

# **Future of Renewable Energy Policy and Investments**

Preview of the content from Nordic Power Market Outlook

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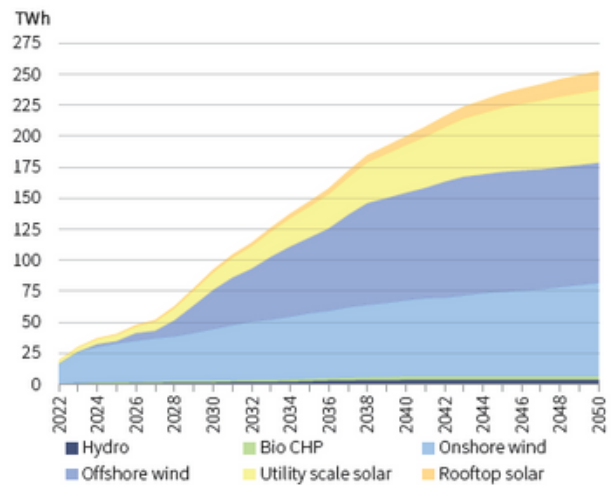
# Renewable Energy Policy and Investments

The energy crisis in Europe has caused many countries to lay out more ambitious plans for renewable roll-out. In the Nordics however, their goals have been ambitious for a long time, and are currently focused on how to concretely realize them.

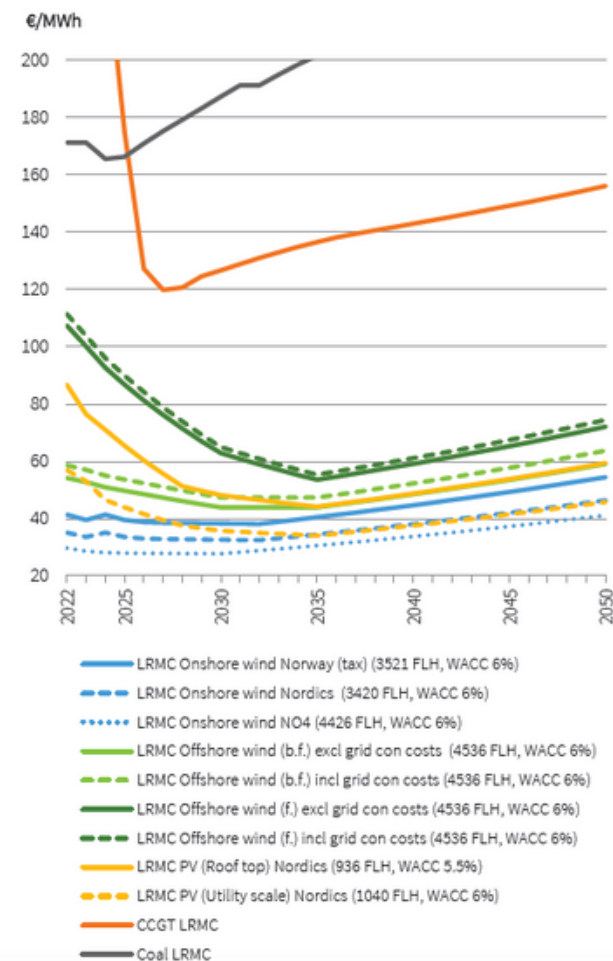
Renewable energy has been the backbone of the Nordic energy system for decades. Hydropower is the dominating technology in the Nordic power system and will be instrumental going forward. In the last 15 years, wind power has been the fastest-growing energy technology in the Nordics. Especially northern Sweden has had a large build-out in the last 10 years whereas Denmark has taken the lead in offshore wind power. The Nordics are fortunate to have hydropower which very effectively can be regulated and thereby handle the intermittence from wind power. However, going forward it is hard to see major investments in hydropower. Wind and solar offer lower costs, and environmental policy and legislation significantly limit new hydropower. We find that the total potential for onshore wind, offshore wind, and solar power is sufficiently high to meet any new consumption. We expect some minor volumes of hydropower to be built out towards 2050. The potential for hydropower investments in Sweden is limited due to environmental concerns, and increasingly so in Norway as well. We expect additional hydropower to come from increased capacity at older plants, predominantly in Norway.

The overall costs of raw materials, freight, etc. have increased markedly since many restrictions concerning COVID-19 were lifted. With the demand jumping upwards suppliers suddenly had large backorders built up. This has increased the price of turbines and solar PV cells dramatically, upwards to 40 %. Today, we see that raw material prices are coming back down, freight costs are stabilizing, and we expect PV cells and turbine costs to eventually come down again. Despite the greater CAPEX, this has by no means slowed the roll-out of wind and solar. In fact, new solar PV installations saw record numbers in the Nordics in 2022. Several large wind park projects were

Nordic Renewable Growth



LRMCs



also confirmed despite the increased costs. In the long term, we see the recent increase in capital costs to be the more important economic factor influencing investment decisions going forward.

