Investing in Belgian offshore wind: a comprehensive overview of associated risks

Offshore wind risk analysis provided for Zeewind 1 fund
June 2014

1. Zeewind 1 investment fund

Meewind is an investment manager specialised in renewable energy investments for private parties, local municipalities and provinces. Zeewind 1 is a Meewind investment fund specifically focused on offshore wind energy. It currently owns a stake in the Belgian offshore wind farms Belwind and Northwind.

The purpose of the analysis below is to provide individuals or companies investing in Zeewind 1 an understanding of basic considerations to a financial investment in the offshore wind sector as well as to provide a more specific risk analysis on the Belwind and Northwind projects.

This analysis has been prepared by Green Giraffe Energy Bankers (GGEB) at the request of Meewind. This analysis is not intended to form the basis of any investment decision and does not constitute or contain any recommendation by GGEB. No representation or warranty, expressed or implied, is or will be made in relation to the accuracy or completeness of this analysis and no responsibility or liability is or will be accepted by GGEB or Meewind, their shareholders or by any of their respective, subsidiaries, officers or employees in relation to furnishing this analysis. Neither GGEB nor Meewind undertake any obligation to provide access to any additional information or to update this analysis or to correct any inaccuracies therein which may become apparent. This analysis is based on information received from Meewind. We have not verified the accuracy of the information supplied to us. We have assumed the accuracy and completeness and (where copies are provided) conformity with the originals of the documents and any documents referred to in them and that no relevant document, information or arrangement has been withheld from us.

2. Belwind offshore wind farm

2.1. Description and status

Belwind is an offshore wind project located on the Bligh Bank, 46 km off the Belgian coast in the Belgian exclusive economic zone. It consists, today, of 55 operating Vestas V90-3.0 MW wind turbine generators for a maximum capacity of 165 MW. The project company owns permits and consents for an additional capacity of 165 MW to be built in the near future, resulting in up to 330 MW of total installed capacity. The concession is granted for 20 years with an extension option to 30 years.

The first 165 MW phase was financed on 24 July 2009 through a combination of equity and non-recourse long term facilities. Non-recourse debt is a liability of the project company which does not benefit from any warranties or commitments of the owners of the project.

The project was built on time and within budget under a 2-contract structure with Vestas and Van Oord Dredging and Marine Contractors. It is now operated under a 15 year full scope operation and maintenance contract with Vestas, including a comprehensive warranty package backed by strong financial commitments by Vestas and a yearly availability guarantee. A long term power purchase agreement is in place with Electrabel, including offtake of the full production and management of the sale of the production on the market at a fixed price to the project. The price for electricity includes a small component of market price risk, which is partly mitigated through hedging instruments and is further described below.

Belwind 1 was completed on 29 June 2011 and has been operating at a high level of performance since.

A second 165 MW phase is currently under development. Additionally, Belwind entered in an agreement with Alstom in 2012 to install – for the purpose of obtaining turbine certification – the Haliade 150-6 MW prototype. The Haliade was successfully installed on 17 November 2013 and is expected to produce electricity in 2014.

2.2. Project financing

Belwind NV is currently owned by Parkwind (a consortium of Colruyt, Korys and ParticipatieMaatschappij Vlaanderen) and Zeewind 1, all of which are experienced long term investors. The main shareholder in Parkwind is the leading Belgian retailer Colruyt, which also owns several other, smaller, renewable energy (including wind, solar and biomass) projects. We have been informed that the Japanese conglomerate Sumitomo will obtain a 39% share in Parkwind mid-2014.

In addition to its 19.9% equity stake in Belwind N.V., Zeewind 1 acquired 80.7% of the total contingent equity provided by Van Oord. Such contingent equity constituted a reserve available during construction and was partly drawn (in a total amount of EUR 15 M, corresponding to 2.3% of the funds initially available).

The total construction budget amounted to EUR 660 M funded through 70% of senior loan facilities to be repaid by 31 December 2025.

USES	EUR M	%	**SOURCES**	EUR M	%
Construction costs	624.8	94.6%	Equity and contingent equity	135.6	20.5%
Financing costs	35.7	5.4%	Term and contingent loans	461.4	69.9%
			Mezzanine loan	63.4	9.6%
TOTAL	**660.4**	**100%**	**TOTAL**	**660.4**	**100%**

The debt financing of the project included senior and mezzanine debt facilities. The senior lenders are well known commercial lenders (Rabobank, ASN and Belfius), as well as the European Investment Bank and Danish export credit agency EKF. Mezzanine lenders include Rabobank and some of the project investors, including Zeewind 1, which contributed 5.9% of the mezzanine facilities.

