**ESG RESEARCH**

# Energy Transition ESG View

*Source: Pixabay (image by Kenueone)*

## Summary

At the end of April 2025, the global average temperature over the trailing twelve months reached 1.58°C above pre-industrial level. Energy-related carbon dioxide ($CO_2$) emissions (or "carbon emissions") rose by 0.8% from 37.3 Gigatonne (Gt) in 2023 to a record of 37.6 Gt in 2024 and have historically accounted for most of energy-related Greenhouse Gas ("GHG") emissions.

Coal contributed to the largest share of energy-related carbon emissions in 2024, followed by oil and natural gas. However, natural gas contributed to the largest share of carbon emissions growth in 2024, followed by coal and oil. China, the U.S., the Middle East and India drove natural gas emissions growth while China, India and Southeast Asia drove coal emissions growth.

Based on the Economic Transition Scenario ("ETS") laid out by Bloomberg New Energy Finance ("BNEF"), which assumes the deployment of only economically competitive clean technology, the global average temperature is expected to rise to around 2.6–2.7°C above pre-industrial level by 2100—higher than the 1.75°C by 2100 outcome in BNEF's Net Zero Scenario ("NZS"). A steeper fall in the consumption of fossil fuels (i.e., coal, natural gas and oil) than is currently expected is needed to mitigate climate change.

Growth in renewables & nuclear is crucial to reducing fossil fuel consumption. Renewables & nuclear cumulatively accounted for around 19.8% of global energy supply and 41.2% of electricity generation in 2024. Based on projections by the International Energy Agency ("IEA"), renewables & nuclear need to collectively account for 35.6% of global energy supply by 2030 and 84.7% by 2050 to achieve net zero emissions by 2050.

Natural gas comprised the majority (94.1%) of Singapore's electricity generation mix in 1H 2024. To reduce its reliance on natural gas, Singapore aims to pursue solar, regional power grids and emerging low-carbon alternatives. Natural gas share of Singapore's electricity generation mix may thus fall from 94.1% in 1H 2024 to over 50% by 2030, with the remainder being made up by renewable energy imports (around 30%) and sources like solar, hydrogen and biofuels (around 20%).

Despite the rollback of environmental initiatives by the Trump Administration, the energy transition remains a major topic that companies need to embrace in view of global climate change. SGX-listed firms will thus need to adopt measures that reduce their environmental impact. Companies that have already started addressing their emissions footprint include electricity providers and transport providers. We also highlight the emissions reduction progress of two companies covered by us.

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## STATE OF ENERGY TRANSITION

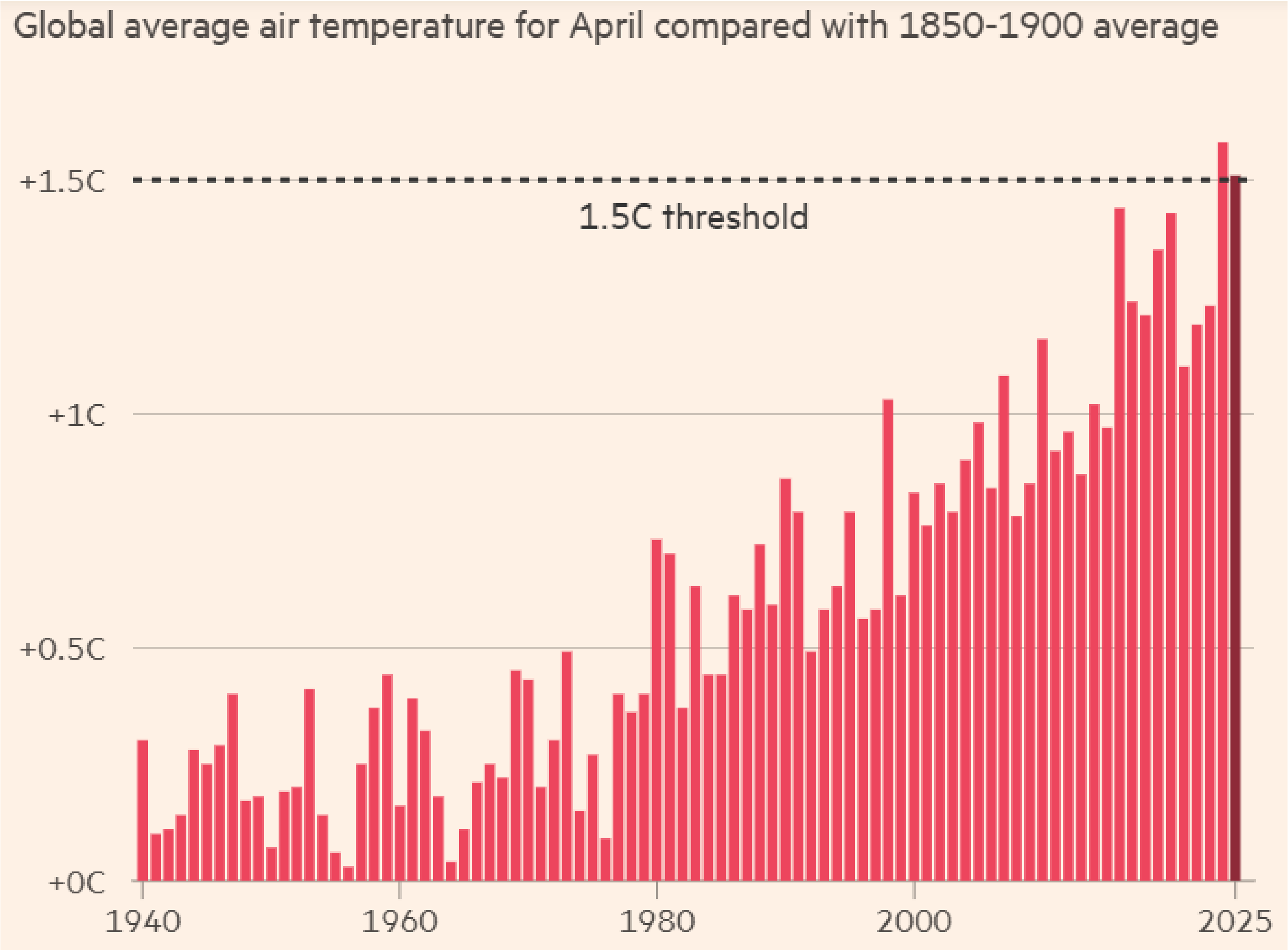
According to the United Nations Development Programme, the energy transition is a "shift in how energy is produced, distributed and consumed, aiming to move away from fossil fuels towards a system centred on renewable energy sources". In this section, we cover the current state of the global energy transition.

### (I) ENERGY-RELATED GREENHOUSE GAS ("GHG") EMISSIONS

The Financial Times ("FT") reported on 8 May 2025 that the "global average temperature over the 12-month period to the end of April was 1.58C above the pre-industrial level". FT added that "April was second-warmest on record globally and remained above 1.5C" as shown in **Exhibit 1**.

FT also cited the International Energy Agency ("IEA") as noting that "levels of methane — the main component of gas — were near an all-time high in 2024, largely as a result of fossil fuel production". FT noted that methane "traps more heat for a shorter time in the atmosphere than carbon dioxide, and is regarded as the easiest near-term way to deal with emissions".

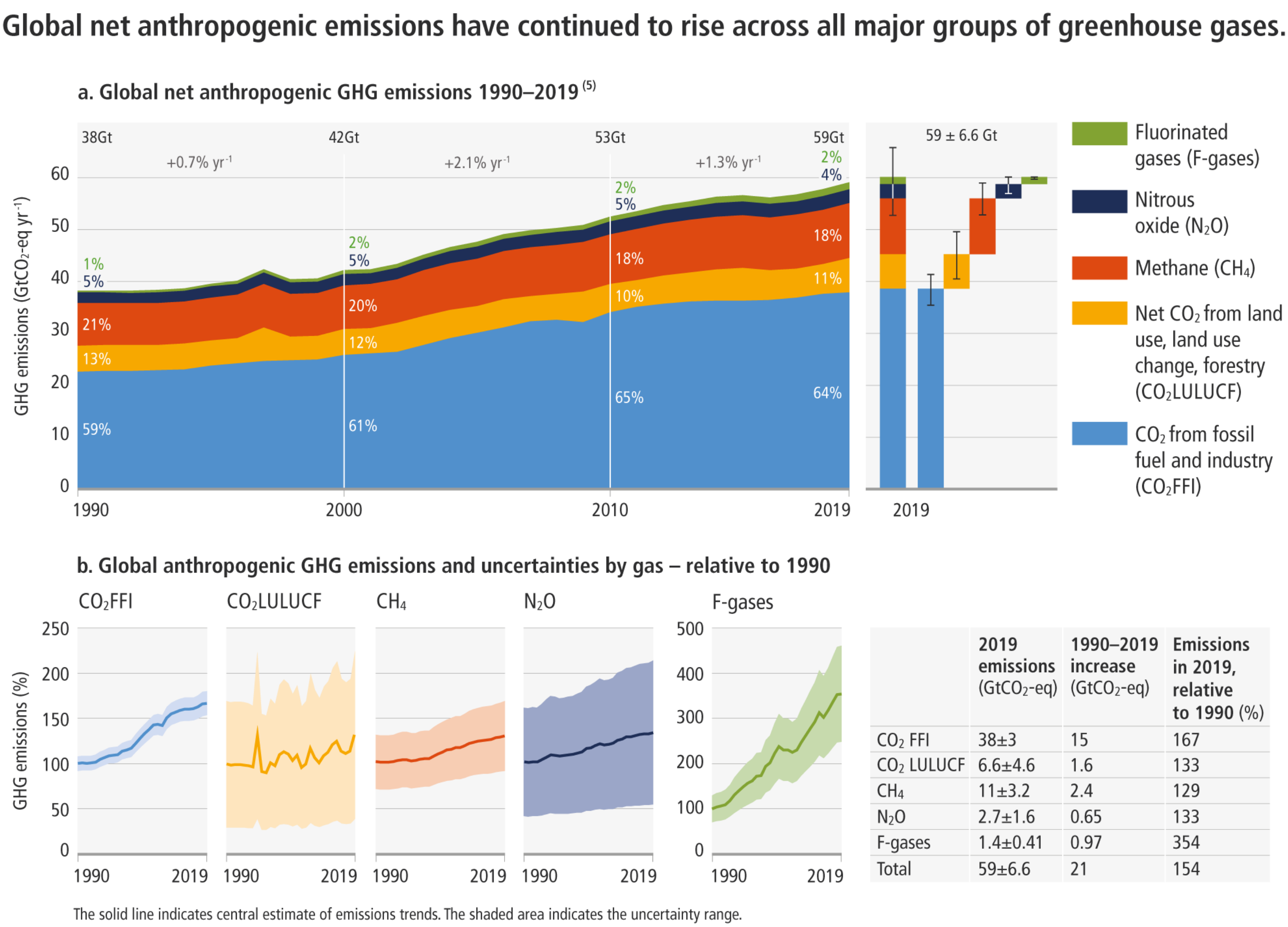
**Exhibit 1: Global Average Air Temperature vs 1850–1900 Average (1940 to 2025)**




*Source: FT, European Centre for Medium-Range Weather Forecasts ("ECMWF"; cited by FT in May 2025)*

According to the Intergovernmental Panel on Climate Change ("IPCC"), methane accounted for 18% of GHG emissions (by $CO_2$ equivalent) in 2019 as shown in **Exhibit 2**. IPCC also indicated in 2022 that carbon dioxide ($CO_2$) emissions (hereafter referred to as just "carbon emissions") "from fossil fuel and industry" accounted for 64% of GHG emissions in 2019.

