SUMMARY

CONTRACTS FOR DIFFERENCES

Assessment of the design of contracts for differences for offshore wind development on the Norwegian continental shelf

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Preface

Menon Economics analyses economic issues and provides advice to businesses, organizations, and public authorities. We are a consulting firm operating at the interface between economics, politics, and markets. Menon combines social and business economics expertise in fields such as social profitability, economic impact, business and competition economics, strategy, finance, and organizational design. We use research-based methods in our analyses and work closely with leading academic environments in most fields.

This is the English summary from the published report "*Differansekontrakter - Vurdering av innretning av differansekontrakter for utbygging av havvind på norsk sokkel*". The entire report in is available in Norwegian on our website www.menon.no

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Summary

In this report, we have assessed how contracts for difference (CfD) should be designed to promote the development of large-scale offshore wind on the Norwegian continental shelf. The analysis is based on current practices in European support systems and existing literature on the subject. We then assess the relevance of technology and the market for offshore wind development in Norway. The focus has been on floating offshore wind, which is still at a pre-commercial stage and will depend on subsidies to ensure commercial profitability over the next decade. However, there are many similarities between the assessments of CfDs related to bottom-fixed and floating installations. We have specified this where we believe that technology-specific aspects must be considered.

Contracts for difference are the preferred support regime, but there is considerable variation in current practices.

Previous studies have indicated that contracts for difference are the preferred instrument for realizing large-scale offshore wind on the Norwegian continental shelf. Menon Economics discussed eight different support systems for floating offshore wind.[1] In the study, we found that contracts for difference particularly stand out in terms of cost-effectiveness. Menon's conclusions are supported by Copenhagen Economics[2] (2020) and Oslo Economics[3]. Specifically, these studies highlight the ability of CfDs to mitigate the wind farm operator's market risk, combined with the fact that the operator gets *sufficient* profit optimization incentives. Menon also points out that contracts for difference reduce the risk of overcompensation.

Our review of current practice shows that CfDs are increasingly used to achieve commercial profitability for European offshore wind power development, which is supported by the European Commission's work in this area. However, there are many details and nuances in the design of such contracts that affect the distribution of risk between the government and the wind farm operator, as well as the incentives to optimize the profitability of the power production.

The challenge is that there is a trade-off between risk reduction and optimization incentives, which is reflected in considerable variation between countries regarding how the contracts are designed. On the one hand, risk reduction lowers the required rate of return, financing costs and thus the necessary subsidy level. Although the risk reduction is a transfer of risk from the operator to the state, there is a broad consensus that such redistribution reduces the socio-economic cost. This is because the government is better able to bear the risk related to power price developments, which are largely influenced by political decisions. On the other hand, increased market exposure has the opposite effect, but increases the operator's incentive to optimize power production, either in the wholesale market for electricity and/or for alternative use. From a socio-economic perspective, it is important to assess whether this benefit is greater than the cost associated with increased risk premiums in the tenders. The effect of increased incentives to optimize production will vary with technological maturity, as well as market developments in the power market, both nationally and regionally. Furthermore, political guidelines will for example affect the value of a direct connection to hydrogen production and supply in the Norwegian power market.

[1] *Menon Economics (2020). Virkemidler for å realisere flytende havvind på norsk sokkel. Norwegian report available here.*
[2] *Copenhagen Economics (2020). How to provide the cheapest green elecitricity: Concession payment versus Contract for Difference in offshore wind auctions. Available here.*
[3] *Oslo Economics (2022). Vurdering av utvalgte støtteordninger for flytende havvind. Norwegian report available here.*

There is some degree of flexibility in the design, but some aspects are essential to ensure socio-economic cost efficiency.

Our analysis indicates that there is significant flexibility in the design of a Norwegian subsidy scheme based on contracts for difference (CfDs), but there are some solutions that stand out. In particular, we recommend choosing a **two-sided CfD**. Two-sided contracts for difference reduce the risk of overcompensation and support the cost-effectiveness of CfDs due to the risk allocations between the state and the offshore wind farm operator. This strength contributes to the wide-spread use of two-sided CfDs in current European practice. In the few countries that employ one-sided contracts, the state only bears the downside risk. In these cases, offshore wind projects are often bottom-fixed, situated in highly advantageous locations, and have unit costs close to the expected prices in the power market.

