WORLD ENERGY OUTLOOK SUMMARY REPORT 2022

A summary from the International Energy Agency (IEA)

Arney Tjaronda

8/11/22

1. Overview

Russia's invasion of Ukraine has sparked a global energy crisis

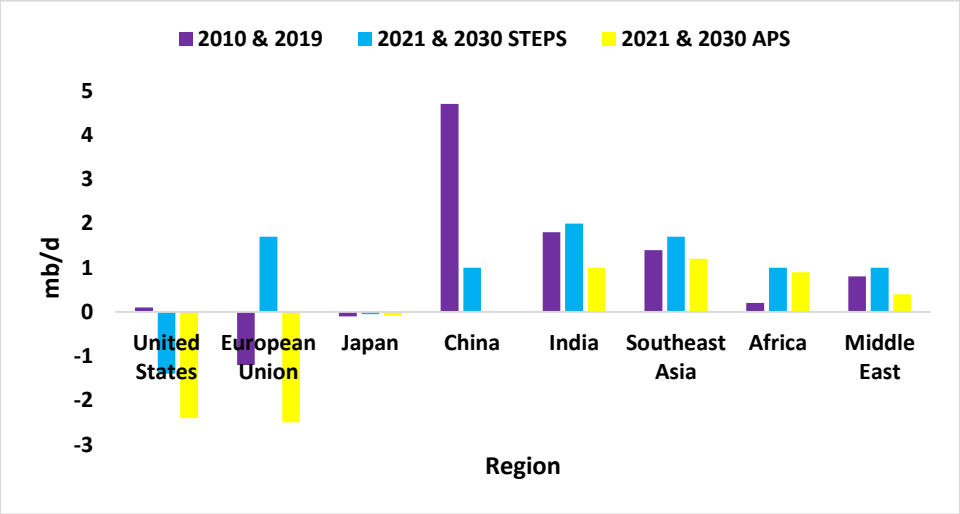
The world has found itself in its first energy crisis-reaching levels of complexities never experienced before. Russia has been by far the world's largest exporter of fossil fuels, but its curtailments of natural gas supply to Europe and European sanctions on imports of oil and coal from Russia are severing one of the main arteries of global energy trade. All fuels are affected, but gas markets are the epicenter as Russia seeks leverage by exposing consumers to higher energy bills and supply shortages.

Prices for spot purchases of natural gas have reached levels never seen before, regularly exceeding the equivalent of USD 250 for a barrel of oil. Coal prices have also hit record levels, while oil rose well above USD 100 per barrel in mid-2022 before falling back. High gas and coal prices account for 90% of the upward pressure on electricity costs around the world. To offset shortfalls in Russian gas supply, Europe is set to import an extra 50 billion cubic meters (bcm) of Liquefied Natural Gas (LNG) in 2022 compared with the previous year. This has been eased by lower demand from China, where gas use was held back by lockdowns and subdued economic growth, but higher European Liquefied Natural Gas (LNG) demand has **diverted gas away from other importers in Asia.**

2. Analysis

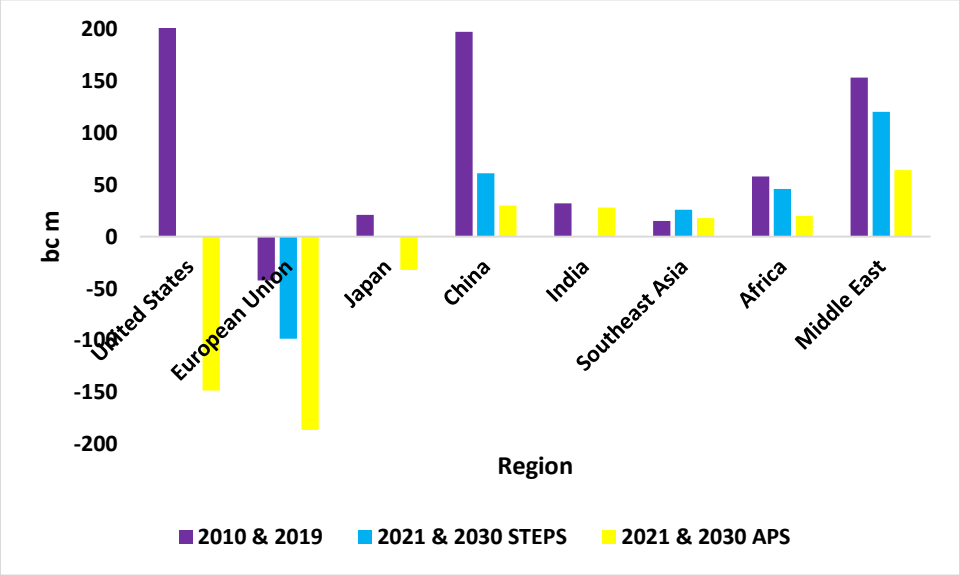
2.2 Energy demand growth in the regions and scenarios, 2021-2030