**Exhibit 2: Global Anthropogenic Emissions by Gas (1990 to 2019)**




| | 2019 emissions ($GtCO_2$-eq) | 1990–2019 increase ($GtCO_2$-eq) | Emissions in 2019, relative to 1990 (%) |
|---|---|---|---|
| $CO_2$ FFI | 38±3 | 15 | 167 |
| $CO_2$ LULUCF | 6.6±4.6 | 1.6 | 133 |
| $CH_4$ | 11±3.2 | 2.4 | 129 |
| $N_2O$ | 2.7±1.6 | 0.65 | 133 |
| F-gases | 1.4±0.41 | 0.97 | 354 |
| Total | 59±6.6 | 21 | 154 |

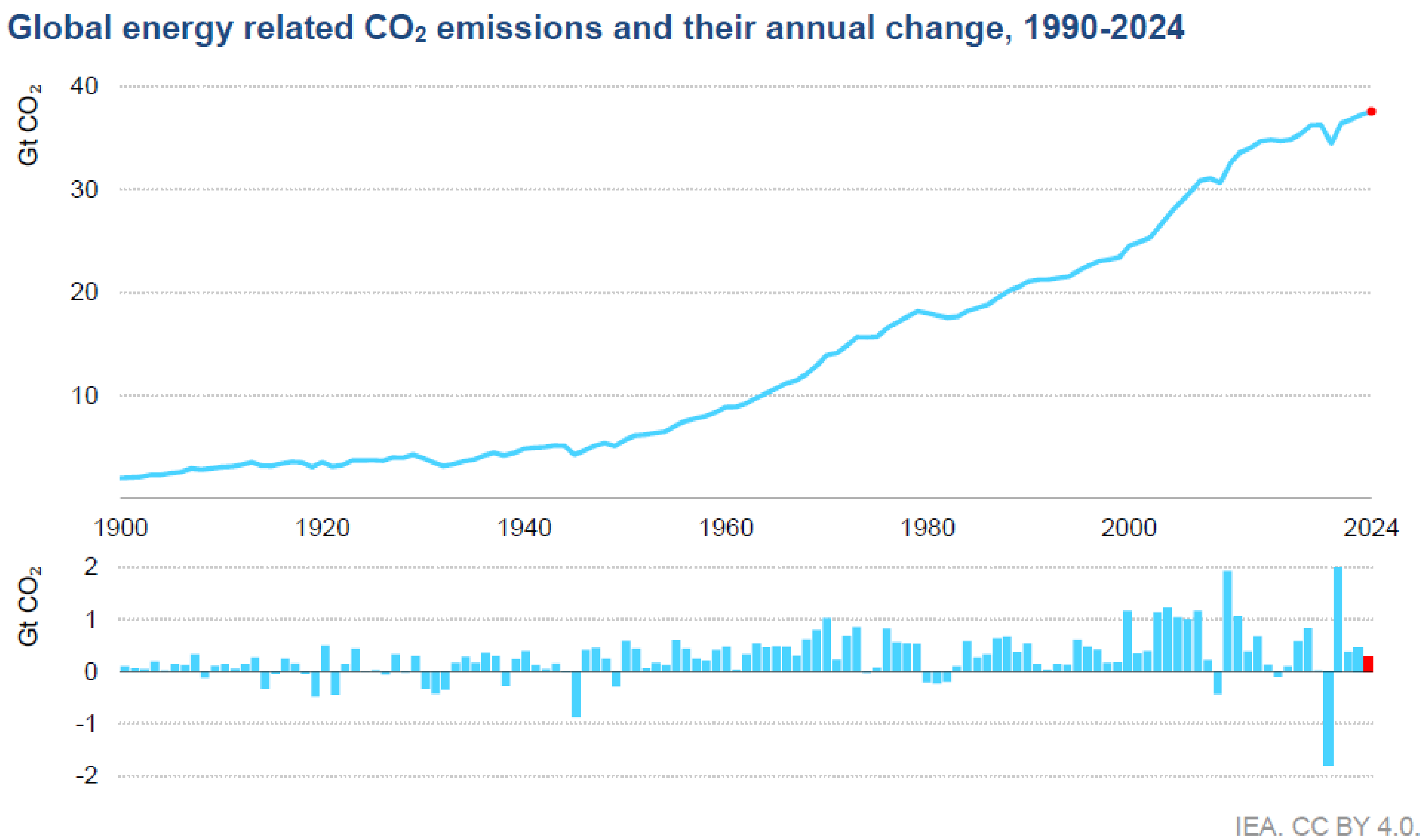
The solid line indicates central estimate of emissions trends. The shaded area indicates the uncertainty range.

*Source: IPCC (published in 2022)*

As carbon emissions comprise most energy-related GHG emissions, we shall focus on carbon emissions.

IEA noted in March 2025 that energy-related carbon emissions rose by 0.8% from 37.3 Gigatonne (Gt) $CO_2$ in 2023 to 37.6 Gt $CO_2$ in 2024, as illustrated in **Exhibit 3**. IEA noted that its scope for carbon emissions "included emissions from all uses of fossil fuels for energy purposes, including the combustion of non-renewable waste, as well as emissions from industrial processes such as cement, iron and steel, and chemicals production".

**Exhibit 3: Global Energy-Related Carbon Emissions and their Annual Change (1990 to 2024)**




*Source: IEA (published March 2025)*

Based on data provided by IEA, coal (excluding those used for the "combustion of non-renewable waste" as well as from industrial processes) contributed to the largest share of energy-related carbon emissions in 2023 & 2024 as shown in **Exhibit 4**. However, natural gas contributed to the largest share of carbon emissions growth in 2024; coal contributed to the second-largest share of emissions growth.

IEA noted that natural gas emissions growth "was driven by higher consumption in China, the United States, the Middle East, and India" as shown in **Exhibit 5**. Meanwhile, coal emissions growth was mainly "fuelled by growing coal consumption in China, India and Southeast Asia", while "demand declined in advanced economies", especially in the U.S. and the European Union.

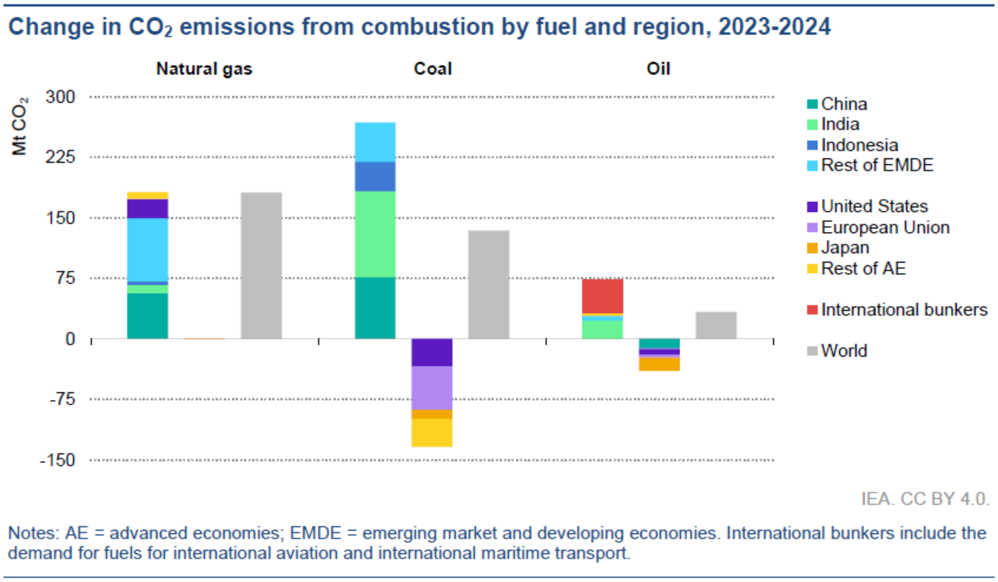
IEA also commented that oil emission growth was "only" 0.3% "despite aviation emissions surging by approximately 5.5% amid record global air passenger demand", as the "modest overall rise in emissions from oil use is largely due to the fact that petrochemical feedstocks accounted for 70% of the total volumetric increase in oil use".

**Exhibit 4: Carbon Emissions by Source (2023 vs 2024)**

| | Actual | | 2023 vs 2024 | |
|---|---|---|---|---|
| (in Mt $CO_2$) | 2023 | 2024 | Absolute change | Change (%) |
| Natural gas | 7,502 | 7,684 | 182 | 2.4% |
| Oil | 11,344 | 11,377 | 33 | 0.3% |
| Coal | 15,489 | 15,623 | 134 | 0.9% |
| **$CO_2$ emissions from fossil fuels (excluding for bioenergy & waste combustion and industrial; estimated)** | **34,335** | **34,684** | **349** | **1.0%** |
| Bioenergy and waste | 241 | 250 | 9 | 3.5% |
| **$CO_2$ emissions from fuel combustion (estimated)** | **34,576** | **34,934** | **358** | **1.0%** |
| Industrial process | 2,694 | 2,632 | (62) | (2.3%) |
| **Total $CO_2$ emissions** | **37,270** | **37,566** | **296** | **0.8%** |

Note: sums may not tally due to rounding.
*Source: IEA (published March 2025), FPA*

**Exhibit 5: Change in Carbon Emissions from Combustion (2023 vs 2024)**




*Source: IEA (published March 2025)*

Bloomberg's primary research service, Bloomberg New Energy Finance ("BNEF"), elaborated in April 2025 on the likely emissions trajectory based on its Economic Transition Scenario ("ETS"), which "maps out a route to a lower-carbon energy system in a world where cost-competitive technologies drive investment decisions to meet rising energy demand". BNEF added that the ETS "assumes that policy makers put in place the conditions for cost-optimal levels of clean energy deployment", although it may not "account for real-world policy, regulatory and practical challenges".

BNEF contrasted its findings for ETS with those for its Net Zero Scenario ("NZS"), which "charts a pathway to global net zero by 2050 and global warming of 1.75 degrees Celsius" by 2100.

According to BNEF, oil demand is expected to peak in 2032 "at 104 million barrels per day, with road fuel peaking a few years earlier". Meanwhile, coal demand is likely to fall as "cost-competitive renewables and gas displace its use in the power sector".

However, gas demand may grow "due to lower long-term fuel-price expectations and higher electricity demand from data centers". BNEF added that "after 2035, power-sector gas consumption kicks in again, led mainly by the US, where favorable economics support investment in gas-fired generation". BNEF also noted gas demand "continues to grow in industry and buildings globally, where cost-competitive low-carbon solutions are lacking".

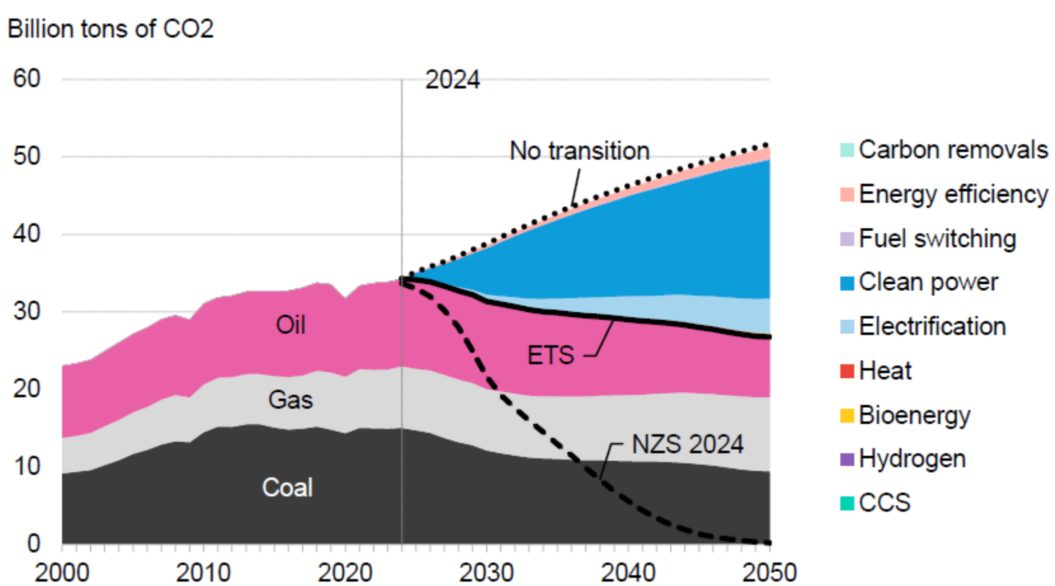
Overall, BNEF noted that "2024 may have been the peak year for emissions" as shown in **Exhibit 6**, "meaning that 2025 could be the first year of structural emissions decline (excepting unusual years such as 2020 or 2009)".

BNEF mentioned though that emissions would "fall 22% by 2050 (back to 2005 levels)" in the ETS, "a trajectory in line with global warming of 2.6C by 2100, with a 67% confidence interval". Bloomberg reported too on April 2025 that BNEF analysts mentioned the global average temperature is now "very close to slipping to an outcome closer to 2.7C".

BNEF noted that the projected temperature increase "shows that deploying only economically competitive climate solutions will not be enough to avert climate disaster".

**Exhibit 6: Forecasted $CO_2$ Emissions Reductions from Fuel Combustion by Measures Adopted (2024 to 2050)**

**Figure 2: CO2 emissions reductions from fuel combustion by measures adopted, Economic Transition Scenario versus 'no-transition' scenario and Net Zero Scenario**




*Source: BNEF (published April 2025)*

## (II) FOSSIL FUELS & ENERGY MIX

Based on IEA's data, fossil fuels' share of global energy supply fell from 80.8% in 2023 to 80.1% in 2024 as shown in **Exhibit 7**.

Amongst fossil fuels, oil had the largest share of energy supply (29.8%) in 2024, followed by coal (27.3%) and natural gas (23.0%). In contrast, renewables accounted for only 15.0% of energy supply in 2024 while nuclear accounted for just 4.8%.

On a positive note, IEA commented that "Oil's share of total energy demand fell below 30% for the first time ever" in 2024, "50 years after peaking at 46%".

As compared with its share of global energy supply, fossil fuels accounted for a lower share of electricity generation in 2023 & 2024. Fossil fuels' share of electricity generation fell from 60.3% in 2023 to 58.6% in 2024.

IEA noted, "While coal remains the world's largest source of power generation, its share in the electricity mix is falling: its current share (35%) is the lowest since the IEA was founded in 1974". IEA added that natural gas "was the second-largest source of electricity" (amongst fossil fuels), "marking more than two decades in which it has provided over 20% of global electricity".

IEA noted though, "For the first time ever, power generation from renewables and nuclear covered two-fifths of total global generation in 2024".

We estimate that electricity's share of global energy supply rose from 17.0% in 2023 to 17.3% in 2024 as shown in **Exhibit 7**.

