Bodecker Partners June 2018

# Elcertificates

Welcome to the third electricity certificate report of this year!

Our goal with this publication is to provide our readers with insight into the most important events with an impact on renewable energy build-out and the electricity certificate market. This year we follow, with great interest, the falling surplus, the investigation on a stop mechanism, investments in wind- and solar parks and much more. In addition, interesting interviews and insightful chronicles.

In this issue, we get a deeper insight into how banks view market development and if increasing prices have affected requirements on long-term hedges. Fredriks chronicle describes alternatives to extended low-prices PPA agreements in »the wind power company as merchant energy trader«.

Please visit our webpage or, even better, visit us »live« in the beautiful west harbour of Malmö!

# A Sammanfattning



**STOP MECHANISM** design has become a bit clearer after presentations from the Swedish and Norwegian energy agencies. A pure volume limit or a volume limit with a scale-down approach seems to be the main options. Decisions can be taken at the earliest next spring and implementation possible from January 1, 2019.

**GUARANTEES OF ORIGIN** may be threatened if the dispute between Polarbröd and the Consumer Agency ends up badly. At the same time, the interest in GoOs on the continent is increasing, and the price has risen by 300% in the last year.

**EU RENEWABLE- AND EFFICIENCY TARGETS** are finalised. Compromise decision is 32% resp. 32.5%

**IN GERMANY**, the process of determining a plan for coal phase-out and grid expansion has been started. Furthermore, the country has held its first auctions for solar and wind where solar won all bids.

**POWER PRICE FORECASTS** have increased further in light of rising fuel and CO2 prices. More upside is expected, but short-term factors such as low hydro balance may have had a too large effect.

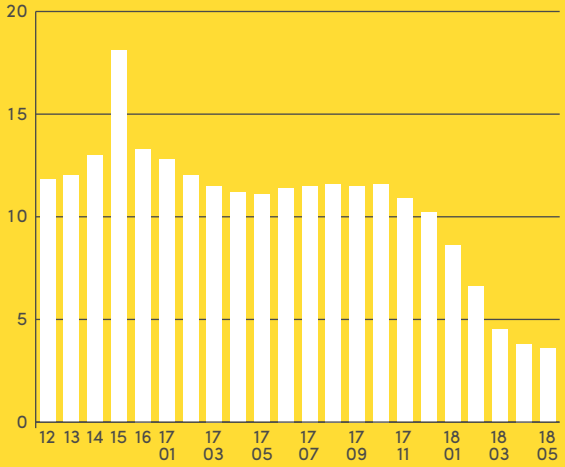
**MAXIMUM 4 TWH LEFT** in the electricity certificate system. This is our, still conservative estimate. Remaining investment decisions are expected this year, making it essential to follow the construction process of future projects.

**THE WIND POWER COMPANY AS MERCHANT ENERGY TRADER** is the title of Fredrik's chronicle. A vision of the wind power company doing active hedging and extracting more value from its assets at a controlled risk level.


Read our interesting interviews with Swedbank och DNB on pages 21-23


## Spot Prices Elcertificates (SEK)


## Cumulative Excess (TWh)




The trend of rapidly falling balance has stopped but balance now below 4 TWh and there is further downside.

Would you like to read the full report? Find out how to subscribe (and take a look at our new site).

www.bodeckerpartners.com/en/reports/

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# News & Politics
## The Nordic Region



### The Nordic Region

The goal of the common electricity certificate market is to increase renewable electricity production cost-effectively by a total of 28.4 TWh in Sweden and Norway from 2012 to 2020. Sweden also has a separate and additional new target of another 18 TWh to be built by 2030.

**Wind power dominates investments**
Wind power dominates, according to an article in DI (Dagens Industri newspaper), the market for M&A in the energy sector. About half of all transactions reported in the last three years are related to wind power, according to Johan Göthberg, partner of law firm Vinge, who has been interviewed in DI.

*»Half of all transactions are in wind power«*

He believes that this trend will continue, but emphasises that you must be careful when analysing the statistics since transactions are not reported. Globally, the trend in M&A within the renewable ▸▸

### Electricity Certificates – control station, stop-mechanism and phase-out

**Transparency assignment**
The Swedish Energy Agency has presented its report on how to increase transparency in the elcertificate system. Their focus has been on planned projects, and the authority wants to supplement market surveillance with more information on the process of investment decisions. The list of planned projects will be updated quarterly instead of only two times per year. Already, there is a newly made compilation of approved wind projects with many details on their website, and from 2019 the Agency will publish data on actual historical certificate entitled production, for comparison with provided estimations.

**Adjustment of quota curve**
The Energy Agency's proposal means that the 2019 quota will be reduced from 0.312 to 0.305. This is due to a higher than expected electricity consumption as well as a lower than forecasted electricity production within the transitional regime. For Norway, the adjustment proposals are not yet complete.

**Stop-mechanism**
During an information seminar in Oslo, the Swedish Energy Agency presented their thoughts so far regarding the design of a stop-mechanism. The five options they investigate are; a pure date-based stop, a pure volume-based stop, a volume-stop but with a pre-notification limit, a date-stop after a certain volume and lastly a stop-mechanism based on date and/or volume with a scaled-down approach.

The Authority acknowledged that some options are no longer applicable due to the rapid expansion. A pure volume-based stop could be an alternative but has the problem that build-out can still continue in Norway until end of 2021. This means that the target still could be exceeded. Their last scale-down proposal is also a working option. This would imply that after a certain volume and/or date (possible from 1st of January 2020), only a preliminary allocation can be obtained. A new re-calculation would be made after 2-3 years, and the preliminary allocation could be reduced to make sure the target of 46.4 TWh is reached. A mechanism based on pre-notification at investment decision is already considered to be too late. Discussions on stabilisation methods were brought to the table by the audience. Could, for example, the system be shortened in terms of entitlement years (e.g. to 15 years after all installations are in operation)? This is a possibility but not included in their current assignment, the Energy Agency replied. On the other hand, they will make an impact assessment that could result in additional assignments.

Swedish politicians have commented that low prices due to an oversupplied market is a part of the market risk in a market-based system. Politically, there is no support for increasing the ambition level to save the market from a possible price collapse. However, they want to speed up the stop-mechanism decision as much as possible. A report will be finished by 20th of December this year, and a decision could be taken next spring at the earliest with possible implementation from 1st of January 2020.

**Phase-out begins**
This year, the installations that were put into operation in 2003 are phased out of the system. In total approximately 30 plants with 80 GWh are removed according to the Energy Agency's statistics.

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sector is very strong and, according to a report by KPMG and Mergermarket, the activity this year is expected to have its highest growth within the wind industry. The energy sector in Sweden has proven very interesting to investors, especially international pension funds, who want to diversify their portfolios with long-term investments in, e.g. electricity distribution companies or district heating companies.

**100% renewable by 2040**

The Swedish government has presented a bill proposing that Sweden's electricity generation should be 100% renewable by 2040. However, they point out that this is a goal and not a deadline for nuclear power. The proposal is a result of the bi-partisan energy agreement. In a report, written by the Swedish Energy Agency, Sweden must build an additional 100 TWh of electricity production by 2045 in order to achieve this goal. One of the major challenges is that a large proportion of existing production will reach its technical lifespan within the next 20-30 years, a total of 105 TWh of accumulated annual production. This applies to both nuclear-, bio- and wind power. Starting in the mid-2030s, the expansion rate of new production needs to be 3-6 times higher than today, according to the report. However, if the current expansion rate continues instead, we will in the shorter time-period, until 2030, still have a large surplus of electricity. They argue further that it is vital to prepare the power system for more variable production with higher demands on flexibility, but also transmission capacity to other countries.

**Support to offshore wind**

In our previous report, we described the Energy Agency's report on proposals for removing grid connection charges for offshore wind in Sweden. The two main proposals were to move the connection point to where the park is being built or that a subsidy is introduced that would cover parts of the connection cost. The subsidy model received the highest support.

However, referral responses show is that Swedish authorities tend to be critical regarding the introduction of a specific support for offshore wind. Svenska Kraftnät does not consider it economically motivated, and the EI (Energy Markets Inspectorate), KI (Competition Authority) and the Swedish Environmental Protection Agency recommend that a removal of connection fees should not be introduced, as this type of technology-specific support distorts competition. Also, the Energy Agency itself has commented that up to 90 TWh of land-based wind power is potentially available at lower costs than offshore.

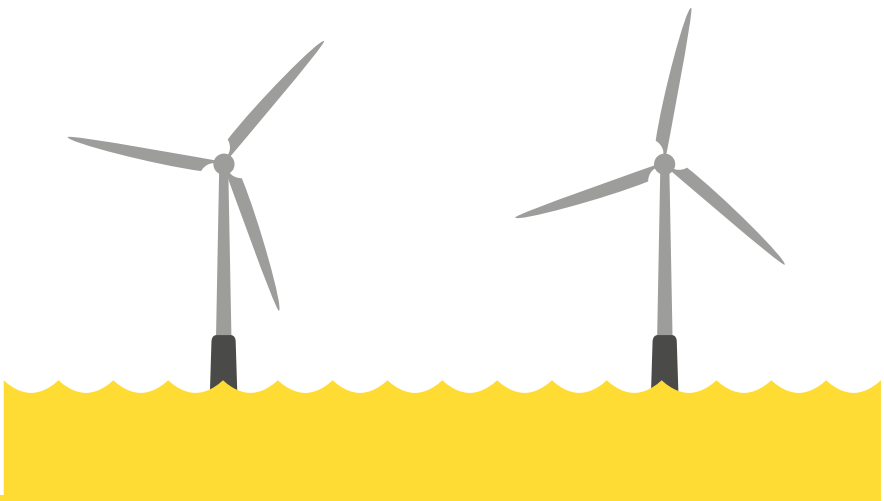
*»Technology-specific support distorts competition«*

Hans Kreisel at Skellefteå Kraft points out that "the government should rather investigate how 100% renewable can be achieved in most cost-effective ways." He also identifies the risk that costs may be transferred to other renewable electricity generation by increasing their grid tariffs. This could jeopardise on-shore wind as well as hydroelectric power.