In a two-sided CfD, the definition of the reference price largely determines the *degree* of risk transfer, and thus the degree of market exposure for the wind farm operator. **A reference price that is linked to an hourly spot price**, as in the British system, provides effective risk reduction and thus a lower expected subsidy level compared with other solutions. This model is preferable if the primary goal of Norwegian energy policy is to realize offshore wind farms in order to develop value chains and technology, and to ensure sufficient access to renewable energy. A British model could be implemented quickly and efficiently as it is well-established and well known among stakeholders. The downside is that it results in low incentives for value optimization. For floating offshore wind, however, we argue that the benefits of increased incentives for value optimization are low. The reason for this is that the focus, at least in the short term, will mainly be on cost reduction and overall concept development rather than incremental optimization to exploit short-term fluctuations in the wholesale market.

As the technology, value chain, and market solutions for offshore wind mature, ensuring sufficient incentives to optimize the value of power generation will become more important. A reference price calculated as an average of the power price over a period (e.g. the last month) will then be more relevant. In such a model, operators are protected against large and long-term fluctuations in the power market, while at the same time having an incentive to produce when prices are high. This can, among other things, affect operations (timing of maintenance work, downtime, etc.) and increase incentives to establish flexibility on the production side if the technology allows it. In the long term, we would particularly recommend considering a model with a **wind-weighted average price**. In addition to the effects we have described, such a model protects the operator against risks related to the scope of future wind power development, often referred to as a "cannibalization effect", which largely depend on political choices. From a socio-economic point of view, however, it will be necessary to assess whether the benefit from increased optimization incentives is greater than the cost - a higher risk premium in the tenders, as well as administrative costs in implementation and operation.

Regarding volume caps, we believe there is **no reason to deviate from the current practice of limiting contract length**. Current trends also indicate that the number of years *without* risk reduction should be at the lower end of the range of current support regimes we have analyzed. As the lifespan of wind farms is increasing, this means that **future contracts should be longer than previous contracts in Europe**, where contracts of between 15-20 years have been the norm. However, we also argue that it should be considered to allow for flexibility in the share of production that is covered by the contract. This could provide incentives for the operator to find alternative uses of power throughout the entire lifetime through, for example, hydrogen production and long-term supply to industrial customers.[4] Such a model also allows for flexibility in the tendering process regarding

[4] Similar to an average reference price, a flexible share of covered production will also provide incentives to optimize operations and maintenance.

how much of the (ongoing) production should be covered by the contract. In this way, the operators themselves can assess whether it is possible to increase project profitability via alternative use compared to a higher risk reduction. A flexible share of covered production differs significantly from current practice, and we point out several aspects that must be thoroughly investigated before any implementation is considered. As mentioned above, the effect is limited by technological maturity, which suggests that a flexible share of covered production will only be relevant for potential sites that are opened for bottom-fixed offshore wind in the future.

By introducing a cap on the subsidy, the government's budget risk is reduced. However, our survey shows that this is not common among other European countries. We acknowledge that this may be useful from a political perspective for planning public budgets and for increasing predictability in government spending. However, **a maximum subsidy amount is not recommended from a socio-economic perspective**, as it reduces the cost-effectiveness of the support scheme. The reason for this is that the market risk increases when a cap is set on the total subsidy amount, but at the same time not providing any benefit in terms of the operators' incentives for value optimization.

However, we believe that the **contracts for difference should include an inflation adjustment**. We have not concluded how this should be designed. Other countries in Europe have varying practices in this regard, both in terms of whether strike price levels are adjusted for inflation and, if so, which price indices are used as a basis. A CPI-based adjustment, as used in the United Kingdom and Poland, results in minimal distortion effects regarding technological orientation compared to indexing based on, for example, commodity prices or a pure "wind index". France is an example of a country that uses a more sophisticated index.

The last parameter we have evaluated is the possibility to exit a contract. Here too, our survey shows that practices vary. In France, for example, the practice is that the operator must repay all previously received support in the event of withdrawal from the contract. **We see no reason why it should not be possible to have an "option" to withdraw from the contract, provided that the authorities can demand compensation for this.** The compensation to the authorities should be negotiated between the operator and the authorities on commercial terms. An option to withdraw without compensation would increase the risk of overcompensation and undermine the socio-economic strengths of contracts for differences and is therefore not recommended.

EU regulations have little impact on the design of CfDs.

In reviewing the EU guidelines on state aid, we find no conflicts regarding our assessments of the aforementioned parameters. Contracts for difference established through competitive bidding processes are currently the preferred support mechanism for renewable technologies in accordance with the EU's guidelines. The limitations primarily lie in the allocation of licenses, which is beyond the scope of this analysis. We find exceptions regarding support in the case of negative prices, but this does not conflict with the explanation above.

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