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The Clean vs Dark Spread: Asian Power Mix and Energy Transition

Energy Research Paper

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Recent fuel price volatility and the increasing prominence of renewables have altered the traditional dynamics between coal, hydropower, and gas generation in Asia. These developments have raised questions about the competitiveness and future of coal generation relative to hydropower and gas generation in key Asian markets. How does this impact the demand for each fuel and its seasonal consumption patterns? Will coal retain its traditional dominance, will gas displace it, or will renewables outpace both the fossil fuels?

ENERGY RESEARCH PAPER

This research paper is part of a 12-month series published by the Al-Attiyah Foundation every year. Each in-depth research paper focuses on a current energy topic that is of interest to the Foundation's members and partners. The 12 technical papers are distributed to members, partners, and universities, as well as made available on the Foundation's website.

Introduction

- Asia's electricity consumption is growing strongly with the region's rapidly expanding economies and energy intensive industrial sector. The region's grid emission intensity will decline in the long-term as renewables are leading the Asian power sector's project pipelines and will continue to do so in the medium-to-long-term.
- High and volatile gas prices deterred switching from coal during 2022-23, but recent lower prices and the prospect of greater LNG supplies after 2026 should improve its prospects. However, LNG's prospects of competing with cheap coal in power generation in countries such as India and China are limited.

China

- China is actively transforming the role of coal in its electricity mix, shifting it from a primary bulk supply source to a more flexible one, which supports the growth of renewable generation, along with a short-term reliance on hydropower generation, all while ensuring energy security. The rise in renewable generation will pose new integration challenges to China's power sector, reduce coal generation, and constrain gas generation growth, which is projected to increase by 4% / year between 2024 – 2026.

Japan and South Korea

- Japan's coal and gas generation is projected to decline by 3% and 2% / year, respectively, between 2024 – 2026, as nuclear output from the Onagawa Unit 2 and the Shimane Unit 2 reactors resume this year and renewable generation increases by 5% / year over the same period.
- South Korea plans to decrease coal's share in the power sector from 33% to 29% by converting coal projects to gas. Nuclear capacity will increase from 25 GW in 2023 to 29 GW in 2026, and the share of gas in the electricity mix is expected to drop from 29% to 26%, while renewables will rise from 8% to 11%

India

- India's electricity demand is projected to increase by an average of 6.5% / year from 2024 – 2026, requiring an extra 80 GW of thermal capacity over the upcoming decade. Although coal remains the primary source of generation, its contribution to the electricity mix is predicted to decline from 74% in 2023 to 68% by 2026, in contrast to renewable generation, which is expected to rise from 21% to constitute 25% of the total electricity mix by 2026.

Southeast Asia

- In Indonesia, renewable generation is expected to grow by 8% / year whilst coal and gas will increase by 5% and 6%, respectively, maintaining their current mix. In 2023, Vietnam added 2.7 GW of new renewable capacity, evenly split between solar PV and wind, and plans to increase non-hydro renewables to 20% of the electricity mix by 2030. The share of gas in Vietnam's electricity mix is expected to increase to 11% by 2026, despite coal dominating at 43% by 2026.

Challenges to the Asian Power Sector

- In the short term, gas generation in East Asia, Malaysia, and Thailand faces potential risks from oil supply disruptions due to geopolitical tensions – raising oil-linked LNG prices, El Niño affecting European demand and weather changes, and regional economic growth. Current forward curves indicate that Asian spot LNG prices may continue to exceed European hub prices in 2024, with the Platts JKM averaging US$ 1 / MBTU above Dutch TTF, encouraging more seaborne LNG inflow into Asian markets.
- Coal generation in China, India, and most of Southeast Asia also faces upside risks from geopolitical tensions, weather changes, and global gas price shocks, which will increase coal generation, reduce hydropower's contribution, and limit renewables' uptake.

Asia's electricity consumption is growing strongly with the region's rapidly expanding economies and energy intensive industrial sector. The region's grid emission intensity will decline in the long-term as renewables are leading the Asian power sector's project pipelines and will continue to do so in the medium-to-long-term.

However, in the short-term, elevated electricity prices combined with sub-par hydropower output continue to drive coal capacity factors, limit gas generation uptake, and risk the Asian power sector's transition. Still, regional regulators will continue to minimise electricity price increases this year to curb inflation.

In 2023, electricity demand in the Asia-Pacific region increased by 4.8% / year, providing most of the additional growth in global electricity use[i]. This demand is forecasted to increase by 4.6% / year from 2024 – 2026, with China expected to account for two-thirds of growth in the region by 2026[ii].

A key factor supporting this robust demand expansion is the relationship between economic growth and energy consumption, which is ever more evident in Asia, as markets with strong real GDP growth rates rely on the energy intensive industrial sector to drive economic expansion. Additionally, increasing electrification and urbanisation across emerging Asian markets, as the population concentrates on manufacturing hubs and cities in Asia, will lead to better access to electricity, ultimately driving electricity demand. This relationship will likely persist in the short-to-medium term, resulting in greater demand for electricity generation and presenting more opportunities for project developers and investors looking to expand their operations across the region.

Asia accounts for ~50% of global electricity consumption, and the Asian electricity mix is poised to experience a rise in the share of renewables from 27% to 35% in 2026[iii]. Coal remains the primary source of electricity generation and dominates the region's electricity mix at 57%, in contrast to low-carbon sources such as nuclear, hydropower, solar, and wind, which stand at 32%[iv]. Gas has a low share by global standards due to its relatively high cost, and the lack of secure local supplies in most countries. Due to its strong reliance on coal generation, the region has the highest grid emissions intensity at 590 gCO_2 / kWh, compared to the global average of 455 gCO_2 / kWh (Figure 1)[v]. It can be seen this varies significantly between countries and even within, with eastern India's coal-heavy grid at 800 gCO_2 / kWh, while Thailand with gas and some renewables performs somewhat better than the global average at 409 gCO_2 / kWh, as does Kyushu in Japan with nuclear power at 351 gCO_2 / kWh. Note that these figures are a 1-hour snapshot, taken at night when demand is low but solar output is also nil.