The government backs giving support to off-shore wind. It is seen as necessary for this technology to have a break-through. They also refer to the fact that neighbouring countries around the Baltic Sea are offered a paid grid connection. The government has now commissioned the Energy Agency to produce a supplementary analysis of the effects of the proposals.

**The new hydropower regulation**

In our previous report, we summarized the proposed new legislation for hydropower. The government has since then received the clearance to proceed with the completion of the bill, even though the law council had some comments on information needing to be clarified. The general response to the bill is cautiously positive. The chairman of the Swedish Hydroelectric Association, ▸▸



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Thomas Sandberg, writes that it is a step in the right direction and that it will continue to be important to follow how the Swedish authorities revise their regulations, guidelines, etc. based on this. He also states that it is crucial, especially for small-scale hydropower, that the stations are classified as "heavily modified water" in the EU Water Directive, and he also points out that in the current proposal there are too many contradictions, ambiguities and elements that are in violation of EU law and which must be cleaned up in the forthcoming proposition.

The Swedish Energy Agency has estimated that the bill can lead to about 1.5 TWh lower hydropower production, but Vattenfall has warned that up to 10 TWh could be threatened. The agency has recently suggested that 250 system critical hydropower plants should be protected as a national interest.

**Improved conditions for solar power**
In the spring budget, announcements were made of an additional SEK 170 million being invested in support of companies and individuals who install solar panels. In total, support for 2018 is now 1085 million SEK. The support rate for private households has since January been 30% of the installation costs, which has led to great interest and long queues at county administrative boards.

The Swedish parliament has also approved the proposal to remove the requirement for building permits for solar power installations on buildings (if existing in detailed community plans). In addition, the Ministry of Finance has drafted a memorandum of proposal for extended tax exemption for self-produced electricity, which is proposed to be enacted from 1st of July 2019. It is the second step in the Government's earlier announcement to abolish energy tax on solar produced in small plants in the same place as it is consumed.

The number of grid-connected solar power plants has increased by more than 52% between 2016 and 2017. Total installed power was 231 MW at the end of the year. The proportion of larger plants has grown, over 10% of installed power came from plants larger than 1000 kW and 46% from plants over 20kW.

**Marketing of green electricity**
A significant dispute is now underway regarding the promotion of green electricity and the importance of guarantees of origin. An excellent article by Svenolof Karlsson on Second Opinion describes the problem and different actors' views on the matter. Polarbröd (a Swedish bread manufacturer) has invested in four wind turbines, whose electricity production corresponds to the company's own electricity use, and the company annulles GoOs to the same extent. They have thus marketed their bread as "baked on wind power". The Consumer Agency believes that it to be false marketing since the physical electricity cannot be earmarked in this way. They find the marketing to be misleading in light of the "average knowledge" of a Swedish consumer. Many market participants (with some support from the Swedish Energy Agency) have commented that the GoOs is the generally accepted way to determine the origin of electricity. They believe that the Consumer Agency's view put the whole system of GoOs at risk.

*»The whole GoO system is at risk«*

GoO marking is used throughout Europe and may become mandatory, so this process is interesting not only in Sweden (our own remark). ▸▸

Read more at Second Opinion:
**GOO.GL/ZZIOKM**

## Other nordic news

**ENERGY MINISTER BAYLAN** says in an interview with Energimarknaden that he wants to see an agreement across the national parties in simplifying licensing processes for energy infrastructure.

**OLKILUOTO 3** has been further postponed. From May to September. The message immediately led to rising prices for the year 2019, especially in Quarter 2 and 3.

**HAVSLUND PRODUKTION** welcomes a new partner in Svartisen, a Norwegian company owned by three Finnish energy companies. It is Fortum, which sells its 10 per cent ownership for 160 million euros.

**RESIDUAL MIX 2017** for the Nordic countries has published. This means the electricity remaining when electricity with GoOs has been eliminated. It is summarised on a Nordic level and comprised 2017 of 16.68% renewable electricity, 40.55% nuclear power and 42.77% fossil-produced electricity.

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# News & Politics
## Europe



### EU Energy politics

**Updated renewable target of 32%**
After many and lengthy negotiations, the Council of Ministers and the EU Parliament finally reached a compromise on a new target of 32% renewable energy by 2030, an increase from today's 27% target. The Commission and Council had proposed a prolonged 27% while the Parliament was lobbying for 35%. The agreement also includes a 14% renewable target in the transport sector, an attempt to pave the way for electric cars, and a phase-out of palm oil. The rapidly declining costs of building renewable energy made it easier to reach an agreement, but critics argue that this compromise does not give any extra boost to development - it would have happened anyway. Sweden was among a group of countries wanting a higher target but others, including Germany, put their foot down at a maximum 32%. Germany's stance surprised many. The target is binding at EU level but not at national level. You could question whether it´s meaningful at all to have a binding target at EU level, but it adds extra weight. A revision will also take place by 2023, and more actions could be taken. It is now essential to see what measures will be put in place. Some measures have already been decided to increase the clarity and stability of different support systems, and to work for faster administration and simplified processes for repowering. Additionally, it was agreed that small production plants for self-consumption (up to 25 kW) should be excluded from fees.

Criticism from e.g. WWF has been directed against the fact that there were no tightened sustainability criteria for bioenergy, as requested by the European Parliament.

**Energy efficiency target of 32,5%**
Finally, the parties also agreed on a new EU-target for energy efficiency. The compromise was a 32.5% and binding target - higher than the proposal of the Energy Commission but lower than Parliament's 35% requirement. The transport sector is however still not included. There will be a control station with the opportunity to revise the ambition level.

### Europe

**Increasing emissions in Europe**
For the first time in seven years, EU emissions increased last year. Although less than one per cent, it is still a break in trend. Given that GDP increased by more than 2% and the European industry increased its production, it is positive that emissions did not increase more. According to Agora / Sandbag's report "The European Power Sector in 2017 ", energy efficiency measures have not been sufficient to cope with an increased production rate. The report also mentions a rapidly rising population, +3 million people from 2016 until 2017, mainly due to immigration.

However, emissions from electricity generation have decreased somewhat, despite increased use of lignite and a relative bad hydrological year. This is due to the prevailing expansion of renewable energy. By 2017, wind power production rose by close to 20% compared with the year before, and solar power by 8% according to the report.

*»38% of emissions still come from coal power plants, nine out of ten in Germany or Poland«*

38% of EU ETS emissions are reported to originate from coal power plants. In a compilation over the ten single largest sources of emissions in Europe, nine of them are coal power plants in Germany or Poland.

**German energy politics...**
The German government has decided to extend the time where cooperatives (private persons) will no longer receive particularly favourable terms in auction procedures for wind power (for example, that they don´t need to have all permits completed before the auction and that they are granted an extended construction period). By the end of 2019, they will compete under the same conditions as the others. The reason is that there is a lot of uncertainty whether the cooperative's projects will deliver as promised. Since they have accounted for a significant proportion of the winning bids in recent years, there is a risk that Germany will not reach its planned expansion rate.

The German coal power Commission has now been given the go-ahead to start work on a phase-out plan for ▸▸

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the country's coal power plants. A report will be presented by the end of this year. Germany needs to take sharp measures to meet its targets by 2030 (they will miss the previous emission targets for 2020), but it is complicated as they also shut down their remaining nuclear power fleet over the coming four years. Angela Merkel recently emphasised that industry and labour issues should be prioritised over emission targets.

Finance Minister Altmaier has announced that before the summer leave, Germany will have put forward proposals on how to accelerate the necessary grid expansion in the country. They are well behind the expansion needed to meet the goals of renewable electricity generation. Germany has also been criticised for the grid congestions preventing flow between European countries. In a separate case, The EU Commission has launched an investigation against the German transmission system operator TenneT to see if they deliberately restricted capacity in the transferring connections between Western Denmark and Germany.

**... and most recent auctions in the country**

Germany has completed a joint auction for wind and solar where the solar projects won all the bids. Total capacity was 210 MW (divided between 32 projects), and the average price came out at 45.7 euros per MWh, about 3 euros higher than in the latest auction for solar. However, both wind and solar organisations in the country view the auction process as a failure since the country needs a mix of different technologies. They believe that two different technologies should not compete.

*» Solar project won all the bids in a joint wind- and solar auction«*

In the latest auction for solar only, the average price was slightly lower at 45.09 euro/MWh. This involved 28 projects with a total capacity of 183 MW. The next wind auction (671 MW) will take place on May 1st followed by a solar auction (182 MW) on October 1st. Thereafter, a joint wind- and solar auction will follow on November 1st. Germany's solar union (BSW) forecasts 2.5 GW of new solar to come online in 2018, compared to 1.8 GW last year, due to falling costs and increased tender interest. However, 10 GW per year is needed for Germany to have a chance to reach its Paris commitments, according to the organisation's spokesman.

