E3G



REPORT NOVEMBER 2026

Powering *Across Divides*

Clean energy cooperation in a fragmented world

Authors:
Dido Gompertz
Jeongha Ju
Samora Levy
Suzie Marshall
Oyku Senlen
Hamsa Srikanth
Matt Webb

ABOUT E3G

E3G is an independent think tank working to deliver a safe climate for all.

We drive systemic action on climate by identifying barriers and constructing coalitions to advance the solutions needed. We create spaces for honest dialogue, and help guide governments, businesses and the public on how to deliver change at the pace the planet demands.

www.e3g.org

E3G

E3G

@e3g.bsky.social

@e3g

COPYRIGHT

© E3G 2026

This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International licence (CC BY-NC-SA 4.0). Anyone may share or adapt this content in any medium or format, if they credit the original source and do not use the material for commercial purposes. Any adapted material must be shared under the same licence as the original. Different licences may apply to third-party materials such as visuals, in which case the original source should be referred to.

Cover image credit: FotoArtist via Adobe

AUTHORS

Dido Gompertz is a Policy Advisor in the Global Clean Power Diplomacy team, whose work focuses on building the coalitions and enabling conditions for the transition to clean power systems in various regional contexts.

Jeongha Ju is a Senior Policy Advisor in the Political Economy and Governance team. Her expertise lies in comparative political economy analysis and methodological design, focusing on the structural forces shaping energy transitions across countries.

Samora Levy is a Programme Lead in the Global Clean Power Diplomacy team, who leads work on the power sector transition and diplomacy including in Africa and China, an on the team's research and analysis.

Suzie Marshall is a Policy Advisor in the Global Clean Power Diplomacy team, where her focus includes accelerating the global exit from coal power, and energy security and the impact of the Hormuz crisis on power sector transitions.

Oyku Senlen is a Senior Researcher in the Global Clean Power Diplomacy team and is an expert on Turkish climate and energy policy. She leads E3G's Türkiye strategy and produces data analyses on the global clean energy transition.

Hamsa Srikanth is a Researcher in the Global Clean Power Diplomacy team. She works on research, analysis and data visualisations of the global power sector transition and the politics and policy that underpin it.

Matt Webb is Associate Director for the Global Clean Power Diplomacy team.

ACKNOWLEDGEMENTS

With thanks to the following for their contributions to researching, preparing, drafting, publishing and communicating this report: Anusha Mata, Artur Patuleia, Bruno Binetti, Danièle Gibney, Hanna Hakko, Jesse Burton, Kathrin Luddecke, Katrine Petersen, Linxiao Zhu, Madhura Joshi, Maike Kirsch. Matt Webb, Nakul Sharma, Natasha Green, Pfunzo Mudau, Pieter de Pous, Robi Ginting, Russell Marsh, Sarah Jenkinson, Susie Elks, Ujunwa Ojemeni & Yoko Mulholland.

As well as external and local partners.

Table of contents

Summary 5

Common energy transition dynamics across diverse economies 5

What this means for international cooperation 9

Introduction: Contested politics on the road to resilience 18

A new multipolar geopolitical landscape 18

Sixteen diverse but strategically important countries as case studies 19

A time of crises and multiple chokepoints 19

The transition as a solution to interlinked crises 20

Chapter 1: Discourses of security in an age of crises 24

Energy supply security: Fossil fuel-based systems 24

Energy supply security: Renewables-based systems 27

Economic security: Transition risks and opportunities 28

Hard security: Resilience from exogenous shocks 30

Accelerating the power sector transition as a security strategy 30

Chapter 2: Transitioning in different power system contexts 32

Transitioning away from fossil fuels 32

Displacing fossil fuels in the power system: progress and risks 34

Electrification and rising power demand 42

Grids and system resilience 45

Chapter 3: Finance in the power transition 50

Global clean energy investment is lagging behind 50

Building on and reshaping financial collaboration 52

Conclusion: Advancing power transitions in a fragmented world 55

Towards a new architecture of practical cooperation 55

Annex 1: Country transition profiles 57

Methodology 57

Australia's profile 60

Germany's profile 65

Indonesia's profile 71

Japan's profile 76

Nigeria's profile 81

Poland's profile 86
South Africa's profile 91
South Korea's profile 96
Türkiye's profile 102
United Kingdom's profile 107
Annex 2: Country transition snapshots 111
Methodology 111
Brazil's transition snapshot 112
China's transition snapshot 115
Ethiopia's transition snapshot 117
India's transition snapshot 119
Mexico's transition snapshot 121
Philippines' transition snapshot 123
Abbreviations 125

Summary

This report provides a **forward-looking political analysis** of how the global clean power transition is being shaped in an increasingly fragmented and multipolar geopolitical context. Rather than focusing solely on national progress, the report **examines how practical cooperation between countries can accelerate implementation** and reduce dependence on fossil fuels. The next phase of the clean power transition will depend not only on raising ambition through multilateral processes, but also on a smaller number of countries finding new ways to turn strategic alignment into delivery together.

The majority of countries cannot by themselves dictate the pace of the energy transition. Multilateral international cooperation will remain important to help countries navigate a secure transition. However, countries must also come together to work in new agile alliances and coalitions of the willing to solve common implementation challenges – be it at a bilateral, regional or sectoral level. Doing so will generate mutual benefit from new opportunities to cooperate and accelerate the transition.

Common energy transition dynamics across diverse economies

Choice of countries examined

This report takes a diverse group of 16 economies as its starting point. It examines these countries through two complementary levels of analysis of where they are in their transition journey, and what opportunities present themselves for international collaboration.

The first ten countries – **Australia**, **Germany**, **Indonesia**, **Japan**, **Nigeria**, **Poland**, **South Africa**, **South Korea**, **Türkiye** and the **United Kingdom** – are a cross-section of middle powers that are strategically important in combination. They form the core comparative sample and are examined through full political economy profiles (Annex 1).

Six further countries – **Brazil**, **China**, **Ethiopia**, **India**, **Mexico** and the **Philippines** – are incorporated through shorter strategic spotlight analyses (Annex 2). These reflect their particular systemic, diplomatic or regional relevance to the wider transition:

- Brazil and Ethiopia as past and future hosts of COP30 and COP32, respectively

- China to reflect the impossibility of interrogating the global energy transition without examining its role
- India as an emerging superpower with an outsize influence on the transition
- Mexico and the Philippines for their regional importance with respect to coal and gas.

The differentiated treatment is deliberate: the full profiles provide a consistent basis for comparative political economy analysis, while the spotlight cases capture additional geopolitical, diplomatic and regional dynamics. Together, the case studies cover:

- advanced, emerging, and developing economies
- major energy producers and consumers
- countries with significant clean technology and industrial capabilities
- countries occupying influential positions in international climate governance, including through COP leadership.

The sample is not intended to be exhaustive, but rather to provide a diverse cross-section of countries that captures the growing influence of actors beyond the traditional superpowers alone, in determining the trajectory of the global clean power transition. **In an increasingly fragmented geopolitical environment, progress will depend heavily on whether countries with different national interests and transition pathways can organise practical cooperation around areas of shared interest.** This report interrogates how a burgeoning set of such countries can achieve greater impact and geopolitical heft through working together.

Choice of mixed methodology reflecting new realities

Our analysis employs a mixed-methods research methodology that reflects the new realities of today's world. Rather than assessing transition progress through energy sector indicators alone, it examines why a country's transition follows a particular pathway by considering the interaction between the structural, political and economic conditions. These include:

- the structure and trajectory of the power system
- political willingness and the durability of transition commitments
- economic and industrial dependence on fossil fuels, including their contribution to domestic economic activity, employment and export earnings
- the extent to which geographic, geopolitical or diplomatic positioning shapes the choices available to governments.

Details of the mixed-methods analysis and wide range of data used, both quantitative and qualitative, are given at the beginning of both Annexes.

Five common energy transition dynamics

Our analysis finds that countries are approaching this challenge from very different starting points, but that common dynamics are emerging (see also Table 1, with details in the Annexes). This section offers an overview of these shared dynamics; it is then followed by a summary of the four priorities we see for international cooperation, from bilateral to global.

▶ Energy security is becoming a key driver of the clean power transition

The latest fossil fuel crisis, sparked by the US–Israeli strikes on Iran on 28 February 2026, has demonstrated the economic exposure created by dependence on imported coal, oil and gas. As we discuss in Chapter 1, fossil fuel importers paid an additional US$330 billion for seaborne crude oil, oil products and liquefied natural gas (LNG) in the six months following these strikes. Yet, clean power added since 2020 saved the same countries an estimated US$36 billion in the first five months of the crisis.[1]

▶ Electrification increasingly is both an opportunity and a challenge

Electricity demand is forecast to grow by an average 3.6% a year between 2026 and 2030.[2] Electrification is critical to reduce fossil fuel use in transport, buildings and industry. However, as Chapter 2 shows, to deliver that, clean generation must be expanded at the same time – as does the infrastructure required (such as grids, storage, and distribution networks). Otherwise, the risk is that rising electricity demand will support fossil fuel generation even as renewables gain market share.

▶ Delivery of projects is becoming the critical constraint

Across the countries examined, the problem is increasingly not a lack of ambition or technology; rather, it is the ability to turn plans into projects that are financed, connected to the grid and operational. Chapters 2 and 3 take a closer look at a number of barriers. Transmission networks and grid connections are recurring physical constraints. High costs of capital, weak project pipelines, limited institutional capacity and regulatory barriers prevent viable projects from reaching financial close.

▶ Coal incumbency remains one of the hardest structural barriers

The economics of new coal are deteriorating, and 36 countries have exited the coal pipeline since 2015, as we see in Chapter 2 (see Figure 3). Yet coal remains embedded in different ways – including in power systems, industrial strategies, employment and regional economies. In ageing energy systems such as in **Poland** and **South Africa**, coal retirement is economically attractive but politically difficult. In a country with a relatively young coal fleet like **Indonesia**, coal is embedded in an industrialisation model centred on energy-intensive sectors such as nickel processing and indeed cleantech.

[1] CREA, August 2026, **What the Hormuz crisis has cost fossil fuel importers – March to August 2026**
[2] IEA, 2026, **Electricity 2026**

Geopolitical fragmentation is changing the landscape of international cooperation

Every country must accelerate its own transition – yet no country can deliver a shift to secure, clean power of the scale required on its own. Navigating a secure transition will not eliminate interdependence, it will reshape it. As our Conclusion states: countries will need to reduce exposure to fuel supply vulnerabilities while preserving the benefits of global markets, investment and technology exchange. This continued interdependence creates a strong case for practical collaboration: addressing shared delivery challenges while drawing on different national strengths to advance each country's own energy and economic priorities.