Energy demand for Oil



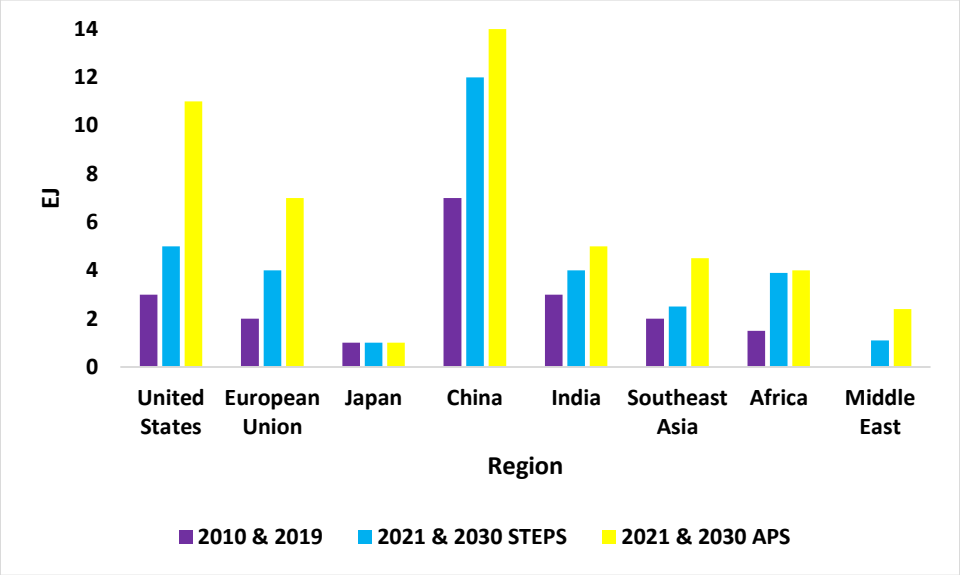
Source: International Energy Agency & HEI Research

Energy demand for Natural Gas



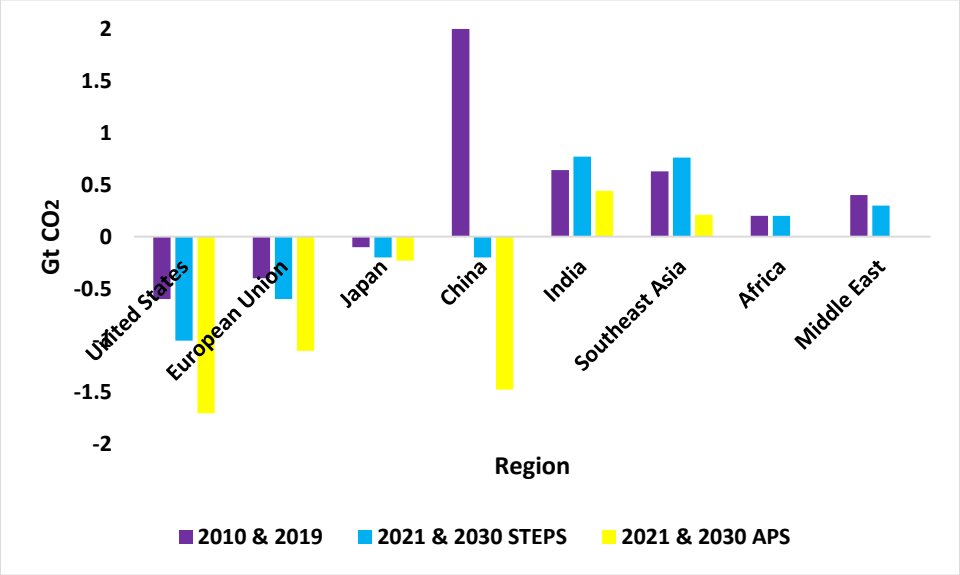
Source: International Energy Agency & HEI Research

