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Creating Investment Incentives, Providing Reserve Capacity

Options for the market integration of renewable energy

The challenge

Renewable energy is **weather-dependent** and rather **difficult to control**. This means it cannot always be matched to electricity demand. Moreover, **up-front investment costs** account for most of the total cost of renewable energy installations. This gives rise to **two key investment problems**:

- 1. Prices fall when there is an abundant supply of electricity:** The growing proportion of **weather-dependent** renewables means that more and more renewable energy installations feed in electricity at the same time. At times when the supply of electricity is abundant, **prices** on the electricity market **fall**. This reduces the incentive to invest in renewable installations, since it takes longer to recoup the investment on the electricity market.
- 2. Supply shortages when less electricity is generated:** The growing proportion of renewable energy in the electricity mix and the concurrent **gradual phase-out** of electricity generated from fossil fuels could result in **supply shortages**, for instance during “dunkelflautes”. In order to prevent these shortages and guarantee a high level of security of supply, the future electricity market will need to provide incentives to invest in the provision and operation of reserve capacity.

The increasing variability of electricity generation is at the root of both investment problems.

Flexibility is key

Less electricity is needed overall if consumers are more flexible about when they use the available electricity. Increasing **flexibility reduces the need** to expand renewables and provide reserve capacity. To achieve more overall flexibility in the energy system, **storage systems, flexible demand and flexible additional capacity** are needed to compensate for the variability of renewables. The **digitalisation** of the energy system, for example the rollout of smart meters, is a key enabler.

The solutions

Changes to the electricity market design can build on this increased **flexibility** and support the **expansion of renewables** and the **provision of reserve capacity**. This will ensure that renewables are integrated into the energy system as efficiently and effectively as possible.

Supporting the expansion of renewables

The following policy options can in some cases be combined:

Policy option 1: Fixed market premiums: Fixed market premiums are paid in addition to the market price.

Policy option 2: Sliding market premiums: The premium prevents the price from getting too low (guaranteed minimum selling price).

Policy option 3: Contracts for Difference: The premium prevents the price from getting too low and taxes any profits over and above the guaranteed selling price.

Policy option 4: Focus on carbon pricing: Makes energy generated from fossil fuels more expensive (indirect support for renewables).

- In the short term, it is important to meet the **renewable energy expansion targets**. In the long term, the support system should be **cost-efficient** due to the high financing requirements.
- The main instrument should be a **progressively increased, cross-sectoral carbon price**. This would incentivise greater flexibility and enable the conclusion of long-term supply contracts, including over-the-counter contracts. It would mean that renewables no longer needed to be subsidised.
- During the transition period, a **sliding market premium model** can help to meet the expansion targets. This would be gradually phased out (ideally by 2030).

Providing reserve capacity

The available policy options are as follows:

Policy option 1: Energy-only market (EOM): Price signals are the only incentive to leverage flexibility.

Policy option 2: EOM with strategic reserve: Payments are made to back-up power plants that are not active in the electricity market.

Policy option 3: Central capacity market: Establishment of a central market to pay for guaranteed capacity.

Policy option 4: Decentralised capacity markets: Providers have a capacity obligation at peak load times, trading of flexible generation.

- It is doubtful whether the current model of an **energy-only market** backed up by a **strategic reserve** will still be able to guarantee a **high level of security of supply** in the future.
- **Central or decentralised capacity markets** are a **fundamentally suitable** alternative means of securing investment in reserve capacity.
- They should be **introduced gradually**, with **preparations beginning well in advance**.