**Exhibit 7: Energy Supply & Electricity Generation by Source (2023 vs 2024)**

| | Actual | | 2023 vs 2024 | |
|---|---|---|---|---|
| (in EJ) | 2023 | 2024 | Absolute change | Change (%) |
| Natural gas | 145 | 149 | 4 | 2.7% |
| Oil | 192 | 193 | 1 | 0.8% |
| Coal | 175 | 177 | 2 | 1.2% |
| **Fossil fuels** | **512** | **519** | **7** | **1.4%** |
| Renewables | 92 | 97 | 5 | 5.8% |
| Nuclear | 30 | 31 | 1 | 3.7% |
| Others (est.) | - | 1 | 1 | n.m. |
| **Total energy supply (in EJ)** | **634** | **648** | **14** | **2.2%** |
| **Share of energy supply:** | | | | |
| Natural gas | 22.9% | 23.0% | - | - |
| Oil | 30.3% | 29.8% | - | - |
| Coal | 27.6% | 27.3% | - | - |
| **Fossil fuels (est.)** | **80.8%** | **80.1%** | - | - |
| Renewables | 14.5% | 15.0% | - | - |
| Nuclear | 4.7% | 4.8% | - | - |
| Others (est.) | - | 0.2% | - | - |
| **Total** | **100.0%** | **100.0%** | - | - |
| **Electricity as share of energy supply:** | | | | |
| Natural gas | 16.4% | 16.4% | - | - |
| Oil | 1.4% | 1.4% | - | - |
| Coal | 21.9% | 21.8% | - | - |
| **Fossil fuels (est.)** | **12.7%** | **12.7%** | - | - |
| Renewables | 35.5% | 37.1% | - | - |
| Nuclear | 32.9% | 33.0% | - | - |
| Others (est.) | n.m. | n.m. | - | - |
| **Total energy supply** | **17.0%** | **17.3%** | - | - |

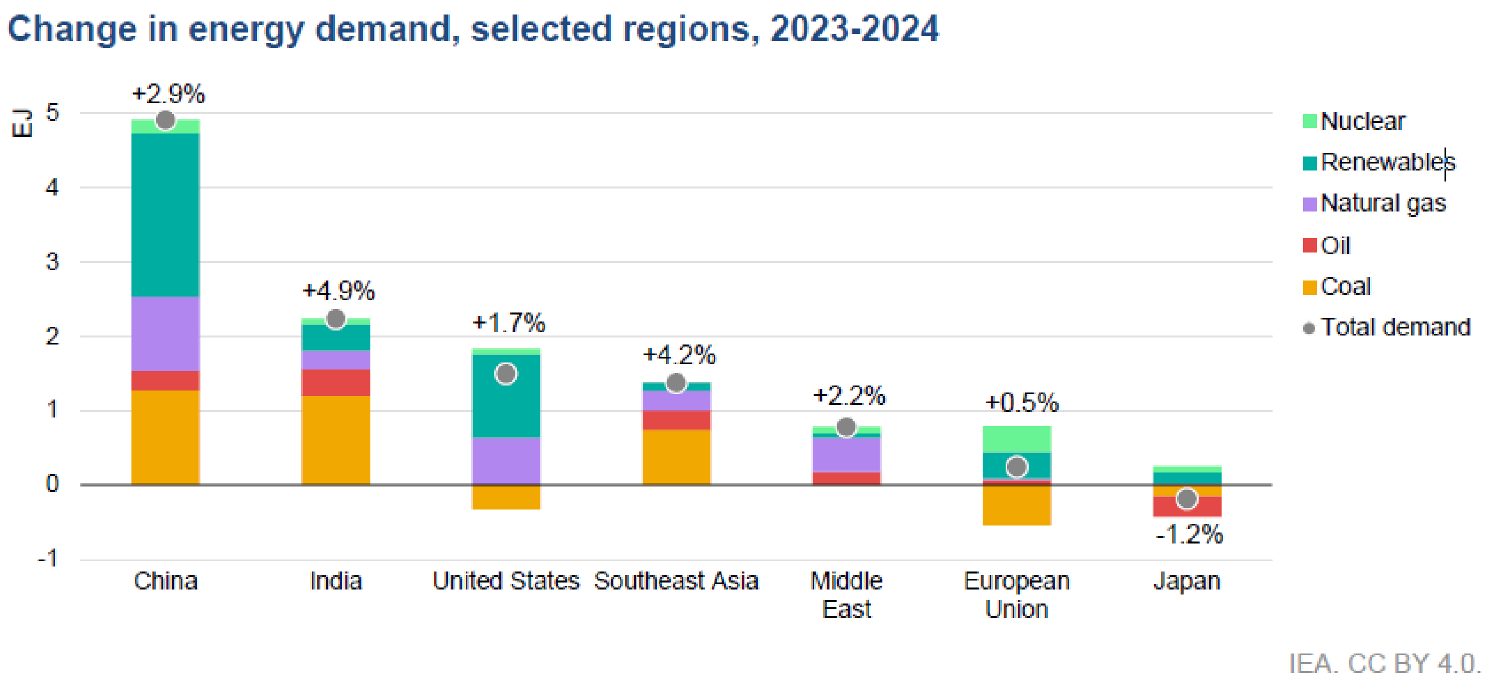
| | Actual | | 2023 vs 2024 | |
|---|---|---|---|---|
| (in TWh unless otherwise stated) | 2023 | 2024 | Absolute change | Change (%) |
| Natural gas | 6,622 | 6,793 | 171 | 2.6% |
| Oil | 762 | 738 | (24) | (3.2%) |
| Coal | 10,645 | 10,736 | 91 | 0.9% |
| **Fossil fuels (est.)** | **18,029** | **18,267** | **238** | **1.3%** |
| Renewables | 9,074 | 9,992 | 918 | 10.0% |
| Nuclear | 2,743 | 2,844 | 101 | 3.7% |
| Others (est.) | 51 | 50 | (1) | (2.0%) |
| **Total electricity generation (in TWh)** | **29,897** | **31,153** | **1,256** | **4.2%** |
| **Share of electricity generation:** | | | | |
| Natural gas | 22.1% | 21.8% | - | - |
| Oil | 2.5% | 2.4% | - | - |
| Coal | 35.6% | 34.5% | - | - |
| **Fossil fuels (est.)** | **60.3%** | **58.6%** | - | - |
| Renewables | 30.4% | 32.1% | - | - |
| Nuclear | 9.2% | 9.1% | - | - |
| Others (est.) | 0.2% | 0.2% | - | - |
| **Total** | **100.0%** | **100.0%** | - | - |
| **In EJ (1 TWh = 0.0036 EJ):** | | | | |
| Natural gas | 24 | 24 | 1 | 2.6% |
| Oil | 3 | 3 | (0) | (3.2%) |
| Coal | 38 | 39 | 0 | 0.9% |
| **Fossil fuels (est.)** | **65** | **66** | **1** | **1.3%** |
| Renewables | 33 | 36 | 3 | 10.0% |
| Nuclear | 10 | 10 | 0 | 3.7% |
| Others (est.) | 0 | 0 | (0) | (2.0%) |
| **Total electricity generation (in EJ)** | **108** | **112** | **5** | **4.2%** |

Note: sums may not tally due to rounding. "n.m." = not meaningful.
*Source: IEA (published March 2025), FPA*

As broken down by regions, China had the largest absolute increase in energy demand (+4.9 EJ), followed by India (+2.2 EJ) and the U.S. (+1.5 EJ), as shown in **Exhibit 8**. We note that renewables energy demand growth (in absolute terms) was the largest in China (+ 2.2 EJ), followed by the U.S. (+1.1 EJ) and both India & the European Union (+0.4 EJ each).

IEA commented that "four-fifths of total global energy demand growth still took place in emerging market and developing economies, with three-fifths of the total in Developing Asia". IEA added that "Growth in India alone was more than the increase in demand in all advanced economies combined".

**Exhibit 8: Change in Energy Demand of Selected Regions (2023 vs 2024)**



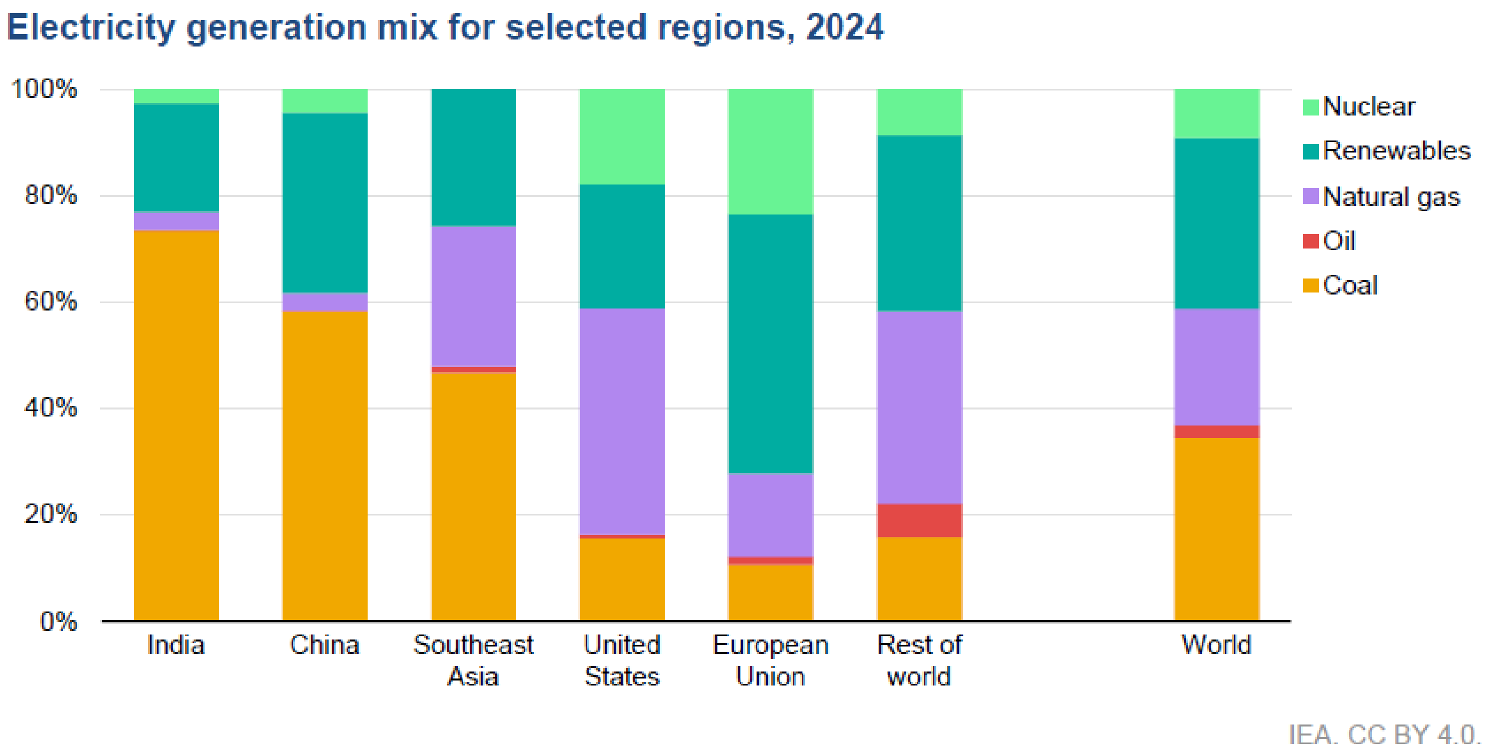

*Source: IEA (published March 2025)*

However, India had the largest fossil fuels share of electricity generation (around 76.9%) in 2024, followed by Southeast Asia (around 74.2%) and China (around 61.7%) as shown in **Exhibit 9**.

IEA commented that "coal is often the primary source of electricity" in "emerging market and developing economies". IEA noted that in India, "coal provided nearly three-quarters of electricity supply, complemented by over 20% from renewables". IEA added that in China, "coal provided almost 60% of generation, followed by about 35% from renewables".

In contrast, IEA remarked that "renewables and natural gas play larger roles in electricity generation" in "advanced economies". IEA noted that in the U.S., "natural gas accounted for over 40% of all electricity generation in 2024, followed by renewables (23%)". Meanwhile, in the European Union, "renewables made up nearly half of electricity supply" while nuclear made up 23%.