Energy demand for Renewables



Source: International Energy Agency & HEI Research

Energy demand for Emissions



Source: International Energy Agency & HEI Research

Africa

The global energy crisis has been a setback for many African countries, with the partial exception of energy exporters. High energy prices have contributed to rising costs for basic foodstuffs both directly (cost of energy for agricultural equipment) and indirectly (through higher natural gas input costs for nitrogen fertilizers). In the Stated Policies Scenario (STEPS), low-cost renewable power, including solar PV, hydro and geothermal, adds substantially to the energy supply over the coming decades, and renewables provide one-third of total generation by 2030. Growth in oil for transport and Liquefied Petroleum Gas (LPG) for cooking push demand to over 5 mb/d by 2030; natural gas, supported by new discoveries, fuels the expanding steel, cement, water desalination, and fertilizer industries.

United States

The Inflation Reduction Act and the Bipartisan Act catalyze a sharp rise in the pace of energy transitions in the United States compared with the World Economic Outlook (WEO)-2021. Strong growth in renewables means that coal demand falls by three-quarters by 2030. Gas-fired generation peaks before 2030: overall natural gas demand ends the decade just under the level it reached in 2021, allowing for increased exports of LNG. Oil demand will fall by 1 mb/d by 2030 from nearly 18 mb/d, largely due to an increase in Electric Vehicles (EV) sales (30% of car sales in 2030) and fuel economy improvements (Figure 1)

European Union

Higher coal use during the energy crisis proves temporary as energy transitions gather pace. In the Stated Policies Scenario (STEPS),strengthened policy targets and frameworks, high fossil fuel prices and the drive to reduce import dependency on Russia mean that the European Union sees demand for coal falling by around half by 2030, and demand for natural gas and for oil by almost fifth each. In the Announced Pledges Scenario (APS), targets in the Fit for 55 package are largely met – and in some cases exceeded – to fulfill the Nationally Determined Contributions (NDC) objective to reduce Greenhouse Gas(GHG) emissions by 55% by 2030 relative to 1990. This means CO2 emissions decline by around 45% relative to 2021 levels in the Announced Pledges Scenario (APS), compared to 26% in the Stated Policies Scenario (STEPS). Rapid renewables deployment, efficiency gains, and electrification drive a faster reduction of natural gas use in the power and buildings sectors than in the STEPS, as well as lower demand for oil. The European Union moves towards an electricity system dominated by wind, with onshore and offshore sources together accounting for just over 40% of total generation in 2050 in the Stated Policies Scenario (STEPS) and 50% in the Announced Pledges Scenario (APS)

Japan

Japan sees a 1% annual reduction in total energy supply to 2030 in the Stated Policies Scenario (STEPS), in line with its new Strategic Energy Plan approved in October 2021. This plan foresees restarting nuclear reactors that are offline and lifting both the shares of nuclear and renewables to allow for a significant reduction in reliance on coal- and gas-fired plants. Japan is also seeking to retrofit coal plants to co-fire with ammonia; it is the only country deploying this technology at a significant scale in the Stated Policies Scenario (STEPS).

In the Announced Pledges Scenario (APS), a 36% decrease in emissions from 2021 to 2030 is achieved via further electrification of industry and transport, and acceleration of energy efficiency improvements, for example through building materials standards for new construction. Additional policy impetus comes from the new Energy Efficient Technological Strategies and strengthening its Top Runner program.

China

Growth in energy demand in China has been a major driver for all manner of energy trends over the past two decades, yet it slows in the Stated Policies Scenario (STEPS) and stalls before 2030, with emissions peaking around the same time (in line with its NDC and national targets). Renewables will account for nearly 45% of electricity generation in 2030 and account for the majority of the electricity demand growth, helping unabated coal use to peak before 2030 in alignment with government targets. Oil demand also peaks in the second half of this decade, reaching a similar level of demand as the United States in 2030 at just under 17 mb/d (with a population four times larger) before declining. This peak and decline reflect rising EV sales, and China remains the world’s largest Electric Vehicles (EV) market.