2.3. Project revenues

As per the applicable Belgian regulatory framework, Belwind benefits from two separate revenue streams:

- the sale of electricity on the wholesale market, which is done through the long term power purchase agreement with Electrabel. The power is sold at prevailing market prices (using a widely traded index), minus a discount paid to Electrabel to remunerate the services the company provides (grid compliance, administrative services, and the guarantee that the whole production will be sold at all times);
- the sale of "green certificates" - renewable energy producers receive these in proportion to their production, and offshore wind projects benefit by law from a guaranteed

purchase of these "green certificates" by Elia, the Belgian grid operator, at a fixed price of 107 EUR/MWh for 20 years.

Both revenue streams are proportional to the net power production of the wind farm. Such production was estimated prior to construction by two reputable experts, Ecofys and Mott MacDonald, which produced similar results. Estimating power production from offshore wind farms is not seen as uncertain as the site conditions are quite simple (flat surfaces), and statistical variability from one year to the other is well understood. Indeed, early production figures are fully consistent with the initial estimates.

Belwind phase 1 **Annual energy yield (10 year average)**[1]	**GWh/year**	**capacity factor**
P50 energy yield	540	37%

Annual energy production is thus expected to be 540 GWh per year, equivalent to a capacity factor of 37 %.

3. Northwind offshore wind farm

3.1. Description and status

Northwind is a 216 MW offshore wind farm currently under construction on the "Bank Zonder Naam", 37 km off the Belgian coast in the Belgian exclusive economic zone. It consists of 72 Vestas V112-3.0 MW wind turbine generators to be erected on monopiles. As of 31 March 2014, 62 turbines were installed, of which 36 had already been commissioned and were ready to feed in electricity into the grid. All the turbine foundations, the offshore electrical transformer station and nearly all cables have been successfully installed. The concession is granted for 20 years with an extension option to 30 years.

Northwind raised non-recourse long term facilities for the project on 28 June 2012 and is expected to have completed construction by the end of the second quarter of 2014.

3.2. Project financing

Northwind is owned by Parkwind (30%), Sumitomo (30%) and Aspiravi (40%). Aspiravi is a renewable energy developer that combines the efforts of a large number of Belgian municipalities in the sector.

[1] P50/P75/P90 are metrics expressed as either (i) annual productions (energy yields), or (ii) percentage of time of full capacity production equivalent across a full year (capacity factor). A "PXX" denotes the annual energy production or capacity factor level that is reached (and therefore exceeded) with a probability of XX%

The total construction budget amounted to EUR 911 M funded through 70% of senior loan facilities to be repaid by 31 December 2029.

USES	EUR M	%	SOURCES	EUR M	%
Construction costs	861.0	94.5%	Equity and contingent equity	273.4	30.0%
Financing costs	50.4	5.5%	Term and contingent loans	638.0	70.0%
TOTAL	**911.4**	**100%**	**TOTAL**	**911.4**	**100%**

Zeewind 1 invested 5.0% in the EUR 111 M shareholder loan provided in the financing.
The debt financing of the project included senior and mezzanine debt facilities. The senior lenders are well known commercial lenders (Belfius, BNPParibas Fortis, ING, KBC and Rabobank), as well as the European Investment Bank and the export credit agencies of Denmark (EKF); Norway (GIEK) and Belgium (ONDD).

The project has decided to adopt a multi-contracting construction strategy to have more control over the works and the risk allocation, resulting in cost containment, improved contract conditions and higher level of guarantees from each contractor. Construction is expected to be completed by the second quarter of 2014:

- Vestas supplies, installs and commissions the 72 V112-3.0 MW turbines;
- GeoSea is responsible for the supply and installation of the inter-array cables, the monopile foundations, the transition pieces and scour protection;
- Innovation, the jack-up vessel used for the installation of both the foundations and the turbines has been chartered separately by the project and is made available to GeoSea and Vestas for their respective installation work at sea;
- Bladt Industries delivers and commissions the offshore high voltage station;
- Jan de Nul lays the 43 km export cable, which is supplied by Nexans.

Northwind has entered into a comprehensive 15 year service and availability agreement with Vestas for all maintenance works, provision of spare parts and (crane) vessels and including a comprehensive warranty package backed with a yearly availability guarantee.