Germany has also completed its second off-shore wind auction, where the average price ended up at 46.6 euros per MWh. The reason for a slightly higher average price than in the last auction is believed to be that 500 MW was reserved for the Baltic Sea with poorer wind conditions than the North Sea. Grid connection costs are not included. Once again, a 0-euro bid was included; Örsted 's project Borkum Riffgrund West 1 in the North Sea. Örsted's other projects in the North Sea, Good Wind 4, was included at 98.3 euros per MWh. Also, Innogy´s project Kaskasi of 325 MW was included as well as projects from Iberdrola (Spain), Sea Wind Holding (Lichtenstein) and KNK Wind (Germany).

**Our Nordic neighbours**

**DENMARK** has presented a plan to reach 50% renewable production in combination with lower subsidies. One of the measures will be to hold an auction procedure in 2021 for the largest off-shore park in the country, 800 MW as well as explore areas for further expansion. In addition, technology-neutral auctions will be held to increase on-shore wind, solar and bio-power. Between 2020 and 2024, 1 GW will be auctioned. At the same time, it will be cheaper for consumers when the grid fee of more than 90 öre (€0,10) and the electricity heating fee of about 40 öre will be reduced by 25 öre / kWh each. The tax dumping means that the interest in heat pumps is likely to increase significantly in Danish district heating. Dansk Energi and Dansk Fjärrvärme have conducted a survey that shows that up to one-fifth of district heating will be produced using heat pumps by 2030. A development which will be interesting to follow.

**FINLAND** will implement technology-neutral auctions for a total of 1.4 TWh renewable production to be built before 2021. The country thus abandons the current feed-in tariff system. Finland had previously planned for up to 2 TWh, but with a forthcoming ban on coal in electricity and heat production, financing is needed there instead.

**Off-shore growth in the Netherlands**

The Netherlands has approved areas at sea for a total of 7 GW of offshore wind to be built between 2024-2030. In total, three regions increasing the total planned renewable expansion to 11.5 GW instead of previous 4.5 GW. An artificial island is planned to connect installations far out, and this island is also considered to be a step towards a connection with Great Britain. Vattenfall will build the country's (and the world's) first fully non-subsidised off-shore park of 750 MW.

**GoOs increase in value**

We wrote in our previous report that ▸▸

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discussions are being held in the EU that can change the market for Guarantees of Origin. Proposals suggest auctioning instead of a separate market-based system, something that has been criticised as it would reduce the value of the so-called "corporate PPAs". The value of GoOs has risen sharply over the past year – over 300%.

*»The value of GoOs have risen by 300%«*

The price of GoOs from hydropower has moved from about 20–25 cent to currently around one euro. GoO from wind is usually worth a few more cents. The reason for the rise is the growing sustainability interest from companies all over Europe. An increasing number of European companies have joined RE100, meaning they must buy a certain amount of green electricity. German industries have been significant buyers of GoOs in recent years (they cannot buy from plants within a feed-in scheme), but interest also from other countries is growing. Swedish wind power owners are beginning to see the benefits of trading bilaterally, or through several brokers, to fully take advantage of the high interest.

**PPA volumes triple**
During the last three years, volume sold through so-called "corporate" PPAs have tripled according to a report by Wind Europe. In 2017, such contracts were signed for 1.4 GW renewable capacity (over 80% of which were wind power projects), compared to 500 MW in 2014. The Nordic market dominated, followed by Great Britain and the Netherlands.

**Battery strategy and expansion**
This spring, The European Commission has presented a strategy to set adequate conditions for a robust European battery industry. The target is ten to twenty large-scale battery plants by 2025 with a turnover of 250 billion a year. Europe must be able to compete with China and the United States. In Sweden, Northvolt has just received an environmental permit for Europe's largest lithium-ion battery production plant, and the company has previously received investment support from both the European Central Bank and the Swedish Energy Agency.

*»At least seven major battery plants will be put into operation until 2020«*

According to Climatechangenews, at least seven new major battery production plants are scheduled to be commissioned by 2020 with a total output of 80 GWh per year (more than three times the global production of lithium-ion batteries for electric cars last year). Behind the factories are the major car manufacturers as well as LG, Samsung and Tesla / Panasonic in collaboration.

In Great Britain, renewable wind energy is currently being stored in a 22 MW battery at a 228 MW wind farm in Wales. It is Vattenfall and Britain's largest co-location of batteries with on-shore wind farms. In Germany, large-scale battery capacity nearly doubled last year to 230 MW and is growing rapidly with 25.3 MW increase only in April this year. French EDF will invest to get 10 GW of energy storage by 2035, estimated to come at the cost of SEK 100 billion. ▸▸

### Changes in EU ETS

Bodecker Partners regularly produce a report specifically on emission rights but for those of you who do not read it, here is a brief summary of what is currently in progress. Negotiations on how the EU ETS will be formed from 2021 and how the large surplus in the system will be addressed were completed on 8 November.

**MARKET STABILITY RESERVE FROM 2019** This means a rapid reduction of the surplus in the system by a large part annually being deposited into a reserve fund and thereby decreasing the auctioned volume. Estimated to increase the price of emission allowances by 3–4 euros in the coming years.

**LOWER FREE ALLOCATION FROM 2021** This increases demand from market participants. The benchmarks on which allocation is based will be lower to take into account technology development and energy efficiency. How much lower is not yet clear.

**FASTER REDUCTION OF FREE ALLOCATION** Free allocation to market participants will annually decrease at a faster rate than before. The ratio will rise from 1.74% to 2.2%.

Read the full article here:
**HTTPS://GOO.GL/ZFBUJQ**

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### Other News

**FRANCE** has initiated negotiations with owners of the off-shore wind parks that won auction procedures in 2012-2014 when prices were around four times higher than today. The average price for these six auctions was 190 euros per MWh for 20 years! The government's goal is to negotiate down the tariffs of in total 500 MW.

**WIND AND SOLAR POWER** in Britain produced more electricity than the country's total eight nuclear power plants at the end of last year. Emissions decreased simultaneously by 3% as coal power continues to be phased out.

**FLOATING WIND POWER** show good results. Statoil's project outside of Scotland has had a higher output than expected during the first three months of the project, operating with a capacity factor of 65%.

**FRANCE** must increase its renewable power generation by 70% by 2028 and reduce its energy consumption by 30% by 2035 if they are to achieve their goals under the country's environmental authority. Their forecasts indicate that it is possible if on-shore wind increases from 21 TWh 2016 to 47 TWh by 2023 and 55 TWh by 2028 and if offshore wind reaches 10 TWh by 2023 and 37 TWh by 2028. Solar needs to increase from presently about 8 TWh to 24 TWh by 2023 and 41 TWh by 2028. ■

# C Reports & Analysis



## External reports and analysis

**Price forecasts electricity certificate**
For this report, we will not provide an updated price forecasts for electricity certificates. In the current situation, with such high uncertainty regarding the underlying market conditions, it is extraordinary difficult to predict and model the price trend. This uncertain situation, which we expect to prevail until it is clear how the new stop-mechanism will work, also makes previous forecasts from e.g. Nena, SKM and Thema Consulting Group irrelevant for the time being. What we instead would like to emphasize are two main stop-mechanism scenarios, and preparations to act on these. We will go through this in the price discussion section further down the report.

A baseline to elcertificate pricing though, is the discussions around the prices needed to achieve profitability in wind power currently. NVE-manager Per Sanderup has commented on this in recent seminar presentations. Larger turbines, more delivery hours and more efficient operation will reduce the cost of new on-shore wind to approximately 28 öre/kWh (€0,28/MWh) by 2020, according to Per. Thus, below the price level at which power alone can be hedged today (editor's note).

*»New wind power at 28 öre kWh by 2020, below current power price alone for this year«*

In 2012, LCOE was at more than 46 öre/kWh and already by 2017 it had fallen to around 32 öre, he points out, and bigger turbines now increase the number of delivery hours even more. Per states that 7.3 TWh is now under construction in the electricity certificate system in Norway. By 2021, 14-16 TWh may well have been reached, which means several TWh above Norway's target (and funding) of 13.2 TWh.

**Price comments Nordic power prices**
During this spring, the Nordic electricity prices have been significantly higher than what we have seen in a long time. This has also affected the contracts further out on the curve even if parts of the reasons are only short-term. The spot price for January-March this year ended up just above 38 euros per MWh, more than 7 euros higher than the same quarter last year. Quarter 2, April-June (until today's date 20 June), has been delivered at just over 37 euros, 9 euros higher than the same quarter last year.

There are several underlying reasons for this development. The marginal costs for both coal and gas-fired power plants have been higher. This affects also Nordic power prices through our interconnections with Denmark and Continental Europe. The price of emission allowances, an important factor for the marginal cost, has since January 1st risen by 80% (100% a week ago). EUAs are now traded at just below 15 euros/ton.

*»CO2-prices have risen nearly 100% this year«*

At the same time, both coal and gas prices have seen a rising trend. It is not only the actual price increases on fuel that affect the power prices, but also the risk premium for future increases. For example, the US sanctions this spring against Russia and the abandoning of the Iran Agreement.

What has also happened during the last months, which fundamentally should not have had such a major impact on electricity prices in the longer term, is that the Nordic hydrological balance has fallen rapidly. From a surplus at the beginning of the year of over 5 TWh to a deficit currently of over 13 TWh! This development has been rapid and has a large effect on the Nordic spot prices. However, although this is mainly a short-term factor, it has contributed to a rise in electricity prices across the curve and also added to a much more 'optimistic' (from a producer perspective) view from research institutes, investors and banks etc. We would want to advocate a call for some caution here.

