

Wind and solar PV will keep taking the lead

Global Future Council on Energy Technologies

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Predicting the future is not easy, but some predictions are easier than others.

The World Economic Forum convened experts from several organizations including IEA, IRENA, BNEF and IHS Markit as well as manufacturers and other energy leaders to agree the 2030 trajectory for wind and solar PV. Together, the group

looked at past performance, new developments and other facts to come up with a forecast for their likely evolution to 2030. The experts agreed that cost reductions and performance improvements will continue. Costs of solar PV energy will decrease by 50% while onshore and offshore wind energy costs will fall by 25 and 50%, respectively, driven by technological improvements and economies of scale.

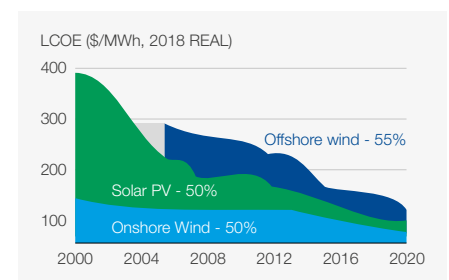
Lowest LCOE for new-build power plants in a given country¹



Today wind and solar PV are the most cost-efficient power sources

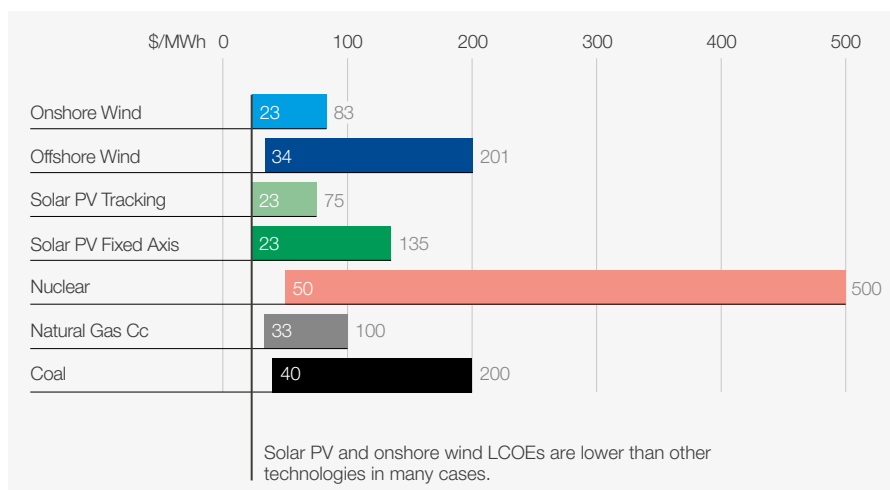
Wind and solar have started – on global average – to outperform newly built fossil fuel-based electricity generation in terms of cost. In two-thirds of the world, the cost of energy from wind and solar PV is now lower than new coal and gas plants.³

Historical view on costs of wind and solar PV



Wind and solar PV industries have demonstrated their ability to lower energy costs drastically in the last 10 years, while increasing efficiency.⁴ Declining costs will continue to drive the industry's exponential growth.

Global LCOE ranges–H2 2020 updates²

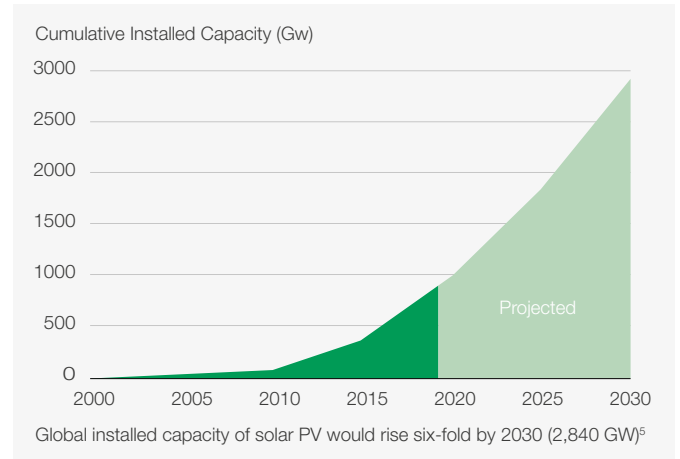


Solar PV cost reductions will continue

The cost of solar PV energy is projected to halve in the next decade.⁶ By 2030 at the latest, and in some markets earlier, solar PV is expected to deliver the lowest cost of energy for new power generation installations. This decline reflects a series of technological improvements mainly driven by:

