Renewable energy 300 kWh

Renewable energy 300 kWh

Overall, the report provides in total data for 243 plants in 24 countries.1 Figure ES.1 provides a synthesis of the different technologies analysed and the range of their LCOEs at plant-level at a real cost of capital cost and a corresponding discount rate of 7%. Given the increasing importance of system considerations for a comprehensive comparison of different technologies, the LCOE analysis is complemented by examples of the IEA"s value adjusted levelised costs of generating electricity (VALCOE) measure for selected regions and technologies.

Electricity from new nuclear power plants has lower expected costs in the 2020 edition thanin 2015. Again, regional differences are considerable. However, on average, overnight construction costs reflect cost reductions due to learning from first-of-a-kind (FOAK) projects in several OECD countries. LCOE values for nuclear power plants are provided for nth-of-a- kind (NOAK) plants to be completed by 2025 or thereafter.

Coal- and gas-fired units with carbon capture, utilisation and storage (CCUS), for which only the United States and Australia submitted data, are, at a carbon price of USD 30 per tonne of CO2, currently not competitive with unmitigated fossil fuel-plants, nuclear energy, and in most regions, variable renewable generation. CCUS-equipped plants would constitute a competitive complement to the power mix only at considerably higher carbon costs.

The LCOE calculations are based on a levelised average lifetime cost approach, using the discounted cash flow (DCF) method. Costs are calculated at the plant level (busbar), and therefore do not include transmission and distribution costs. The LCOE calculations also do not capture other systemic costs or externalities beyond plant-level CO2 emissions such as, for instance, methane leakage during the extraction and transport of natural gas. This report does however recognise, in particular in Chapter 4, the importance of the system effects of different technologies, most notably the costs induced into the system by the variability of wind and solar PV at higher penetration rates.

The aggregated data for the 24 countries that provided data for this report does not tell the whole story of levelised generation costs. Due to more or less favourable sites for renewable generation, varying fuel costs and technology maturity, costs for all technologies can vary significantly by country and region. In addition, the share of a technology in the total production of an electricity system makes a difference to its value, load factor and average costs.

Whereas renewables are very competitive in most countries participating in this report, the data provided for Projected Costs of Generating Electricity - 2020 Edition shows that they still have higher costs than fossil fuel- or nuclear-based generation in some countries (in this report: Japan, Korea and Russia). Also within countries, different locational conditions can lead to differences in generation costs at the subnational and local level. In Europe, both onshore and offshore wind as well as utility scale solar installations are competitive to gas and new nuclear energy.

In the United States, gas-fired power plants benefit from the expected low fuel prices in the region, although fuel price assumptions are, in general, uncertain. Nevertheless, in terms of the LCOE of the median plant, onshore wind and utility scale solar PV are, assuming emission costs of USD 30/tCO2, the least cost options. Natural gas CCGTs are followed by offshore wind, nuclear new build and, finally, coal.

In China and India, variable renewables are having the lowest expected levelised generation costs: utility scale solar PV and onshore wind are the least-cost options in both countries. Nuclear energy is also competitive, showing that both countries have promising options to transition out of their currently still highly carbon-intensive electricity generation.

In the default case with emission costs of USD 30/tCO2, equipping coal and gas plants with a CCUS is, due to the higher investment costs of CCUS equipment and the reduced thermal efficiency, more expensive than unmitigated fossil fuel-based electricity.

With higher emission costs however, the picture could change. For coal power plants, due to the fuel"s relatively high carbon content, CCUS units become competitive at around USD 50 to 60 per tCO2. For gas-fired CCGTs, only carbon prices above USD 100/tCO2 would make plants with CCUS competitive. At such high carbon prices, renewables, hydroelectricity or nuclear are likely to constitute the least-cost options to ensure low-carbon electricity.

Although the necessary carbon price levels required for triggering a cost advantage of CCUS plants exceed the majority of today"s prices, they are still relatively low compared to existing estimates of the social cost of carbon. Although the estimates carry great uncertainties, global social costs could exceed USD 100 per tCO2 (Nordhaus, 2017). Thus, if flexible low-carbon generation is needed, competitive alternatives are lacking and affordable fossil resources are available, CCUS may become an option. Depending on national circumstances, with sufficiently high carbon prices, CCUS could be a possible complement in certain low-carbon power mixes.

To enhance the comparability of costs between regions and markets, it was necessary to harmonise certain assumptions. Therefore, in the base cases of our analyses we assume an 85% capacity factor for nuclear, coal and CCGT plants as well as a 7% discount rate. Depending on the individual market, these parameters can differ significantly, based on the existing technology mix as well as the market environment.

Contact us for free full report

Web: https://www.kary.com.pl/contact-us/
Email: energystorage2000@gmail.com
WhatsApp: 8613816583346