The year-19 contract has increased by almost 9 euros since January 1st and by nearly 6 euros only since April 1st. The current price is around 35 euros. The following two years (YR-20 and YR-21) have increased by about 3 euros since January 1st,whereas if we go all the way out to 2025, there has been no major change. Just a couple of weeks ago, these contracts were priced even higher. The 2020-contract has fallen by almost two euros since the first week of June.

Another influencing factor of the forward prices are expectations regarding future production in volume and composition. Planned phasing-out strategies of coal power, primarily communicated during the past six months, means that a large part of today's low-cost coal production can disappear. Moreover, the fact that most of the long-term forecasts for electricity have been adjusted upwards, most certainly also affected psychology and sentiment in the market.

**Price forecasts Nordic power**
In previous reports, we have summarized forecasts pointing towards rising ▸▸

# C Reports & Analysis



power prices from for example NVE (up 6 - 7 öre/kWh), MK Online (about 45 euros to 2025), Kinect Energy (32 euros to 2022) and Bixia (raising its forecast to 32 euros to 2023 and 37 euros to 2030 due to higher fuel price forecast and more transmission capacity to Europe). We noted that there is high level of uncertainty and the discrepancy between forecasts is unusually high. Almost 20 euros between the high and low.

*»The discrepancy between forecasts is unusually high«*

On the downside, strong growth in small-scale production is emphasised as well as high renewable growth and grid constraints in Germany. Shepherd writes that the rapid coal phase-out in Europe opens up to new high level in the Nordic region. We have also described Thema Consulting's opposing scenario, where strong growth in small-scale production can keep Nordic electricity prices low for a long time.

**BIXIA'S** latest forecast in May showed that they expect power prices in the Nordic region to rise to 35.50-42.50 euros per MWh in the second half of the 2020s - thus another five euros up compared to their previous forecast from March. The reasons cited are even stronger fuel and CO2 prices but also that they now have higher expectations of Nordic electricity consumption. They now estimate 23 TWh of higher consumption in 2030 compared to today, where the most significant individual contribution is expected to come from new data centres. At the same time, they have lowered their forecast for the expansion of new power generation, which, together with the phasing out of nuclear and fossil fuels, yields a 9 TWh lower energy balance in the Nordic region in 2025 and 16 TWh lower energy balance in 2030. However, it is pointed out that more interconnectors will be in place from 2020 to export.

**WATTSIGHT** (formerly MK Online) announced in mid-April that the 2020-contract was traded "too low" even though it had risen to close to 28 euros at that time. They claimed that the "correct price" would be between 32-33 euros per MWh. Now, just over a month later, the market price is there accordingly. In this scenario, Wattsight used the prevailing fuel and CO2 prices at that time. If they in turn would rise (as they have done since) there should be further upside according to the company.

**STORMGEO** also increased their power price forecasts during the spring based on higher marginal costs of fossil fuel power generation due to higher fuel and CO2 prices.

Thema Consulting, Wattsight and Energy Aspects were some of the companies presenting their price forecasts during Montel's recent spring conferences in Stockholm and Helsinki (which we can also recommend for those who want to keep attuned with the market).

**THEMAS**' forecasts show that the CO2 market will be the major driving force for Nordic power prices going forward, and rising emission allowance prices will push the power price up by 5 euros/MWh between 2020-2030. The base scenario is that the price of CO2 will rise from today's 15 euros/ton to over 20 euros/ton by 2030, and 25 euros/ton five years later. The CO2 price contributes more than 2 euros to the forecasts of the Nordic power price according to Thema. From 2025, also gas prices will have a large effect, with up to 4 euros. The Nordic power price is expected to stay at around 34 euro/MWh until 2020 and 35-36 euro/MWh by 2025, but reach 40 euros by 2030.

**WATTSIGHT** (formerly MK Online) estimates that power supply will rise sharply in the future as a result of more wind, two new Finnish nuclear reactors and more hydropower. However, they also see a strong consumption increase, up to close to 30 TWh more than today. This in total increases the Nordic surplus, or export opportunity, to over 35 TWh to 2030 (from -6 TWh in 2017 according to the company's figures). At the same time, the capacity of grid interconnectors increases. To the UK with over 4000 MW already to 2023 (two cables), to Holland with 700 MW from 2019 and to Germany by close to 4000 from 2020. To the UK alone, Wattsight estimate that about 10-11 TWh/year will be exported per cable, thus a total of about 20 TWh already from 2023. In northwestern Europe there is a significant phase-out of both nuclear and coal power and the marginal cost of gas is expected to be price-setting for power in an increasing number of markets. The cable to the Netherlands is interesting as domestic power prices will rise due to the implemented price floor on emissions - up to 43 euros/ ton in 2030. The final price estimate for the Nordic is just over 36.5 euros/MWh in 2020 and about 49 euros/MWh in 2025.

We at Bodecker Partners agree that there are many factors pointing to future price increases, but we have a somewhat more conservative view than most. We foresee, for example, that the usual forecast models based on marginal costs for coal and gas will be less relevant as the number of hours with a marginal cost of zero increases. ▸▸

# C Reports & Analysis



In addition, we believe that the renewable expansion and the development of storage technology is still undervalued in many reports.

**Batteries are not sufficient**
"Batteries will not suffice in balancing a future system with a very high share of renewables", said Axel Wietfield from Uniper in an interview with Montel. Many agree with this. Bill Gates and Jeff Bezos have joined forces in start-up investments in innovative solutions for storage of electricity. According to an article in Veckans Affärer, their environmental fund shall invest in "patient capital" for up to 20 years. One of the first companies to receive support is Quidnet Energy, which has developed a solution that pumps water into old oil and gas wells. When water is released, high pressure is created. This pressure is then used for powering turbines. The second company is working to produce a highly efficient battery for longer storage periods.

At Chalmers, Lisa Göransson and Filip Johansson have conducted a study and comparison of different strategies and techniques for storing electricity for communities with, for example, 100% renewables. They have looked at how "shifting" (to shift consumption in time, for example using batteries), "absorbing" (to use excess energy in other ways, such as by a power-to-gas or power-to-heat) and "complementing" (e.g. flexible production like hydropower or flexible heat production) techniques can best be used in Europe. Lisa gave a presentation expressing the importance of using all of these systems combined. Batteries are very good for managing short-term variability, such as frequency regulation or for a number of hours. To handle a 100% renewable power system, also so-called absorbing techniques are needed, in combination with controllable and flexible power. Lisa emphasizes hydrogen as interesting in a community with 100% renewable power coupled with more and more electric cars, and in cooperation with industry.

*»Policies and support systems must eliminate competition between different storage technologies«*

The conclusion emphasise that policies and support systems must eliminate competition, and instead support cooperation between these different storage techniques to get the most effective system.

The article is recommended for those interested:
**HTTPS://GOO.GL/5EGHHI**

**Nearly 90% renewable power in Europe by 2050**
In Bloomberg Energy Finance's (BNEF) recent long-term outlook, Europe is able to achieve 87% renewable electricity generation by 2050, from today´s level around 30%. The report points out development of storage opportunities (mainly batteries) as a strong contributing factor to such a rapid expansion of wind and solar. The cost of land-based wind power is estimated to fall by an additional 58% and the cost of solar by 71%. Globally, coal is set to be the big loser. Coal will, according to BNEF forecast, only cover 11% of the total by 2050, from today´s just under 40%.

**Germany's electricity consumption can double by 2050**
The think-tank Dena base their analysis, reported in a Montel article, on an extensive electrification. Consumption is expected to increase from today's approximately 600 TWh to at least 1130 TWh by 2050, of which the transport sector accounts for around 100 TWh. The prerequisite for their forecast is that Germany will reach its target of at least 80% emission reduction by 2050 (compared to 1990). In the building and housing sector, demand is expected to increase by 34% and in the industry sector by more than 85%. Demand will be covered primarily by renewable power in combination with gas, but also storage, power-to-gas, import/export and demand flexibility are pointed out as vital. According to the report, for Germany to achieve its 80% emission reduction target, the country needs to increase its annual expansion rate from 2.9 TWh and 2.5 TWh per year for wind and solar respectively, to 7.6 TWh per year for each technology. The use of coal is expected to have halved by 2030 and be completely phased out by 2050.

## Investment trends – WindEurope report

WindEurope has written a very interesting report summarising the development of financing and investment in wind power in Europe. Wind accounts for half of the total investments made in the European energy industry in 2017. In total, investments in wind increased by 9% during the year. Cost reduction and opportunities for lower risks have led to a great interest among investors to diversify their portfolios and increase their sustainability focus. The low-interest rates have been important.

# C Reports & Analysis



*»Wind accounts for more than half of the investment volume in European energy«*

It is still in northern and western Europe where most of the investments take place (of which Germany and England account for half, followed by Sweden). The single largest on-shore wind project last year was Markbygden with 650 MW. The largest offshore project was Hornsea 2 with 1.4 GW. WindEurope also notes that arrangements for refinancing and selling minority shares are now occurring much earlier in the process than previously.

Investment value in new projects decreased compared to the year before, partly amid cost reductions, but also on fewer offshore projects. Acquisitions of projects and companies increased volumes – there is an ongoing consolidation trend. Bank financing has been the dominant model for on-shore wind financing, covering 77% in 2017. For off-shore parks, bank financing has been used primarily for refinancing purposes. Only 19% of new funding is based on a debt structure, compared to 33% the year before.

In terms of interest rates, there has been a sharp decline in recent years. In an interesting graph showing "points above LIBOR" in wind debt structure, you can clearly see a decrease from an average of 325 points in 2011 to almost 200 points in 2017.