**Exhibit 9: Electricity Generation Mix for Selected Regions (2024)**




*Source: IEA (published March 2025)*

Based on data provided by IEA in October 2024 (and as illustrated in **Exhibit 10**), fossil fuels' share of total (global) energy supply (as summed up across coal, natural gas, and oil) is expected to fall from around 79.9% in 2023 to:

- around 58.3% in 2050 in the Stated Policies Scenario ("STEPS"), which "provides a sense of the prevailing direction of travel for the energy sector based on a detailed reading of the latest policy settings in countries around the world";

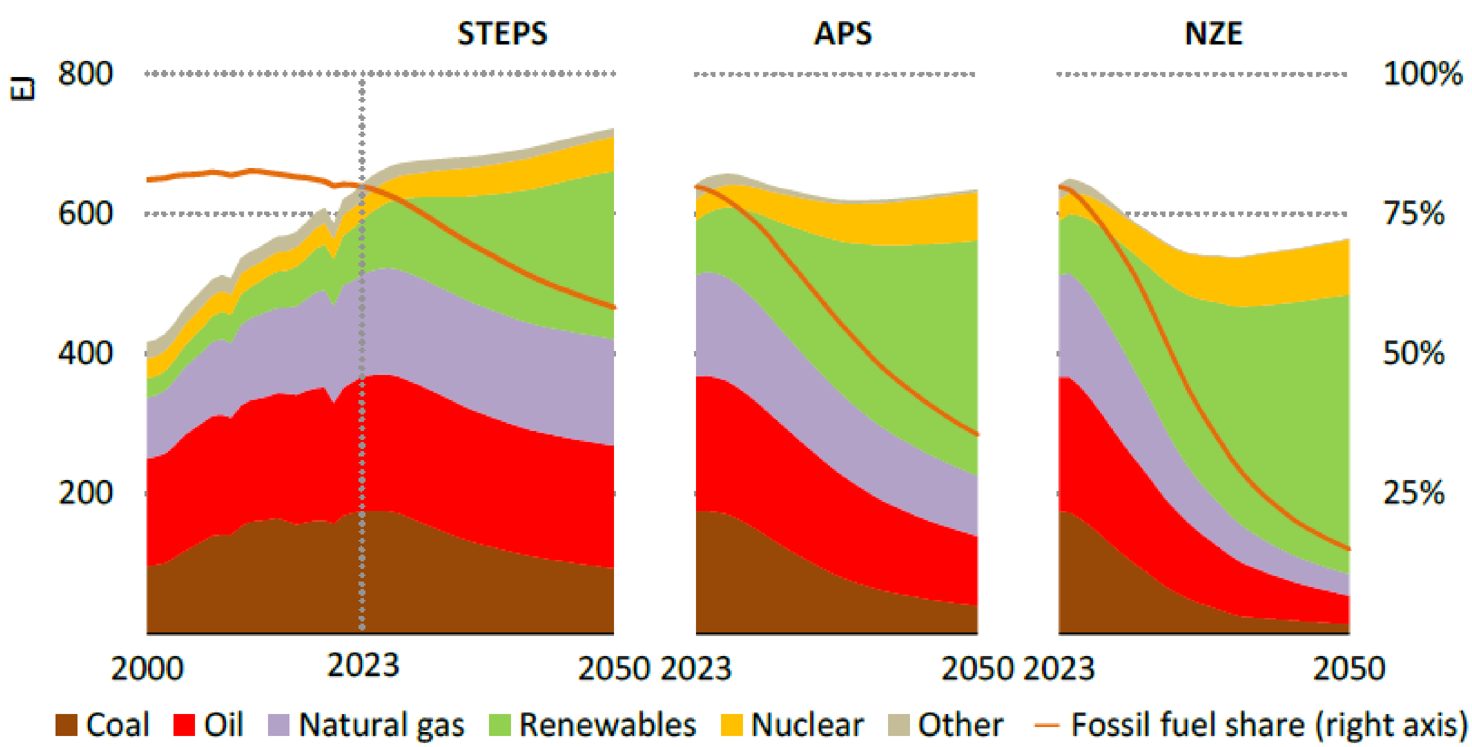
- around 35.6% in 2050 in the Announced Pledges Scenario ("APS"), which also "assumes that all national energy and climate targets, including longer term net zero emissions targets and pledges in Nationally Determined Contributions, are met in full and on time"; or

- around 15.2% in 2050 in the Net Zero Emissions by 2050 Scenario ("NZE"), which "portrays a pathway for the global energy sector to achieve net zero $CO_2$ emissions by 2050 which is consistent with limiting long-term global warming to 1.5 °C with limited overshoot (with a 50% probability)".

Meanwhile, OPEC indicated in September 2024 that fossil fuels' share of total (global) primary energy demand is expected to fall from around 79.8% in 2023 to around 66.4% in 2050. We note that OPEC members are oil producers.

**<u>Exhibit 10: Forecasted Total Energy Supply by Source & Scenario (2023 to 2050)</u>**

**Figure 3.1 ▷ Global total energy supply by source and fossil fuel share by scenario, 2000-2050**




*Source: IEA (published October 2024)*

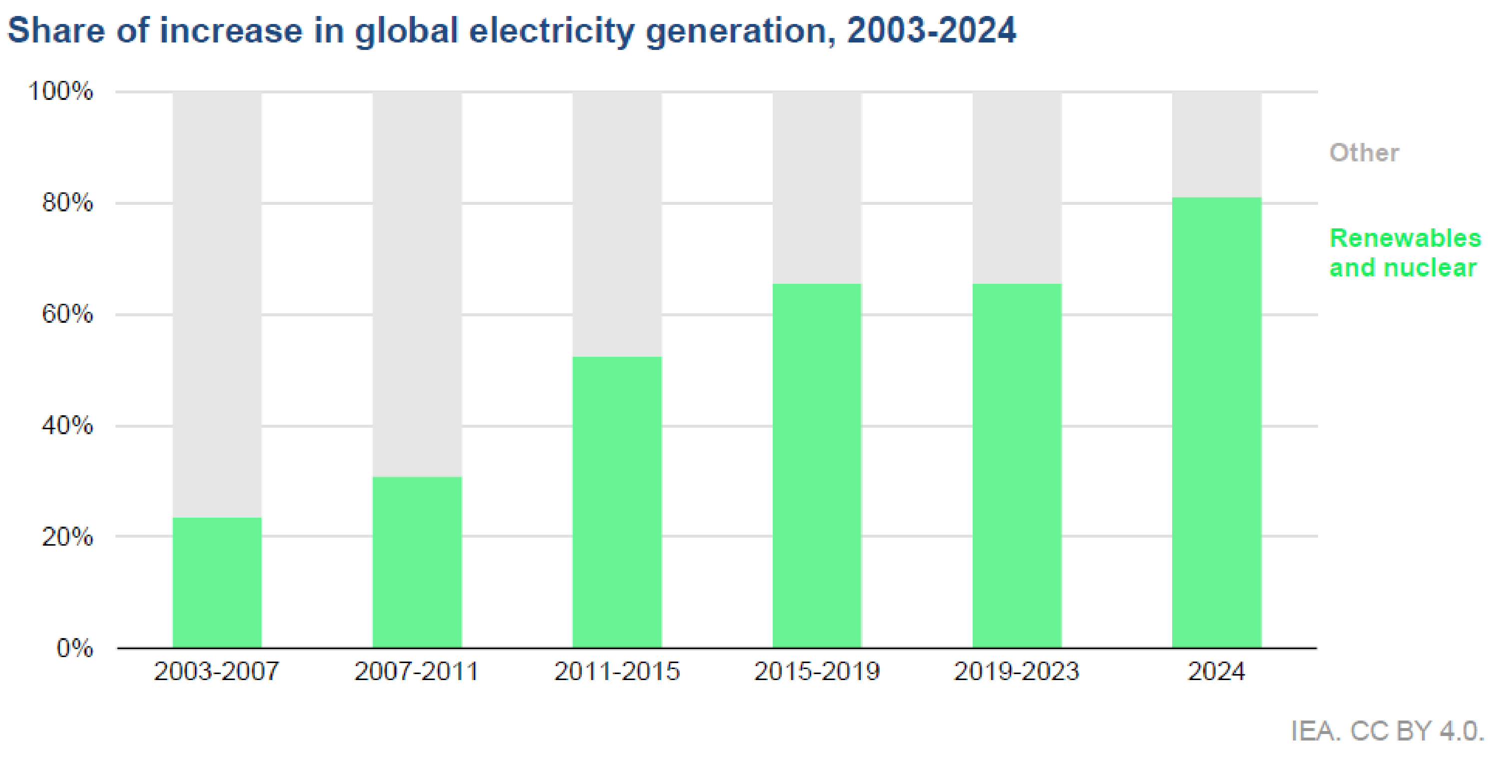
## (III) GROWTH IN RENEWABLES & NUCLEAR

Based on data provided by IEA, renewables & nuclear cumulatively accounted for around 19.8% of total energy supply and around 41.2% of electricity generation in 2024 (as may be estimated from **Exhibit 7** on page 8).

Renewables accounted for 15.0% of total energy supply and 32.1% of electricity generation in 2024, while nuclear accounted for 4.8% of total energy supply and 9.1% of electricity generation in 2024.

Renewables & nuclear collectively made up around 81.1% of global electricity generation growth of 1,256 TWh in 2024 as may be seen in **Exhibit 11**. IEA remarked that the growth in 2024 was a “step up” from “two-thirds of total growth” (around 65.9% of 744 TWh) in 2023.

**Exhibit 11: Share of Global Electricity Generation Growth (2003 to 2024)**




*Source: IEA (published March 2025)*

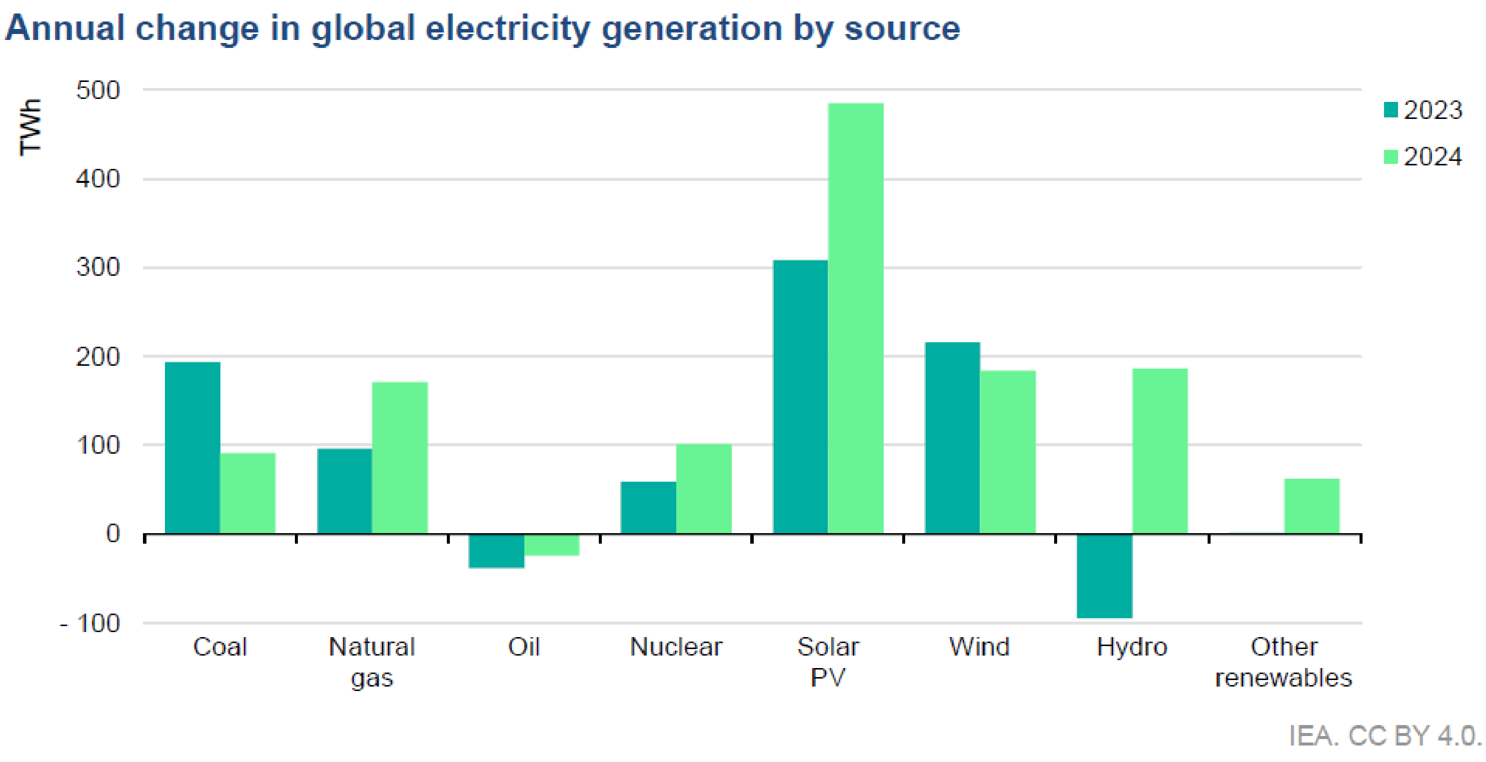
IEA added, solar PV contributed “the most of any source and far exceeding the previous year” and grew by “about 480 TWh” (around 38.2% of electricity generation growth) in 2024 as shown in **Exhibit 12**. IEA commented that “Global generation from solar PV has been doubling approximately every three years since 2016, and it did so again between 2021 and 2024”.

Meanwhile, wind “expanded by about 180 TWh in 2024 as new projects were brought online”. IEA noted the annual growth of 8% “was the lowest in the last two decades due to a high base, as well as permitting and licensing challenges in several regions”.

IEA also noted that hydropower generation “increased by 190 TWh in 2024, mainly due to wet weather in several major markets”.

IEA mentioned too that nuclear power generation rose by “nearly 4%, boosted by new projects and restarted operations at several reactors in France and Japan”.