Table 1: The energy transition dynamics of the 16 countries analysed.

Country	Energy transition dynamics
Australia	Australia is scaling renewables and critical minerals to pursue its clean energy superpower ambitions. Yet its dual identity as exporter of both fossil fuels and clean energy creates uncertainty as its transition is hampered by continued dependence on coal and LNG export revenue.
Brazil	Brazil has a largely clean power system and is expanding renewables and clean industry. Yet its transition remains shaped by fossil fuel interests, including continued oil expansion, and a development model that seeks to advance clean and fossil fuel development in parallel.
China	China is scaling renewables, electrification and cleantech manufacturing at enormous scale. However, coal remains embedded in energy security, and grid constraints, along with market dynamics, limit the extent to which renewable growth displaces fossil generation.
Ethiopia	Ethiopia is building on an almost fully renewable, clean power system to link clean energy with development and regional integration. But low rates of electricity access, affordability pressures, hydropower dependence and widespread biomass use constrain delivery.
Germany	Germany has made strong progress toward a renewables-based power system. However, phasing out fossil fuels by 2045 will require further electricity system expansion, clean dispatchable power and flexibility. It will also require faster electrification of transport, buildings and industry.
India	India is rapidly scaling renewables and clean manufacturing to meet soaring electricity demand. Yet continued coal expansion and grid and storage constraints risk fossil lock-in as its power system grows.
Indonesia	Indonesia is pursuing a development-led energy transition, scaling renewables and clean industries where they support industrialisation. However, coal remains central to electricity generation and the country's cleantech economic transformation.
Japan	Japan's transition is industry-led and security-driven, prioritising energy resilience and economic competitiveness over rapid decarbonisation. Fossil fuel-adjacent options receive strong policy support, while conventional renewables like wind and solar remain constrained by grid and regulatory barriers.
Mexico	Mexico is linking renewable expansion to energy sovereignty and nearshoring-led industrial development. But gas dependence, grid constraints and a centralised, state-led power model limit the pace of clean energy investment and integration.

Country	Energy transition dynamics
Nigeria	Nigeria's transition is access-led and increasingly decentralised, with distributed renewables expanding around a fragile gas-dependent grid. Yet oil and gas remain central to economic security.
Philippines	The Philippines is seeing rapid solar growth as high power prices and imported-fuel exposure strengthen the case for renewables. However, entrenched coal contracts, fossil-favouring market structures and grid constraints continue to slow displacement of coal and gas.
Poland	Poland is rapidly diversifying its power system. But its transition remains constrained by deep coal lock-in, energy security concerns, an ageing and inflexible grid, and major investment in gas infrastructure alongside its plans to scale renewables.
South Africa	South Africa's transition is progressing as energy insecurity and market reform are driving renewable deployment, while liberalisation is reshaping the balance between public and private participation in the power sector. However, coal remains entrenched, and expanding gas risks fossil lock-in.
South Korea	South Korea is advancing its energy transition with ambitious commitments, framing decarbonisation around industrial competitiveness and energy security. Yet structural dependencies on fossil fuels and energy-intensive industries necessitate a pragmatic, managed transition.
Türkiye	Türkiye's transition has accelerated in line with its government's priorities to strengthen energy security and advance towards a 2053 net zero target. However, progress has been uneven, as renewable energy expands alongside continued reliance on fossil fuels.
United Kingdom	The UK's transition has strong momentum from exiting coal and significantly expanding renewables, grids and storage. However, it now faces the challenge of delivering a fully clean power system to break away from gas dependence.

Source: *E3G country analyses in the Annexes to this report.*

What this means for international cooperation

Countries increasingly have reasons to cooperate that go beyond climate action, as our Introduction illustrates. Working together on clean power can at the same time strengthen energy security, reduce exposure to global supply shocks, support industrial competitiveness and build more resilient economies.

Cooperation can also allow countries to use their different strengths more effectively: bringing together broader renewable energy potential, demand, finance and technology. Connecting these complementary assets can create value that countries would struggle to capture as efficiently on their own, thereby creating a **cooperation dividend** in which countries can achieve more, faster and at lower cost than they could by acting alone.

We conclude that this means building a broader ecosystem of practical cooperation alongside the multilateral processes that set global ambition. Cross-country partnerships and coalitions can focus on the implementation challenges that are holding back the transition, as our country studies show: from working on resilient supply chains and

stronger grids to mobilising finance, developing technologies and integrating regional power systems.

Our analysis identifies four priorities for the next phase of the transition, for the international community as a whole – but crucially also countries acting jointly in smaller, more flexible groupings. What we suggest will add real value is to:

1. Place the pursuit of clean energy security at the centre of international diplomacy.
2. Support complementary pathways away from fossil fuels and towards electrification.
3. Mobilise finance and investment through practical delivery partnerships.
4. Use clean energy trade partnerships and regional infrastructure to diversify supply chains and accelerate investment.

The following offers a selection of potential ways in which these priorities could be addressed, building on existing shared goals, mechanisms and experiences. Table 2 also provides an overview of how each of the 16 countries analysed in this report can take up and deliver more agile cooperation.

Priority 1: Place the pursuit of clean energy security at the centre of international diplomacy

The current energy and climate context creates an opportunity to establish a more ambitious model of international cooperation. New clean energy security partnerships could provide a stronger framework for international cooperation, bringing together countries seeking to raise ambition, rebalance global clean energy supply chains, and support new models and pathways for clean energy development in partnership with the Global South. COP31 provides an early opportunity for leaders to make such commitments to be more actively mobile and develop new connective alliances and partnerships.

A strengthened network for collaboration can help countries achieve greater prosperity and benefits from the clean energy transition at home, and also help build trade in clean technologies with existing and new partner countries – reaping the cooperation dividend.

Specific examples of ways countries can elevate the clean energy transition to the highest levels of diplomacy and establish it as a strategic priority across policy areas include:

- Governments should work together to forge new high-level political partnerships, bringing together strategically important countries around bolder clean energy objectives. This should build on existing international architecture, including but not limited to the EU's Clean Energy Transition Partnership, the UK's Global Clean Power Alliance, the Beyond Oil and Gas Alliance (BOGA) and Powering Past Coal Alliance (PPCA), while providing a broader and more effective framework for cooperation and filling the space left by the Major Economies Forum which used to convene at Leader level. It should also build on lessons from previous G7-led approaches to international clean energy cooperation (including the Partnership for Infrastructure and Investment)

seeking to frame broader collaboration among a wider group of countries, including those covered in this report.

- Governments should use their diplomatic networks to make clean energy and cleantech supply chains a cornerstone of international cooperation and partnership.
- Governments and other partners, especially those with finance, project and technical expertise, should cooperate with an explicit focus on delivery: to develop pipelines of investable clean energy projects and then mobilise the technical and financial capacity of all partners involved to bring them forward.
- Governments should put clean energy at the heart of the energy security debate. Specifically, the **UK** can use its upcoming G20 Presidency to create a broader coalition and support and build upon the initial work of 2025's Energy Security Summit held with the IEA, while elsewhere Singapore could lead via its 2027 ASEAN Presidency, as could **South Africa** as hosts of the 2027 World Economic Forum.
- Countries should cooperate to accelerate the deployment of firmed renewables[3] connected to modern grids now. This will create tangible benefits and lay the foundations for a strong majority of governments to push for a stronger collective clean energy ambition in 2028 and beyond. Over time, this will support stronger collective progress as we approach the next milestone for international collective action on climate change through the second Global Stocktake – the next five-yearly assessment of collective progress towards the goals of the Paris Agreement, taking place in 2028.

Priority 2: Support complementary pathways away from fossil fuels and towards renewables and electrification

Within the new contours of elevated and strengthened international diplomacy on clean energy, countries should provide coordinated political, technical and financial support for two mutually reinforcing priorities:

1. establishing credible, nationally led pathways away from fossil fuels
2. accelerating the delivery of a renewables-led electrified energy system.

Accelerating the transition will require greater international understanding and agreement on credible pathways forward for all countries and economies, both fossil fuel exporters and importers. These efforts should be understood as part of a single global endeavour to halve dependence on fossil fuels and double the rate of electrification over the next decade, and include:

- Countries should continue to support an ongoing Transitioning Away From Fossil Fuels (TAFF) process within the UNFCCC following the COP30 Brazilian Presidency initiative, alongside an open space for dialogue under the Santa Marta process. Publishing national roadmaps for reducing fossil fuels, with clear plans and trajectories, will

[3] Renewable energy paired with storage (and in some cases other technologies and systems) to reduce variability.

provide everyone with greater certainty to plan an equitable and just transition away from fossil fuel dependence.

- Countries should complement domestic action on renewables-led electrification, a critical component of net zero pathways, by supporting efforts to realise the benefits of electrification across different regions and geographies, including by addressing the financial and technical barriers identified in this report (see Chapter 2). The "35-by-35" electrification target, which forms a key part of the COP31 Action Agenda under the presidency of **Türkiye**, provides an important benchmark.
- Countries should also engage with, and expand, the government-led part of the Electrify Now platform[4], broadening its membership and strengthening its ability to help countries address the barriers specific to their regional circumstances.

Priority 3: Mobilise finance and investment through practical delivery partnerships

Finance remains a barrier to progress as our analysis illustrates. While country NDCs set out new pathways, the projects, grids and finance needed to reach them are not in place. Transition finance architectures are not built to address systemic risks, high cost of capital, currency exposure and uncertainties, which prevents scarce concessional finance from unblocking investment where it is most needed.

Intensified international focus on clean energy should encourage countries to intensify cooperation through country platforms. These provide a useful mechanism for middle powers to work together – first, to identify priorities that help deliver on national commitments and, second, to better align and coordinate existing instruments to mobilise public and private finance. For instance:

- Particular emphasis should be placed on mobilising and de-risking private investment. This should include greater use of instruments such as Singapore's FAST-P and the Public Development Bank Guarantee Hub.
- Mechanisms to expand investment in infrastructure such as grids should also be considered crucial, for example **South Africa**'s Credit Guarantee Vehicle which is supported by funding from partners including the World Bank.
- Countries should also prioritise clean energy deployment through international partnerships such as the Asia Zero Emission Community (AZEC).
- Country platforms should look at electrification (driven by renewable energy) in particular because it is relevant across multiple sectors. Platforms should, however, also address fossil fuel incumbency and the just transition impacts associated with structural changes in energy systems.