- Increasing module efficiency (i.e. using better manufacturing techniques and new cell structures)⁷
- Reducing overall usage of material content, in addition to the effect of rising module efficiency through reducing wafer thickness, decreasing silicon losses, silver paste, etc.⁸
- Improvements in manufacturing processes, which increase throughput, reduce labour costs and achieve greater economies of scale⁹

Global Installed Solar PV Capacity



By 2030, onshore and offshore wind costs will converge at around \$30/MWh in most parts of the world

By 2030, onshore and offshore wind costs will converge at around \$30/MWh in most parts of the world.¹⁰ This reflects technological innovations, a more efficient supply chain and economies of scale created by market growth.

The cost of onshore wind energy is projected to reduce by 25%-30%¹¹ in the next decade mainly due to:

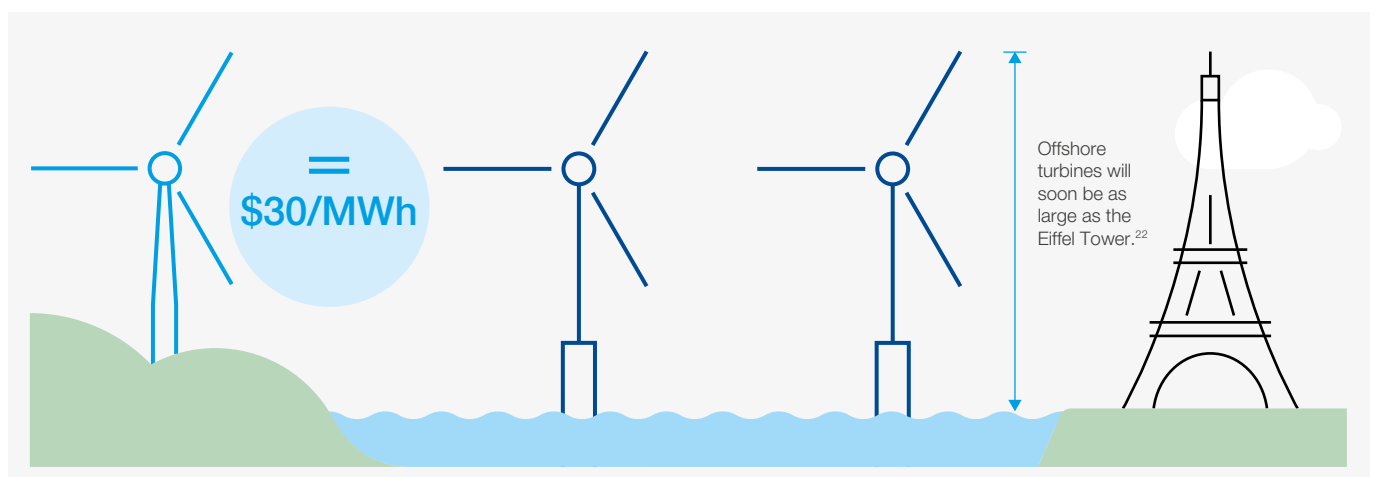
- Larger turbines with increased power output (on average, 6.5 MW per turbine), reducing the investment per power plant to achieve the same or even more electricity output with fewer turbines¹²
- Increased swept-area-to-power-output ratios, which give rise to greater energy generation at low wind speeds¹³
- Digitalization through better data analysis, combined with larger turbines and increased power output ratios, mean that an array of suitable locations worldwide become available¹⁴

These improvements are helping not only to reduce costs, but also to increase the annual capacity factor (on average, 40% for onshore¹⁵ and 50% for offshore¹⁶ by 2030).