Almost 40 TWh of renewable power are under construction or with final investment decision (FID) with expected commissioning by 2025. We expect solar power and offshore wind to make up most investments from 2026 towards 2050.



## Low Scenario (Base Scenario where not specified)

### Onshore wind assumptions:

- 2022 CAPEX: 1.14 MEUR/MW. We assume a 1.5% annual decline in turbine prices per MW per year up to 2030, and 2% inflation thereafter. All other parts of CAPEX inflated already from 2022 by 2%
- WACC: Total after-tax nominal WACC of 3.5%

### Bottom fixed offshore wind assumptions:

- 2022 CAPEX at 2.63 MEUR/MW(full grid con.costs) / 2.35 MEUR/MW(red. grid con.costs). We assume a 2.5% annual decline in total CAPEX per MW per year up to 2030, a 1% annual decline from 2031 to 2035, and from then on inflated by 2% annually
- Production: 4234 FLH in Conti Europe, 4536 FLH in the Nordics. Load hours up 0.4% annually to 2025, up 1.0% annually from 2026 to 2035, unchanged then on
- Total after-tax nominal WACC of 3.5%

### Floating offshore wind assumptions:

- 2022 CAPEX at 5.58 MEUR/MW(full grid con.costs) / 5.33 MEUR/MW(red. grid con.costs). We assume a 7.5% annual decline in total CAPEX per MW per year up to 2030, a 5% annual decline from 2031 to 2035, and from then on inflated by 2% annually
- Production: 4234 FLH in Conti Europe, 4536 FLH in the Nordics. Load hours up 0.4% annually to 2025, up 1.0% annually from 2026 to 2035, unchanged then on
- WACC: Total after-tax nominal WACC of 3.5%

### Utility-scale Photovoltaics assumptions:

- 2022 CAPEX at 0.73 MEUR/MW. We assume total CAPEX to decline to 0.51 MEUR/MW in 2028, from 2029 to 2035 we assume a 1% decline in total CAPEX. From then on total CAPEX inflated by 2%.
- Production: 1155 FLH in Conti Europe, 1040 FLH in the Nordics. Load hours up 2% from 2022 to 2030, up 0.13% from 2031 to 2035, unchanged then on
- WACC: 3.5 %

### Rooftop Photovoltaics assumptions:

- 2022 CAPEX at 1.2 MEUR/MW. We assume an 8.5% annual decline in total CAPEX per MW per year up to 2028, a 2% decline from 2029 to 2035, and 2% inflation thereafter
- WACC: 3.0 %

## High Scenario (Base Scenario where not specified)

### Onshore wind assumptions:

- 2022 CAPEX: 1.04 MEUR/MW. We assume nominally unchanged turbine prices per MW up to 2030 and 2% inflation thereafter. All other parts of CAPEX inflated already from 2022 by 2%
- Production: 2900 FLH in Conti, 3400 FLH in the Nordics. Load hours unchanged until 2050
- WACC: Total after-tax nominal WACC of 8.0%

### Bottom fixed offshore wind assumptions:

- 2022 CAPEX at 2.71 MEUR/MW(full grid con.costs) / 2.42 MEUR/MW(red. grid con.costs). We assume a 1% annual decline in total CAPEX per MW per year up to 2030, nominally unchanged from 2031 to 2035, from then on inflated by 2% annually.
- Production: 4217 FLH in Conti Europe, 4518 FLH in the Nordics. Load hours up 0.2% annually to 2035, unchanged then on.
- Total after-tax nominal WACC of 8.0%.

### Floating offshore wind assumptions:

- 2022 CAPEX at 5.89 MEUR/MW(full grid con.costs) / 5.63 MEUR/MW(red. grid con.costs). We assume a 5.0% annual decline in total CAPEX per MW per year up to 2030, a 2.5% annual decline from 2031 to 2035, and from then on inflated by 2% annually
- Production: 4217 FLH in Conti Europe, 4518 FLH in the Nordics. Load hours up 0.2% annually to 2035, unchanged then on
- Total after-tax nominal WACC of 8.0%

### Utility-scale Photovoltaics assumptions:

- 2022 CAPEX at 0.76 MEUR/MW. We assume total CAPEX to decline to 0.64 MEUR/MW in 2028, from 2029 to 2035 we assume nominally unchanged total CAPEX. From then on total CAPEX inflated by 2%.
- Production: 1155 FLH in Conti Europe, 1040 FLH in the Nordics. Load hours up 2% from 2022 to 2030, unchanged then on
- WACC: 8.0 %



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