[4] Electrify Now is a global campaign launched in 2026 to accelerate clean electrification, targeted at governments along with groups including industry, finance organisations and initiatives, and more.

- The nascent Climate Implementation Bridge launched by the Turkish COP31 Presidency could provide additional political momentum for country platforms. This country-led mechanism aims to help governments identify gaps in their national plans and delivery systems, prepare bankable project pipelines and design the financing needed to attract public and private investment at scale. Building on the Belém Mission to 1.5 °C and the Global Implementation Accelerator agreed at COP30, its scope covers mitigation and adaptation across sectors, not just power. However, the coal transition is one of the primary tests of its effectiveness, since it addresses the transition challenges described above. The first phase of the Bridge focuses on electrification, tying it directly to the "35-by-35" electrification target and the clean power that this requires. Its development should remain inclusive of countries that have already established platforms through the Just Energy Transition Partnership (JETP) process or through other national and international initiatives. If the pilot projects are successful, they will show that a coal exit, an electrification roadmap, grid modernisation and a resilient power system can be integrated into a single national delivery framework, rather than handled as separate negotiations.

- **Ethiopia**'s upcoming COP32 Presidency presents a significant opportunity to develop an initiative demonstrating how increased renewable energy deployment, grid development and international cooperation can accelerate clean electrification, economic growth and prosperity through new green industrialisation pathways. Such an initiative could make an important contribution to the global discussion on development pathways that avoid future fossil fuel dependency.

Priority 4: Use clean energy trade partnerships and regional infrastructure to diversify supply chains and accelerate investment

As identified, countries face common challenges including exposure to volatile fossil fuel markets, imbalanced clean energy supply chains, the need to electrify across the economy while maintaining affordable energy costs, and the need to deliver climate commitments against a backdrop of worsening climate impacts. Ways in which they could cooperate to overcome these include:

- Industrial and trade policy should be used more deliberately to expand and diversify clean energy supply chains, to reduce major imbalances and high levels of dependencies on any singular country. The recent **UK** and EU free trade agreements with **India** and the Green Economy Partnership Arrangement on Climate and Energy between **Australia** and **South Korea** provide possible examples of the potential for this approach.

- Countries should identify which segments of the clean energy supply chain require greater domestic resilience and which can be opened to a more diverse range of international partners. Greater coordination can help establish more balanced trade arrangements, supporting reindustrialisation while maintaining access to cost-effective components and input materials.

- Regional cooperation on clean energy infrastructure should be strengthened in parallel. New mechanisms are needed to manage the variability of renewable generation, including through greater interconnection between national grids and common rules and guidelines for technologies such as hydrogen and carbon capture and storage (CCS). Joint planning should be supported by shared financial vehicles that provide greater clarity on future infrastructure requirements and reduce investment risk for the private sector.

- Coordinated planning should focus particularly on grids and interconnection, given that interconnection, unified markets and power pooling (on a regional or even continental basis) make the transition more effective and can mitigate risks. Countries should ensure that electricity system knowledge sharing agreements are in place as operators develop their ability to manage high penetration of renewable energy. Cooperation on energy in the North Seas offers a leading example of large-scale possibilities open to countries which work together on these issues; the goal of greater, shared and interconnected renewable energy between a broad set of neighbouring nations. The **UK** could show further leadership by hosting the next North Seas Summit, and making links to their chairing of the G20 in 2027.

- Countries should also establish mechanisms to share lessons and approaches, and to implement delivery across strategic regional platforms, including large grid and renewable energy interconnection projects like the North Seas Energy Cooperation (as above), ASEAN Power Grid, African Power Pools and the T-MED Initiative working to connect countries around the Mediterranean. This should complement and extend the work of existing initiatives such as the Green Grids Initiative and the Global Grids Catalyst, with greater emphasis on the role of international cooperation and diplomacy in enabling regional clean energy infrastructure build-out.

Table 2: Opportunities for international cooperation across the 16 countries analysed.

Country	#1 International cooperation architecture	#2 TAFF and electrification diplomacy	#3 Country platforms and Bridges	#4 Clean energy trade partnerships and regional infrastructure
Australia	**Diplomatic influence:** COP31 negotiations presidency **Partnerships:** MIXTA, Asia-Pacific dialogues	**Power landscape:** Solar and wind pipeline; rooftop solar and EVs **Transition pathway:** No New Coal **Security narrative:** hedge against fuel shocks		**Industry:** Critical minerals; Future Made in Australia **Trade levers:** GEPA with Korea; SE Asia demand
Brazil *	**Diplomatic influence:** COP30 host; TAFF roadmap	**Power landscape:** clean power system; distributed solar **Transition pathway:** PLANTE; TAFF roadmap	**Platforms:** BIP	**Industry:** Green manufacturing; biofuels **Trade levers:** EU market access; CBAM
China *	**Diplomatic influence:** Global South leadership; BRICS presidency 2027; 2035 NDC **Partnerships:** EU engagement	**Power landscape:** Renewables and EVs at scale **Transition pathway:** Coal to flexibility; 15th FYP	**Capital sources:** MDB reform; Global South infrastructure finance	**Industry:** cleantech manufacturing; strategic minerals **Trade levers:** export procedures **Grid and infrastructure:** grid investment
Ethiopia *	**Diplomatic influence:** COP32 Presidency; ACS2; AGN	**Power landscape:** hydropower system **Transition pathway:** Access; clean cooking; transport	**Capital sources:** Self-financed GERD **Financing needs:** Blended finance for access	**Industry:** green industrialisation **Grid and infrastructure:** Eastern Africa Power Pool; Kenya interconnector
Germany	**Diplomatic influence:** EU external policy **Partnerships:** Strategic partnerships	**Power landscape:** renewables build-out **Transition pathway:** Phase-out targets; electrification **Security narrative:** Resilience after the 2022 gas shock	**Capital sources:** European finance and market access	**Industry:** GreenTech; India corridor **Grid and infrastructure:** North Seas; Baltic Offshore Grid; storage
India *	**Partnerships:** EU–India agenda; UK & EU FTAs	**Power landscape:** Record renewables **Transition pathway:** Generation Adequacy Plan; access policies	**Financing needs:** Large-scale finance	**Industry:** Manufacturing hub **Grid and infrastructure:** Storage and transmission **Enabling reforms:** Power market reform
Indonesia	**Partnerships:** MIXTA; AZEC	**Power landscape:** Renewable potential **Transition pathway:** Golden Indonesia 2045; nickel roadmap	**Platforms:** JETP	**Industry:** Nickel; EV and battery making **Trade levers:** Clean standards **Grid and infrastructure:** Grid and storage

Country	#1 International cooperation architecture	#2 TAFF and electrification diplomacy	#3 Country platforms and Bridges	#4 Clean energy trade partnerships and regional infrastructure
Japan	**Diplomatic influence:** Indo-Pacific security framing **Partnerships:** Security dialogues; AZEC	**Power landscape:** AI and chip demand **Transition pathway:** Non-fossil target **Security narrative:** Import dependence; chokepoints	**Platforms:** AZEC finance	**Industry:** Minerals partnerships; RE100 demand **Grid and infrastructure:** Grid and offshore wind expertise
Mexico *	**Partnerships:** MIXTA; strategic partnerships	**Power landscape:** Solar and wind resources **Transition pathway:** CFE plan; Solar Ejidos **Security narrative:** Dependence on US fuel and gas	**Platforms:** Mixed investment scheme **Financing needs:** Grid finance	**Industry:** Nearshoring; lithium **Grid and infrastructure:** Grid resilience
Nigeria		**Power landscape:** Distributed solar growth **Transition pathway:** Energy Transition Plan; BOGA	**Platforms:** NCIP; Climate Change Fund; Mission 300; DARES **Capital sources:** pension funds; international capital	**Grid and infrastructure:** Stranded capacity **Enabling reforms:** Electricity Act; net billing; local content
Philippines *		**Power landscape:** Solar surge **Transition pathway:** coal moratorium; renewables targets **Security narrative:** Fuel import exposure; power prices	**Financing needs:** Concessional finance; solar lending	**Grid and infrastructure:** Grid upgrades; geothermal and hydro
Poland		**Power landscape:** Rapid solar additions **Transition pathway:** NECP; coal-region models; social contract; business backing		**Industry:** Battery and minerals **Grid and infrastructure:** Baltic Offshore Grid; grid plan
South Africa		**Power landscape:** Renewables pipeline **Transition pathway:** Liberalisation; just transition principles **Security narrative:** Power crisis	**Platforms:** JETP; World Bank grid vehicle **Capital sources:** Pension funds	**Industry:** PGMs; green steel **Trade levers:** Global Gateway **Enabling reforms:** NTCSA
South Korea	**Partnerships:** PPCA; MIXTA; GEPA with Australia	**Transition pathway:** renewables and coal-exit targets; KEPCO reform **Security narrative:** Hormuz exposure	**Platforms:** PPCA	**Industry:** Battery and EV conglomerates; RE100 demand **Grid and infrastructure:** West Coast Energy Highway

Country	#1 International cooperation architecture	#2 TAFF and electrification diplomacy	#3 Country platforms and Bridges	#4 Clean energy trade partnerships and regional infrastructure
Türkiye	**Diplomatic influence:** COP31 Presidency; 35 by 35; **Partnerships:** MIXTA	**Power landscape:** Renewables growth **Transition pathway:** Wind and solar target; net zero target **Security narrative:** Domestic and national energy framing	**Platforms:** Climate Implementation Bridge; grid pipeline **Financing needs:** SME finance	**Industry:** Industrial competitiveness **Trade levers:** CBAM; CSRD **Grid and infrastructure:** Grid development
United Kingdom	**Diplomatic influence:** G20 2027; G7 2028 **Partnerships:** PPCA; CETP; GCPA	**Power landscape:** Coal exit; grids and storage **Transition pathway:** Clean Power 2030; net zero law; CCC **Security narrative:** Clean energy seen as security	**Capital sources:** CfDs; capital markets; MDB reform	**Trade levers:** UK–India FTA **Grid and infrastructure:** offshore wind; North Seas; grids and storage

Source: *E3G country analyses in the Annexes to this report. Country snapshots are marked *.*

Introduction: Contested politics on the road to resilience

> *"We are clearly moving towards a multipolar world. And that movement is irreversible… But, there is another path. A path towards networked multipolarity. A world built on interdependence – and sustained by a dense web of economic, political, social and technological connections."*
>
> **António Guterres**
> **Secretary-General of the United Nations**

A new multipolar geopolitical landscape

We are in a rapidly changing world where geopolitical influence is becoming increasingly widely distributed and international systems are more multipolar. The traditional dominance of the Global North has given way to a more diverse landscape, with new centres of economic and diplomatic influence, particularly across emerging and developing economies (EMDEs) and the Global South.