3.3. Project revenues

As per the applicable Belgian regulatory framework, Northwind, like Belwind, benefits from two separate revenue streams:

- the sale of electricity on the wholesale market, which will be done through another long term power purchase agreement with Electrabel. The power is sold at prevailing market prices (using a widely traded index), minus a discount paid to Electrabel to remunerate the services the company provides (grid compliance, administrative services, and the guarantee that the whole production will be sold at all times);
- the sale of "green certificates" - renewable energy producers receive these in proportion to their production, and offshore wind projects benefit by law from a guaranteed purchase of these "green certificates" by Elia, the Belgian grid operator, at a fixed price of 107 EUR/MWh for 20 years.

In order to assess the wind yield Northwind appointed 3E in February 2012 to carry out an independent wind resource and energy yield study. Mott MacDonald, as technical advisor to the lenders, reviewed that analysis and further compared the results of this energy yield assessment to data from the MOW 7 meteorological mast and to the Belwind operating data. The combination of both assessments provides estimates of the expected energy yield which the project is confident are robust.

Northwind Annual energy yield (10 year average)	GWh/year	capacity factor
P50 energy yield	875	46%

4. Zeewind 1 investment profile

As stated in the previous section, Zeewind 1 owns:

- 19.9% in Belwind equity giving rights to dividends and shareholder loan payments;
- 80.7% in Belwind contingent equity in the form of a shareholder loan;
- 5.9% in Belwind mezzanine debt; and
- 5.0% in Northwind shareholder loan.

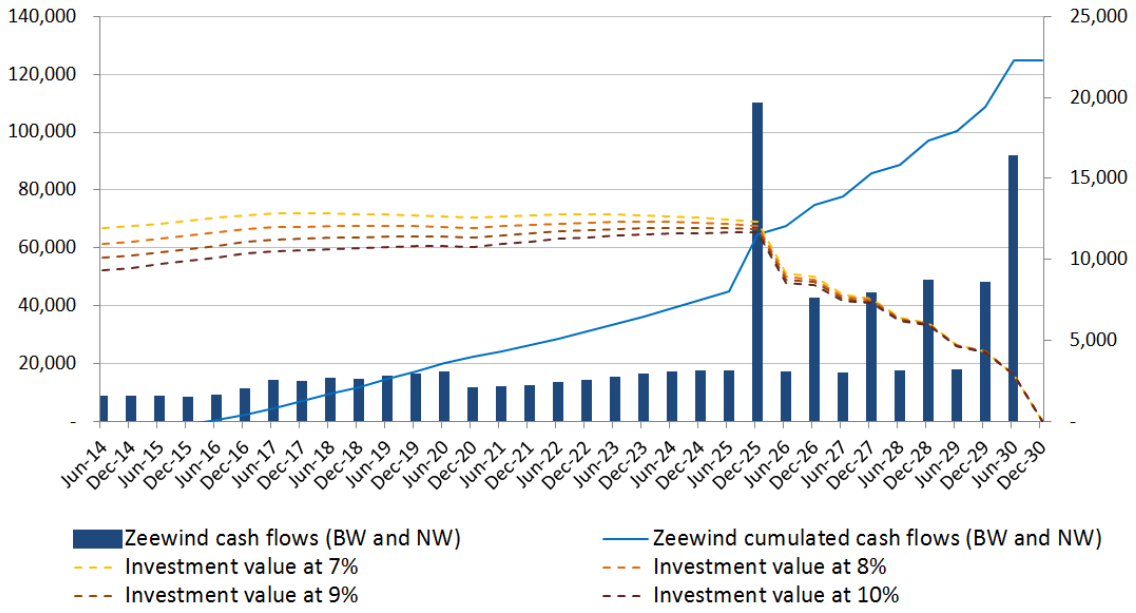

Figure 1- Zeewind 1 investment in Belwind and Northwind (values in k€)

