Quantifying value drivers and risks of renewables

Current state of renewables support

In the last three decades, the share of electricity generated from Renewable Energy Systems (RES) in the German power market has increased considerably. By 2018, RES made up 37.8% of total electricity generation. This development is primarily driven by EEG subsidies from feed-in tariffs (2000 – 2011), support direct marketing (2012 – 2016), and competitive auctions (since 2017). Increased competition and technological progress led to quickly plummeting subsidy levels through the auction system. For example, the market premium for solar PV auctions dropped from 9.17 ct/kWh in April 2015 to 5.47 ct/kWh in June 2019. In the long-term, further technological cost declines and political pressure are expected to sustain this trend.

Conversely, power prices are expected to increase, primarily driven by large centralised base loads plants leaving the system through the coal and nuclear phase-out. Furthermore, rising gas and EUA prices, as well as demand uncertainty and policy changes in neighbouring countries place an upward pressure on wholesale prices. As a result, increasing power prices and decreasing subsidy levels support the development of merchant-renewables, which need to be financed despite being exposed to uncertain future market revenues.

A major consequent for financing renewables based on market revenues is derived from direct exposure of the asset owner to risks ascribed to changing market prices. In contrast, in the FiT and SDM system the state, or the citizens, bore the brunt of the market price risks; these are now shifted to the asset owner and its contractual counterparts. Consequently, project financing costs will increase, which limits available debt financing. If bankable revenue streams are non-existent, the asset owner must invest higher levels of equity at higher interest rates. It is therefore quintessential to develop a bankable P90 downside debt scenario, in which technology-specific downside risks and the associated drivers are quantified.

Excursus: Methodology to derive a P90 value

In order to estimate the bankable revenue streams for post-EEG renewables projects, Aurora developed technology-specific downside risk scenarios.

(i) Analyse key power price drivers and estimate their P90 values

(ii) Estimate the effect of a P90 realisation on baseload and capture prices for each individual driver

(iii) Identify risks likely to occur together by assessing the correlation of key drivers and combining those that are positively correlated with negative price impacts

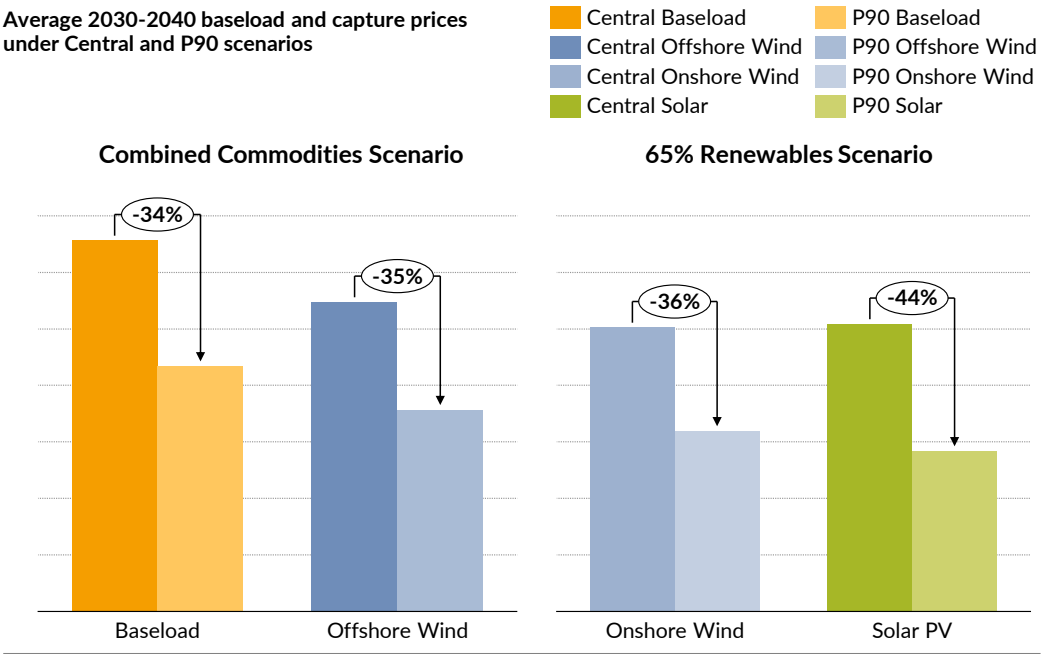
(iv) Determine the effect of the P90 scenario on capture prices for RES technologies using our electricity market model

Quantification of a bankable downside scenario

Based on Aurora's long-term electricity market forecast and an in-depth analysis of possible risks, we estimate that renewables capture prices face significant exposure to P90 risks. Hereby, P90 risk drivers for offshore wind are a world with low gas and CO_2 prices, whereas solar PV and onshore wind installations face the greatest risk from a high renewable penetration, such as a market in which renewables cover 65% of gross consumption in 2030.

When compared to the Central case and under the realisation of the respective P90 scenarios, solar PV faces the largest capture price discount of the three technologies. Due to its narrower generation profile, the achievement of the 65% RES target will require significant solar capacity additions, which result in solar capture prices to fall 44% below our Central case. Comparatively, average capture prices between 2030 and 2040 for offshore wind and onshore wind are 35% and 36% lower than Central, respectively. This is illustrated in the graphic below.

Capture price discount is most significant for solar PV under a P90 scenario when compared to the Central case



Source: Aurora Energy Research

Renewables assets are not only exposed to capture price risks, but also the development of imbalance costs, the occurrence of negative price periods, and the market price for guarantees of origin. The profitability of an asset must take all possible value and risk drivers into account in order to establish a bankable and comprehensive asset evaluation.

Solution

This analysis presents an excerpt of our newest offering, the German Renewables Service. The service itself presents answers to four key questions. How will capacities, market prices and costs develop? How to structure and price green PPAs? How to quantify market risks to secure financing? What other opportunities become investible and when?

Aurora is at the forefront in modelling and forecasting all relevant revenue and cost streams for renewables in their transition to merchant market entry. Our core value-adding activity is economic modelling of energy markets – we quantify impact of market and regulatory developments on a market and asset level, both project-based and through our regular updated market intelligence services.

For more information and pricing please get in touch.

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