In this new era, an increasingly diverse group of countries now occupies the middle of the global geopolitical and economic spectrum.

Most countries cannot by themselves dictate the pace of the energy transition. As a result, international cooperation will remain vital to help countries navigate a secure transition. Countries must, however, also work together in new agile alliances and coalitions of the willing to solve common implementation challenges. Doing so will generate mutual benefit from new opportunities to cooperate and accelerate the transition.

Already interest has increased in exploring what the future of multilateral, mini-lateral and bilateral cooperation on climate and the energy transition could look like. As UN Secretary General Guterres and others, from the EU to Canada in recent times, have repeatedly expounded the importance of collaboration and exploring new possibilities, the eyes of the world are following.

While differing in size, capacity and influence, collectively, the countries serving as examples in this report have a growing ability to accelerate – or impede – global climate progress, as do others not included here. Understanding the political economy and diplomatic dynamics of a wider group of countries will therefore be critical to also

understanding the future trajectory of the global energy transition, and to exploring shared priorities and opportunities open to them – individually and collaboratively.

Sixteen diverse but strategically important countries as case studies

This report analyses the power sector transition in sixteen countries that play strategically important roles in shaping the global energy transition (see Annexes 1 & 2): the fifteen without **China** already represent 26% of global GDP and 24% of carbon emissions.[5] They have also been chosen as they span advanced economies and EMDEs, with growing influence in clean energy industries and international climate governance. Analysed as a group they help to understand the wider and increasingly diverse set of countries that, as noted, sit at the centre of contemporary climate diplomacy and rapid energy transitions.

A time of crises and multiple chokepoints

Climate risks are rising and the impacts are already being seen, and increasingly felt, across the world: climate change made the recent devastating flash floods in Nepal and Tibet more likely[6] and the strongest ever El Niño from 2026 to early 2027 is projected to cause over 451,000 excess deaths.[7] All of this comes as the latest science shows that a considerable overshoot of 1.5 °C is inevitable. The best-case scenario is currently estimated to be warming of 1.8 °C above pre-industrial levels before there is any chance of returning to 1.5 °C or below.[8]

At the same time the world's second fossil fuel crisis in less than five years has created both acute risks and a historic opportunity. The US–Israeli attacks in Iran on 28 February 2026 catalysed a months-long blockade of the Strait of Hormuz, severely disrupting transport through this vital maritime chokepoint and causing the largest supply disruption in the history of the global oil market.[9] This has shown both the volatility and unreliable nature of imported fossil fuels, underlining the critical need to redouble our efforts to accelerate the global energy transition.

Indeed, energy is currently at the behest of multiple chokepoints, both geographical (e.g. the strait of Malacca as well as Hormuz) and geopolitical (e.g. US trade disruption, China's control of critical minerals and manufacturing – dominating clean energy supply chains). Energy security is now firmly established as of the highest importance for governments everywhere: it has moved beyond the remit of energy and climate ministries to finance,

[5] E3G analysis in this report, excluding China; inclusion of China gives figures of 43% GDP and 56% emissions.
[6] World Weather Attribution, October 2026 **Rapid urbanisation and climate change key drivers of dramatic flood impacts in Nepal**
[7] Climate Impact Lab, 2026, **451,000 at Risk. Where Action Can Save Lives During the Super El Niño**
[8] UN Environment Programme, 2026, **Overshoot explained: 5 things to understand about a world beyond 1.5°C**
[9] IEA, March 2026, **Oil Market Report - March 2026**

defence and national security (see Chapter 1). Moving towards greater domestic energy security has never been higher on the agenda for nation states.

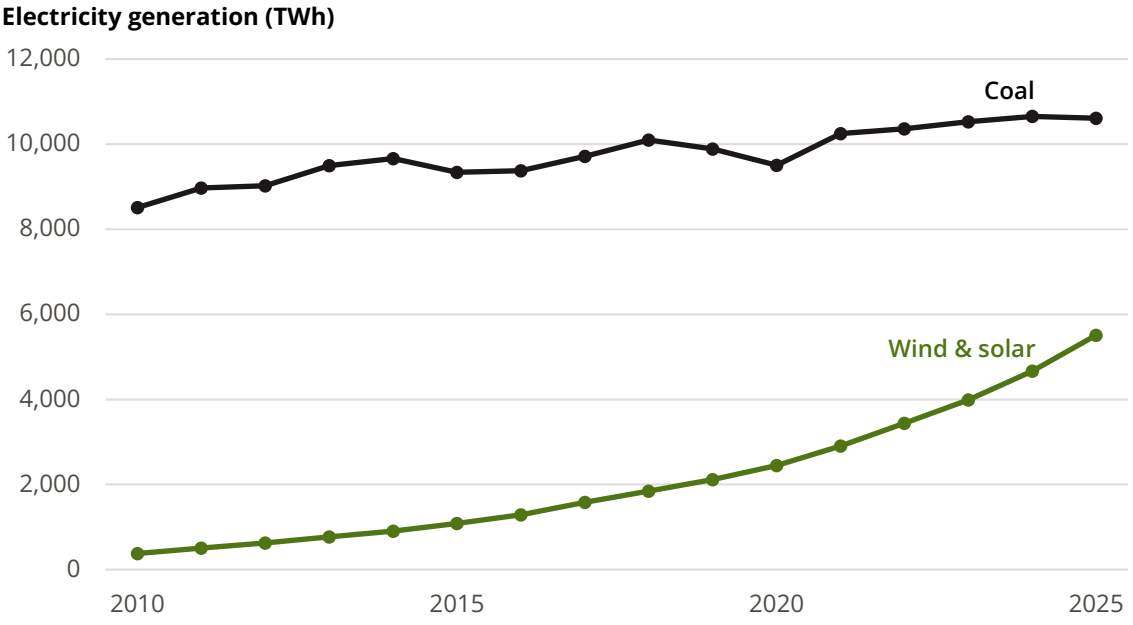
The transition as a solution to interlinked crises

It is now generally accepted that a faster shift from fossil fuels to renewable energy is required. Indeed, renewables deployment is emerging as an enduring response to the twin energy and climate crises. It is even more clear now that moving rapidly to renewable energy and away from fossil fuels will help countries reduce volatility, increase stability and insulate themselves from future shocks. Rapidly decarbonising the power sector is also fundamental to any chances of reaching 1.5 °C, or at least staying below 2 °C, of global warming – given that the power sector is the largest global emitter by sector and within it, coal-powered electricity remains the largest global aggregated source.

Emissions reductions are off track despite progress

The transition away from fossil fuels to renewable energy is of course happening. Much of the progress in reducing global carbon emissions achieved to date is based on power decarbonisation. The momentum in electricity generation is behind wind and solar, with coal – still the biggest power source – stalling (Figure 1). Deployment of renewables is in many places meeting current demand growth. However, despite this, the world remains fundamentally off track for safe levels of warming.

Global power generation from coal and renewables (2010–2025)



Source: *Ember, **Electricity Data Explorer***

Figure 1: Power generation from wind and solar is rising exponentially, while coal has flatlined.

For instance, retirement of existing gas power plants has yet to be properly tackled, while the pace of retirement of existing coal plants is not on track to meet 2030 (OECD, EU) and 2040 (non-OECD) milestones. Coal demand is set to increase slightly in 2026,[10] driven by disruptions from the Hormuz crisis and by greater cooling needs resulting from an intense El Niño, delaying peak coal consumption. Indeed, countries continue to build expensive, polluting new fossil fuel power plants, both coal and gas (see Chapter 2).

Rapid expansion of new gas power plants is a global risk, particularly in Southeast Asia and North America, with significant additions (over 1,100 GW in development)[11] threatening to lock in fossil infrastructure with long lifetimes. For example, new gas power plants in development in the US have increased hugely to 387 GW; this new dash to gas is fuelled at least in part by the boom in proposals for AI computing and data centres.[12] However, while the risk is severe, the likelihood of all planned gas being built is low, with costs high, supply chains slow and turbine delivery often delayed by years;[13] and the AI boom is being contested.

Power sector decarbonisation is more vital than ever

In fact, increased energy demand means it is even more vital to accelerate progress towards renewables-based power systems. A rapid transition in the power sector will both help ensure that any boom in AI, data centres and computing is powered by renewable energy and will underpin and create the enabling conditions for the decarbonisation of more challenging sectors (including transport, industry, heating and the built environment).

The goals of the Global Stocktake, the first assessment of collective progress towards the goals of the Paris Agreement, all rely heavily on decarbonisation of the power sector for success. Governments committed to triple renewable energy deployment, double energy efficiency gains, accelerate efforts towards the phase-down of unabated coal power and transition away from fossil fuels in energy systems in a just, equitable and orderly manner – all by 2030. These targets have set a clear direction and deepened energy system transformation. However, with the second Global Stocktake coming up at COP33 in 2028, there remain major implementation gaps that need to be addressed.

Calls for electrification have increased significantly over 2026. Global business leader polling conducted earlier in 2026 found strong support for clean electrification, with 91% of executives expecting electrification to improve energy security, 88% competitiveness and

[10] IEA, September 2026, **Global coal demand set to increase this year amid Middle East conflict**

[11] Global Energy Monitor, 2026, **https://globalenergymonitor.org/projects/global-oil-gas-plant-tracker** (webpage, accessed 04/08/2026)

[12] Global Energy Monitor, August 2026, **U.S. gas power proposals tied to data centers nearly double in six months**

[13] S&P Global, 2026, **INTERVIEW: Mitsubishi Power gas turbine orders stretch to 2030 amid AI, security demand**

84% long-term operating costs.[14] But 69% say businesses are electrifying faster than governments are preparing power systems, and 89% support investment in grid upgrades.