In the Announced Pledges Scenario (APS), the peak in emissions occurs slightly earlier and at a lower level as China accelerates action to achieve carbon neutrality before 2060. Electrification

via low-emissions sources is central to its emissions reduction efforts: total generation in 2050 rises by two-thirds in the Stated Policies Scenario (STEPS) and nearly doubles in the Announced Pledges Scenario (APS). The share of low-emissions technologies exceeds 75% in the Stated Policies Scenario (STEPS) and 90% in the announced pledges scenario (APS), up from 34% today. The world's largest new build nuclear Programme means an expanding role: new projects add more than 120 GW of nuclear capacity in the Stated Policies Scenario (STEPS), and 160 gigawatt (GW) in the announced pledges scenario (APS), on top of the 50 gigawatt (GW) in operation today.

India

India will become the world's most populous country by 2025 and, combined with the twin forces of urbanization and industrialization this underpins rapid growth in energy demand, which rises by more than 3% per year in the Stated Policies Scenario (STEPS) from 2021 to 2030. It sees the largest increase in energy demand of any country. Even though India continues to make great strides with renewables deployment and efficiency policies, the sheer scale of its development means that the combined import bill for fossil fuels doubles over the next two decades in the Stated Policies Scenario (STEPS), with oil by far the largest component. This points to continued risks to energy security.

Coal generation is projected to continue to expand in absolute terms in the Stated Policies Scenario (STEPS), peaking around 2030, though its share of electricity generation falls from just below 75% to 55% over this period. Government programmes, such as the Gati Shakti National Master Plan and the Self-Reliant India scheme, and strong economics underpin robust growth in renewables and electric mobility, notably for two/three-wheelers. Renewables meet more than 60% of the growth in demand for power, and account for 35% of the electricity mix by 2030: solar PV alone accounts for more than 15%. However, coal will still meet a third of overall energy demand growth by 2030, and oil, mainly for transport, another quarter. In the Announced Pledges Scenario (APS), more rapid progress in deploying low-emissions alternatives in the power, industry, and transport sectors in particular puts India on a trajectory in line with its goal of net zero emissions by 2070.

Southeast Asia

Southeast Asia is also projected to see a rapid rise in energy demand, with an annual average growth of more than 3% from 2021 to 2030 in the Stated Policies Scenario (STEPS). This is met by increases in all fuels and technologies, led by oil. Coal continues to dominate in the electricity sector, its share declining only slightly from 42% today to 39% by 2030 in the Stated Policies Scenario (STEPS). With the implementation in full of announced pledges – notably Indonesia's goal to halt unabated coal generation by the 2050s – coal use in the power sector falls by more than half by 2050 in the Announced Pledges Scenario (APS), and renewables quickly become the largest source of electricity generation. Electricity use extends to new end-use sectors, driven by targets to halt sales of internal combustion engine (ICE) vehicles in Thailand by 2035 and in Singapore by 2040, and the aim of Indonesia to achieve 2 million electric cars on the road by 2030.

Middle East

Natural gas meets more than 60% of energy demand growth in the Middle East to 2030 in the Stated Policies Scenario (STEPS), much of which is due to an increase in the use of natural gas in water desalination plants. Gas demand remains relatively resilient in the Announced Pledges Scenario (APS), with a small but increasing share used for hydrogen production. Renewables meet half of rising power demand, thanks to some of the lowest cost solar in the world and an increasing policy focus on diversifying the energy sector and the broader economy. With large hydrocarbon reserves and renewables potential, many Middle East countries are also exploring the potential for hydrogen production and trade, with Europe and Japan the main potential buyers.

Russia's invasion of Ukraine is shaping the energy world

Energy market

High and volatile energy prices are affecting households and businesses, shifting the choice of fuels setting back progress towards achieving universal access to energy.

Energy policy

Short-term responses have focused on securing available supply and protecting consumers, but many governments in the United States (US), European Union (EU) and elsewhere have adopted new policies that give a major boost to investments in clean energy and efficiency.