**Exhibit 12: Annual Change in Global Electricity Generation by Source (2023 & 2024)**



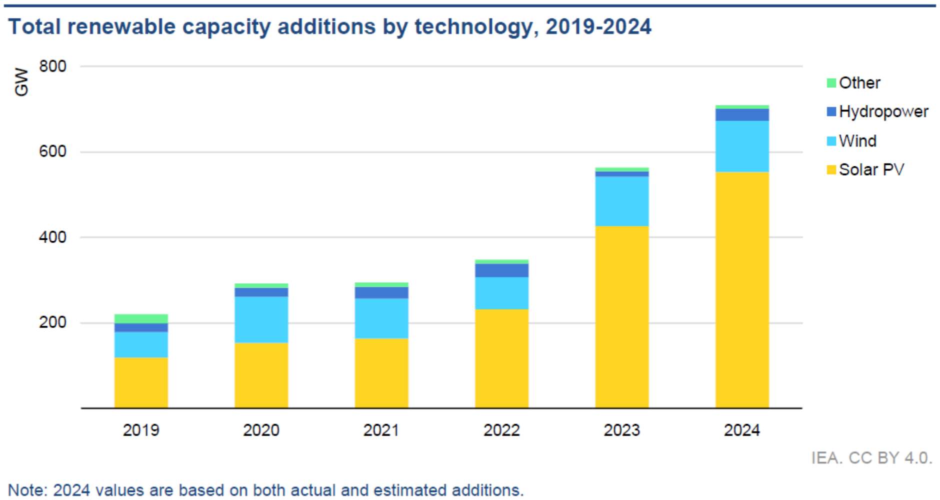

*Source: IEA (published March 2025)*

In terms of capacity additions, IEA noted that “global annual renewable capacity additions surged by an estimated 25% to around 700 GW” in 2024, “marking the 22nd consecutive year that renewables have set new records for expansion”. IEA added, “Solar PV accounted over three-quarters of renewable capacity additions, followed by wind (17%) and hydropower (4%), with bioenergy, geothermal, concentrating solar power and marine making up the remainder” as shown in **Exhibit 13**.

According to the U.S. Energy Information Administration, electricity generation capacity “is the maximum electric output an electricity generator can produce under specific conditions” while electricity generation “is the amount of electricity a generator produces during a specific period of time”.

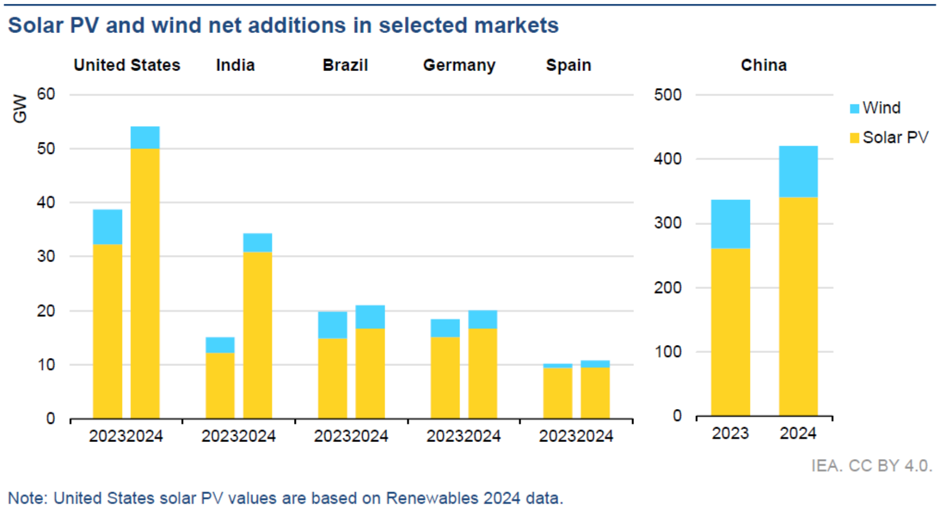
IEA also noted that China made up “almost two-thirds of all renewable capacity connected to the grid in 2024” as shown in **Exhibit 14**. IEA mentioned that China “surpassed its 2030 ambition of 1 200 GW of combined solar PV and wind capacity six years early, in mid-2024”.

**Exhibit 13: Renewable Capacity Additions by Technology (2019 to 2024)**




*Source: IEA (published March 2025)*

**Exhibit 14: Solar PV & Wind Net Additions in Selected Markets (2023 & 2024)**




*Source: IEA (published March 2025)*

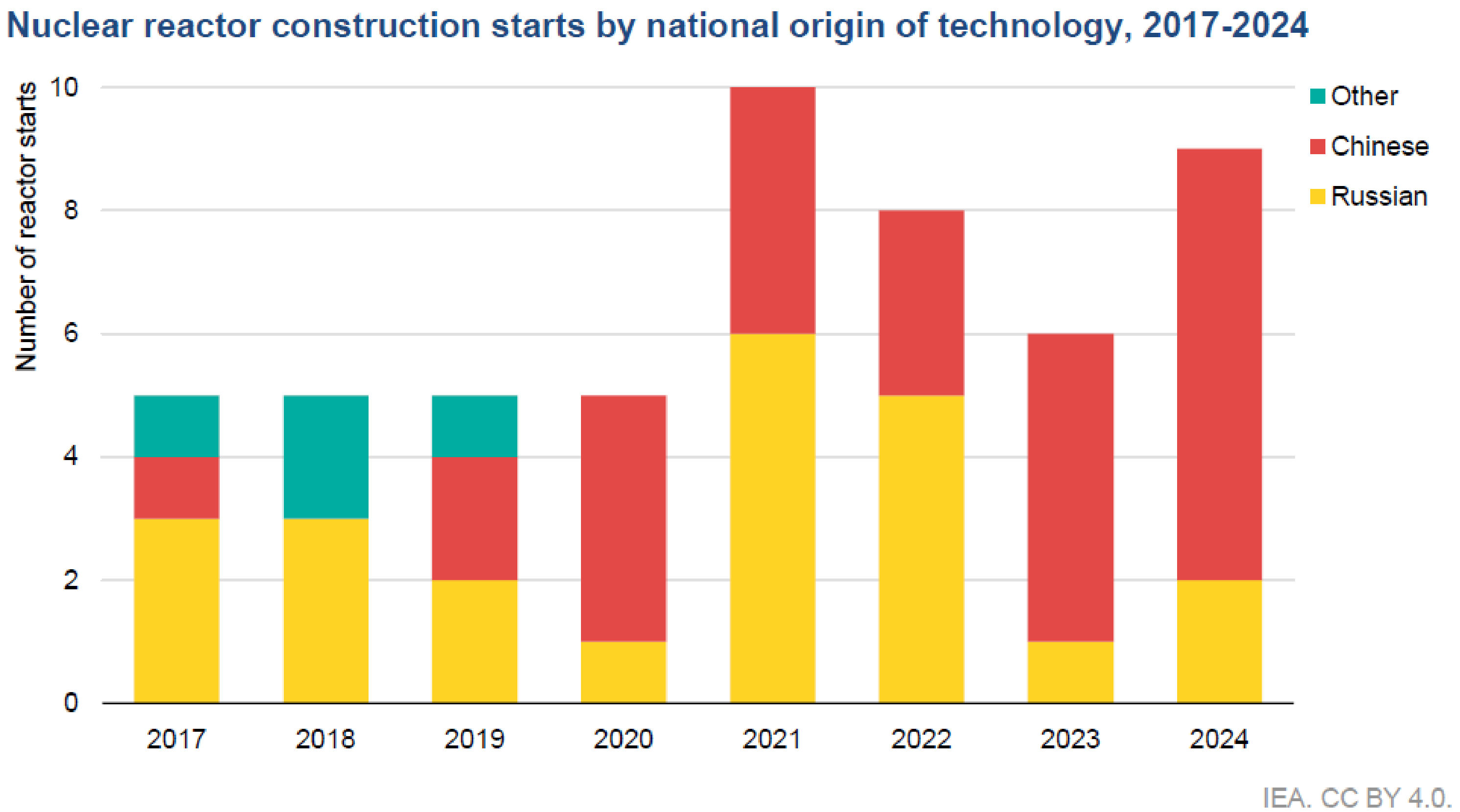
IEA mentioned too that “there were nine construction starts of nuclear reactors in 2024, 50% more than in 2023”, as shown in **Exhibit 15**. IEA noted that the reactors “are expected to have a total capacity of 11 GW” upon completion, and added, “Over the past five years, all nuclear construction starts have used either Chinese or Russian designs”.

IEA noted that China “began construction of six nuclear reactors in 2024” while Pakistan “began construction of one reactor”, of which both countries used Chinese reactor design(s). Meanwhile, Egypt & Russia “each began constructing one nuclear reactor in 2024, both of Russian design”.

In August 2024, Nikkei Asia cited an official at Japan’s Ministry of Economy, Trade and Industry as saying that China & Russia “have taken the global lead” in “next-generation reactors”.

Nikkei Asia commented that China has been pursuing nuclear power as part of its “efforts to cut carbon dioxide emissions and air pollution”, noting that China “relies on fossil fuel-burning plants for about 70% of its electricity”. Meanwhile, Nikkei Asia added that Russia has been seeking to “reduce its consumption of natural gas, a major Russian export”.

**Exhibit 15: Nuclear Reactor Construction Starts by National Origin of Technology (2017 to 2024)**




Note: Capacity is reported in gross terms.
Source: IEA analysis based on IAEA PRIS database (Accessed 6 February 2025).

*Source: IEA (published March 2025)*

IEA indicated in March 2025 that renewables & nuclear need to collectively account for 35.6% of global energy supply by 2030 and 84.7% by 2050 to reach net zero emissions by 2050.

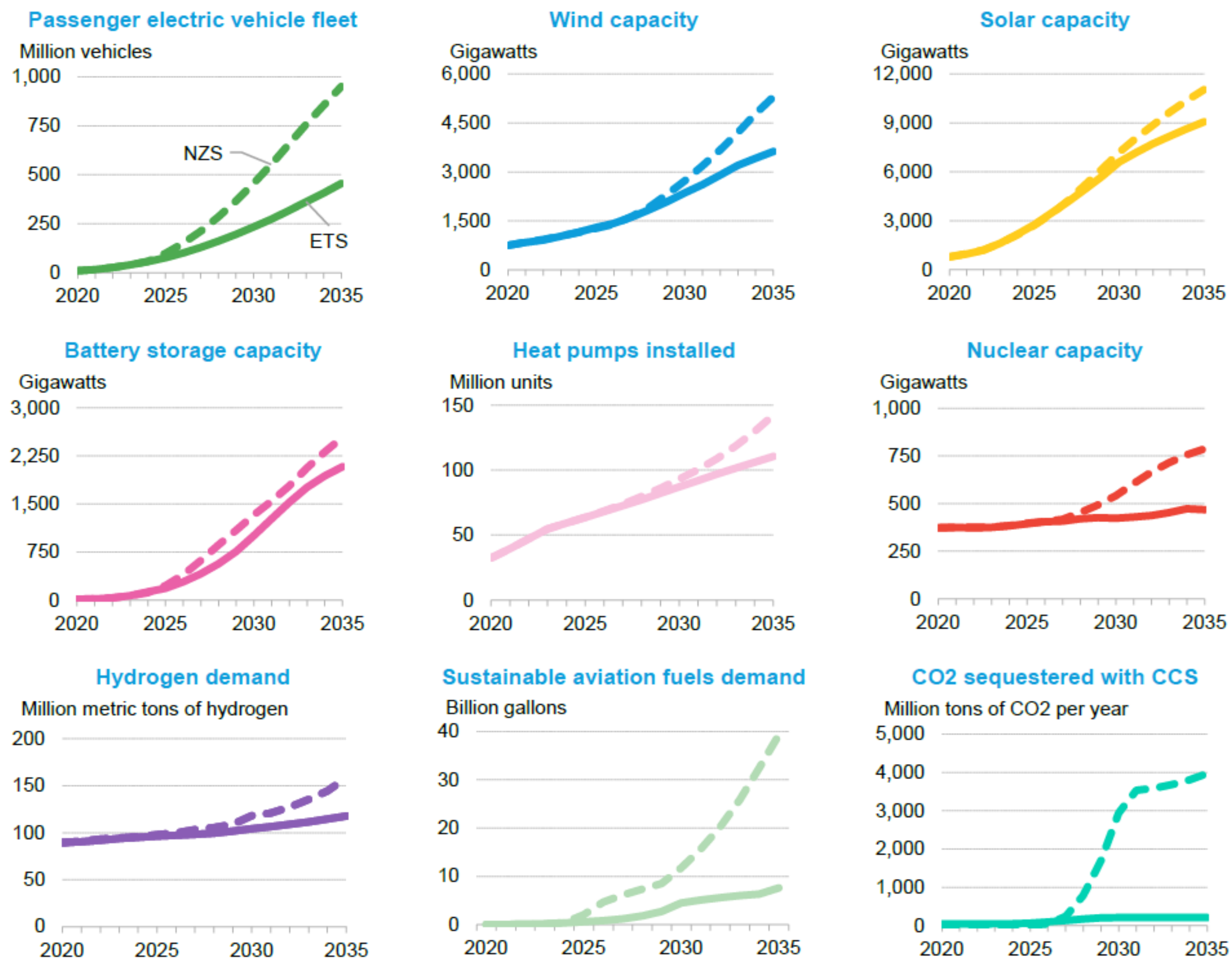
BNEF summarised in April 2025 the required growth in "clean technology" needed to limit the impacts of climate change, as shown in **Exhibit 16** (by the dotted lines indicating the required trajectory under NZS).