Yet ultimately the success of electrification in reducing emissions relies entirely on generating the electricity needed from renewable sources (see Chapter 2). As power demand grows, it highlights both the importance of energy efficiency and demand reduction measures, and the scale of renewable energy deployment still required. Analysis by IRENA shows that achieving "35-by-35" requires primary dependency on fossil fuels to drop to 48% by 2035.[15] The IEA too has made it clear that achieving the benefits of electrification requires a 70% reduction in generation from coal and gas power.[16]

Action on the urgent need to transition to date

The TAFF process, kickstarted by the Belém declaration at COP30 and taken forward by the Santa Marta conference in 2026, is showing increasing momentum. With France, the Netherlands and **Germany** all now having released national roadmaps for phasing out fossil fuels, the UN Secretary-General's calling for all countries to submit credible roadmaps at the September 2026 climate summit is an important staging post for ambition. It can help both to increase the global push for rapid decarbonisation of the power system and to speed up implementation. And the "35-by-35" electrification target now forms a key part of the COP31 Action Agenda under the presidency of **Türkiye**, which has launched its own plan to achieve it.

The analysis presented in this report underlines that increased cooperation on all these areas, and more, will be vital to ensure that the pace of the energy transition meets global requirements. Working together will help countries to be more than the sum of their individual parts, so that jointly they can both combat the risks and embrace the opportunities that are emerging.

However, despite the risks of inaction, and these opportunities, there is as yet limited evidence that countries are working to create the new structures or partnerships required, or to put clean energy security at the heart of their cooperation. We hope that the four priorities identified through our analysis below will contribute to addressing this impasse:

1. to lift energy transition diplomacy to the top table
2. to deliver on electrification, grids and Transitioning Away from Fossil Fuels (TAFF)
3. to mobilise finance at scale to make implementation possible
4. to collaborate on trade and supply chains.

---

[14] E3G, We Mean Business Coalition, Global Renewables Alliance, June 2026, **Powering Up: Business perspectives on electrification**

[15] IRENA, May 2026, **Transitioning away from fossil fuels: A roadmap powered by renewables, electrification and grid enhancement**, pp. 7, 13.

[16] IEA, November 2025, **World Energy Outlook 2025**

If taken seriously by governments, individually and collectively, they can truly help power across the current divides and deliver ever more urgent and ambitious progress on delivering a global clean energy transition.

Energy sources: definitions

For the purposes of this report:

- **renewable energy** refers specifically to solar and wind
- **clean, low-carbon or non-fossil energy** refers to solar, wind, hydropower, bioenergy and nuclear power
- **fossil fuels** refer to coal, oil and gas.

Chapter 1: Discourses of security in an age of crises

Geopolitical shocks have reinforced energy security as a central driver of power sector policy, but governments retain significant discretion over how they interpret the source of their vulnerability and the policy responses that follow. Energy security has thus become the most powerful, yet most ambiguous, justification for divergent power sector strategies – despite the ever more urgent need to transition.

Energy supply security: Fossil fuel-based systems

The latest fossil fuel crisis due to blockade of the Strait of Hormuz earlier this year has sparked a wave of policy responses from governments worldwide as they try to ensure a reliable, affordable and sufficient supply of power for their countries.[17]

Alternative conceptions of energy security are competing for government buy-in:

- one based on the old fossil fuel architecture, with increased redundancies built in, or
- one predicated on an accelerated transition to an electrified economy fuelled by a renewables-based power system, with investment in grid modernisation, storage and flexibility, as well as boosting energy efficiency to further lessen demand.

Naturally, this is not a strict binary as most countries are using both fossil fuels and renewables at this time. Indeed, for some governments, such as **Türkiye**, fossil-derived and clean energy are not competing strategic choices, but complementary instruments within a broader approach to energy security and industrial planning, despite the conflicting policy choices this approach may require.

Today's fast-changing climatic and geopolitical context puts countries under pressure to rapidly revamp the role global collaboration plays in delivering energy security, and to decide what shared vision of energy security must be established. The ultimate significance of the Hormuz crisis may therefore be how governments choose to redefine energy security in response. As the examples of two countries with similar

[17] For details about the events starting on 28 February 2026 see the Introduction. GRA, E3G, ZCA, GGON, Ember, **Global Energy Crisis Policy Monitor 2026**, (dataset, accessed 28 September 2026)

exposure to the crisis and similar energy sectors and ambitions show, government responses can and do vary even when the context is similar.

▶ Japan and South Korea: Similar security vulnerabilities, different strategic responses

Both economies are highly dependent on imported energy. Japan's net energy imports accounted for 87% of total energy supply in 2024, with almost 100% of power sector fossil fuels imported. South Korea likewise imports virtually all its coal, gas and oil, with substantial exposure to Middle Eastern supplies.

Both countries have consequently prioritised maintaining dispatchable generation through gas and nuclear to serve as the dominant baseload source, alongside comparatively modest renewable deployment. Here, average capacity additions for wind and solar in the last five years have been 0.9 GW/year in South Korea and 1.7 GW/year in Japan, while planned gas capacity additions remain substantial at around 21 GW and 18 GW, respectively.

Both economies also anticipate substantial growth in electricity demand from strategic industries, particularly semiconductors, AI and data centres. Thus, here too Japan and South Korea face a similar challenge: securing large volumes of reliable electricity for increasingly electricity intensive industries while limiting exposure to volatile imported fuels.

Energy insecurity does not determine a country's energy pathway. The crucial difference lies in how governments translate vulnerability into policy:

- Japan has largely interpreted this energy security exposure as a reason to preserve and extend a diversified portfolio of thermal generation, supported by technologies such as hydrogen and ammonia co-firing and CCS.
- South Korea, by contrast, has begun to interpret energy security more explicitly as a reason to reduce exposure to imported fossil fuels. Its decision to join the PPCA at COP30 in November 2025 marked a shift in this direction, with the government committing to stop building new unabated coal plants and phase out existing unabated coal generation. Its subsequent decision not to support new plans for ammonia co-firing at coal plants, partly because this could prolong the operation of plants already marked for closure, further reinforces this direction.

*For full country analysis and sources, please refer to **Japan** and **South Korea** in Annex 1.*

Hormuz's global impact highlights crucial differences

The Hormuz crisis illustrates how disruption reverberates across global trade networks:

1. Global energy prices rose sharply in the weeks following the strikes, with crude oil up more than 40% and gasoline up more than 50% between 28 February and 28 May 2026 compared to average prices over the previous two years.[18]
2. This in turn fuelled higher coal prices – which are almost 40% more expensive year-on-year in 2026 – as markets anticipated fuel switching.[19]
3. Increased energy prices have led to higher inflation, forcing central banks to keep interest rates elevated or consider rate hikes.[20]
4. With long-term borrowing costs across many of the world's economies subsequently hitting new highs,[21] governments are increasingly having to balance trade-offs between energy access, affordability and transition investment.

Yet it also shows that energy import-dependent nations heavily reliant on supplies from the Strait of Hormuz have been hit the hardest, while countries that had already reduced their fossil fuel import dependence have been shielded from the worst economic impacts of this supply shock:

- Fossil fuel importers paid an extra US$330 billion for seaborne crude oil, oil products and LNG in the six months following the strikes against what pre-war futures markets had forecast.[22]
- Meanwhile, in the first five months of the crisis, clean power generation added since 2020 saved importing countries an estimated US$36 billion, including over €30bn in the EU.[23]

This highlights a critical difference between supply security in a renewables-based power system versus a fossil-based one:

- While solar and wind power require a one-off import of infrastructure components, such as photovoltaic panels or wind turbines, once installed the fuel (sunlight and wind) is domestic, free and cannot become stuck in transport chokepoints – permanently reducing exposure to international commodity supply constraints and price shocks.
- Countries dependent on fossil fuel imports, in contrast, must rely on the continuous extraction, transportation and re-importation of coal, oil or gas.

---

[18] UNCTAD, June 2026, **Strait of Hormuz Disruptions: The burden of oil price shocks on vulnerable economies**

[19] Trading Economics, **Coal** (commodity tracker, accessed 04 September 2026)

[20] The Guardian, August 2026, **Interest rate dilemma for central banks as inflation rises but growth slows**

[21] BBC, August 2026, **Global borrowing costs hit fresh highs over oil, AI and inflation concerns**

[22] CREA, August 2026, **What the Hormuz crisis has cost fossil fuel importers – March to August 2026**

[23] Solarpower Europe, September 2026, **€30 billion of gas imports now avoided thanks to Europe's solar fleet**

Pursuing energy security through diversified fossil fuel imports, domestic stockpiles or investment in more refining capabilities aims to build a fossil fuel-based system better able to withstand disruption, but does not obviate the fundamental dependencies embedded in a fossil economy. Measures such as energy efficiency improvements, electrification and clean power deployment can reduce dependence on internationally traded fossil fuels in a more lasting fashion.

Energy supply security: Renewables-based systems

Responses to risks inherent in global renewables supply chains

Energy security also exists in a renewables-based power system, including supply chains and other dependencies. For instance, the high concentration of clean energy trade value in **China** is now seen as a strategic risk by several countries, including much of the EU, the **UK**, **India** and **Japan**,[24] fearing geopolitical leverage in the form of supply weaponisation.

Decades of Chinese industrial strategy have led to it controlling over 70% of global manufacturing capacity in every major clean technology segment:[25] it supplies 85% of the world's solar panels, has 80% of lithium-ion battery, 95% of photovoltaic wafers and 97% of anode materials supply chain production capacity.[26]

Dual responses to this concern are emerging, with several governments choosing to invest in domestic manufacturing and also seeking to diversify their cleantech supply chains, while others seek to develop export capacity. For example:

- **India** is positioning itself as a possible alternative, though it remains more concentrated on downstream deployment (installation, module assembly, system integration) than upstream manufacturing, where China dominates.[27]
- **Indonesia** and the **Philippines** are others looking to site clean manufacturing capacity within their borders, including by Chinese companies looking to circumvent Western trade tariffs.[28]
- In **Ethiopia**, additional solar manufacturing capacity, and imports of solar cells rather than completed panels, are indicative of an increased drive for value creation on the African continent.

[24] The Oxford Institute for Energy Studies, April 2026, **The National Security Risks of China's Role in Europe's Energy Transition**

[25] BloombergNEF, April 2025, **China Dominates Clean Technology Manufacturing Investment as Tariffs Begin to Reshape Trade Flows**

[26] IEA, March 2026, **Energy Technology Perspectives 2026**

[27] The Diplomat, June 2026, **China, India, and the Emerging Green Divide**

[28] Rhodium Group, June 2026, **From Pledges to Plants? Rightsizing China's Global Clean Tech Investment**

Purchasing abundant and affordable Chinese cleantech while simultaneously investing in domestic or alternative supply chains offers a pragmatic dual-track strategy for global energy security and rapid decarbonisation in the short and medium term.