Offshore wind installed capacity is expected to increase ten-fold by 2030¹⁷ and will become a more important part of the electricity landscape than it is today, first in Europe but later elsewhere. Costs are set to reduce by 40%-50% by 2030¹⁸ driven by:

- Larger turbines can be deployed offshore (up to 15-20MW by 2030)¹⁹
- Lack of land limitation issues offshore plus opportunities for deep water deployment
- Increased supplier competition²⁰ and improvement of efficiencies in the supply chain to reduce installation cycles²¹

Cost convergence by 2030



It's not just about cost

Competitiveness is not only about costs, but also the positive or negative value that these technologies provide to the energy system and to society at large.

Wind and solar present several system benefits – beyond being cost-competitive – that are not compensated today:

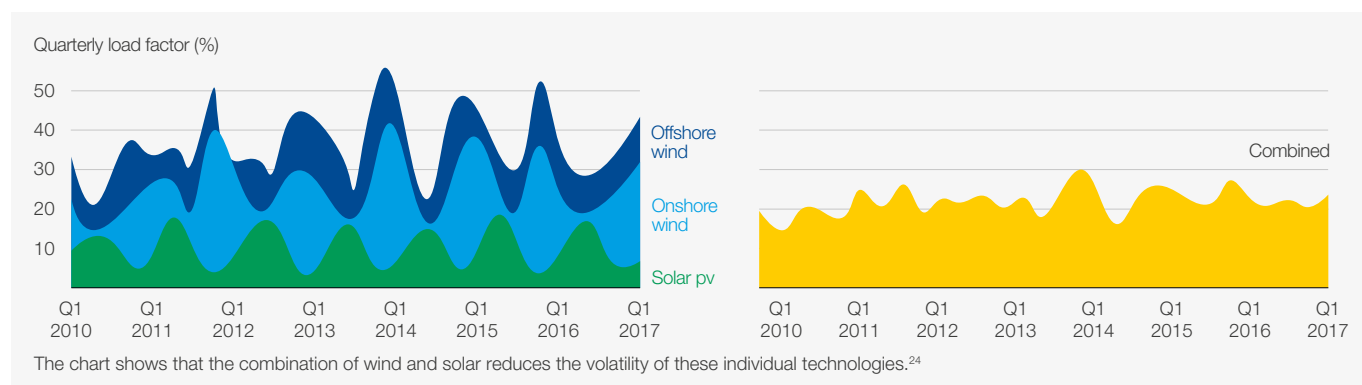
- Society not only benefits from lower-cost energy, but also from lower emissions

- Wind and solar are unique in terms of power generation technologies because they can be rapidly deployed and scaled up

In addition, wind and solar are not competing technologies, but rather complementary, which combined could reduce their individual inherent volatility²³ in output and contribute to a more affordable, sustainable and reliable power system.

After permitting is completed, it takes less than one year to deploy a PV or wind power plant.

The Combination Of Wind And Solar Can Reduce Quarterly Volatility By More Than 50%



Energy systems need to evolve

The experts agree that cost reductions and performance improvements will continue, and that wind and solar PV will become the most cost-efficient power sources by 2030. Large-scale transformation and deployment will, however, require rethinking energy systems and policy interventions.

As more wind and solar PV are deployed, new policies should encourage increasing efficiency and flexibility of the overall system.²⁵ Investments in smart electricity networks and storage will typically be required to integrate a high penetration of wind and solar, and in most regions, the power market design will need to be restructured. The traditional approach of distinguishing power plants based on baseload, intermediate and peak load needs to evolve.

Policy Interventions

Rethinking the system will require more flexible options, policy intervention and continued investment for innovation.



Wind and solar PV are cost competitive and deployment is encouraged now. Looking to the future, for large-scale transformation and deployment, an additional focus on integration and market design will be necessary.

Delivering high system value

The COVID-19 pandemic has created a global health and economic crisis. Quantifying the impact of wind and solar PV using a “system value” lens demonstrates the role of these technologies for both economic recovery and the clean energy transition. System value encompasses not only the levelized cost of energy but also the societal value that a clean energy transition will deliver. This includes reduced emissions and water usage, better air quality and health, more jobs, and contributing to an energy system that is scalable, resilient and reliable.

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