Figure 1 Grid emissions intensity in selected Asian countries, 11 March 2024[vi]

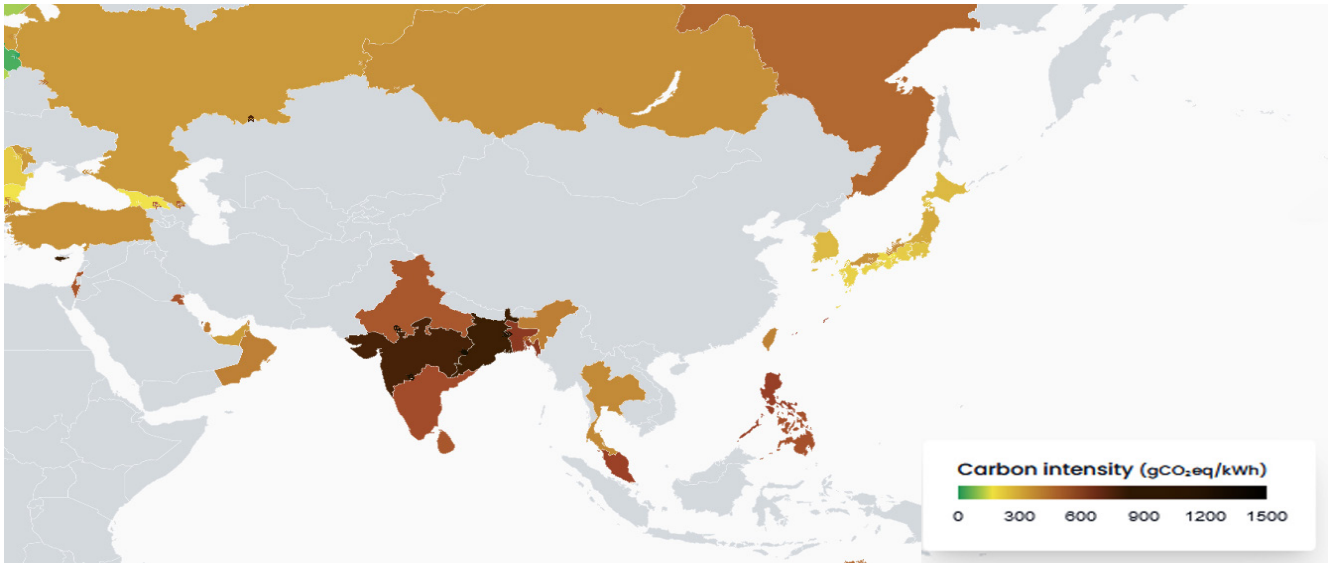
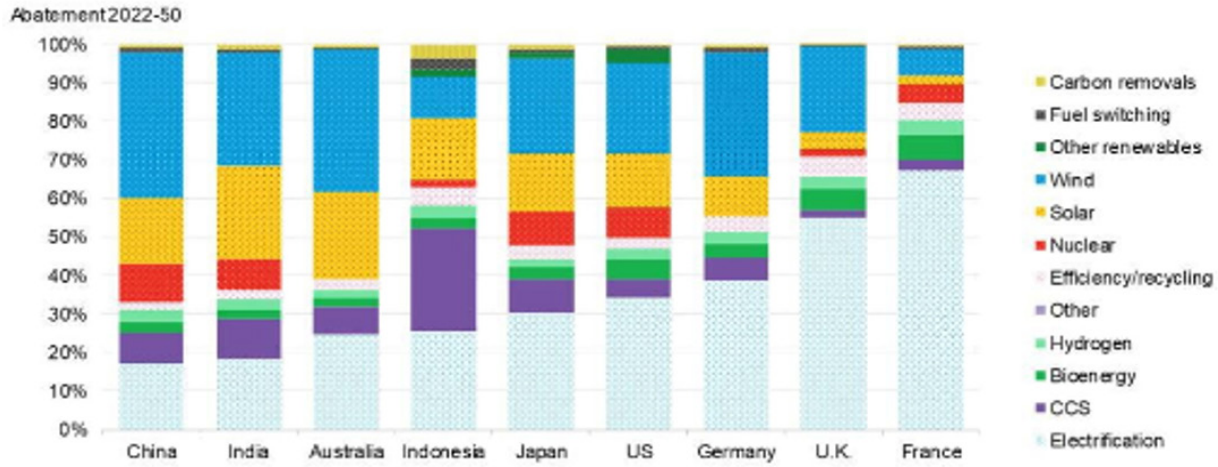


Figure 2 Cumulative CO_2 abatement by 2050, by country[vii]



Emissions abatement in Asia will lean more heavily on wind, solar, nuclear power and carbon capture than in other regions, because of the existing heavy dependence on coal (Figure 2). Electrification (of transport, home heating and industrial processes) will make a lesser contribution than in Europe or the US.

However, the region's grid emission intensity will decline in the long-term as renewables are leading the regional power sector's project pipeline. In addition to an increase in large utility-scale renewables deployment, the region's renewable capacity growth will also be supported by distributed capacities, mainly through the deployment of rooftop solar, which will be vital in driving the power sector's transition, as consumers look towards generating electricity for self-consumption, amid the challenges of relying heavily on grid-connected electricity that has been exposed to periods of elevated energy prices.

The growing interest in renewables is evident by solar dominating the region's renewable capacity additions. Additionally, regional regulators are encouraging rooftop solar installation through policies such as net-metering schemes, whilst solar equipment costs are easing, and solar equipment will experience continued cost decreases.

Elevated electricity prices combined with sub-par hydropower output continue to drive coal capacity factors, limit gas generation uptake, and pose a risk to the Asian power sector's transition. Over the last three years, Asia has experienced a rapid increase in electricity prices due to elevated global gas and coal prices.