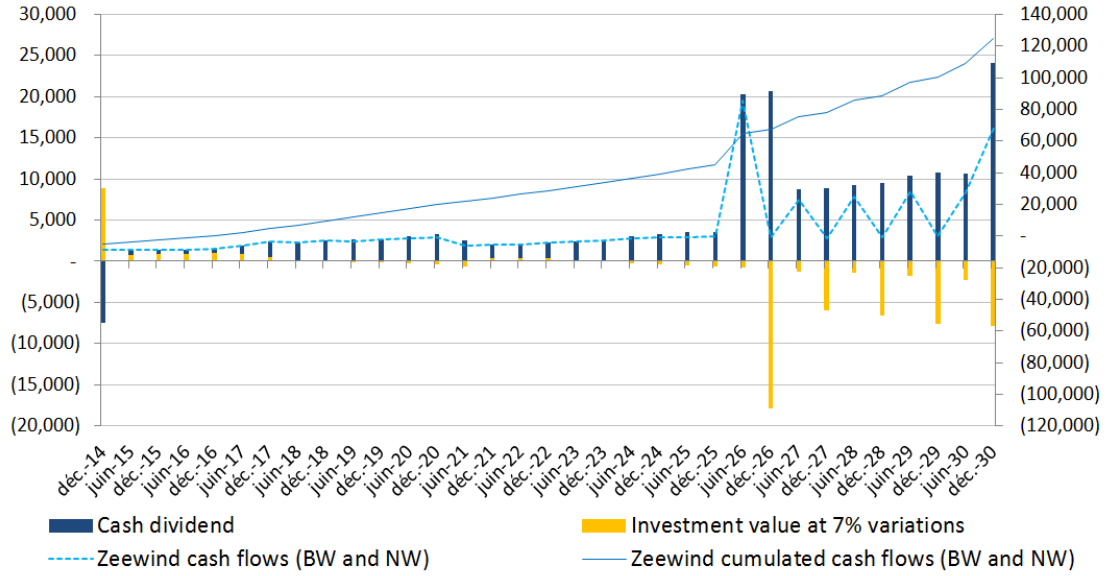

Figure 2- Zeewind 1 investment in Belwind and Northwind based on a 7% discount rate (values in k€)

The main assumptions used for the forecast – being wind yields (P50), availability, resulting electricity production, operation and maintenance expenses – have been validated and extensively reviewed by the project, the lenders and reputed advisors on behalf of both. Such figures are broadly in line with the market standards and fit with the projects constraints and technology: P50 yield around 40% of installed nameplate capacity, availability in the 92-95% range and maintenance costs in the range of 15-20 €/MWh. Actual performance to date is in line with or above the assumptions used for the forecast.

For Zeewind 1 this results in the following net present values of expected future cash flows from the investments in Belwind and Northwind.

Asset (values in k€)	NPV as per 30 June 2014			
	7%	8%	9%	10%
Investments Belwind and Northwind	57,811	52,257	47,334	42,960

5. Overall risk assessment

The Belwind and Northwind offshore wind farms are assets with contracted and largely de-risked long-term revenues.

The Belwind project is operational, with a satisfactory track record, while Northwind is at an advanced stage of construction. The contractors, the project management and technical teams have a proven track record across multiple projects in offshore wind. The early operational performance data shows that the projects run as technically expected or better.

Both projects benefit from a favourable and stable support regime. The high wind speeds at the offshore sites ensure favourable economics. The projects are controlled by investors with a good track record in investing in large renewable energy projects and with a strategic focus in the offshore wind sector.

No regulatory/permitting risk
Both Belwind and Northwind are fully permitted and benefit from the well-tested Belgian regulatory framework, which specifies for all phases of a project life the standards to be met and the documents to be provided. The revenue regime is set for 20 years by law.

Low residual construction risk
Offshore wind projects are complex infrastructure assets. They are specifically exposed to weather risk due to the marine environment and require experienced contractors and management to get built.

The Belwind and Northwind projects are developed, built and operated by experienced project management, technical teams and contractors, which hold significant successful track records in the offshore wind industry.

The Belwind project is now fully operational and is not subject to construction risk.
The construction of the Northwind project is now well advanced with all 72 turbines already installed, and the critical grid connection infrastructure (offshore substation and cable) already in place. The residual construction risk is therefore limited, and the project is currently expected to be on time and budget. The project is backed by a robust contractual structure that further minimizes the risk of cost overruns and delays.

Limited technology risk
Offshore wind turbines are exposed to a combination of challenges such as increased loads, a saline environment and limited accessibility during construction and operation. For these reasons owners, suppliers and operators place great care on turbine reliability, with a focus on (i) robust design subject to stringent testing campaigns, (ii) quality of supply of components (from a structural, coating and sealing perspective) and (iii) redundancy of critical functions within the turbines allowing efficient and timely pre-emptive maintenance (instead of curative) interventions. Offshore wind turbines are now specifically designed for the hostile offshore wind environment.

Technology risk is further mitigated by the warranties provided by the turbine manufacturers, who "stand by" their turbines through a 5-year warranty period and long term guarantees that turbine availability will exceed certain levels (typically in the 92-95% range).