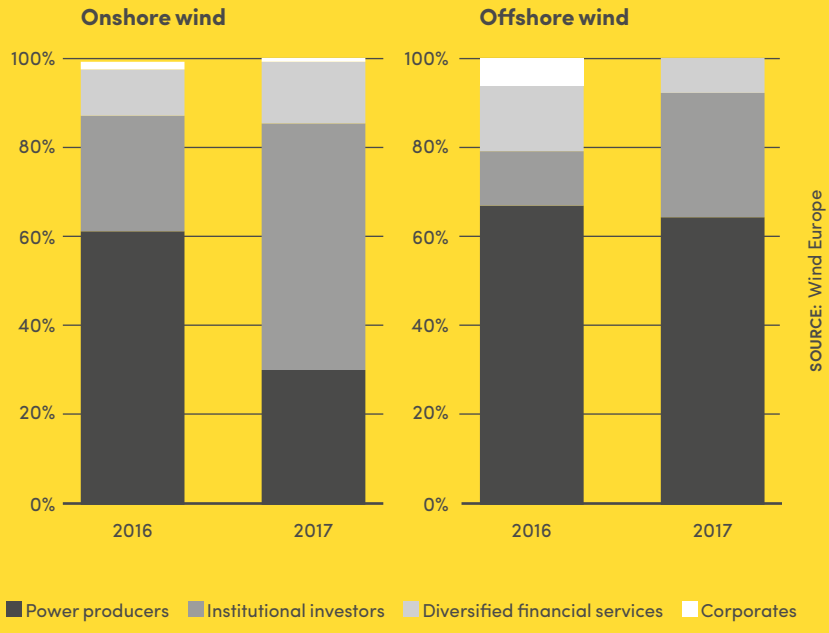
*»Basis points have fallen from over 300 to under 200«*

The banks with the largest market share are Santander, NordLB , HSH Nordbank and ING Group with 5-6 % market share each, followed by seven international banks with 3-4 % of the market each.

The volume of electricity sold through long term PPA contracts directly with companies that consume electricity (e.g. Corporate PPA) has almost tripled over the last three years. Sweden took over the lead from Norway last year, followed by Norway and then Holland and Great Britain on 3rd and 4th place. There are still obstacles for these types of contracts in much of Europe, but they are expected to ease with the new RES directive.

In 2018, investment volumes are expected to increase further in light of the many auctions that have taken place, and are planned, in Europe. At least 17 GW will be auctioned between 2018-2020, of which the largest part during this year. However, the trend of falling interest rates (basis points) is expected to turn, and the authors also emphasise that the increased risk exposure in projects will change the conditions going forward. By 2030, 25% of installed wind capacity is estimated to be exposed to market risks (merchant market). This increases the importance of finding financing and hedging solutions suitable for this new environment. ■

**Project acquisition activity by type of investor in 2016 – 2017 (GW, %)**



D

# Growth of Renewables – Sweden and Norway



## Statistics and forecasts

In our previous report, following upon the February elcertificate issuance, we had an accumulated balance of approximately 6.5 TWh. Our estimation at that time were that the balance would fall to 4-5 TWh before May. The latest statistics show a balance of just over 3.5 TWh, thus even lower than expected. However, the rate of decline is slower and current assessment is that we will remain around this level during the next few months. Just over 2.3 million certificates were issued in April, and the demand was approximately 3 million. In May, around 2.4 million certificates were issued, and the demand was close to 2.7 million.

**Quarterly Report Q1 -18**

The quarterly report for Q1 2018 was published by the Swedish and Norwegian Energy Agencies in mid-May. Volume with status "in operation" had increased by only 0.7 TWh this time (partly due to installations also being phased out from this year). Volume with status "Under construction" has decreased by 1.3 TWh compared with the previous quarterly report. Included here, with planned start of operation this year we find for example Lethirova (490 GWh), Jenåsen (275 GWh) and Högkölen (200 GWh). With planned start next year we find Markbygden ETT (1.9 TWh), Ersträsk (540 GWh) and Svartnäs (345 GWh). From 2020 we have, for Valhalla (750 GWh and 365 GWh) and Åskälen (930 GWh).

Among the major projects under construction on the Norwegian side, we find the three Fosen projects totaling 1.8 TWh, Kvitfjell at approximately 680 GWh and Tonstad wind farm at 680 GWh. The Norwegian list does not indicate any deployment date, but at least around 700 GWh of Fosen is set to start in the last quarter this year. NVE writes in its overview that 4.05 TWh of those currently being built will be commissioned next year, and by 2020 1.5 TWh is expected to run.

*»In Norway, more than 4 TWh will come into operation next year and 1.5 TWh in 2020«*

The Energy Agency's quarterly report further states that investment decisions of approximately 1.4 TWh have been taken. However, within these statistics, no investment decisions taken after the year-end are included, and no Norwegian projects (not published with this status). In Norway, for example, Øyfjellet with appr. 1,2 TWh should be added. Furthermore, Hennøy wind and Tolga hydropower totalling approximately 400 GWh have also received firm investment decisions. Also two of the Fosen projects; Hitra 2 and Geitfjellet totalling about 1 TWh, should be included as well as Bjerkreim of about 500 GWh. In Sweden, we have Blakliden, which is in the report only has the status »permitted« but where PPAs have already been signed with Norsk Hydro. Another nearly 550 GWh.

*»Total investment decisions of at least 3.5 TWh in addition to the 1.4 TWh in the quarterly report«*

In summary, there is at least 3.5 TWh with investment decisions in addition to the 1.4 TWh in the quarterly report, and even this is a rather conservative estimate. In addition, 3 TWh in Norway has the status »MTA approved«, the last ▸▸



See how much wind is produced in all European countries

HTTPS://GOO.GL/PVJEIQ

| TWh per Q1-18 | In operation | Construction | Investment decisions (est) | To reach 2020-target (est) | To reach 2030-target (est) |
|---|---|---|---|---|---|
| Biofuel | 3 | 1.4 | | | |
| Hydro power | 4.7 | 2.2 | | | |
| Wind power | 13.2 | 11.6 | | | |
| Solar power | 0.1 | | | | |
| **In total** | **21.0** | **15.2** | **6** | **-14** | **4** |

D

# Growth of Renewables – Sweden and Norway



stage before construction starts. In our table below, we have included investment decisions of 6 TWh; also this is a conservative number. Using these estimates mean that there is only 4 TWh left for 2030-target to be met. This forecast is also in line with Swedish Wind Energy and its Norwegian counterpart Norwea who also estimates that we will exceed the 2030-target by about 8 TWh if no stop-mechanism is put in place on time.

*»Norway will exceed its target«*

NVE estimates that Norway already now has a total of 12.9 TWh in operation or under construction, only slightly below their target of 13.2. This means that the expansion in Norway will exceed the target with a good margin as commented by NVE.

**Statistics Swedish Wind Energy Association**

Turbine orders during the first quarter of 2018 were significantly lower than the Q4-17 record. Only 8.4 MW was ordered in Q1-18 compared to 1417 MW in the last months of last year. However, large variations are often seen between quarters. Swedish Wind Energy's estimate for new orders during 2018 is 815.5 MW. For 2019, the forecast is 1734 MW and for 2020 it is 72 MW. Most of the build-out is taking place in SE1 and SE2 (just over 900 MW in each), but SE3 is not far behind with around 700 MW.

## Investments and new projects

There has been a slightly lower rate of communicated investment decisions during this first half of this year compared to the end of last. In our last report, we reported about, for example, Eolus Wind project Øyfjellet with an estimated annual output of 1.2 TWh where Alcoa entered a 15-year PPA agreement.

In recent months, Vattenfall has started the construction of Blakliden/Fäbodberget (which in the latest quarterly report only had the status "Authorized"). The 84 turbines will be commissioned in 2021/2022 and 60% of the production sold to Norsk Hydro in a 20-year agreement. Vestas will deliver the turbines. The ownership is split between Vattenfall, Vestas and the Danish pension company PKA. It is becoming more and more common for turbine manufacturers to join as partners in projects, or to develop their own. This trend has also been noted by banks as can be seen in our interviews later in the report.

Facebook has entered into a 15-year PPA agreement with Luxcara to purchase the electricity from three Bjerkeim projects in Norway (294 MW). The electricity will power their data centres in Odense and Luleå. Facebook buys 100% of the production, estimated at approximately 1 TWh by the end of next year.

*»Facebook buys 100% of the production«*

Vattenfall acts as intermediary and takes care of balancing services. Facebook also indicates that they expect a continued consumption increase and they plan to build a new data centre in Luleå, Sweden.

In Norway, hydropower is continued to be built out. Shortly, the construction of the Tolga hydropower plant will start. Estimated output is 205 GWh per year starting from 2021. Italian Falck Renewables has also, together with Svelgen Vind taken the decision to build the wind park Hennøy (50 MW) in Norway. ▸▸

**-4** TWh

14 TWh above 2020 target
4 TWh remaining to 2030-target

INCL. EST. INVESTMENT DECISIONS

D

# Growth of Renewables – Sweden and Norway





**Solar records on and on again**
There has been many announcements of records during these last months when it comes to that reporting on upcoming solar cell projects.

**ON APRIL 19**, it was reported that Åbro will build one of Sweden's largest roof-mounted solar systems. The 1780 solar panels on the brewery´s 3500 cubic meters roof were estimated to produce more than 0,5 million kWh per year.