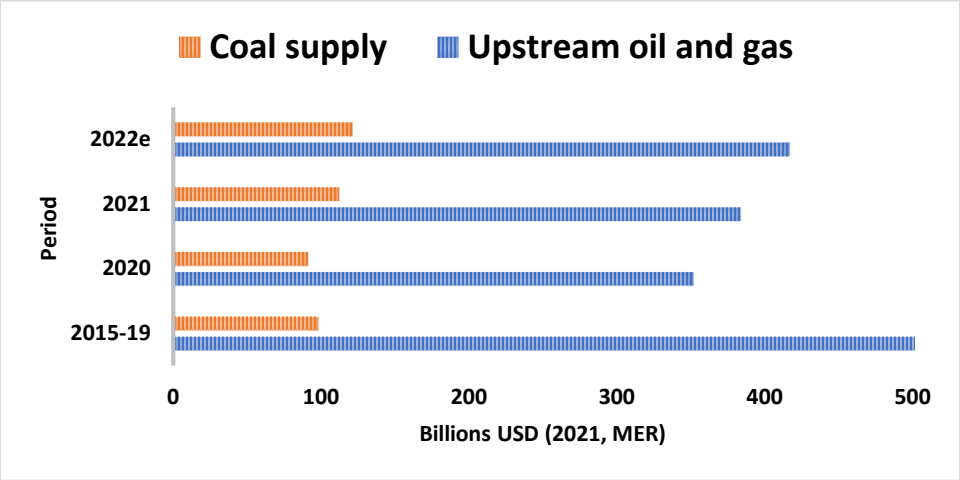
Energy trade

European sanctions on coal and oil imports and Gazprom's decisions to cut gas supply are triggering a profound reshuffling of trade flows around the world.

Economic impacts

High fossil fuel prices are stoking inflationary pressures; the combination of falling real incomes and rising prices is creating a looming risk of global recession.

Global investment in upstream oil, gas and coal supply



[1]

Source: IEA & HEI Research

Russia's invasion of Ukraine is closing off one of the main arteries of international energy commerce, both because of European sanctions on coal and oil imports and Gazprom's decisions to cut gas supply. This is set to generate a reduction in Russian output as well as a profound reshuffling of trade flows around the world. The logical expectation is that, over time, more Russian resources will flow eastwards to Asian markets, rather than westwards to Europe.

An eastward focus for Russia's crude exports sets up a battle for market share with Middle East oil exporters, which have invested both politically and financially in their relationships with key Asian oil consumers.

The European Union remains very vulnerable to near-term shortfalls in Russian supply, especially for natural gas, but the key elements of a medium-term strategy to reduce reliance on Russian imports have taken shape relatively quickly. Most of the work will need to be done on the demand side, as there is little prospect of large volumes of additional non-Russian supply becoming quickly available.

Energy security in energy transitions

10 guidelines for secure energy transitions

- Synchronize scaling up a range of clean energy technologies with scaling back of fossil fuels
- Tackle the demand side and prioritize energy efficiency
- Reverse the slide into energy poverty and give poor communities a lift into the new energy economy
- Collaborate to bring down the cost of capital in emerging markets and developing economies

[1] Note: 2015-19 indicates average annual figure; 2022e = estimated values for 2022; MER = market exchange rate.

- Manage the retirement and reuse of existing infrastructure carefully, some of it will be essential for a secure journey to net zero
- Tackle the specific risks facing producer economies
- Invest in flexibility, a new watchword for electricity security
- Ensure diverse and resilient clean energy supply chains
- Foster the climate resilience of energy infrastructure
- Provide strategic direction and address market failures, but do not dismantle markets

3. Outlook

Global coal demand rebounded strongly in 2021 to 5 640 million tons of coal equivalent (Mtce) as economies recovered from the pandemic and coal-fired power generation reached a historic high in 2021. Both China and India have boosted investment in domestic coal production, but global production struggled to keep pace with demand increases, causing coal prices to surge. Russia – the world's third-largest coal exporter – and its invasion of Ukraine complicated coal market dynamics and brought additional pressure on prices.

Following the European Union ban on Russian imports, a short-lived increase in coal consumption in Europe is supplied from a variety of sources including South Africa and Colombia. The Asia Pacific region accounted for more than three-quarters of global coal imports in 2021 and this share is set to rise. Despite efforts to increase domestic production, India becomes the world's largest coal importer in the Stated Policies Scenario (STEPS) in the mid-2020s, while, by far, China remains the largest producer and consumer. In the Announced Pledges Scenario (APS), the coal trade falls by 60% by 2050; in the Net Zero Emissions by 2050 Scenario (NZE) Scenario, it falls by 90%.

The looming recession anticipates further bottlenecks for the energy crisis. However, the energy crisis is forecasted to decline amid the seasons changing in European Areas. The fast-changing transition into clean energy will aid in Europe's dependency on Russian gas in the medium to long term.