

## **Motivation**

Germany is widely considered as a frontrunner in deploying renewable energies (RE) on an unprecedented scale, especially wind and solar power. In 2000, when the current support scheme (EEG) was put in place, the share of REs (excluding hydro power) in overall power consumption was around 2%. In 2014 it already amounted to more than 23% - an increase of 21 percentage points in only 14 years. This development underlines that REs have matured into an established market segment. The EEG, however, had originally been designed to create a niche market, which is why the German Government repeatedly made clear that a fundamental reform is needed. The main objective of this reform is to fully integrate renewables into the power market in the mid to long run, specifically with a view to increase cost effectiveness. But it is an unresolved debate how to do this, especially in a way that does not endanger the investment environment and the achievement of future deployment targets with it. This is what motivated this paper.

## **Short account of research performed**

Research was guided by the observation that risk is a critical factor in two ways: Increasing risk for RE investors is essential in order to make renewable deployment more cost effective. But at the same time, increasing risk too much could considerably reduce investment activity, especially of smaller actors, considerably. For that reason, removing risk had always been one of the main design elements of the EEG. In the face of this trade off, we developed a proposal that gradually increases risk and provides a fallback in case increasing risk does not work out. To that end, we analyzed relevant market risks and transfer provisions in past, current and an aspirational “more risky” EEG schemes, the latter serving as a benchmark. We then outlined a scheme for allocating support contracts termed “cascading risk auction”, which builds on two tenders that differ in the riskiness of the tendered support contract. The guiding idea was to create incentives for taking higher risks, and thus let investors decide about the degree of risks they want to take rather than imposing it through regulation. We also outlined options for standardized power purchase agreements (PPAs), which we view as an essential complement to this scheme because they can facilitate risk analysis and management. Finally, we analyzed and discussed this proposal in terms of critical design parameters (e.g. auction reserve price) and potential bidding behavior. Importantly, we conducted research under a combined scientific and business perspective in order to provide a more comprehensive picture accessible to both domains and assure relevance to decision makers.

## **Conclusions summarizing outcome & benefits of the work**

The analysis of the evolution of risk transfer in German RE support has revealed that a clear approach for further transferring risks to RE projects in order to fully integrate them into the power market is missing. The proposed gradual transfer by means of a “cascading risk auction” and standardized PPAs is a possible way forward. First, it creates incentives for taking more risks and at the same time provides a fallback if willingness or capacity to do so is insufficient. This might be particularly appealing for policy makers, who might be concerned about changing a running system. It might also be appealing to investors and financiers, mainly because it might trigger a learning process for the use of risk mitigation instruments. In that regard, also drawing on international experience with PPAs and risk instruments seems promising. A caveat for the effectiveness and feasibility of our proposal arises from the uncertainties related to the broader regulatory environment. Crucial in that regard is the still unresolved question of the future electricity market design, which is likely to have considerable – but yet unknown – influence on the price setting mechanism. Accordingly, a transparent and credible

long-term approach to upcoming electricity market reforms is an essential complement to the outlined proposal. Finally, higher risk-taking can also pave the way for a more important role of carbon pricing for RE deployment in the mid to long term.