**ON APRIL 26TH**, Affärsverket Karlskrona published the news that they will build the largest solar park in Sweden. Total power produced is estimated at 6 MW, and organisations, companies and individuals have been invited as shareholders. Each 50 kW costs 525 000 SEK. There are also smaller shares of 100 W which costs 1150 SEK. The park will be more than twice as big as any other solar park today, according to the energy company. It will be put into operation in 2018 or 2019.

**ON JUNE 15TH**, energy company Jämtkraft and real estate company Östersundshem announced that they will join forces in building one of Sweden's largest solar power generation plants. It will be located in the city of Östersund, and the 6-hectare plant is estimated to deliver approximately 3000 MWh of electricity annually. Also here there will be a shared ownership where each share will cost around 1000 SEK and provide 100 kWh of solar electricity per year.

**ON MAY 15TH**, we could read that also the energy company Göteborg Energi is building Sweden's largest solar park at Säve Airport in Gothenburg. 5 MW and estimated annual production of 5 GWh.

It may well be that the sunny city of Karlskrona is the winner so far, but we will most likely see a continuation of this story ... ■

## Other news

**UNIPER** has signed an agreement with Energi Försäljning Sverige regarding 2.5 TWh of electricity in 2018. The electricity from Uniper's production facilities will go to Energi Sveriges customers directly instead of via Nordpool. The deal is stated to mark against Nordpools high trading fees and is valid for one year.

**RABBALSHEDE** has purchased the wind power projects Gärdshyttan and Lönhult totalling 15–20 MW in Örebro and Jönköping County (SE3).

**AQUILA** buys Finnish 14.4 MW wind farm from OX2.

**LARGEST BATTERY IN THE EU** has been launched in northern Germany and will be used for grid balancing. Capacity is 48 MW and, according to a press release, the battery could store electricity for 5300 customers for up to 24 hours. Dutch Eneco and Mitsubishi are the companies behind the product.

E

# Price Development
## Electricity Certificate



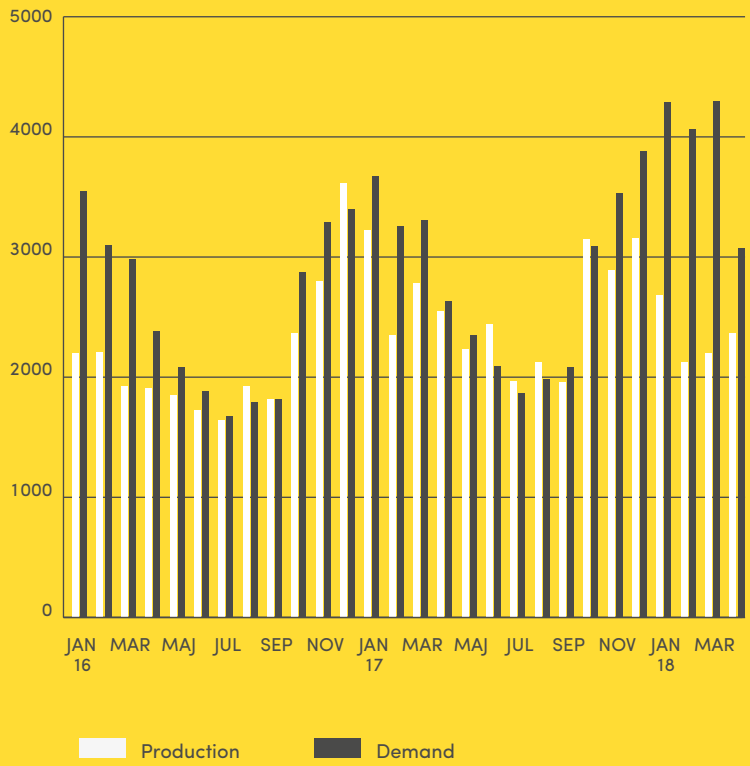
### Balance and price development

As stated in previous sections, the very rapid decrease in accumulated balance has paused for the time being, but we still see a somewhat lower balance for each of the coming months. From our previous expectation of having a balance of about 6.5-7 million certificates at the end of the year, the Feb/March weather caused this to occur much earlier. Current accumulated balance is down to approximately 3.5 TWh, and expected to remain around these levels in the next months.

**Price increase (temporary?) halted**
The trend of rapidly rising electricity certificate prices seems to have temporarily ceased. In addition, the market has calmed down and the high volatility has subsided. During the first half of May, prices ranged from 140 to about 180 SEK, but since the beginning of June, prices have fallen slowly from just over 160 to current 150-155 SEK. Electricity certificates with delivery next year are priced around 5 SEK above this and has been over the last weeks.

The contracts further out on the curve are still traded significantly lower. March-20 at just over 110 SEK and the price difference to Mars-19 has increased by about 5-10 SEK compared to a month ago. March-21 and March-22 remain at around SEK 40, but the liquidity is very low. As we have said before, it will be interesting to follow specifically the 2020 contract as much of planned production will come into operation during this year and the balance is low so sensitive to delays. ▸▸

### Balance 2016–2018 (GWh)




### Statistics elcertifikat price (SEK)

E

# Price Development
## Electricity Certificate



### Price discussion

We would like to start with a recap and describe the historical price development in three phases. The first years of the joint electricity certificate market, 2013 to 2015, were characterised by rising surpluses when the expansion »leapt ahead« of the plan on which the quota curve was based. The rapid technological development coupled with a new type of investor with lower yield requirements contributed to this. During this period, prices fell from over 200 SEK to about 150 SEK.

The next phase, 2016-2017, the balance peaked at about 18 million electricity certificates in excess. Thereafter and since, the surplus has fallen. But we have still had falling prices... This time, the link between balance and price was broken. Instead, prices were driven by long-term expectations of a future surplus and a possible price crash.

However, starting from 2018 we see prices increasing. We have entered, in our view, the third phase. Prices have once again coupled with the development in balance. We knew that the balance would fall due to higher quotas, but it was only when this happened – and faster than anyone would have thought – that the large effect on prices was reaslised. This could indicate that speculation in electricity certificates is low.

**One scale - two separate markets**
Currently, we almost have two separate markets. On one side we still see a very low balance for next year, and going into 2020. There is still a risk of shortage during next year. This calls for high prices, which we also see in the market - and it is not unlikely that there will be another increase. On the other hand, we have the situation in the longer term which is very different. Regardless of the stop-mechanism, we will a have a number of years of high balance, and there is still concern that the market may end with an oversupply. More and more reports indicate that it is profitable to build wind power without electricity certificates, especially if electricity prices continue up according to many forecasts.

In our last report, we raised the question of whether it must be the cost scenario for building new wind power that should determine the price of electricity certificates. We will ask ourselves why owners of existing parks should want to sell at a price that is far from profitable for them - especially when demand is there. This contributes to our trust in further price increases at the beginning of next year.

**Long-term reflection**
In the longer term, it is critical with a functioning stop-mechanism, and in time. Implementing it in time is still possible as long as the criteria is the date of deployment. The mechanism will not be perfect, it will not provide enough foresight, and the investment calculations of projects with deployment at the end of 2020 or in 2021 must withstand the possibility of getting a lower number of certificates, or none at all. Since banks, and many investors, already do not assign the certificate any value, it is clear that this will not stop the build-out. However, in many cases, slightly higher power prices, at around 35 euros, is often requested. Could also be slightly lower but many calculations are based on even higher forecasts.

*»Without electricity certificates, interest in low priced PPAs should be reduced«*

Without electricity certificates, it becomes more important to make use of potential increases in the power market and retain opportunities to capture return here. A market without electricity certificates should, to some extent, mean that PPA prices on long contracts can no longer be below 30 euros. Fredrik writes in his chronicle about other alternatives. Do not miss it!

Back to the electricity certificate. We assume that a volume-based stop mechanism will be in place. A pure volume ▸▸

**Price development electricity certificates**

| Montly prices | Direction | April–Juni 20 | Feb–March 15 |
|---|---|---|---|
| March-19, June 20 | ↑ | 158 | 96 |
| Average spot | ↑ | 141 | 92 |
| Highest spot | ↑ | 176 | 101 |
| Lowest spot | ↑ | 97 | 81 |

E

# Price Development
## Electricity Certificate



limit or perhaps even more likely a volume limit with a step-down approach. After a certain date and/or volume, turbines put into operation will only be granted a preliminary allocation. After 2-3 years, a new calculation is made for allocation in order to match it with annulation according to quota curve. The preliminary allocations might be lowered either by shortening the number of years or by lowering the yearly allocation. The first option is, according to the authorities, the most likely but the design has not been decided. It is no longer as interesting to follow which investment decisions are taken but rather to closely track construction process of planned projects and for project owners to get turbines into operation as fast as possible.

With a secured long-term balance, the value of the electricity certificates can be maintained. Prices during this period may depend on annual balance (likely high in the middle years). However, the balance may be levelled out if players act on this fact and sell their certificates when the balance is once again lower. This would provide for a more evened out price curve.

*»Will the quota curve be shortened?«*

It is also important to follow any additional measures that might be proposed by the Swedish Energy Agency following the proposal for a stop mechanism design and their impact assessment. A new investigation is rather likely. The need for a stability mechanism of some kind have been raised and the agency seems to have understood this. Perhaps the quota curve should be shortened? If all production is in operation already in 2021 - should the quota curve really extend to 2045, why not just 15 years from 2021?