Belwind and Northwind have both contracted the supply and long term operation of the wind turbines to Vestas, the Danish turbine manufacturer. Vestas is the largest turbine manufacturer in the world and has a substantial track record in offshore wind, dating back to 1995, with a 30% share of all turbines installed at sea as of end 2013. Both the V90-3.0 MW model (used on Belwind), and the V112-3.0 MW model (used on Northwind) has been specifically designed for offshore use and were subject to detailed investigations by external engineering firms on behalf of the lenders to each project.

Turbine availability on Belwind has been confirmed by actual on-site production data over 30 months of operation. The wind farm is currently significantly exceeding revenue expectations thanks to excellent availability.

Turbines on both projects are installed on monopile foundations, a proven technology that is commonly used in the offshore wind industry. The monopiles are customised for the water depth and soil conditions of the site, and their design is accordingly site specific.

Low wind risk
Wind is a statistically predictable resource. At sea, wind is stronger, steadier and more predictable than onshore. Although a weaker year is possible, expected long term yields can still be established with reasonable accuracy.

During the early development of an offshore wind farm, substantial effort is invested to study the wind resource in detail and find the most appropriate turbine lay-out that will optimise the energy production from the site.

These studies use historical data on wind speeds from long term neighbouring meteorological masts as well as modelling from atmospheric data. Both methodologies have a good track record and provided consistent results. These studies were further scrutinised by independent experts on behalf of the lenders to the projects. The resulting analyses conclude both sites have excellent wind conditions and provide a good understanding of the likely variability from year to year of the energy yield.

Wind levels on Belwind have been further confirmed by actual on-site production data over 30 months of operation. Wind levels are fully in line with expectations.

Limited performance risk
Lower performance of a wind farm could be caused by three main reasons (i) the turbines are not available to produce the energy, (ii) the turbines do not efficiently transform the wind energy into electricity (power curve deficiency) and (iii) the electrical transmission assets (cable and offshore high voltage substation) are deficient.

The loss of income due to decreased availability or a lower power curve can be substantial. This problem can be avoided by selecting a proven technology, putting in place a well-developed maintenance strategy and sound project management, and negotiating solid contractual commitments from the manufacturer.

It is thus common practice in the offshore wind sector for projects to enter into supply contracts that include availability and power curve guarantees and are accompanied by protective long term maintenance contracts from the turbine supplier. Such comprehensive contracts ensure the turbines are properly maintained by a knowledgeable party providing integrated services from installation through operations.

These contractual structures protect the project from unforeseen maintenance costs and also include compensation for lost revenues in case availability and power curve levels drop below a certain threshold.

Both Belwind and Northwind have entered into such contracts with Vestas, which has an excellent track record of ensuring the long term performance of its offshore wind turbines. Both wind farms entered into a 15 year service and availability agreement, under which turbine supplier Vestas performs all scheduled and unscheduled maintenance, provides the required spare parts and vessels and warrants an agreed availability level.

Problems with the electrical transmission assets could be caused by incidents occurring on the cable and substation. Operations and maintenance of such equipment is straightforward and contracted from a qualified electrical operator. More importantly, the projects have subscribed comprehensive insurance packages including compensation in case of incidents or damage to the

assets from accidents during construction or other external causes. Such insurance packages allow for a replacement of the impaired asset and a compensation for lost revenues, protecting both the financiers and owners of the projects.

Belwind and Northwind have subscribed comprehensive insurance packages in line with the highest standard of the industry.

Performance on Belwind has been further confirmed by actual on-site production data over 30 months of operation. The wind farm significantly exceeds availability and production expectations.

Limited market price risk
The revenues from the projects include a fixed price component (the "green certificates" sold to Elia) and a variable price component (the megawatt hours of electricity sold to Electrabel at market prices.

The fixed price component represents approximately two thirds of the expected revenues of the projects under prudent scenarios, thus limiting the impact of power price variations on project revenues. Further, power price movements are mitigated through options available to the projects under their respective Electrabel contracts which allow them to fix prices over several years, based on market quotes provided by Electrabel. Under the loan agreements with the banks, the lenders may require that such price fixing options be exercised if prices fall below certain levels, thus ensuring a minimum level of revenues in all circumstances.

Conversely, and unless such price fixing options are exercised, the projects and their owners benefit from the additional revenues if power prices go up.