BNEF noted that passenger electric vehicles are expected to be "one of the most important drivers of emissions reductions in the Economic Transition Scenario" and would help to "deliver a 40% reduction in oil consumed in the transport sector by 2050".

However, BNEF added, "Policy makers must not only grasp the easiest opportunities – renewables, storage and EVs – but also tackle harder solutions such as low-carbon heat, industrial decarbonization, carbon capture, hydrogen and clean transport fuels".

**Exhibit 16: Key Technology Drivers in BNEF's Economic Transition Scenario (2020 to 2035)**

**Figure 3: Key technology drivers in the Economic Transition Scenario, 2020-2035**




*Source: BloombergNEF. Note: ETS is Economic Transition Scenario, NZS is Net Zero Scenario. Wind includes offshore and onshore. Solar and storage include small-scale and utility-scale. CCS is carbon capture and storage, the ETS shows project pipeline forecast as of November 2024. Heat pumps included for China, Japan, Germany, France, UK and the US. Power grids are a mature technology solution but were not updated for this report. For more, see New Energy Outlook 2024: Grids (web | terminal).*

*Source: BNEF (published April 2025)*

## (IV) TRUMP AND THE ENERGY TRANSITION

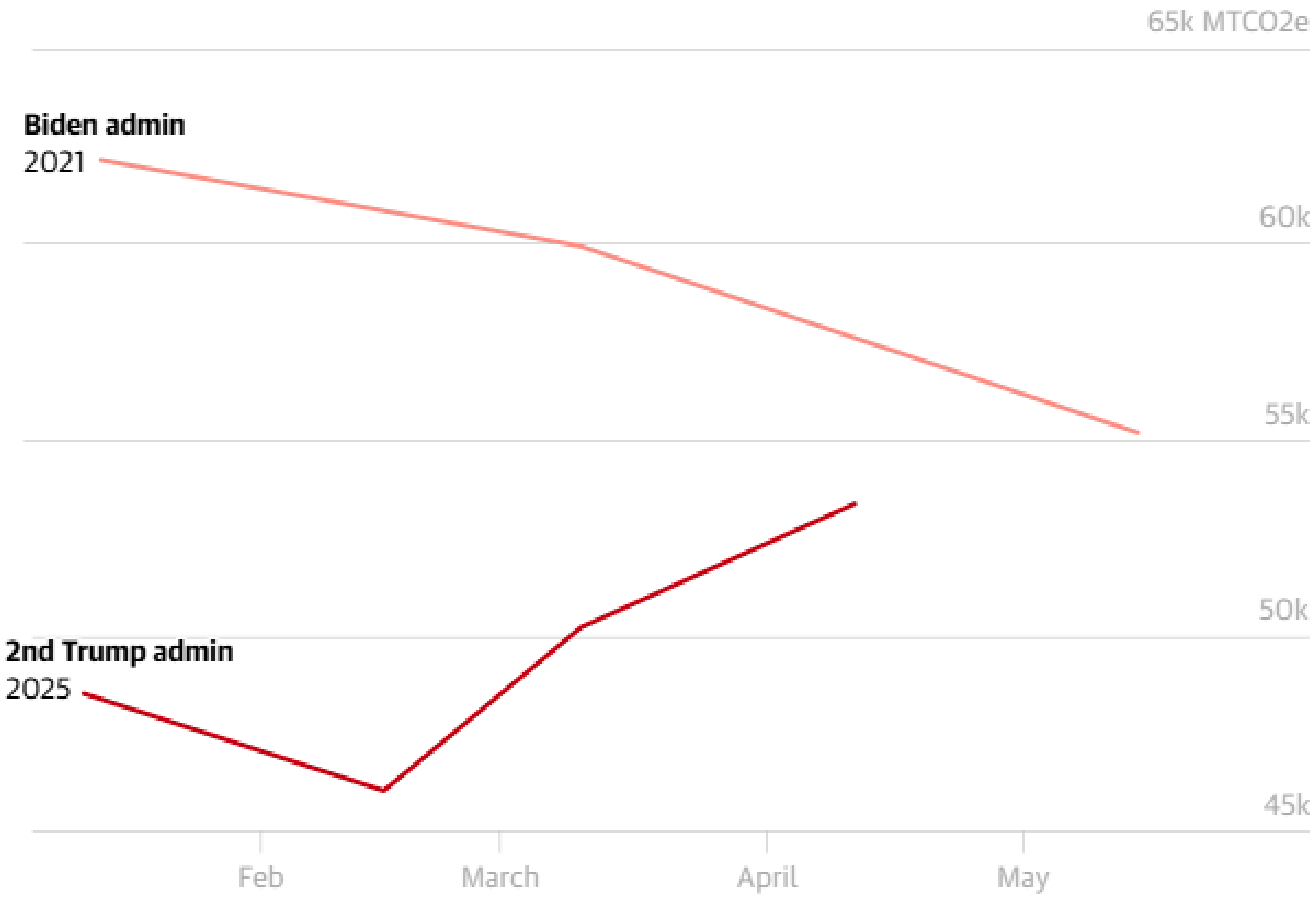
Since U.S. President Donald Trump indicated previously that he intended for the U.S. to “Drill, Baby, Drill” and that he would push back against renewables, we discuss how the Trump Administration has thus far impacted the energy transition in the U.S. & the world.

Reuters reported on 2 May 2025 that the Trump administration proposed to cut “more than $15 billion in carbon capture and renewable energy funding from the bipartisan infrastructure law” that former U.S. President Joe Biden signed in 2021. Reuters added that the Trump administration also proposed to “cancel $6 billion from that law for EV chargers”.

The Guardian also reported on 2 May 2025 that the Trump Administration “has already taken more than 140 initial actions to reverse environmental regulations and promote the use of fossil fuels, dismissing established climate science as a “giant hoax” and exhorting further drilling”. The Guardian noted that, under the Trump administration, forecasts of lifetime emissions from U.S. oil & gas production have been rising as shown in **Exhibit 17**.

**Exhibit 17: Forecasts of Lifetime Emissions from U.S. Oil & Gas Production (Biden & 2nd Trump Administration)**

Lifetime emissions forecasts made during the ...




Guardian graphic. Source: International Institute for Sustainable Development. Note: Projections include active and planned projects. Emissions measured in millions of tons of CO2

*Source: The Guardian (published May 2025)*

However, FT reported on 22 April 2025 that “while US policy emphasised fossil fuel expansion, 97 per cent of the American executives polled wanted to see the government expand renewable electricity in the grid”, according to a poll “which was carried out between December and February”. FT added that “almost all” of the 1,500 business leaders polled (from “across 15 countries” including the U.S., U.K., Germany, Brazil and India) “backed a long-term shift away from fossil fuels”.

On 1 May 2025, S&P Global cited Neil Chatterjee, a “former head of the US Federal Energy Regulatory Commission”, as expecting that Trump “will moderate some of his anti-renewable energy policies due to economic realities and industry pushback”. Citing Chatterjee, S&P Global added that Trump would be forced to “adopt more flexible policies toward renewables”, “to lower consumer energy prices and to promote the domestic data center industry as a means of bolstering national security”.

ST reported too on 9 May 2025 that Singapore signalled it “is supportive of climate action, and will not flip-flop on this stance”. ST cited former Senior Minister Teo Chee Hean as having told “global investors” that “Singapore will continue to work with partners to tackle the planetary crisis, even though it cannot be sure what other countries will or will not do”.

# SINGAPORE'S ENERGY TRANSITION

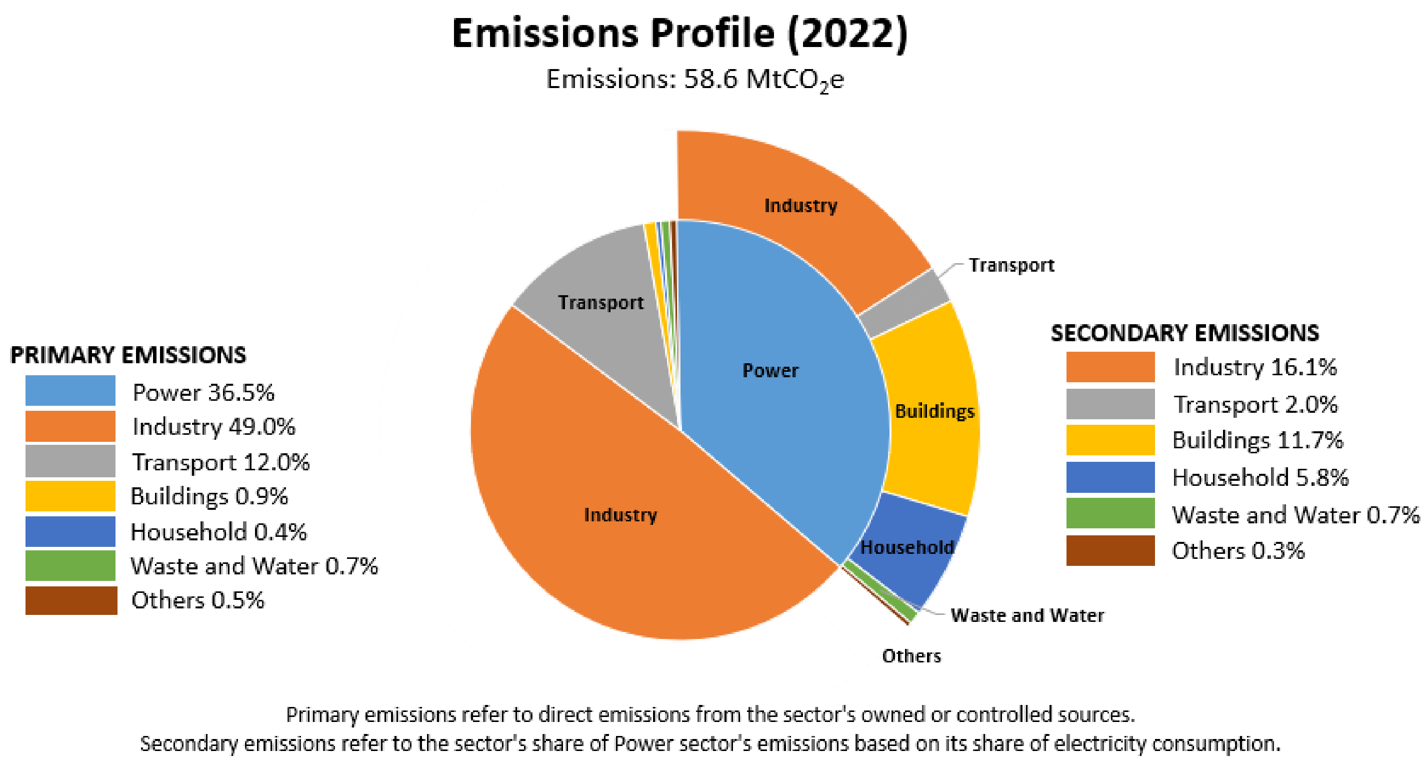
The National Climate Change Secretariat ("NCCS") announced on 10 February 2025 that Singapore "would further reduce its emissions" to between 45 and 50 Megatonne $CO_2$ equivalent ($MtCO_2e$) in 2035.

NCCS noted that the announcement "builds on" Singapore's 2030 Nationally Determined Contribution ("NDC") "to reduce emissions to around 60 $MtCO_2e$ by 2030, after peaking emissions earlier", and "is aligned with" Singapore's longer-term goal "to achieve net-zero emissions by 2050".

NCCS cautioned though that Singapore's "ability to fulfil our pledges, like all Parties, will depend on continued international commitment by countries to deliver on their climate pledges". NCCS added, "The targets will also be contingent on the maturity of decarbonisation technologies and effective international cooperation".

NCCS separately noted that Singapore's emissions were 58.6 MtCO2e in 2022 as broken down in **Exhibit 18**.