An alternative route to reduce dependencies on imported cleantech is to invest in domestic recycling capabilities. Examples include:

- In the **UK**, one of the country's earliest wind farms at Hagshaw Hill in Scotland has been fully recycled and reused – with less than 0.1% of turbines being sent to landfill.[29]
- The European wind industry made a voluntary commitment in 2021 not to send any blades to landfill,[30] indicative of a broader trend within the EU of ramping up domestic recycling initiatives to build strategic autonomy.[31]
- The **Indian** government has introduced an incentive scheme to promote domestic critical minerals recycling;[32] just one of the 21 countries the IEA lists as having such a policy.[33]

Economic security: Transition risks and opportunities

Carbon-related trade measures: Emerging impacts

Climate policy is beginning to alter the competitive conditions under which international trade takes place. Measures such as carbon pricing and carbon tariffs, like the EU's Carbon Border Adjustment Mechanism (CBAM)[34], are intended to reduce emissions while ensuring that domestic producers are not systematically disadvantaged by more emissions-intensive imports. (Financial rather than trade measures – such as JETPs, country platforms and investment treaties – are considered in Chapter 3.)

The dynamics of such carbon-related trade measures could create a clean re-industrialisation pathway for economies such as the **UK** and **Germany**: they narrow the cost advantage of higher-emissions production abroad by strengthening the relative competitiveness of lower-carbon domestic production.

These measures also have important implications for emerging economies seeking to industrialise and access major demand markets:

[29] The Times, August 2026, **ScottishPower fully recycles Hagshaw Hill wind farm in UK first**

[30] WindEurope, June 2021, **Wind industry calls for Europe-wide ban on landfilling turbine blades**

[31] European Parliament, January 2025, **Clean tech in the energy sector**

[32] Reuters, June 2025, **India incentives for critical minerals recycling in final stages of approval, government document shows**

[33] The IEA, **Policies database** (accessed 15 September 2026)

[34] European Commission, **Carbon Border Adjustment Mechanism** (accessed 29 October 2026)

- Much of **Indonesia**'s industrial expansion relies on captive coal power and carbon-intensive production, which could become less competitive in markets where carbon costs increasingly affect the price of traded goods.
- By contrast, countries such as **Türkiye** may be better positioned to compete in the EU as lower-carbon production becomes a growing advantage.

This emerging shift in trade patterns creates opportunities for the Global South, particularly countries with significant reserves of critical minerals. Governments across Africa and elsewhere are already seeking to move further up global value chains through mineral processing, component manufacturing and, where feasible, domestic clean technology production. Moreover, domestic access to low-cost renewable energy could itself become an industrial asset, allowing governments to leverage their clean power potential to attract energy-intensive processing and manufacturing.

Alignment of climate and economic policies: Emerging responses

We are seeing a greater intertwinement of clean energy expansion with industry and trade cooperation. This closer alignment of climate, industrial and trade policy is also driving new forms of international cooperation. For example:

- The **EU–India and UK–India partnerships offer an opportunity to link trade with clean technology manufacturing, innovation** and investment, while creating scope to deepen the development of new cleantech value chains. This has the potential to enhance competitiveness and energy security by reducing strategic dependencies on fossil fuels, while diversifying clean supply chains and accelerating the transition.
- The **Green Economy Partnership Arrangement on Climate and Energy** (GEPACE) between Australia and South Korea, which both have a 2050 net zero target yet whose existing energy trade relationship is dominated by fossil fuels: **Australia** is South Korea's largest supplier of LNG, while **South Korea** is one of Australia's key suppliers of refined petroleum products and its largest supplier of diesel.[35] As both countries seek to grow their clean energy industries, GEPACE expands this trade relationship to include green hydrogen and low-emission ammonia, critical minerals and batteries, and green metals.

[35] Minister of Foreign Affairs, Australia, April 2026, **Australia-Republic of Korea (ROK) joint statement on Energy Resource Security**

Hard security: Resilience from exogenous shocks

Energy security is also hard security. Without reliable power, there is no national security. A renewables-based power system faces different threats to a fossil-based one, beyond the differences in supply chain risks discussed above. Increasingly, principles of security of supply must be merged with those of security of critical infrastructure to ensure true energy security. Three different types of exogenous shocks serve to illustrate this point:

1. **Violent conflict:** Distributed renewable energy systems offer far greater wartime resilience and security than centralised thermal power plants because their modular nature prevents total system collapse when individual units are attacked.

2. **Cyberattacks:** The ongoing transformation of the energy sector is creating increasingly interconnected systems that rely on potentially vulnerable digital technologies.[36] Although no sub-sector of the energy system is invulnerable, analysis of recent attacks has found that the power sector is the most affected (with 36% of incidents recorded), followed by the oil and gas sectors (25% and 23% of incidents, respectively).[37]

3. **Climate impacts:** As extreme weather events become more frequent and ever more intense, the power system is also more exposed to these kinds of risks. Ideally, resilience to extreme events such as intense storms and long heatwaves is built in from the outset: by hardening physical infrastructure, improving operational flexibility and advanced digital management. Energy planners must consider the resilience of different sources of generation to current and future climates. For instance, in many parts of the world, climate change is worsening periods of drought, leading to greater water scarcity,[38] which impacts the reliability of hydropower, nuclear and coal-fired power stations, all requiring water for cooling.

Accelerating the power sector transition as a security strategy

This chapter has examined the energy security challenges facing countries in an increasingly volatile geopolitical landscape, looking at risks inherent in both fossil fuel- and renewables-based energy systems. In particular, exposure to fossil fuel markets, growing concentration in clean technology supply chains and physical threats to energy infrastructure. While the transition to renewables-based power systems can reduce some of these vulnerabilities, it also creates new dependencies that governments must manage.

[36] Energy Policy, January 2026, **Cyber threats and energy security: Development and analysis of an incident dataset for the period 2022–2024**

[37] Ibid.

[38] UN, **Water – at the centre of the climate crisis** (accessed 17 September 2026)

Based on this analysis, several priorities can be highlighted:

- **Reducing dependence on imported fossil fuels** would shield economies from the volatility of international fossil fuel markets and minimise supply disruptions at key chokepoints. The most enduring ways for countries to achieve security of power supply are to deploy clean power, enable rapid electrification and improve energy efficiency.
- **Diversifying clean technology and critical mineral supply chains is increasingly important for energy security**, particularly given China's dominant position in key manufacturing and mineral processing markets. Greater international cooperation on supply chain diversification, alongside investment in domestic recycling capabilities for critical minerals and clean technologies can add further security to new renewables-based power systems.
- **Strengthening the resilience of energy infrastructure** is essential as electricity systems face growing risks from conflict and extreme weather. While the distributed nature of a renewables-based system has security benefits to a centralised grid with a few large thermal power stations, both fossil fuel- and renewables-based systems are exposed to physical threats, making investment in resilient infrastructure, greater system flexibility and effective grid management increasingly important.
- **Deepening international cooperation on clean energy deployment** can help countries address shared security risks and accelerate the transition. Influential economies beyond the major powers have an important role in translating political commitments into practical cooperation on grids, renewable deployment, supply chains and finance, strengthening collective energy security.

Chapter 2: Transitioning in different power system contexts

For the world to have any chance of meeting Paris-aligned climate scenarios, the global power transition must accelerate rapidly. Progress across countries is varied but points to key themes, including the importance of delivering renewable energy and displacing fossil fuels, the challenges of phasing out coal and the risk of new gas, and the role of electrification and supporting infrastructure and grids.

Transitioning away from fossil fuels

At COP28, as part of the UAE Consensus, the world's countries agreed to the landmark global goal of transitioning away from fossil fuels in energy systems in a just, orderly and equitable manner to achieve net zero by 2050. **Delivering this goal will depend as much on international cooperation as on national action: no country can manage the structured decline of fossil fuels alone.**

The agreement on a global goal reflects growing momentum at global, regional and national levels, as the clean energy transition becomes increasingly central to countries' energy security, climate and industrial priorities. These dynamics helped create the political conditions for a negotiated agreement, which now provides a shared direction and level of ambition for international cooperation and implementation of the global energy transition.

Meeting this goal will require steep declines in fossil fuel use. In the IEA's Net Zero Emissions by 2050 Scenario, for example, global supplies of coal, oil and gas fall by 92%, 77% and 80% respectively between 2024 and 2050.[39]

This transition is not just a matter of exchanging one energy source for another, but instead a whole-systems rewiring of the global economy – reshaping how energy is produced, transported, consumed and governed across value chains. The challenges and opportunities that countries face in this transformation will therefore also be determined by a wide range of dynamics, including of global trade, macroeconomics, geopolitics and different development pathways.

[39] IEA, 2025, **World Energy Outlook 2025** (PDF)

Managing transition complexities: The national perspective

At the national level, implementing this whole-economy shift will require countries to manage the economic, industrial, security, development and affordability implications of fossil fuel dependence across their economies. The nature of that dependence varies, and many countries face more than one form of it.

Where countries depend on fossil fuel production and exports, the transition means reducing fiscal dependence on fossil fuel revenues, building new trade and export opportunities, and advancing economic diversification – often as part of new development models. Where they depend on fossil fuel imports, it means reducing exposure to price shocks, tackling affordability challenges and enhancing strategic autonomy through clean power and electrification.

These distinctions are not always clear-cut, with many countries dependent on both fossil fuel exports and imports. Within the oil value chain, **Brazil** and **Mexico** export crude oil but import refined products, while **South Korea** and **India** rely heavily on imported crude oil yet are major exporters of refined petroleum products. Across fuels, **Australia** and **Indonesia** are major coal and LNG exporters but net importers of oil.[40]

For developing countries, whatever their position, the transition also requires improved access to finance, addressing high costs of capital and debt burdens and unlocking investment to meet the scale of the challenge.

Managing fossil fuel phase-out: The international perspective

Crucially, these transitions cannot be delivered only through isolated national action, first-mover clubs, or be left to fragmented market and policy approaches. The challenges are systemic and tied to global markets, which means international cooperation frameworks and new forms of governance are essential to manage the structured decline of fossil fuel supply and demand – and to guard against volatility, economic shocks, inequitable outcomes and geopolitical spillover, thus ensuring all countries can share in the opportunities of the transition.

