Energy

14 June 2019

Abstract

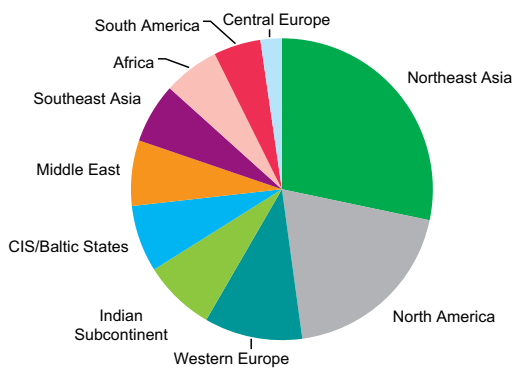
This new CEH report presents an overview of the global energy industry; it focuses on the fossil fuels (crude oil, natural gas, and coal), but also discusses nuclear energy, hydroelectric power, and renewables. Renewables include primarily wind and solar energy, but the report also touches upon geothermal, biomass, and other technologies.

The main feature of the energy world from 2018 to 2050 is an intense competition for energy market share. Suppliers of oil, natural gas, coal, nuclear power, hydroelectricity, biomass, and renewable energy compete to maintain market share or displace incumbents. By the 2030s, after several decades of competition, no source of energy commands more than 30% of global primary energy demand. This has not happened before.

Also having an impact on energy consumption are environmental pressures regarding global warming and attempts to slow greenhouse gas (GHG) emissions of carbon dioxide (CO_2) and other pollutants. Despite the fact that GHG emissions have slowed, the absolute level of emissions continues to increase.

The following pie charts show world consumption of energy by region and by fuel.

World consumption of energy by region—2018



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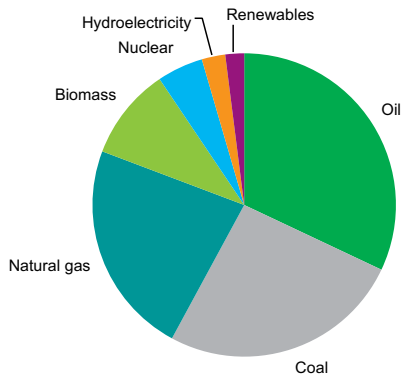
World consumption of primary energy by fuel—2018



Source: IHS Markit © 2019 IHS Markit

This report provides IHS Markit's base case scenario. The report also tracks alternative scenarios, both more optimistic and more pessimistic, meaning there is potential for the world to move in one of these directions as well, much of which is dependent on geopolitical differences. The energy rivalry is driven by four factors: price differential, environmental concerns, technology improvements, and energy security. Alternatives loosen oil's grip on transport demand, while renewables increase competition with natural gas, coal, and nuclear in power generation.

GHGs trap heat in the atmosphere and make the planet warmer. Human activities are responsible for nearly all the increases in GHG in the atmosphere over the past 150 years. The largest source of GHG emissions for human activity is

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from burning fossil fuels in the production of electricity, heat, and transportation. The primary sources of GHG emissions are domestic uses (commercial/residential/agricultural), industry, transportation, electricity generation, and production of chemical feedstocks. At the global level, carbon dioxide accounts for an estimated 76% of total GHGs, with 65% from fossil fuels and industrial processes and 11% from agricultural and forestry applications. Methane (CH_4) accounts for 16%, nitrous oxides (N_2O) for 6%, and F-gases (fluorinated gases used for cooling purposes) for 2%.

It has been proven that climate change can intensify weather. Examples are hurricanes, cyclones, tornadoes, wildfires, and extreme rain patterns (drought or flooding). Human-induced climate change has already increased the number and strength of these extreme events.

The world's energy economy has the largest influence on the decisions that government and people make. Current global consumption rates are depleting the planet's ability to sustain our way of life. Increased demand for energy means increased prices in every sector of the world's economy. Likewise, investment in energy technologies creates jobs and grows the national economies. Many political, technological, and economic factors will create change in the sources of energy in the future. The biggest contribution to change may come from conservation and the more efficient use of energy, influenced by market prices and governmental policy.

Renewable energy is forecast to be the fastest-growing source of new energy for global power generation. Globally, 73% of new power capacity scheduled is forecast to be from renewable sources. Installed power capacity (excluding large hydroelectric) is forecast to increase nearly sixfold, from just over 1,000 GW at year-end 2017 to 6,300 GW by 2050. More than half of this growth will come from Asia, with China itself accounting for a third of new renewable capacity additions. Solar photovoltaic (PV) is forecast to account for 60% of renewable capacity additions, while wind (both onshore and offshore) will account for 36%. Distributed generation, in particular from small-scale solar systems, is expected to play an increasing role. It is estimated that 30% of renewable energy will be distributed.

Wind and solar photovoltaic costs are projected to steadily decline until the mid-2020s as technology improves, as manufacturing scale of production improves, and as development experience grows globally. It is estimated that by the mid-2020s, wind and solar will be competitive against installed thermal generation relative to both coal and natural gas.

Global production of coal is forecast to remain relatively stable during 2015–40. China, the United States, and India are the world's three largest coal producers, but only India is forecast to increase coal production, as production in both China and the United States is declining. India is forecast to surpass the United States in world coal production by 2025 and to double US coal production by 2040.

Worldwide consumption of coal is forecast to increase slightly during 2015–25, prior to declining during 2025–40. The top three coal consuming countries are China, the United States, and India, combined totaling around 70% of total world consumption. However, because of China's slowing economy and plans to implement policies to address air pollution and climate change, it is forecast that coal use in China will decline.

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