**Exhibit 18: Singapore's Emissions Profile (2022)**



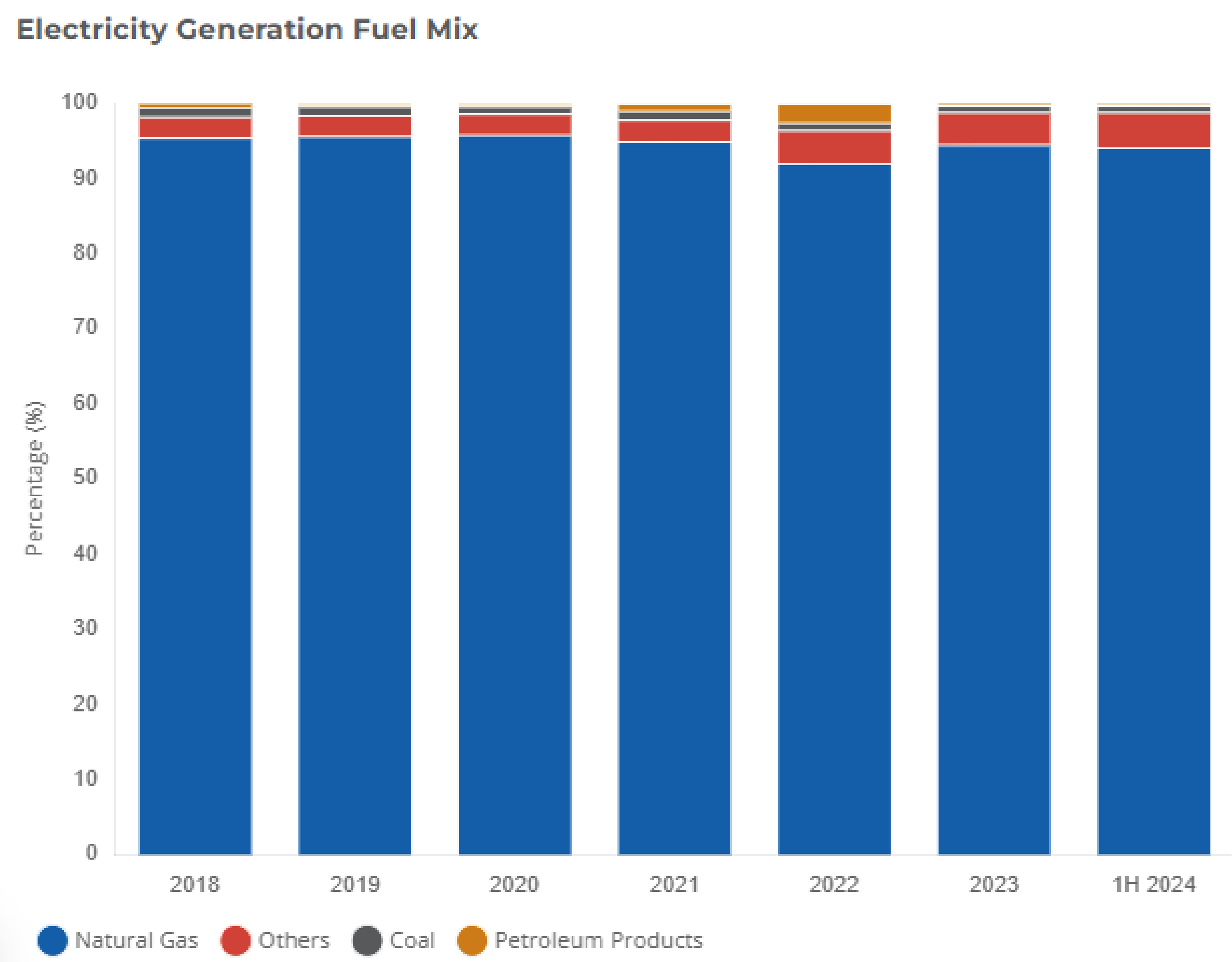

*Source: NCCS*

With a "low-lying" land area of 734.3 $km^2$ and "one of the highest population densities globally (8,058 persons per $km^2$)", along with "low wind speeds and lack of high-quality hydrothermal resources", NCCS noted that Singapore is "alternative energy disadvantaged".

NCCS added that "current nuclear fission technologies are not suitable for deployment in Singapore" given the "small land area and high population density", while there is "also limited scope for solar photovoltaics (PV) deployment and for Singapore's forests to be a significant carbon sink". Accordingly, NCCS separately noted that Singapore currently relies "heavily" on imported natural gas instead for power generation.

According to the Energy Market Authority ("EMA"), natural gas comprised 94.1% of Singapore's electricity generation fuel mix in 1H 2024 as shown in **Exhibit 19**.

**Exhibit 19: Singapore's Electricity Generation Fuel Mix (2018 to 1H 2024)**




*Source: EMA*

Based on IEA's data though, natural gas comprised only 25.4% of Singapore's total energy supply in 2022 as shown in **Exhibit 20**; oil comprised the majority (71.4%) of total energy supply in 2022. We note that electricity generation comprised only 13.2% of total energy supply in 2022.

According to IEA, non-energy use comprised the majority (51.7%) of oil products final consumption in 2022, followed by industry (30.7%) and transport (16.7%).

**Exhibit 20: Singapore's Electricity Generation, Total Energy Supply and Carbon Emissions (2022)**

| | Electricity generation | | Total energy supply | | $CO_2$ emissions[1] |
|---|---|---|---|---|---|
| (in respective units) | in GWh | in TJ | in TJ | % electricity | in Mt $CO_2$ |
| Coal | 571 | 2,056 | 17,404 | 11.8% | 1.775 |
| Oil | 1,484 | 5,342 | 1,117,790 | 0.5% | 21.472 |
| Natural gas | 52,543 | 189,155 | 397,238 | 47.6% | 22.179 |
| **Fossil fuels** | **54,598** | **196,553** | **1,532,432** | **12.8%** | **45.426** |
| Biofuels & waste | 1,794 | 6,458 | 28,972 | 22.3% | not indicated |
| Wind, solar, etc. | 955 | 3,438 | 3,438 | 100.0% | not indicated |
| **Total** | **57,347** | **206,449** | **1,564,842** | **13.2%** | **46.595** |
| **Share of electricity generation / total energy supply / emissions in 2022:** | | | | | |
| Coal | 1.0% | - | 1.1% | - | 3.8% |
| Oil | 2.6% | - | 71.4% | - | 46.1% |
| Natural gas | 91.6% | - | 25.4% | - | 47.6% |
| **Fossil fuels** | **95.2%** | **-** | **97.9%** | **-** | **97.5%** |
| Biofuels & waste | 3.1% | - | 1.9% | - | - |
| Wind, solar, etc. | 1.7% | - | 0.2% | - | - |
| **Total** | **100.0%** | **-** | **100.0%** | **-** | **100.0%** |

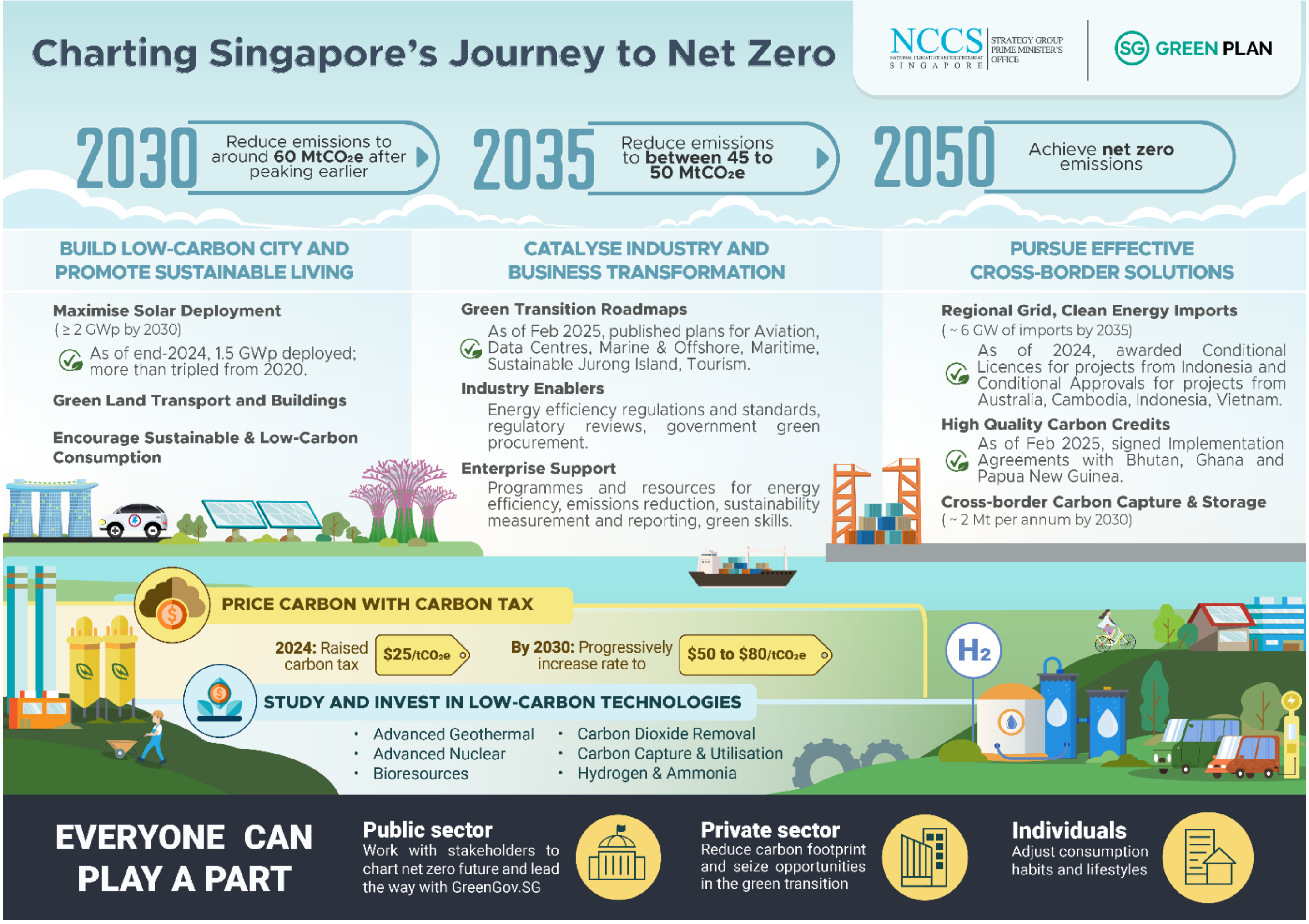
Note: 1 GWh = 3.6 TJ. [1] From fuel combustion only.
*Source: IEA, FPA*

NCCS noted that Singapore aims to lower carbon emissions through three "key thrusts" (as elaborated in **Exhibit 21**): "Build Low-carbon City and Promote Sustainable Living", "Catalyse Industry and Business Transformation" and "Pursue Effective Cross-Border Solutions".

NCCS added that the key thrusts "are supported by a carbon tax". NCCS separately indicated that the carbon tax was raised from S$5 per tonne of CO2 equivalent (tCO2e) in 2022 "to S$25/tCO2e with effect from 2024", and would be "raised to S$45/tCO2e in 2026 and 2027, with a view to reaching S$50-80/tCO2e by 2030".

NCCS also mentioned that the carbon tax "is levied on facilities that directly emit at least 25,000 tCO2e of greenhouse gas (GHG) emissions annually"[1] and that "around 70%" of Singapore's emissions "are covered by the carbon tax levied on about 50 facilities in the manufacturing, power, waste, and water sectors".

**Exhibit 21: Singapore's Net Zero Pathway (to 2050)**




*Source: NCCS*

[1] According to the National Environmental Agency ("NEA"), the carbon tax does not cover indirect (i.e., Scope 2 & 3) emissions.

To reduce reliance on natural gas for power generation, NCCS noted that Singapore will “harness and tap on the four switches”, which include solar, regional power grids and “Emerging Low-Carbon Alternatives” (the last switch being natural gas).

For solar, NCCS commented that Singapore is “pressing ahead with ambitious solar deployment plans to achieve our target of at least 2 gigawatt-peak (GWp) by 2030, which will generate enough energy to meet around 3% of Singapore’s total projected electricity demand in that year”.

For regional power grids, NCCS mentioned that Singapore “has an ongoing Request for Proposal to import a capacity of 4 GW of low-carbon electricity by 2035, which is expected to make up around 30% of Singapore’s total projected supply”.

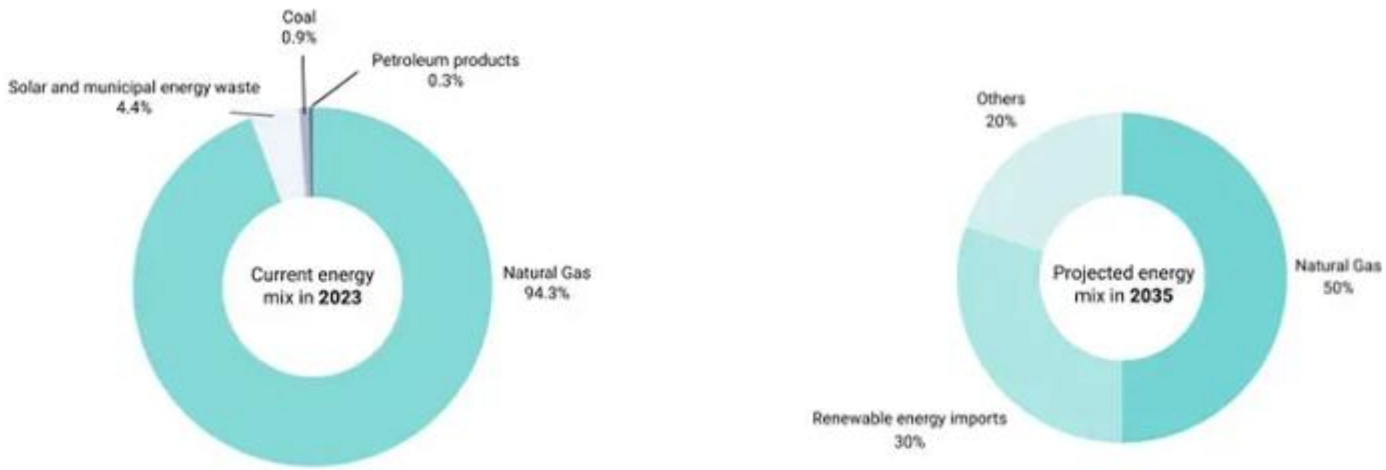
NCCS also noted that Singapore “is studying emerging low-carbon technologies like hydrogen, carbon capture utilisation and storage (CCUS), and advanced geothermal systems as possible paths to decarbonising our power sector”.