Electricity prices in Asia typically lag that of European prices by about a year. European electricity price peaks in Q1 2022 and Q3 2022 were translated to Asian electricity price peaks around Q1 2023 and Q3 2023. The price-time lag is attributed to the relationship between the renewals of coal and gas supply contracts and new contracts being signed, thus reflecting only a year later as companies aim to recoup their losses. LNG prices are also typically set in the region against oil with some months' lag. However, the short-term price-time lag will remain strong as Asia currently relies on fossil fuels for 60% of its electricity demand[viii].

Additionally, as most Asian markets regulate electricity prices, the financial strain on independent power producers by keeping prices low for consumers has pressured regional regulators to hike electricity prices. In 2024, regional regulators will likely continue to minimise electricity price increases in efforts to curb inflation, also in light of energy price drops in 2023, which will translate into a fall in input costs for the power sector and, consequently, electricity prices for 2024.

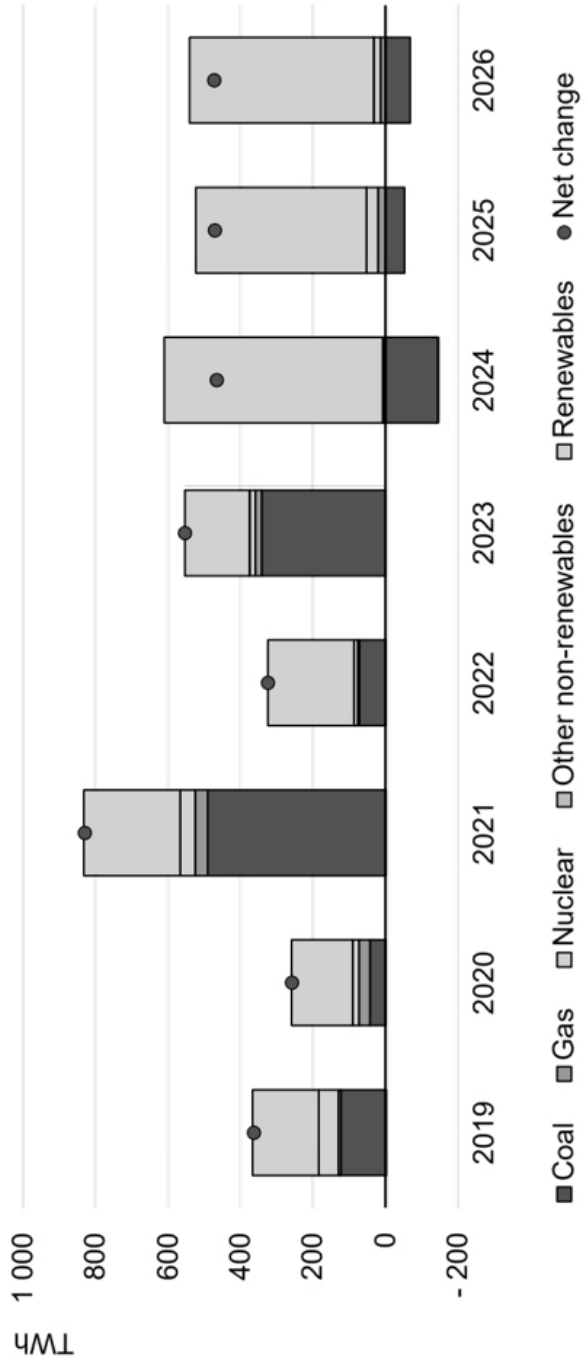
China is actively transforming the role of coal in its electricity mix, shifting it from a primary bulk supply source to a more flexible one, which supports the growth of renewable generation, along with a short-term reliance on hydropower generation, all while ensuring energy security. The rise in renewable generation will pose new integration challenges to China's power sector, reduce coal generation, and constrain gas generation growth, which is projected to increase by 4% / year between 2024 – 2026[ix].

Coal currently plays a dominant role in China's electricity mix, with an installed capacity of 1.1 TW[x]. Thermal coal accounts for 74% of China's electricity demand and around 63% of total coal demand[xi]. While historically, coal generation and capacity have grown in line with demand, the rapid growth of renewables is changing this dynamic. Over the next three years, ~40 – 50 GW / year of new coal capacity will be added[xii].

However, as the share of renewables increases, the role of coal will shift from providing a consistent baseload supply to intermittent supply. The average capacity factor of coal projects is also expected to decline further from its current 53%, compared to 61% in 2010[xiii]. To support coal projects amidst this transition, Chinese authorities have announced a new capacity remuneration mechanism beginning in January 2024, aiming to help recover some of their fixed costs as low carbon generation takes on a larger share of the electricity load[xiv].

Energy security continues to remain a significant issue for China. After experiencing outages in 2021 – 2022, concerns resurfaced in the summer of 2023 about the country's ability to meet demand during record heatwaves. The summer peak load increased by 50 GW y-o-y, reaching a historic high of 1,340 GW[xv]. Droughts and unusually low temperatures from winter 2022 to spring 2023 led to significantly low water reservoir levels. Chinese authorities responded by introducing policies to increase domestic coal production and imports.

Figure 3: Change in China's Electricity Generation Mix



Whilst Chinese authorities have pledged to stop permitting coal projects solely for bulk generation, some local provinces continue to approve new projects amid regional energy security concerns to meet peak load and address a lack of flexible generation[xvi]. Some western provinces have approved new coal projects near large utility-scale solar and wind farms to improve utilisation rates on ultra-high-voltage (UHV) grid lines for distribution to eastern provinces. In H1 2023, more than 40 GW of new thermal capacities were commissioned, surpassing the installation rate observed over the last 13 years.