New frameworks and platforms are already emerging to address the currently fragmented international cooperation architecture:

- At COP30, **Brazil** launched an initiative to develop a global roadmap on the transition away from fossil fuels, following intense negotiations on next steps for implementing the UAE goal within the UNFCCC space.
- In parallel, the first global Conference on Transitioning Away from Fossil Fuels (TAFF) took place in Santa Marta, hosted by Colombia and the Netherlands to advance

[40] For information about the sources of information relating to countries highlighted, please see the Methodology section at the beginning of the Annexes.

international cooperation on practical delivery; Tuvalu and Ireland will co-host a follow-up conference in 2027.

- Existing energy diplomacy coalitions such as PPCA and BOGA continue to evolve as spaces for norm-setting, fostering peer-to-peer exchange, and supporting country transition partnerships.

These processes and platforms are also fostering new dialogue between fossil fuel producer and importer countries and international institutions such as multilateral development banks (MDBs), international energy agencies and other alliances, to set political direction and to tackle the transition as an economic transformation agenda.

At the heart of these new discussions is how to coordinate emerging support for national and regional transition plans, roadmaps, to transition away from fossil fuels. These serve both to signal direction and momentum and help align cross-government actors and institutions around a whole-economy transition. At the time of writing, **Germany**, France and the Netherlands have all published national roadmaps.

Similarly to the national perspective, it is unlikely – amid geopolitical fragmentation and different country realities – that any single coalition or platform can deliver the international cooperation needed. Rather, a combination of multilateral, regional, sectoral and first-mover forums will be necessary to provide the support and partnerships needed to underpin the next phase of implementation, from the UNFCCC to the Santa Marta TAFF process, from energy coalitions to new producer–importer partnerships.

Building this more coherent architecture for international support and cooperation will fundamentally shape the political conditions for both country-led implementation pathways, and for the Second Global Stocktake as a lever for renewed ambition, momentum and delivery in the global transition. In the remainder of this chapter, we will showcase some of the challenges and opportunities to move forward identified though our country analysis (Annexes 1, 2).

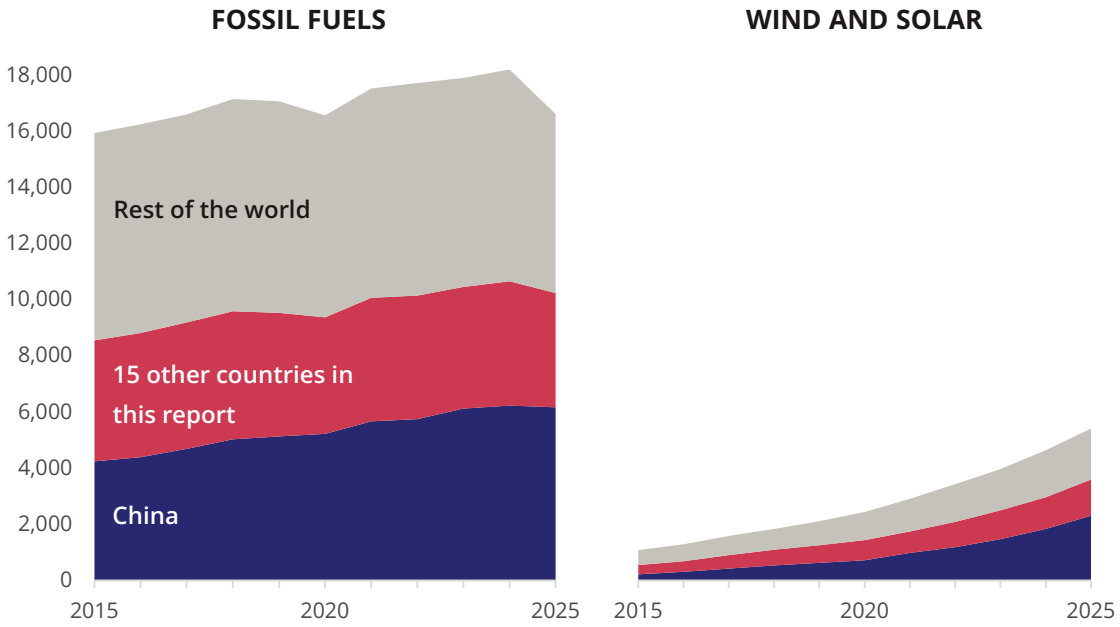
Displacing fossil fuels in the power system: progress and risks

The clean power transition is well underway, given that electricity generation from wind and solar has almost quintupled globally in the decade since the Paris Agreement.[41] This is the case also across the countries covered in this report: compared with 2015, renewable generation in 2025 was more than ten times higher in **China**, and four times higher across the remaining 15 countries (see Figure 2).

[41] Ember, October 2026, **Electricity data explorer**

Power generation from fossil fuels vs wind and solar (2015–2025)

Electricity generation (TWh)



Source: *E3G analysis of Ember yearly electricity data.*

Figure 2: Power generation from wind and solar has grown significantly over the past decade, though this has not yet translated into lower generation from fossil fuels. China is illustrated separately from the other 15 countries covered in this report given its size.

Yet the growth of clean power has not consistently translated into lower fossil fuel generation. In fact, fossil generation in TWh has remained broadly stable across the world, or even increased (such as in **China**, **India** and **Indonesia**) as electricity systems have expanded in response to electrification, industrialisation and development.[42]

Mature systems: Renewable expansion and fossil fuel displacement

The experiences of Germany and the UK demonstrate that renewables deployment can displace fossil fuel generation. Since the Paris Agreement in 2015, absolute generation from fossil sources has declined in both countries while wind and solar have surged ahead. In 2025, variable renewable energy accounted for approximately 36% of electricity generation in the UK and 45% in Germany, while projected 2030 renewable shares are around 81% and 68%, respectively. These trajectories indicate that significant displacement of fossil generation is possible when renewables deployment is accompanied by broader changes across the power system.

[42] Ember, 2026, **Global Electricity Review 2026**

Coal phase-out policies have been an important component of this shift (see below on coal incumbency generally):

- The UK completed its coal phase-out in 2024, with wind and solar together accounting for 34.5% of electricity generation that year.[43]
- Germany has committed to phasing out coal by 2038 at the latest and continues to retire coal capacity, including 6.7 GW in 2024.[44]

These experiences suggest that renewables deployment is more likely to translate into sustained fossil fuel displacement when accompanied by deliberate measures to retire fossil capacity and constrain its continued expansion.

However, both Germany and the UK continue to plan significant new gas capacity (15.7 GW and 13.1 GW respectively, see below on gas lock-in). The challenge for the next phase of the transition in these mature systems is therefore no longer simply to add clean generation – rather, it will be to ensure that the wider power system can absorb increasing volumes of renewables while fossil capacity is retired (rather than retained, replaced or extended through new gas investment).

Developing systems: Expanding electricity access and renewables

Countries where electricity systems still need to expand rapidly to meet unmet demand and support broader access to electricity face a fundamentally different challenge – as Indonesia and Nigeria demonstrate. If overall electricity demand is rising faster than renewable supply, that means even rapid growth in clean power may still occur alongside continued expansion of fossil generation. However, as these two examples illustrate, the factors driving increased demand can be very different.

- In **Indonesia**, much of the continued fossil expansion is linked to industrial growth within an increasingly electrified economy. Here, clean power is being layered onto an expanding system rather than replacing fossil fuels; in 2024, fossil fuels generated 82% of electricity, with coal alone at roughly 62%. While the government has announced plans for over 100 GW of renewable energy and storage, these ambitions sit alongside one of the world's largest planned coal pipelines (11 GW pre-construction plus construction capacity) and almost 17 GW of new gas capacity. Much of this is driven not by rising household electricity demand, but by captive coal plants supplying energy-intensive industrial sectors such as nickel processing.
- By contrast, in **Nigeria** fossil fuel investment is closely tied to the development imperative of expanding electricity supply and improving energy access. Around two-fifths of Nigerians (approximately 86–110 million people) still lack reliable access to electricity, so expansion here is driven primarily by the need to provide more electricity to a large and underserved population. Nigeria has one of the highest fossil-to-clean

[43] Ember, 2026, United Kingdom power sector overview (webpage, accessed 10 September 2026)
[44] Global Energy Monitor, 2025, **Boom and Bust Coal 2025**

ratios among the countries analysed – its planned fossil fuel capacity is almost seven times larger than planned renewables capacity; excluding a further 15 GW of gas-fired power capacity already in the pre-construction or construction stages.

Indonesia therefore illustrates why renewables deployment must be assessed against the growth of the electricity system as a whole: because electricity demand is rising alongside industrialisation, renewables generation must first keep pace with additional demand before it can materially reduce fossil generation. In Nigeria, the challenge is not simply to phase out an existing fossil-heavy system, but to expand electricity supply rapidly while limiting carbon lock-in.