NCCS added though that natural gas “will continue to be an important fuel for Singapore in the near future as we scale up our other switches”.

Singapore Economic Development Board (“EDB”) noted in January 2024 that natural gas was “projected to be reduced from the current 94.3 per cent to more than 50 per cent” as shown in **Exhibit 22**, with around 30% “expected to come from renewable energy imports”. EDB added that the “final 20 per cent could include solar, various forms of hydrogen, biofuels, nuclear power, and geothermal power”.

NCCS also noted that Singapore aims to have all vehicles “run on cleaner energy by 2040”.

**Exhibit 22: Singapore’s Electricity Mix (2023 & 2035)**




*Source: EDB (published January 2024)*

## IMPACT ON SGX-LISTED COMPANIES

Based on how the energy transition trends are likely to emerge globally and in Singapore, SGX-listed companies will need to develop plans to reduce their environmental impact.

Companies that have already started addressing their emissions footprint include electricity providers like Sembcorp Industries and Keppel Infrastructure Trust, as well as transport providers like Singapore Airlines Limited and ComfortDelGro.

### (I) ELECTRICITY PROVIDERS

#### (a) Sembcorp Industries ("Sembcorp"; SGX:U96)

Sembcorp's market capitalisation is S$11.8 billion as at 16 May 2025. According to Sembcorp, its energy portfolio's total gross capacity (installed + secured or under construction) is 25.1 GW (including gas & diesel-fired capacity of 8,015 MW) as at 27 February 2025, of which renewable energy comprised 17.0 GW (including solar-powered capacity of 7,995 MW, wind-powered capacity of 7,472 MW and hydro-powered capacity of 49 MW). Sembcorp also separately indicated that their total gross capacity in Singapore is 5,549 MW as at 31 March 2025, which includes gas-powered capacity of 4,463 MW (80.4% of total) and solar-powered capacity of 760 MW (13.7% of total).

Sembcorp noted that its "total five-year investment plan is projected to be S$14 billion", of which 75% (or S$10.5 billion) "is expected to be invested in renewable energy" to support its goal of raising gross installed renewables capacity to 25.0 GW by 2028. Sembcorp's gross installed renewables capacity rose by around 39.4% from 9.4 GW in 2023 to 13.1 GW in 2024.

Sembcorp also noted, "Net profit before exceptional items for the Renewables segment is expected to increase at a six-year compound annual growth rate of +25% (2022-2028)".

#### (b) Keppel Infrastructure Trust ("KIT"; SGX:A7RU)

KIT's market capitalisation is S$2.4 billion as at 16 May 2025. KIT is sponsored by and 18.2% owned by the Infrastructure division of Keppel Ltd. ("Keppel"; SGX:BN4) as at 28 February 2025. According to KIT, 59.0% of its S$9.0 billion Assets Under Management ("AUM") as at 31 December 2024 are related to the energy transition. Besides its 1,300 MW Keppel Merlimau Cogen ("KMC") "combined cycle gas turbine generation" plant in Singapore, KIT has around 1,269 MW of renewable energy capacity in Europe.

KIT noted that a "second turbine upgrade" for its KMC plant is expected to be completed "by end June 2025", which would lower KMC's carbon emissions "by at least 17,800 tCO2e per year, which is the equivalent of removing more than 5,400 internal combustion engine vehicles from the roads annually". KIT also noted that the "upgraded turbine will also be able to co-fire hydrogen blended with natural gas as feedstock".

KIT indicated too that they are aiming to increase their renewables capacity to "2 GW of renewables capacity by 2030". KIT's renewables portfolio rose by 71.5% from 740 MW at end-2023 to 1,269 GW at end-2024.

## (II) TRANSPORT PROVDIERS

### (a) Singapore Airlines Limited ("SIA Group"; SGX:C6L)

SIA Group has a market capitalisation of S$20.5 billion as at 16 May 2025. According to SIA Group, it has 200 aircraft in its operating fleet (SIA: 142 passenger aircraft + 7 freighter aircraft; Scoot: 51 passenger aircraft) as at 31 March 2024.

SIA Group noted that it aims to reach the use of Sustainable Aviation Fuel ("SAF") "for 5% of total fuel requirements for SIA and Scoot by 2030". SIA Group added that SAF "is widely recognised as a critical decarbonisation lever for the hard-to-abate aviation sector, estimated to contribute approximately 65% of emissions reductions required for the sector to achieve net-zero emissions by 2050". SIA Group also noted that it "signed an agreement with Neste" (a "producer of sustainable aviation fuel (SAF) and renewable diesel" according to Neste) "to purchase 1,000 tonnes of neat SAF" in May 2024.

SIA Group announced too on 9 May 2025 that it bought an additional "1,000 tonnes of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)-eligible neat SAF, sourced from renewable fuel producer Neste" (footnote removed from quote) as well as "approximately 2,000 tonnes of CORSIA-eligible SAF in the form of emissions reductions from World Energy, a United States-based producer, utilising the Book & Claim Chain of Custody model"[1]. SIA Group added that both transactions "are projected to reduce more than 9,500 tonnes of carbon dioxide emissions".

### (b) ComfortDelGro ("CDG"; SGX:C52)

CDG has a market capitalisation of S$3.3 billion as at 16 May 2025. According to CDG, it has a total operating fleet of over 54,000 ("Including owned, partners' and platform vehicles" as noted by CDG) in 2024. CDG also noted in its AR for the FY ended 31 December 2024 that it has over 31,000 owned vehicles in 2024, of which 60% are "cleaner energy vehicles". CDG indicated that its total operating fleet in Singapore is 15,138 vehicles (around 27.8% of total).

CDG noted that it aims to transition 90% of its total car fleet across all its operations globally to "cleaner energy vehicles" by 2030 and 100% by 2040, from 76% in 2024. CDG also noted that it aims to transition 50% of its total bus fleet across all its operations globally to "cleaner energy vehicles" by 2030 and 100% by 2050, from 16% in 2024.

In November 2024, The Straits Times ("ST") cited CDG's founding chairman, Lim Jit Poh, as saying that CDG "expects to spend $6 billion to replace the bulk of its fleet of largely combustion-engined buses and taxis with electric vehicles (EVs)". ST also cited Mr Lim as adding that CDG "will face a future which is tougher than that it faced in the first 20 years".

[1] According to 4Air, an aviation sustainability company that helps aviation companies reduce emissions, one way that a book-and-claim system may work is by allowing companies that have paid the "green premium" of a specified quantity of SAF to claim the associated environmental benefits without using the fuel themselves. Companies that pay only the "traditional" jet fuel price for the same portion of SAF get to use the SAF but not claim the environmental benefits.

## (III) OTHERS

We also highlight the emissions reduction progress of two companies covered by us, namely Digital Core REIT and Baker Technology Limited.

### (a) Digital Core REIT ("DCREIT"; SGX:DCRU)

DCREIT has a market capitalisation of around US$676.2 million as at 16 May 2025. DCREIT holds interest in 11 data centre properties as at 31 March 2025 and has an AUM of US$1.7 billion as at 31 December 2024.

In its AR for the FY ended 31 December 2024, DCREIT noted from the World Economic Forum that "Data centers and networks currently account for 1% of energy-related emissions, with electricity use expected to double by 2026 due to rising AI power demand". DCREIT added that, in partnership with its Sponsor, Digital Realty, it has "deployed various AI tools to enhance energy and water efficiency, such as optimising maintenance cycles and focusing on infrastructure improvements".

DCREIT noted its progress in FY2024 for each of its "Energy Management" goals:

- "Achieve ENERGY STAR® certification for 100% of US and Canadian assets under reporting scope by 2030 (against 2023 baseline)": DCREIT noted that "one-third of the portfolio under the reporting scope" (at least two out of seven data centres under operational control) "are ENERGY STAR® certified".

- "Achieve Leadership in Energy and Environmental Design ("LEED") Silver or equivalent standard certification for 100% of assets under reporting scope by 2030 (against 2023 baseline)": DCREIT noted that it was in the "Process of pursuing LEED certification for three assets over the next two years". We discuss the LEED certification (and other green building certifications) in our previous ESG report dated January 2025.

- "Expand the adoption of sustainability-aligned (green) lease provisions to all customer contracts (against 2023 baseline)": DCREIT noted that a "recent lease renewal with a top-five customer incorporated green lease provisions". DCREIT added that "more than 60% of colocation contracts signed in 2024 contained green lease provisions".

- DCREIT also noted that it has a "Long-term goal of making 100% renewable energy available to customers (against 2023 baseline)", for which it added that 40% of its data centres are "fully matched with renewable energy".

We discuss DCREIT's recent performance in our update report dated April 2025.

**(b) Baker Technology Limited ("BTL"; SGX:BTP)**

BTL has a market capitalisation of around S$111.6 million as at 16 May 2025. BTL's main business is in the design, construction, operation and chartering of mobile offshore units and offshore supply vessels, along with the design and construction of a wide range of equipment & components for the marine offshore industry (specifically, for oil & gas and renewables).

However, BTL noted that its sustainability report for the FY ended 31 December 2024 did not include CH Offshore ("CHO"; SGX:C13), through which BTL holds and operates its anchor handling tug supply vessels. CHO fully owns five vessels as at 31 December 2024 and operated five vessels for FY2024.

BTL mentioned that it "currently does not consume any direct renewable energy but instead generates all its direct energy from diesel, liquified petroleum gas and acetylene". BTL added though that it is "exploring renewable energy sources in place of grid electricity" across its "yards and facilities in the next 3 years" and that it aims to reduce its Scope 2 emissions "by a target 50%".

Meanwhile, CHO noted that the International Maritime Organization aims to reduce "carbon intensity of international shipping by at least 40% by 2030 and potentially 70% by 2050". CHO mentioned that it is looking to lower its energy intensity by "optimising" its "operations and processes, exploring alternative fuel sources and adopting increased energy efficient vessel designs for new vessels during vessel renewal".

However, CHO added, "it is difficult for us to have climate (specifically emissions and energy) related targets" as "our emissions (and emissions intensity) are reliant on our clients' ability to provide us with alternative energy and the activity that is required by our clients when we are on charter".

We discuss BTL's recent performance in our update report dated April 2025.

## CONCLUSION

At the end of April 2025, the global average temperature over the trailing twelve months reached 1.58°C above pre-industrial level. Energy-related carbon emissions rose by 0.8% from 37.3 Gt in 2023 to a record of 37.6 Gt in 2024 and have historically accounted for most of energy-related GHG emissions.

Coal contributed to the largest share of energy-related carbon emissions in 2024, followed by oil and natural gas. However, natural gas contributed to the largest share of carbon emissions growth in 2024, followed by coal and oil. China, the U.S., the Middle East and India drove natural gas emissions growth while China, India and Southeast Asia drove coal emissions growth. Coal tends to be the main source of electricity for developing economies, while renewables & natural gas tend to account for a larger share of the electricity generation mix in developed economies.

Based on BNEF's ETS, which assumes the deployment of only economically competitive clean technology, the global average temperature is expected to rise to around 2.6–2.7°C above pre-industrial level by 2100—higher than the 1.75°C by 2100 outcome in BNEF's NZS. A steeper fall in the consumption of fossil fuels (i.e., coal, natural gas and oil) than is currently expected is needed to mitigate climate change.

Growth in renewables & nuclear is crucial to reducing fossil fuel consumption. Renewables & nuclear cumulatively accounted for around 19.8% of global energy supply and 41.2% of electricity generation in 2024. Based on IEA's projections, renewables & nuclear need to collectively account for 35.6% of global energy supply by 2030 and 84.7% by 2050 to achieve net zero emissions by 2050. In terms of electricity generation, solar grew the most (around 480 TWh) amongst renewables in 2024, followed by hydro (around 190 TWh) and wind (around 180 TWh). In terms of capacity addition, solar grew the most too; however, wind had the second-highest growth, followed by hydro. China made up over 60% of all renewable capacity additions in 2024.

Despite the rollback of environmental initiatives by the Trump Administration, executives across countries have indicated that they still support the energy transition. Singapore has also affirmed its continued commitment to mitigating climate change.

As Singapore faces geographical constraints regarding renewables deployment, Singapore has been relying on imported natural gas; natural gas comprised 94.1% of Singapore's electricity generation mix in 1H 2024. However, Singapore intends to reduce its reliance on natural gas by pursuing solar, regional power grids and emerging low-carbon alternatives. Natural gas share of Singapore's electricity generation mix may thus fall from 94.1% in 1H 2024 to over 50% by 2030, with the remainder being made up by renewable energy imports (around 30%) and sources like solar, hydrogen and biofuels (around 20%).

In view of global climate change, the energy transition remains a major topic that companies need to embrace. SGX-listed firms will thus need to adopt measures that reduce their environmental impact. Companies that have already started addressing their emissions footprint include electricity providers (e.g., Sembcorp and KIT) and transport providers (e.g., SIA Group and CDG). We also highlight the emissions reduction progress of two companies (DCREIT and BTL) covered by us.

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