The conclusion is that, regardless of further adjustments, the electricity certificates have a value all the way to 2045, as long as the system is balanced at the end. Opportunities are also available for balancing the curve so that the high balance of the years we see in front of us now will not be infused. If this does not happen through political adjustments, it can be done by market participants themselves. This is our theory and our philosophy in portfolio management. ■

F

# Insight
## Swedbank and DNB



**WELCOME TO INSIGHT!**
In this section we interview people within interesting companies with an influence on, or being affected by, renewable energy and the Electricity Certificate market. A selection of previous topics include Technology development – flexible wind power, storage and airborne wind, Riskmanagement and market views of banks, New concepts for photovoltaics, Bankruptcies in wind and Offshore wind.

Forecasts of rising power prices, an electricity certificate market in change and winds that seem to blow in the right direction for renewable energy. How do the banks view this? What do investors and wind power owners want? How do the increasing spreads between market prices and long-term PPAs affect the willingness of more flexible hedging strategies? We interview **Swedbank** and **DNB**, two Nordic banks involved in many wind transactions.

**ANDREAS AUSTRELL** is the Client Executive within Power & Renewables at Swedbank with specific responsibility for financing of wind power in Norway and Sweden, a large area of interest within Swedbank. In this position he has been included in many of the larger wind projects where Swedbank has been a stake holder. Andreas has worked at Swedbank since 2003 and has high experience in several areas, mainly within asset financing.

**Have the rising prices of power and electricity certificates affected the interest in new wind power investments?**
There has been considerable interest for a long time, so it's hard to see a clear shift right now, it's rather that the high pressure continues. There is a high demand for projects ready to be built and most are sold in a short period of time and at good prices. My view is that the low interest rate situation we have seen over a long period is largely behind the significant interest we have seen for a long time. But of course, rising prices, and especially increased long-term expectations, also contribute to further demand.

*»To a large extent, the low interest rate is the reason behind«*

However, current market development imposes a certain risk. Rising coal- and gas prices and, above all, CO2 prices may be indications that the economy in Europe is improving, which can lead to higher interest rates, thus making alternative investments more attractive.

**What types of investors do you see today? Other than before?**
No, mainly the same as before. There ▸▸

F

# Insight
## Swedbank and DNB



is a mix of financial and industrial players. Among the financial ones, there are many funds and pension companies, primarily from central Europe, and among the industrialists, we see that both pure wind power producers and larger power companies have a lot going on. Both new and already existing parks are of interest, also those that have been in operation for 8-10 years. There is also high demand for parks where the current owners have been in financial difficulties, mainly from industrial players who see an opportunity to consolidate the market.

**Will the trend of rising prices persist?**
In the case of electricity certificates, there is very high uncertainty and, even if they have risen in the short term, we do not add higher value to them in the long term. This is also reflected in the low prices and the limited liquidity in the forward market.

We note that the market and analysts expect rising power prices, but of course there is also considerable uncertainty around market balance development, as well as prices for CO2, coal and gas prices in the future. On the whole, we are united with the analysts and expect to see a positive development of electricity prices in the future in line with market expectations.

**Have your long-term hedging requirements changed with the increased spread between PPA prices and prevailing pricing and forecasts?**
Basically, it is essential for us as a bank to secure the highest possible share of production in order to reduce the risk of a negative scenario. However, we have always been somewhat more flexible in terms of hedging requirements than the most rigid banks, as long as we get paid for the risk we take. Many of the institutional investors cooperate with the major European banks, which generally have strict security requirements. In many cases, they may be sharper in pricing and offer long maturities up to 15-20 years, but then require a PPA for most of the production with a maturity corresponding to the loan.

*»Due to the increased spread, we have received more requests to offer flexibility«*

At the same time, there are now more players who begin to realise that the upside is limited if prices are locked in at these relatively low levels. After the above mentioned spread, we have received significantly more requests if we can offer flexibility, so for us it is clear that there has been a shift in investors' focus from interest rate margins to security structures. For the reasons mentioned above, this development has been beneficial for us who have the opportunity to offer that flexibility. With a more flexible structure with shorter hedges, we may however not be able to offer equally long maturities resulting in a certain refinancing risk. In these cases, we work on solutions, such as to risk minimise through rolling hedges to extend the hedging horizon continuously. Flexibility allows the opportunity to follow the market and in a rising market secure volume to higher prices.

**How do you handle electricity certificates and especially the usual requirements for hedging further out on the curve where this is difficult and prices low?**
We usually also demand long-term hedges of electricity certificates. But we note that in today's market it is difficult to hedge beyond a couple of years. We have lately taken this into account by placing less emphasis on certificate prices in the calculation of the debt amount and thus accepting a shorter but rolling security structure.

**NIKLAS JOHANSSON** is head of Power & Renewables, Northern European at DNB and located in Stockholm. DNB is the largest Norwegian bank with a high focus on industries, e.g. within shipping, fishing, manufacturing and energy where renewable energy is continuously more in focus. Niklas has worked on DNB since 2005 on different management positions.

**Have the rising prices of electricity and electricity certificates affected the interest in new wind power investments?**
We notice a definite increase in interest and feel that it is driven mainly by rising power prices, not by the rise in electricity certificates which we perceive as temporary. Above all, the interest applies to new projects, but also to existing parks already in operation. ▸▸

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# Insight
## Swedbank and DNB



**What types of investors do you see today? Other than before?**
We still see much capital from international investors, but also more direct investments from for example insurance companies and pension funds. We have also noted that turbine manufacturers are now entering the market also as project owners. Probably, this is largely for the reason of selling their turbines, so it is not certain that they are interested in staying as long-term owners. This applies to both European and overseas manufacturer. Chinese manufacturers have, for example, shown interest even if they have not been included in any of our transactions so far.

**Will the trend of rising prices persist?**
It's always hard to look into the future, but in terms of electricity certificate prices, we think it is quite clear that they are going down in a couple of years, that the current upturn is only temporary. When it comes to power prices, the situation is different. In this case, we would say factors are pointing towards the fact that the upswing is persistent, but it's tough to say how much.

**Have your long-term hedging requirements changed with the increased spread between PPA prices and prevailing pricing and forecasts?**
No, I would not say that. We basically never set any actual hedging requirements and have not done so previously either. On the other hand, existing and planned hedges do affect our debt sizing calculations.

*»Existing and planned hedging has a major impact on debt sizing«*

This is where we have discussions with investors, but they are the ones who make the final decisions. Regarding the interest in long-term PPAs contra shorter hedges, it is crystal clear that PPAs are in many cases needed for the deal to take place. We do not see much of the shorter hedging strategies anymore. However, this depends on the type of investor. A certain type of investor will always want to take as little risk as possible even if it is in exchange for a possible lower return. However, other types of investors may see it differently and be interested in the opportunity to increase their return at the expense of certain collateral and, based on these preferences, also determine what structure they want on a PPA.

**How do you handle electricity certificates and especially the usual requirements for hedging further out on the curve where this is difficult and prices low?**
We have had the same policy for a number of years now, I think we were among the first to introduce it, but now we believe it is the same for many banks. We do not assign any value to the electricity certificates at all unless they are hedged. Hedged volume is included in our debt sizing, for the remaining volume we set the value 0 kr. ■

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# Chronicle
## The wind power company as merchant energy trader



**A vision of the wind power company doing active hedging – extracting more value from its assets at a controlled risk level.**


**Summary**
Wind power markets are moving from feed-in tariffs to market-based payments. The Norwegian/Swedish market is already entirely market-based as both power, and the support scheme with green certificates are traded markets.

Market price risks can be more or less avoided with PPAs but at the cost of 30 percent or more of the value further out in time, a loss of flexibility and a large timing-risk when closing a PPA. There will still be volume risk due to weather and seasonality.

This article proposes to choose active management of the price and volume risks by hedging with financial instruments, and when the timing is right, combining that with (corporate) PPAs and other contracts – ***a merchant trading approach***.

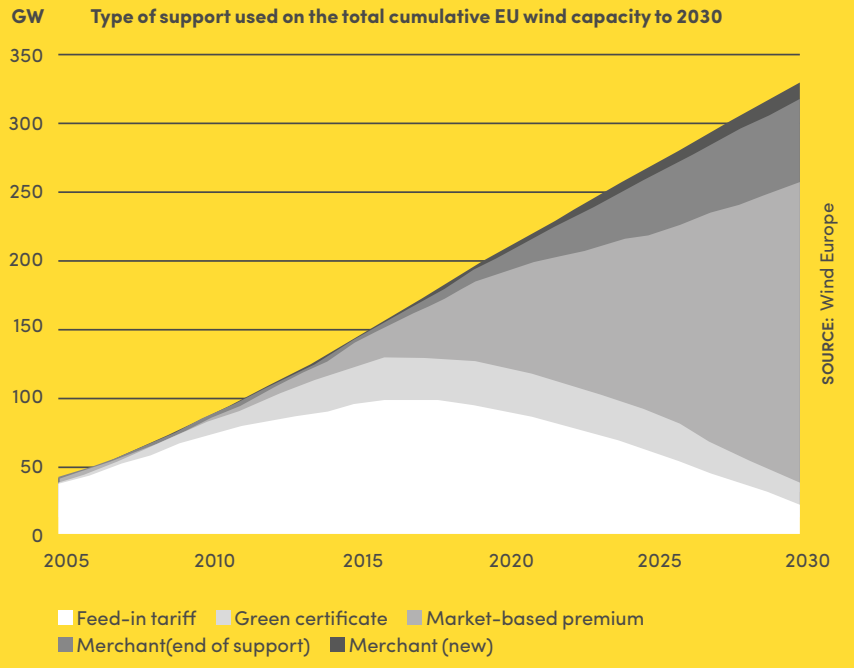
By setting up an in-house merchant trading ***function***, ***focusing on cash flow and not production***, it is possible to construct a hedging strategy with almost similar risk profile as a long-term (corporate)PPA but with maintained long-term value, flexibility and lower timing risk.