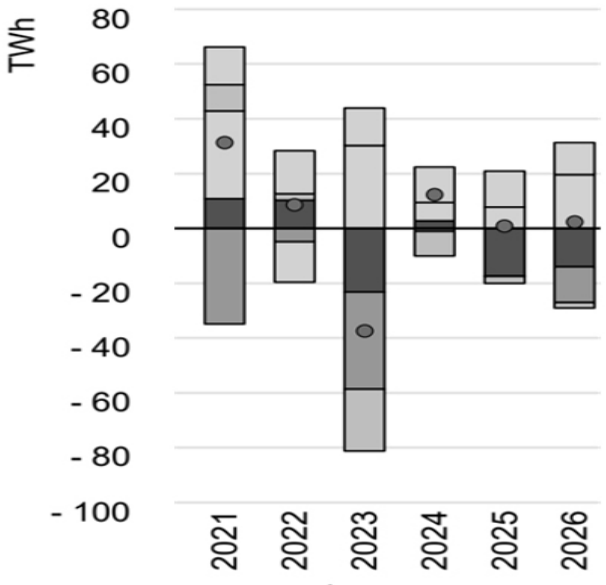
In H1 2023, China added 130 GW of solar capacity, primarily in the form of distributed projects, twice the combined solar additions of Europe and the United States in 2022, which resulted in a significant 29% y-o-y increase in solar generation in 2023[xvii]. Solar PV continues to dominate renewable capacity additions but is expected to lag behind wind capacities in the short-term. At the end of 2023, grid-connected solar PV and wind capacity are close to reaching the symbolic milestone of 1,000 GW, enabling China to meet the 14th Five-Year Plan target of doubling annual solar and wind generation from 2020 by as early as 2024[xviii].

However, grid integration / saturation challenges in provinces like Hebei, Shandong, and Henan have restricted renewable capacity expansion. Provincial authorities in these areas have restricted new distributed renewable projects until grid improvements are made. Additionally, decreasing prices throughout the solar industry, attributed to competitive economies and scale and surplus manufacturing capacity, may impede installation rates. Some Chinese independent power producers are already experiencing reduced profits as a result.

Overall the transition from coal to hydropower and renewable generation will slow down the growth of China's gas generation, which is projected to increase by 4% / year between 2024 – 2026[xix]. The LNG market is anticipated to stabilise from 2025 onwards, with new liquefaction capacity coming online, leading to lower gas prices and an increase in cost-effective gas generation. Nevertheless, gas will continued to be preferred in China more for residential heating and industrial use than power generation.

Japan's coal and gas generation is projected to decline by 3% and 2% / year, respectively, between 2024 – 2026, as nuclear output from the Onagawa Unit 2 and the Shimane Unit 2 reactors resume this year and renewable generation increases by 5% / year over the same period[xx].

Figure 4: Change in Japan's Electricity Generation Mix



In 2023, Japan's electricity demand decreased by 4% y-o-y due to higher electricity costs and active energy conservation efforts[xxi]. Over the next three years, demand is expected to rise by 0.5% / year, driven by a potential manufacturing sector recovery and increased electric vehicle adoption[xxii]. In 2023, the Ministry of Economy, Trade and Industry released initial guidelines for electric vehicle chargers, raising installation targets and expanding support for semiconductor factories through the GX (Green Transformation) programme[xxiii].

Coal and gas generation make up two-thirds of Japan's electricity mix[xxiv]. Nuclear generation increased by 54% y-o-y in 2023, reaching 8% of the mix, as more reactors restarted after inspections were completed in 2022[xxv].

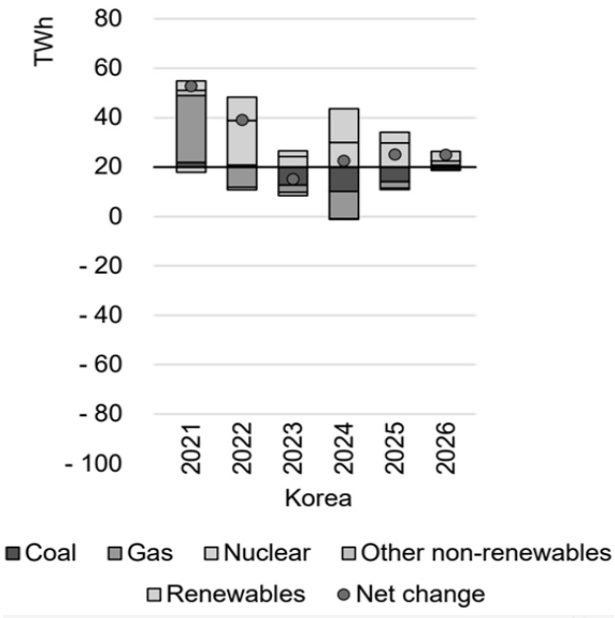
The Takahama Units 1 and 2 were restarted in August and October 2023, respectively, which added 1.5 GW to the electricity system after being shutdown after the Fukushima disaster[xxvi]. Renewable generation increased by 6% y-o-y in 2023, accounting for 24% of the electricity mix[xxvii]. Overall, growth in low carbon electricity generation, coupled with reduced electricity demand, resulted in a 10% y-o-y decrease in grid emissions intensity, currently standing at 464 MT / year at the end of 2023[xxviii].

The country's nuclear output will continue to improve once operations at the Onagawa Unit 2 and Shimane Unit 2 reactors resume this year. A rise in nuclear output combined with a steady increase in renewable generation of 5% / year from 2024 – 2026, will reduce coal and gas generation by 3% and 2% / year, respectively, resulting in grid emissions intensity declining by 4% / year between over the same period[xxix]. In 2023, Japanese regulators extended the operational lifetime of old nuclear plants beyond 60 years and lifted the operational ban on the Kashiwazaki – Kariwa reactors following safety improvements[xxx].

South Korea plans to decrease coal's share in the power sector from 33% to 29% by converting coal projects to gas[xxxi]. Nuclear capacity will increase from 25 GW in 2023 to 29 GW in 2026, and the share of gas in the electricity mix is expected to drop from 29% to 26%, while renewables will rise from 8% to 11%[xxxii].