Reduced operating cost risk
A significant portion of the operating costs (50% or more) of the project is related to the operations and maintenance of the turbines, for which both Belwind and Northwind have entered into 15 year fixed price contracts with Vestas, thus fully eliminating such cost risk, given the comprehensive scope of these contracts.

Insurance is another important operating cost item for the projects, representing 20-25% of total operating costs). Both Belwind and Northwind have entered into fixed priced operational insurance contracts for the first several years of operations and conservative estimates have been budgeted for the following years, taking into account current conditions in the insurance market for offshore wind.

Other costs are either less material or predictable by nature under applicable rules (like taxes).

Minimal macroeconomic risks
Belwind and Northwind are largely protected from interest rate risk through extensive interest rate hedging programs, ensuring that a significant portion of interest payments under the debt facilities are fixed during the first 10 years of operations.

Limited legal-political risk
Under the Kyoto Protocol of December 1997, Belgium is committed to limit emissions of greenhouse gases, including carbon dioxide. Among other measures aiming at realising such goal, the CREG, the federal regulator, shall issue one green certificate for each mega-watt hour of offshore wind energy produced over a period of 20 years. It further puts a mandatory purchase

obligation on Elia with respect to such green certificates at a price of 107 EUR/MWh in relation to the first 216 MW of installed capacity of the Belwind and Northwind projects.

Altogether, the Belgium framework for offshore wind is stable and well understood by operators. The revenue scheme with green certificates provides a transparent economic framework for investments in the sector and long term certainty on future income streams.

Limited counterparty risk

Since most of the risks have been contracted to third parties outside the project, counterparty risk is an important consideration in the assessment of an offshore wind investment. The projects have carefully selected their counterparties and assessed their experience in their specific field and financial strength. Additional (financial) security has been put in place where required. Most important counterparties are:

- for the construction phase: the contractors for their building obligations, the lenders for providing their funding and the insurers for being able to fulfil any claims should they arise;
- for the operational phase: the contractors for the guarantee period, the turbine O&M contractor for maintaining turbine availability, indirectly the Belgian state for payment of the green certificates, the off taker for payment of the electricity sales, the hedge counterparties for the interest rate swap and the insurers for being able to fulfil any claims should they arise.

6. Sensitivity analysis

Below chart shows the indicative impact on the internal rate of return of a number of sensitivities that can be run in the financial model, being (i) the operational expenses, (ii) the electricity prices, and (iii) fluctuations in the energy yield (5% deviation from the P50 wind as well as P90).

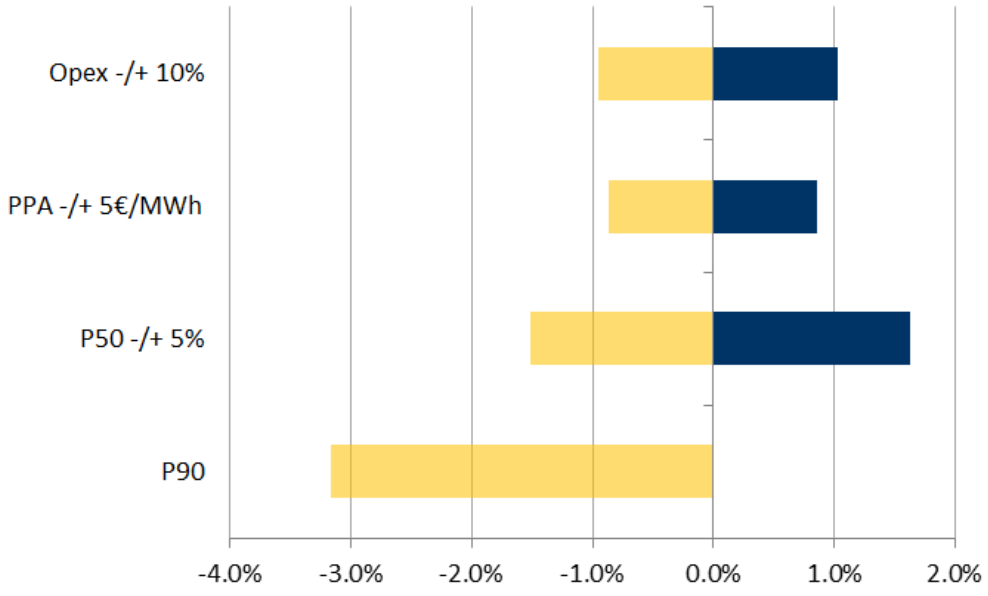

Figure 3: Sensitivity analysis