Contrary to the message from providers of external portfolio management, wanting to save their business and their generous margins, a merchant trading function does not have to be a costly or complicated setup. The value comes from the hedging strategy, the decision making, the choice of instruments and the risk management; the rest is tools and can be out- or in-sourced.


## Background

**From feed-in tariffs to market-based payments**
In 2030 only a mere 6% of European wind capacity will be supported by feed-in tariffs down from almost 65% today.[1] The Swedish/Norwegian power market with its green certificates is already very dependent on market prices for electricity and elcertificates and will in a few years be fully market based as the elcertificate system target is reached.

**Long-term corporate PPAs; no risk and no opportunity...**
...and a considerable loss in value longer out on the curve. Typically, a long-term ▸▸




1. WIND EUROPE

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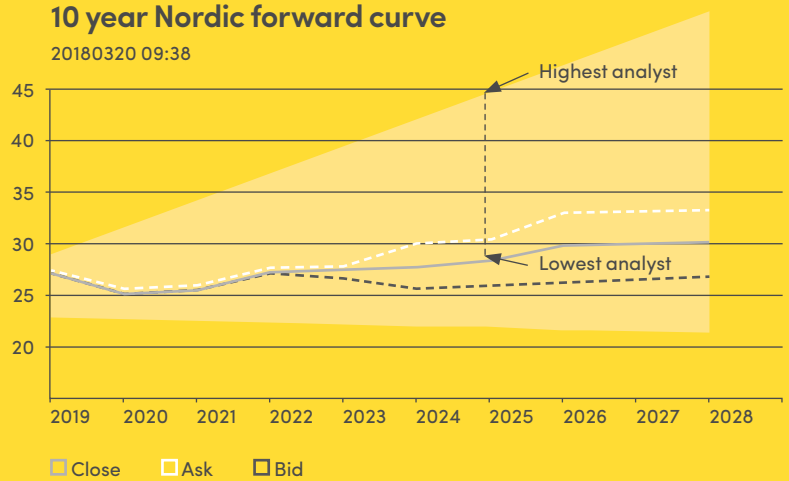
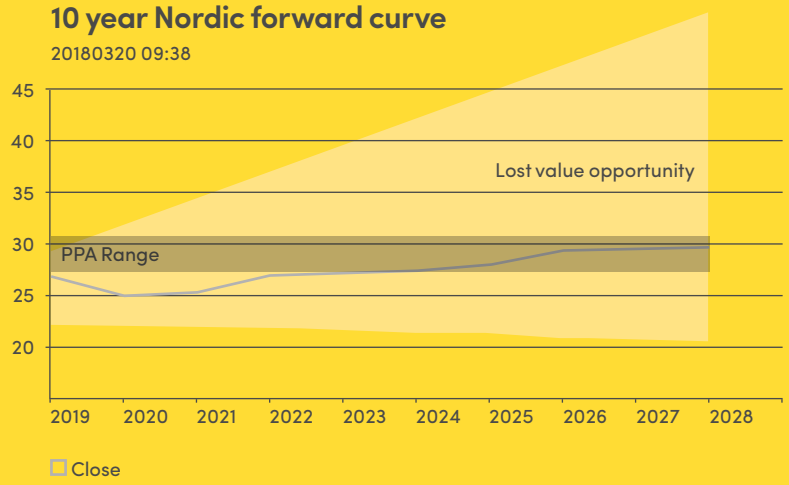
(corporate) PPA is priced 30–40% below the expected value 5–15 years out in time.

*»You give away an enormous amount of value in terms of the price you can get with active hedging compared to what the long-term forward price curve is showing.«*

It is mainly because of a lack of natural buyers further out in time. Few electricity consumers have a long-term view, but many producers would prefer securing the price to finance their investments. It is mainly large steel, pulp and paper producers, and mining companies that secure power on a 10–20-year horizon.

Below is Bodecker Partners view on a potential future price range and the lost value opportunity when you choose a PPA instead of actively manage the hedge.




**Timing Risk – when is the decision made to lock in cash flows the coming 15 years?**

15-year or longer corporate PPAs have become popular among the banks and lenders as a tool to secure their debt payments. It seems to have been forgotten that *the actual timing of the decision on when to accept a PPA bid is associated with an immense variation in value.* Maybe there is a belief that the 10–15-year price level is stable, and there is a prevailing view from analysts and traders on the future power prices. The chart on the next page illustrates how the financial instrument for the year 2025 delivery has moved in price over four years, from April 2015 to April 2018. This instrument is a proxy for the value further out on the price curve, and longer-term PPA prices correlate to it. Note the massive swing from 37 EUR/MWh to 21 EUR/MWh to 30 EUR/MWh.

To be concrete, for a hypothetical decision on a 250 GWh wind park to secure all the production in a 15-year PPA **there has been a 60 million EUR timing difference**[2] over the last four years!

It can be avoided with active hedging. ▸▸

**TOP:** Bodecker Partners' view on potential price range 2019–2028

**BOTTOM:** Estimated PPA range (in grey) from Nov-17 to Mar-18

2 250.000 MWH X 15 YEARS X (37–21 EUR/MWH)

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# Chronicle
## The wind power company as merchant energy trader



**Termin 2025 – Price variation during past four years**


**The alternative: active hedging and merchant trading**

A mindset shift is needed to start focusing on cash flow and not physical power sales and production profiles. The first thing to learn in professional energy risk management is to separate the physical delivery and the financial instruments in the hedge. The second thing is to combine the cash flows from these two into a net resulting cash flow – which comprises the total generated income to perform debt service with, as well as generate net return.

The physical delivery has balancing risks that need skilled next-day forecasting and preferably access to intraday trading. It is best performed by a service provider that ideally not only is skilled in forecasting but also has a matching consumption portfolio to lower the net exposure and costs. Many companies are providing this, and it is essential to evaluate service, reliability and backup resources and not only lowest price. With active hedging it is possible to use financial instruments, futures and options, to replicate the risk profile of a PPA but keep the flexibility to change the profile, keep more or most of the value further out in time and spread out the timing risk, i.e. not betting everything at one specific point in time. Portfolio managers and other PPA-providers work this way and get well paid to take the limited residual risk.

There are liquid financial instruments to hedge Nordic power the nearest two years. Up to ten years are listed on the exchange, but those contracts suffer from the same drawdown as PPAs – hard to do in larger volumes and with low prices further out in time. It can be managed though, if the demand for guarantees from the counterpart or clearinghouse can be met, as the nearest instruments can be used instead and rolled forward.

»Merchant trading« means even more active management of the exposure where the financial hedging instruments can be combined with PPAs or other agreements of different contracts lengths ***when the timing is right*** and when it fits the hedging strategy.

**Not as complicated as you may be led to believe**

You need several functions to perform professional energy trading, hedging or merchant trading business:
These functions contain skilled and expensive people with back-ups as well as IT-systems and all other corporate support. The competition among the providers of these services has become much tougher. There are now over 20 companies in the Nordic countries providing different levels of portfolio management, balancing services, and spot trading. They have invested a lot in all these functions, and they are expensive to run. By bundling them all into ▸▸

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# Chronicle
## The wind power company as merchant energy trader



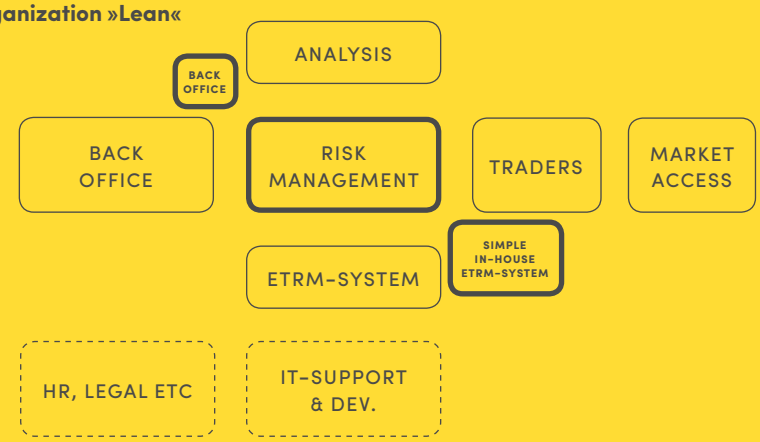
one non-transparent service, it is possible to charge extra for the perceived, and marketed complexity.

However, ***the vital and essential function is where the hedging strategy is maintained and complied to and where the actual hedging decisions are taken.***

All the other functions can be outsourced or insourced at a low cost, zero investment, and high redundancy level. Left is the risk/exposure management function, a simple risk management system and deal database (for redundancy) as well as a small "back office function" to maintain flexibility and negotiating power to change service providers. Thus, if you know what is vital and what to demand from the service providers, ***you can run a hedging or merchant trading function with few people and relatively low complexity.*** ■

**Merchant Trader Organization**


**Merchant Trader Organization »Lean«**




## Conclusion

**AVOIDING NORDIC POWER** price risk with long-term PPAs to please lenders and investors come at a very high cost and loss of flexibility. The timing risk is substantial.

**IT IS POSSIBLE** for the wind power producer to take control of its hedging and risk at a lower cost, with maintained flexibility, lower timing risk and most importantly without giving away 20–40% of the value further out in time.

**WITH THE NECESSARY** knowledge and experience, it is possible to set up a lean hedging or merchant trading function without the complexity and number of employees in a typical energy trading or portfolio management organisation.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