In 2023, South Korea's electricity demand declined by 0.8% / year in 2023, primarily due to a weaker industrial sector, and is projected to increase by 1% / year between 2024 – 2026.

Figure 5: Change in South Korea's Electricity Generation Mix



In August 2023, the country's peak load surpassed 100 GW for the first time, reaching 101 GW.

Coal currently makes up 33% of South Korea's power sector and is set to decrease by 2026[xxxiii]. Plans include converting seven coal projects to gas projects with a total capacity of 4 GW[xxxiv]. Nuclear capacity is expected to grow from 25 GW in 2023 to 29 GW by 2026, with no plans to retire any nuclear capacities[xxxv].

In the next three years, nuclear and renewable generation will continue to grow, reducing the reliance on coal and gas generation. South Korea's 10th Basic Energy Plan for Long-term Electricity Supply and Demand (BPLE), announced in January 2023, aims to increase nuclear power capacity to 29 GW by 2026, making up 32% of the electricity mix[xxxvi]. The commissioning of the Shin Hanul 1 reactor took place in December 2022, with 25 reactors currently in operation totalling 25 GW. The Shin Hanul 2 reactor is set to be commissioned in Q1 2024[xxxvii], while the Saeul 3 and Saeul 4 reactors are expected to be operational by 2026[xxxviii].

Renewable generation is also expected to increase significantly over the medium-term. Consequently, gas generation is forecasted to decline by 10% / year between 2024 – 2026[xxxix]. Under the 10th BPLE, South Korea aims to expand the share of renewables in the electricity mix to 22% and the share of gas generation to 23% by 2030[xl].

Last year, South Korean regulators announced a wave of policies and plans for new generation installations, major transmission lines and substation facilities, among other initiatives to improve and expand the electricity system as part of the 10th BPLE to accommodate an increase in demand mainly from the semiconductors industry.

In October 2023, the National Assembly proposed the Special Act on Expansion of the National Power Grid to streamline construction time for transmission lines and support power grid expansion, including developing a new long-distance transmission network crucial for maintaining the competitiveness of high-tech industries[xli].

India's electricity demand is projected to increase by an average of 6.5% / year from 2024 – 2026, requiring an extra 80 GW of thermal capacity over the upcoming decade[xlii]. Although coal remains the primary source of generation, its contribution to the electricity mix is predicted to decline from 74% in 2023 to 68% by 2026, in contrast to renewable generation, which is expected to rise from 21% to constitute 25% of the total electricity mix by 2026[xliii].

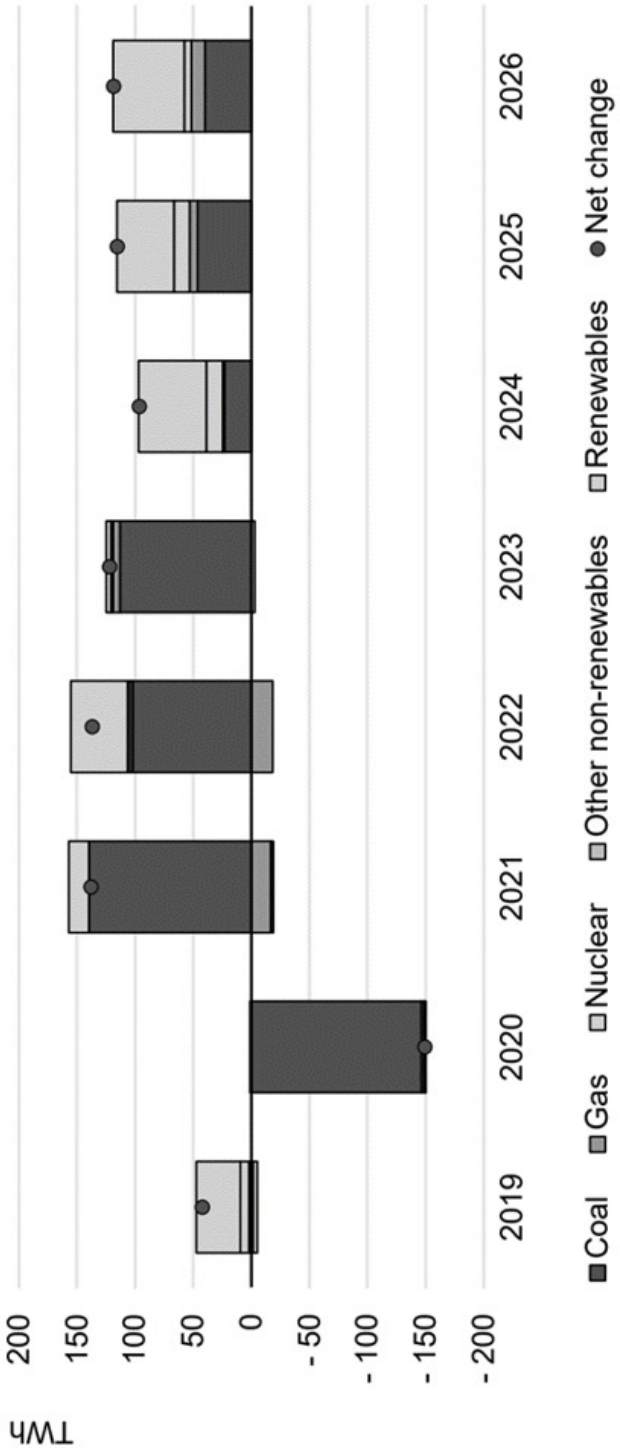
In 2023, unpredictable weather patterns greatly impacted India's electricity demand. A particularly dry August, the driest in over a century, led to a surge in electricity demand[xliv], exceeding 240 GW on 1 September due to heightened cooling demand. With increased demand and limited hydropower availability, the government instructed all power generation firms and independent producers to continue blending at least 6% imported coal with domestic coal until March 2024 to guarantee a consistent power supply[xlv].

