWh. Adjusting for the expected level of inflation between 2021 and the first quarter of 2024, as described in 2.1, brings that sum to 78 øre/kWh. Adding a further 15 percent margin in accordance with the advice given in the Task 3 and 4, would raise the reservation price to 90 øre/kWh.

In addition, the LCOE calculation itself should discount earnings in the support stage by the nominal discount rate, i.e. the real discount rate of 6 percent plus the expected level of inflation of 2 percent. This gives an LCOE of 80 øre/kWh.[1] Adding the inflation adjustment from 2021 to 2024 and the 15 percent margin this gives a reservation price of 106 øre/kWh.

4 Conclusion

There are several factors that all contribute to chosen reservation price being too low. The effect of inflation since the publication of the LCOE estimate is a straightforward issue, that can easily be

[1] The calculations have been made by manually changing the parameters in NVEs spreadsheet.

explained. Taking into account inflation in the discount rate used in the LCOE calculation, and choosing a higher discount rate due to the risks faced by the operator is a somewhat more complex issue to explain to the public. We do however recommend that the Ministry adjust the reservation price according to these factors as well. That would give a reservation price of 106 øre/kWh. If this is considered too high, it is possible to not change the discount rate as described in section 3, which would give a reservation price of approximately 90 øre/kWh.

Figure 4.1 shows the expected annual payments for different levels of inflation with bids at a reservation price of 106 øre/kWh, and with a real market price of 44 øre/kWh, that increases with inflation.

Figure 4.1 Expected annual nominal payments (in Mkr) with bid at reservation price of 106 øre/kWh, and power price at NVEs estimate for NO2 in 2030, adjusted for inflation

Source: *Vista Analyse*

This shows that with this higher reservation price, the cap is reached rapidly in most inflation scenarios, with zero payments from 2034 or 2035. The cap therefore effectively limits the costs for the state. The present value of payments varies less with different levels of inflation. It is 13.1 billion NOK with zero inflation, 12.5 billion NOK with 2 percent inflation, 11.8 billion NOK with 5 percent inflation and 9.1 billion NOK with 10 percent inflation. That the level of inflation is less important for the net present value of the payments for the bidder is a desirable property. That the cap is reached rapidly means that the actual difference between bids near the reservation price is quite small, since a lower bid only means slightly delayed payments and a slightly lower present value of payments. Setting the cap somewhat higher, would alleviate this issue.

When the reservation price is adjusted to take into account inflation, it is also logical to adjust the cap on payments, which may be too low. If it is adjusted by 15 percent in line with the inflation adjustment from 2021 t0 2024, this gives a new cap of 17,25 billion NOK.