Capgemini

22nd Edition World Energy Markets Observatory: Energy Transition

Worldwide investments in wind and solar climbed **3%**

Batteries remain a critical enabler of at-scale adoption of intermittent renewable generation — a promise that may be realized as production costs continue to fall and new megafactories are planned worldwide

Green hydrogen has emerged as a promising new energy source, though cost efficiencies must be achieved to realize its potential

H_2

Key Stats:

Europe
Clean energy investments: $76.4B
Share of renewables in electricity mix: 23%
Coal production: -13%

U.S.
Clean energy investments: $55.5B
Renewables share of primary energy: 6.2%

China
Clean energy investments: $83.4B (-8%)

Australia
Clean energy investments: $20.4B
Share of renewables in electricity mix: 24% (+2.7%)

India
Clean energy investments: $11.1B
Share of renewables: 3.6%

Batteries and Storage

Batteries are essential to the advancement of intermittent renewable generation

115 new megafactories planned worldwide including 88 in China

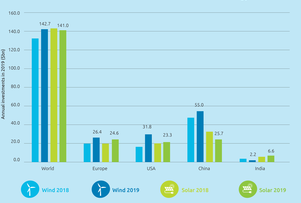
Costs -19% 2019/2018

Anticipated capacity: **2632** GWh by 2028

Renewables

Global investments in wind & solar energy remain steady at **+3%**

2018-2019 investments in wind and solar energy



Europe
42% European renewable capacity in 2019
+110 Solar additions
50% projected share of renewables in Europe's power generation mix by 2025

North America
~20.2 GW U.S. renewable capacity added in 2019

China
China is the world leader in wind energy production with an installed capacity of **211.4 GW**

Australia
11.1 GW of new generation are under construction or financially committed in 2019

Green Hydrogen

Renewable or "green" hydrogen is a critical new energy carrier for a carbon-neutral future

However, improvements in cost efficiency are needed in order to optimize this promising solution

Green H2
Produced from renewable energy sources

Blue H2
Produced from non-renewable sources but with low CO_2 emissions (e.g., CCUS, nuclear)

Grey H2
produced from fossil energy sources without carbon capture

3X production cost of Green Hydrogen as compared to Grey Hydrogen in 2019

The EU has potential to be a global leader in the electrolyser manufacturing industry, owing to the region's expertise in electrolysis-based chlorine production and company capabilities.

According to Hydrogen Europe, by 2030:

40GW of electrolyser capacity could be fully operational

4.4Mt of hydrogen could be produced

Up to **170,000** local jobs could be created through European investments, including:

€9B in Germany

€7B in France

China is the world's largest hydrogen producer today but relies mainly on fossil fuels.

4% hydrogen production from water-electrolysis in China at present though the country projects 70% projected hydrogen production from renewables by 2050

10x projected growth of hydrogen in India's energy mix by 2050

Nuclear

Nuclear energy provided about 10% of the world's electricity in 2019.

Nuclear is the second low-carbon source of electricity after hydropower.
Global nuclear power capacity over 30 years

~240 reactors will enter into a decommissioning process during the 2030 - 2050 period

$ This represents a potential market worth **US$120 billion** to **US$240 billion**

Coal

Europe, North America and Australia decreased their reliance on coal, while Southeast Asia, including China and India, slowed commissioning of new plants.

-4.4% Share of coal in Europe's electricity mix

14 coal power stations are set to close over the next 30 years in Australia

5 GW of coal-fired capacity in Canada to retire by 2028

17 GW of coal-fired capacity in U.S. to retire by 2025

-85% construction of new coal plants in Southeast Asia from 2016 to 2019

Utilities transformation roadmaps must be reconsidered in a post-COVID world.

Energy Transition, Carbon Neutrality
Priority #1

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About WEMO
The World Energy Markets Observatory (WEMO) is Capgemini's annual thought leadership and research report that tracks the development and transformation of electricity and gas markets in Europe, North America, Australia, Southeast Asia, India and China. Now in its 22nd edition, WEMO examines the following topics: climate change & regulatory policies; energy transition; infrastructure & adequacy of supply; supply & final customer; transformation; financials; and, for the first time, the oil & gas industry. This edition also includes data and analysis for the first half of 2020 due to the extraordinary events related to COVID-19.

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