India will continue to be the driving force behind the upward pressure on global coal demand until 2026. The country aims to achieve 500 GW or 50% share of its electricity generation from renewables by 2030 to reduce its dependency on coal[xlvi].

However, in the short-term, additional coal generation will still be required to meet the growth in demand and ensure the security of supply. India's latest National Electricity Plan foresees 19 – 27 GW of additional coal capacity up to 2027[xlvii].

Currently, gas makes up 3% of India's electricity generation[xlviii]. After a significant decrease in 2023, gas generation is projected to show improvement from 2024 – 2026.

Figure 6: Change in India's Electricity Generation Mix



Despite ongoing additions of renewable capacity, gas generation is anticipated to rise by an average of 15% / year as existing gas plants enhance their capacity factors to meet increasing demand[xlix].

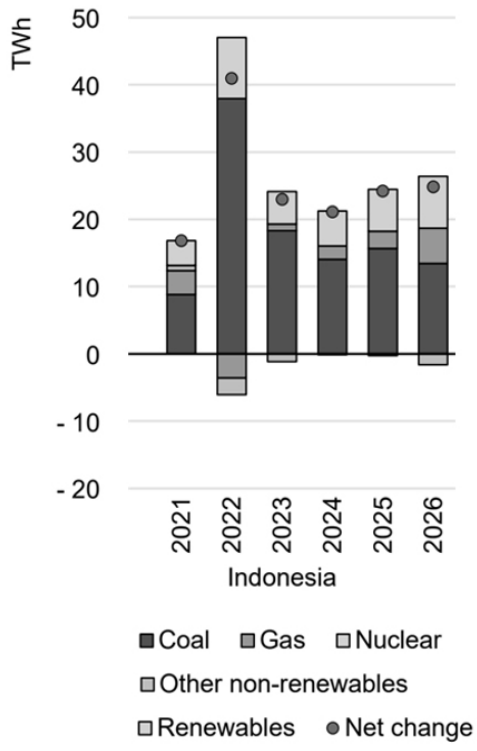
Over the next three years, coal generation is projected to increase by 2% / year, whereas renewable generation is forecasted to grow by 12% / year[l]. India's new policy on biomass generation, starting in April 2024, sets an obligatory blending rate of 5% for coal projects, increasing to 7% subsequently[li]. Still, the effect of this policy on coal consumption is uncertain, as the biomass supply chain is in its infancy.

There is a renewed emphasis on developing large hydropower and nuclear projects to provide baseload electricity, balance the electricity grid, and promote solar generation. In August 2023, over 12 stalled hydropower projects with a combined capacity of 11 GW assigned initially to private sector companies 15 years ago were transferred to central public sector entities under the Ministry of Power to progress forward[lii]. In June 2023, India's largest domestically built nuclear project, the 700 MW Kakrapar Unit 3 reactor, commenced operations, reaching full capacity in August 2023[liii]. The country's nuclear generation is estimated to increase rapidly between 2024 – 2026, with new projects totalling an estimated 4 GW of capacity entering commercial operation over this period. India currently has 23 operable nuclear reactors, providing about 2% of the country's electricity[liv].

In Indonesia, renewable generation is expected to grow by 8% / year, whilst coal and gas will increase by 5% and 6%, respectively, maintaining their current mix[lv]. In 2023, Vietnam added 2.7 GW of new renewable capacity, evenly split between solar PV and wind, and plans to increase non-hydro renewables to 20% of the electricity mix by 2030[lvi]. The share of gas in Vietnam's electricity mix is expected to increase to 11% by 2026, despite coal dominating the electricity at 43% by 2026[lvii].

In Indonesia, coal currently makes up 66% of the electricity mix, up from 65% in 2022 and 61% in 2021[lviii]. Gas generation accounts for 13% of the electricity mix, with renewables making up 20%[lix]. Hydropower, geothermal, and biomass generation dominate renewables generation, with solar and wind contributing less than 1% to the electricity mix[lx].

Figure 7: Change in Indonesia's Electricity Generation MixMix



Indonesia's electricity demand is expected to increase by 6% / year from 2024 – 2026, reflecting the country's strong economic growth outlook[lxi]. Renewables are anticipated to grow by 8% / year during this period, while coal and gas generation are forecasted to increase by 5% and 6% / year, respectively, despite both fuels expected to retain their current share in the electricity mix by 2026[lxii].

Indonesia's Comprehensive Investment and Policy Plan (CIPP), released in November 2023 under the Just Energy Transition Partnership (JETP), outlines an ambitious strategy to increase the use of renewable technologies in the country[lxiii]. The CIPP is dependent on financial backing from the International Partners Group (IPG) and the Glasgow Financial Alliance for Net Zero (GFANZ) and sets out a roadmap for decarbonising the power sector by 2050, with the rapid deployment of solar and wind technologies, aiming for 7.3 GW by 2025 and 72 GW by 2030[lxiv].

Vietnam's electricity demand is projected to increase by 7% / year from 2024 – 2026[lxv]. In 2023, the country added 2.7 GW of new renewable capacity, equally split between solar PV and wind. This trend is expected to continue over the forecast period, supported by Vietnam's Power Development Master Plan, which aims for a 20% share of non-hydro renewables in the electricity mix by 2030. The share of gas generation in the electricity mix is forecasted to rise from 9% to 11% in 2026, while coal is anticipated to average around 43% from 2024 to 2026, down from 46% in 2023.

