230 kWh low-carbon economy



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Low-carbon electricity is the sum of electricity generation from nuclear and renewable sources. Renewable sources include hydropower, solar, wind, geothermal, bioenergy, wave and tidal. Measured in terawatt-hours.

Low-carbon energy is the sum of nuclear and renewable sources. Renewables include hydropower, solar, wind, geothermal, wave and tidal and bioenergy, but not traditional biofuels. Measured in terawatt-hours of primary energy, using the substitution method.

The carbon intensity of global electricity generation fell to a record low of 436 gCO2/kWh in 2022, the cleanest-ever electricity. This was due to record growth in wind and solar, which reached a 12% share in the global electricity mix, up from 10% in 2021.

Low-carbon electricity or low-carbon power is electricity produced with substantially lower greenhouse gas emissions over the entire lifecycle than power generation using fossil fuels. [citation needed] The energy transition to low-carbon power is one of the most important actions required to limit climate change. [1]

The report analyses electricity data from 78 countries representing 93% of global electricity demand and includes estimated changes in the remaining generation. It also dives deeper into the top ten CO2 emitting countries and regions, accounting for over 80% of global CO2 emissions.

The global electricity sector is the first sector that needs to be decarbonised, in parallel with electricity demand rising, as electrification unlocks emissions cuts throughout the entire economy. The IEA Net Zero Emissions scenario points to a 2040 net zero power sector; ten years ahead of a net zero economy in 2050. Tracking the electricity transition, therefore, is critical to assess our climate progress.

The decarbonisation of the power sector is underway, as record growth in wind and solar drove the emissions intensity of the world"s electricity to its lowest ever level in 2022. It will be an impressive moment when power sector emissions begin to fall year-on-year, but the world is not there yet, and emissions need to be falling fast.

2022 will be remembered as a turning point in the world"s transition to clean power. Russia"s invasion of Ukraine made many governments rethink their plans amid spiking fossil fuel prices and security concerns about relying on fossil fuel imports. It also accelerated electrification: more heat pumps, more electric vehicles, more electrolysers. These will drive reductions in emissions for other sectors, and will put more pressure to build clean power more quickly.

A new era of falling power sector emissions is very close, thanks to the electricity superpowers of wind and solar. Wind and solar will need to maintain high growth rates this decade, even as they mature. More growth is



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needed from all other clean electricity sources, while more attention to efficiency is needed to avoid runaway growth in electricity demand. Urgent work is needed on ensuring wind and solar can be integrated into the grid: planning permissions, grid connections, grid flexibility and market design.

This report showcases the significant strides made in the transition towards a sustainable and decarbonized energy system, and the promising outlook for achieving the critical milestone of peak emissions from the power sector - perhaps in this coming year. Wind and solar are growing at between 15-20% pa based on a 10 year average, so look set to exceed increases in annual electricity demand by the end of 2023.

The world has abundant supplies of wind and solar, and this report documents how, through technical innovation and policy execution, this abundance has been converted into on-the-ground energy supply. Often at a lower cost than fossil fuels and faster than other sources of clean electricity.

Other clean non-fossil fuel technologies are also playing their part – nuclear could be entering a renaissance in some countries but there have also been set backs, as unusual weather affected both hydro and nuclear plant.

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