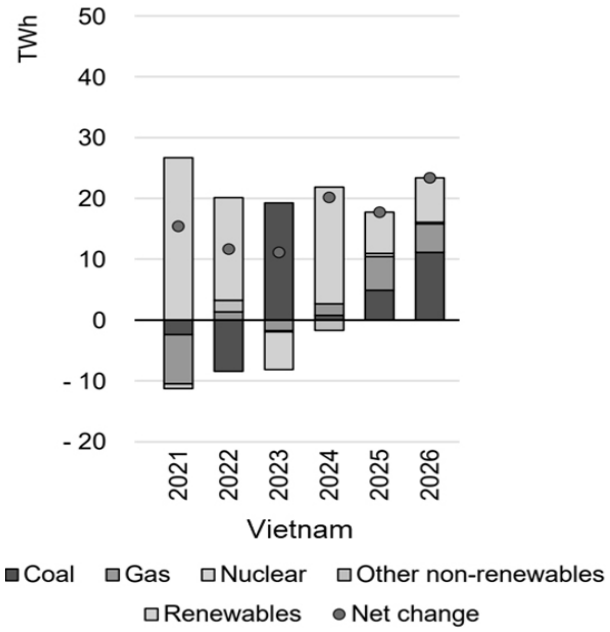
In 2023, a drought-induced hydropower shortage led to a power sector crisis where peak demand in July could not be met due to low water levels in hydropower reservoirs[lxvii].

Vietnamese regulators increased coal generation to address this issue in response to the country's heavy reliance on domestic hydropower and high global gas prices. China also supported by resuming cross-border electricity exports to Vietnam for the first time since 2016[lxviii]. The northern region of Vietnam faces particularly high electricity supply risks due to the country's grid structure. The Ministry of Industry and Trade anticipates an electricity deficit of up to 1.8 GW in the northern region in 2024.

Gas will continue dominating the electricity mix in other parts of Southeast Asia, such as Thailand. The country gets more than 60% of its electricity supply from gas and has increased LNG imports to meet demand[lxix]. Recent LNG price increases have triggered concerns about another gas and power crisis.

Despite this, the Thai regulators decided in September 2023 to reduce the electricity rate to lower the cost of living.

Figure 8: Change in Vietnam's Electricity Generation Mix



Thai regulators also continue to press state-controlled PTT Exploration & Production to expand gas reserves and production at domestic fields to boost the country's energy security. PTT plans to double gas production at Erawan, its largest field, to 800 MCF / day this year[lxx]. Currently, imported LNG accounts for a third of the gas used in the power sector.

In Malaysia, coal accounts for 46% of Malaysia's electricity mix[lxxi]. The government's National Energy Transition Roadmap (NETR) aims to reduce reliance on coal by increasing the use of gas and renewables[lxxii]. Coal demand in the power sector is expected to plateau by 2026, whilst gas generation is expected to steadily overtake coal generation by 2026.

Malaysian regulators have set a new target of 70% renewable energy in the electricity generation mix by 2050[lxxiii]. Efforts to accelerate renewable energy investment include increasing the green energy tariff, ten initiatives in the NETR and removing barriers to renewable energy growth. In addition, the ban on renewable energy exports was lifted in 2023 to encourage investment in local renewable resources.

In the short term, gas generation in East Asia, Malaysia, and Thailand faces potential risks from oil supply disruptions due to geopolitical tensions, El Niño affecting European demand and weather changes, and regional economic growth forecasts. Current forward curves indicate that Asian spot LNG prices may continue to exceed European hub prices in 2024, with the Platts JKM averaging US$ 1 / MBTU above Dutch TTF, encouraging more seaborne LNG inflow into Asian markets.

Oil supply disruptions caused by escalating conflicts could significantly affect gas prices in Europe and Asia. Since the start of the Russia-Ukraine conflict, LNG has become crucial in the global gas market, and any delays in delivering seaborne cargoes could lead to sustained increases in gas prices. Recent incidents that disrupted gas flow and affected markets include suspected sabotage of the Estonia-Finland pipeline, the temporary shutdown of the Tamar gas field in Israel, and labour disputes at LNG facilities in Australia and French import terminals. If geopolitical conflicts worsen, prices could rise due to higher precautionary demand for LNG or further supply reductions.

El Niño could also impact gas and LNG prices by causing an increase in electricity demand in Europe, which could lead to East Asian and some Southeast Asian buyers competing for LNG supplies with Europe. El Niño is associated with drier and colder winters, requiring more gas for heating, with a potential upward impact on prices.

In contrast to upside risks, on the downside, any worsening of the slowdown in the global or Chinese economies between 2024 – 2026, particularly in industrial production, could reduce demand and global gas prices.

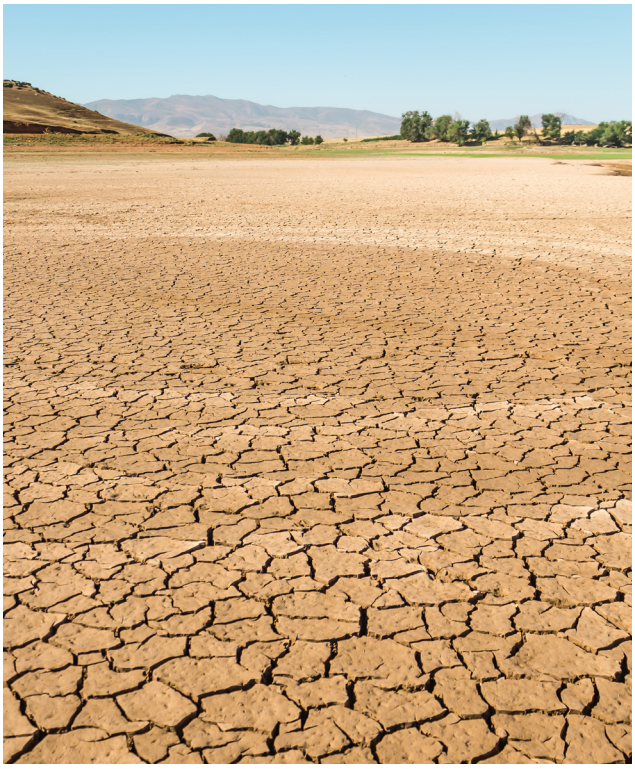
In the short-term, Asian spot LNG prices are expected to trade above the Dutch TTF in the short-term. In Q4 2023, Platts JKM prices followed a similar trajectory as the Dutch TTF and increased by 20% q-o-q to an average of US$ 15 / MBTU, albeit 50% lower than during the same period of the previous year[lxxiv]. Lower competition with Europe for spot LNG cargoes, together with high storage levels across East Asian markets and higher nuclear availability in Japan, kept Platts JKM well below its average levels in Q4 2022. Asian spot LNG prices recovered their premium over European hub prices at the end of May 2023. In H2 2023, Platts JKM prices averaged US$ 2 / MBTU above Dutch TTF month-ahead prices[lxxv]. The resurgence of the JKM premium over the Dutch TTF led to a shift of LNG shipments away from Europe, resulting in a 7% y-o-y increase in Asia's LNG imports in H2 2023, whilst Europe's LNG imports decreased by 10%[lxxvi].

As per the forward curves in mid-January 2024, Dutch TTF is expected to average 20% below its 2023 levels in 2024, at US$ 10 / MBTU, and Asian spot LNG prices will retain their premium over European hub prices in 2024, with JKM averaging US$ 1 / MBTU above Dutch TTF[lxxvii]. This will incentivise higher seaborne LNG flows into the Asian markets.

Coal generation in China, India, and most of Southeast Asia also faces downside risks from geopolitical tensions, weather changes, and global gas price shocks, which will increase demand for coal generation, reduce hydropower's contribution, and limit renewables' uptake.

If the Middle East conflict does not worsen, coal prices are forecasted to drop by 26% y-o-y in 2024 and 15% y-o-y in 2025, although they are anticipated to remain significantly higher than the average from 2015 – 2019[lxxviii]. Coal consumption growth is expected to be modest in 2024 – 2025, with slight increases in China and India despite notable decreases in the United States and Europe. Global coal consumption is shifting to Asia, with China and India projected to represent 70% of coal consumption by the end of 2024.

Domestic heatwaves across Asia can increase demand for air conditioning and space cooling, as well as demand for coal generation. The duration of a heatwave season has doubled over the past five decades. Droughts will significantly limit hydropower generation, increasing reliance on coal. In recent years, coal generation has been necessary to supplement dry conditions in China, France, and the western United States. However, over the long-term, coal will be gradually phased out of the Asian power sector, partly due to the rapid expansion of renewables and modest growth in gas generation.



19 CONCLUSION

Asia's electricity consumption is rising with economic growth and industrial activity, driving demand and opportunities in the power sector. Despite challenges like high prices and reliance on coal, the region is transitioning to renewables, with an aim to reduce grid emissions intensity. China is a key player in this growth, while Japan, South Korea, India, and Southeast Asia are also making significant changes in their electricity mixes.

Regional regulators are supporting renewables and controlling electricity price increases to manage inflation. Renewables are set to increase to 35% of the electricity mix by 2026, with solar leading the way. The Asian power sector's transition faces obstacles like high prices and limited hydropower, affecting coal and gas generation.

However, as the sector moves towards more renewable sources, grid emissions will decline in the long term. Regional policies and decreasing costs for solar generation are also driving the shift towards a cleaner electricity mix.

In China, the role of coal is shifting to supporting renewable generation despite the country facing grid integration / saturation challenges with new renewable capacities. The electricity mix in Japan and South Korea is transitioning away from coal and gas. Both countries are increasing nuclear and renewable capacities. India continues to struggle to meet rising electricity demand and will require more thermal capacity despite the country's aim to reduce the role of coal in its electricity mix.

In the short-term, gas generation in East Asia and parts of Southeast Asia will face upside risks from oil supply disruptions and downside risks from a fall in regional economic growth.

Coal generation in China, India, and Southeast Asia also faces challenges from geopolitical tensions, weather changes, and global gas price shocks, which will impact coal demand and renewable uptake.

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December – 2023

Fair COP or COP Out? Key Outcomes from COP28 and the Long-Term Effect on Fossil Fuel Demand

The 28th UN climate conference, COP28, held in Dubai in November-December 2023, was the largest and one of the most complicated of the series.

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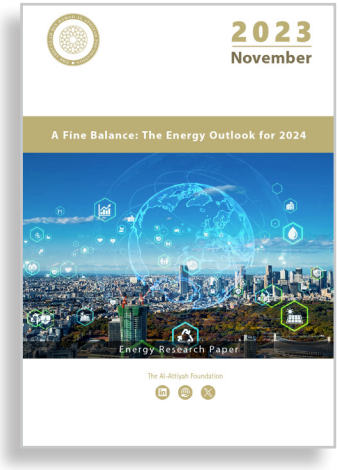

November – 2023

A Fine Balance: The Energy Outlook for 2024

Energy has witnessed four very volatile years since the start of the decade. Global markets are still striving to find a sustainable balance between supply and demand, while a decelerating macroeconomic framework and geopolitical events add headwinds to slowing demand growth.

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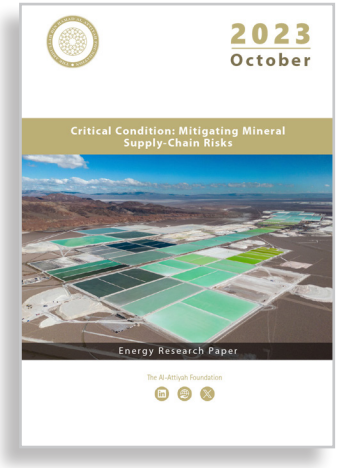

October – 2023

Critical Condition: Mitigating Mineral Supply-Chain Risks

New energy systems use a wide variety of critical minerals, including lithium, rare earths, cobalt and others. However, concerns are growing over the economic, political, and environmental risks to reliable supplies of such minerals. What are these risks? Which are real and which exaggerated? What are strategies to mitigate supply-chain risks in extraction and processing, for companies who use them as inputs, and for governments?

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