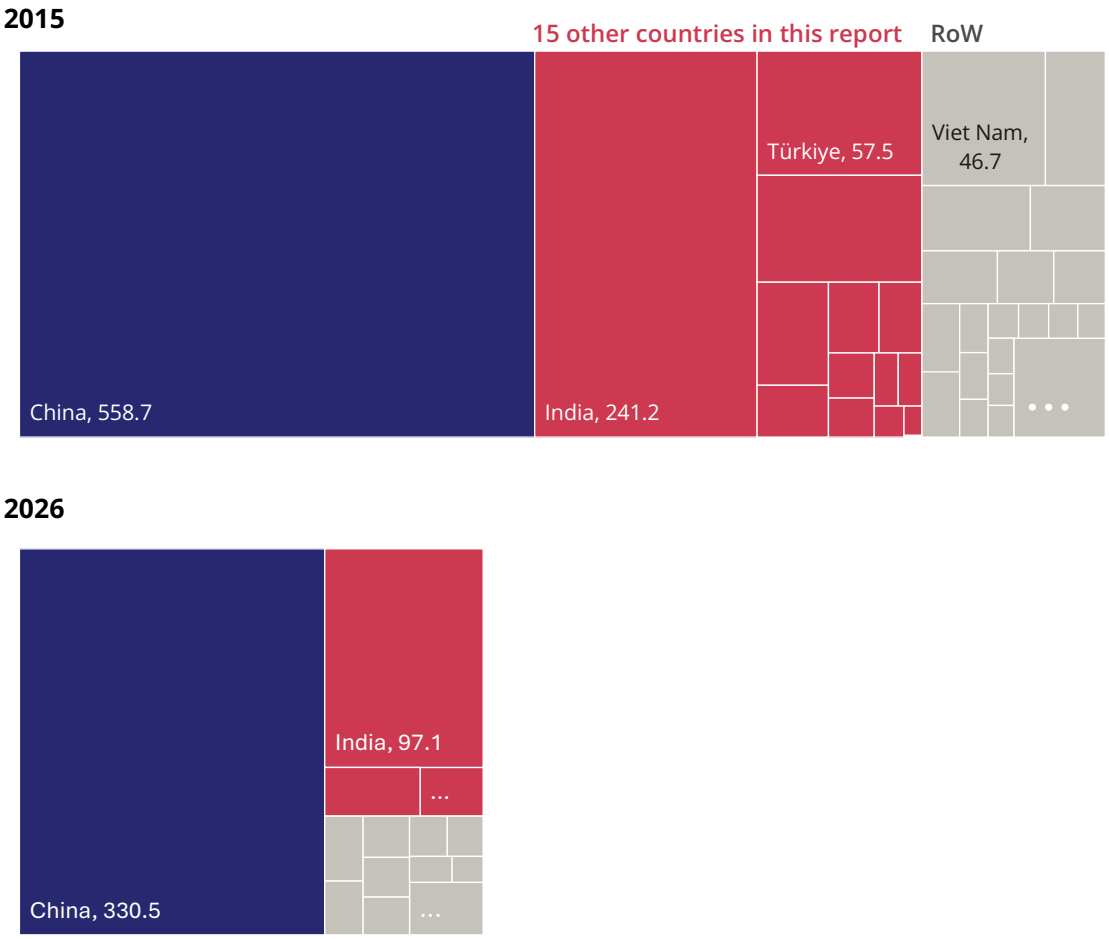
Managing coal incumbency: Diverse contexts and strategies

While the clean power transition is underway, delivering on the UAE Consensus commitment to transition away from fossil fuels in a just, orderly and equitable manner, and achieve net zero by 2050, will require a steep decline in global coal production and consumption – falling by 92% by 2050. The entrenched role of coal in energy systems, economies and political institutions is the most significant structural barrier to accelerating the transition. However, the past decade has also seen a substantial shift away from new coal development, with the global coal project pipeline contracting significantly since the Paris Agreement, reflecting the declining viability of new coal power projects (Figure 3).

The role of coal across countries' energy mix continues, as it depends not only on the age of existing assets but on how they function within the power system and broader economy. As a result, governments face very different challenges in managing coal incumbency, depending on the legacy systems they inherit. The examples that follow will help illustrate this in greater detail, and help point towards ways forward for countries with:

- coal phase-out already achieved or feasible
- ageing coal fleets
- young coal fleets.

Global coal project pipeline, 2015 & 2026 (GW)



Source: *E3G analysis of Global Energy Monitor Status Changes. Data shown is for pre-construction capacity only (planned coal pipeline).*

Figure 3: 36 countries have exited the coal pipeline since the Paris Agreement (2015).

Among advanced economies, coal phase-out is largely a matter of political follow-through and managed structural decline:

- The **UK** completed its coal exit in 2024, while **Germany** has a legally binding 2038 phase-out date supported by structural assistance for affected coal regions (see mature systems discussed above).
- **South Korea** has committed to phase out all unabated coal by 2040, following its accession to the PPCA at COP30. 40 of the country's 61 coal plants currently have retirement dates set; the government's broader phase-out roadmap is expected to address the future of the remaining plants.
- **Australia** has a less defined pathway. It has no national coal phase-out date, with its last coal plant currently scheduled to retire in 2046, although modelling by the Australian Energy Market Operator (AEMO) indicates that an exit during the 2030s is technically feasible and consistent with Australia's climate objectives.

- **Türkiye** presents a further contrast, as continued plans for new coal capacity complicate the broader trend towards managing the decline of existing coal fleets.

For countries with ageing coal fleets, the economic case for retirement is strengthening as older plants become increasingly costly to operate and maintain. This pressure is reinforced by the declining cost of renewable energy: over half of the coal plants operating today cost more to run than building new renewable capacity, suggesting that for many plants, continued operation is already becoming economically inefficient.[45] However, economic inefficiency does not necessarily translate into rapid closure.

South Africa illustrates this tension particularly clearly. Its coal fleet is one of the oldest among the influential middle economies,[46] yet coal remains deeply embedded in the electricity system and wider economy, accounting for around 81% of generation. Coal remains closely tied to industrial activity, employment and regional economies, particularly in Mpumalanga province. It is also bound up with Eskom, the state-owned utility that dominates South Africa's power system, and with perceptions of energy sovereignty, employment, Black Economic Empowerment and development.

This means that the clean power transition is contested not only in terms of the pace of retirement but also of ownership and who benefits from the emerging renewables sector. The challenge is therefore not simply whether ageing coal plants can be replaced economically or technically, but how their retirement affects the communities, workers, institutions and electricity systems that have developed around them. In other words, coal phase-out remains as much a political and structural challenge as a technical one.

Another issue that South Africa illustrates is the need for grid finance to flow. It has a substantial renewable pipeline that could provide replacement capacity, yet constrained transmission infrastructure and Eskom's financial position limit the extent to which this potential can be realised. (See box on "Turning capital into transition delivery" in Chapter 3.)

Indonesia presents a different form of coal incumbency, with a relatively young coal system but one that remains embedded in the country's development and industrialisation model. First, Indonesia is the world's third-largest coal producer, after **China** and **India**, and its largest coal exporter. Second, captive coal plants supplying nickel and other mineral-processing industries further deepen this economic dependence, representing approximately 31 GW of coal capacity (operating and under development). Because these plants directly supply industrial facilities rather than the wider grid, the resulting emissions growth largely sits outside the conventional grid-managed transition. In this case, coal is not simply an incumbent source of electricity but remains closely connected to industrial expansion and the country's broader economic transformation.

---

[45] Carbon Tracker, March 2020, **How to waste over half a trillion dollars: The economic implications of deflationary renewable energy for coal power investments**

[46] **Poland** operates the oldest coal fleet among the countries analysed in this report, averaging almost 42 years, followed by **South Africa** at 39.6 years and **Australia** at 35.8 years.

Relatively young coal fleets also change the economics of transition, as ageing and rising operating costs do not provide an immediate structural impetus for retirement, as they do in Poland, South Africa or Australia. Rather, recently constructed plants are expected to operate for decades, as is the case particularly in Asia, including the Philippines and Indonesia whose coal fleets are less than 15 years old, on average. This increases the risk of carbon lock-in and makes the management of coal incumbency more complex.

The challenge is therefore not simply to retire existing assets as they reach the end of their economic lives, but to develop mechanisms for early retirement, repurposing or alternative uses that can reduce the long-term role of coal while allowing Indonesia to pursue industrial development.

The contrast between these different contexts highlights why coal phase-out cannot be treated as a single policy problem. The effectiveness of coal transition strategies will therefore depend not only on the availability of replacement clean generation, but on the role that coal continues to play in the wider electricity system and economy.

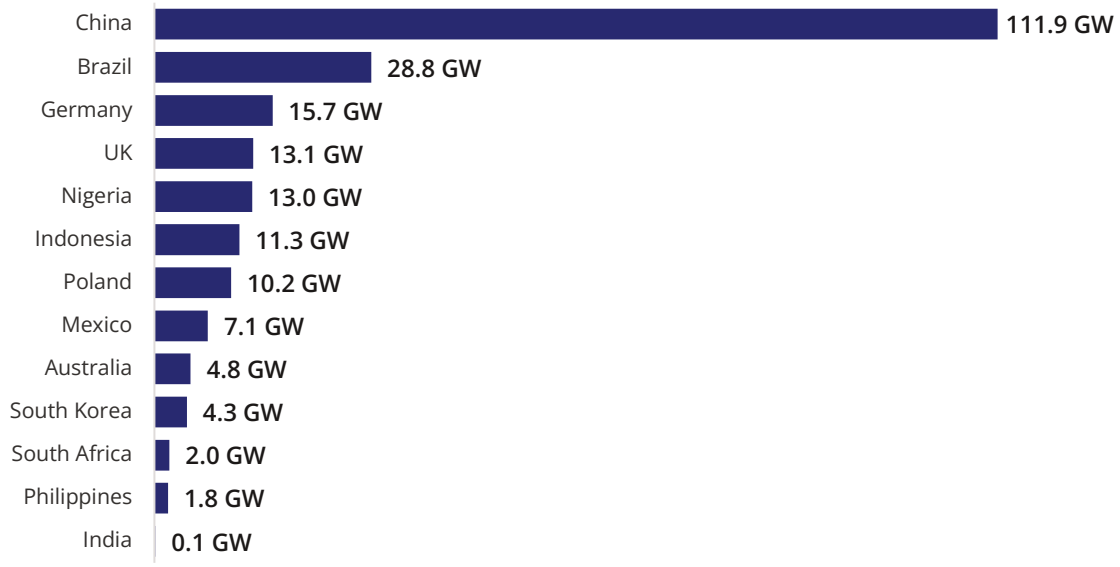
Emerging risk of gas lock-in

Countries also continue to plan significant new gas capacity: as of August 2026, approximately 1,136 GW of oil- and gas-fired power capacity was under development globally, with the US accounting for around one-third (378 GW).[47] **China** accounts for 14% (111.9 GW), while the other countries analysed in this report have smaller pipelines (see Figure 4). The rationale for this expansion differs across countries:

- In the **UK** and **Germany**, new gas capacity is primarily being justified by the need for flexibility as variable renewables expand.
- **Japan** and **South Korea** import almost all of their gas as LNG, and it continues to play a significant role in the power system and remains closely tied to energy security concerns.
- The **Philippines** is moving towards a similar position, as imported LNG replaces declining domestic gas supply and gas fills part of the gap left by its 2020 moratorium on new coal plants.
- In **Indonesia**, gas expansion is linked to rapidly rising electricity demand and delays in bringing clean projects to construction.

[47] Global Energy Monitor, August 2026, **U.S. gas power proposals tied to data centers nearly double in six months**

Gas capacity under development in the countries analysed



Source: *E3G analysis of Global Energy Monitor, Integrated Power Tracker data as of August 2026.*

Figure 4: Gas projects in the 16 countries analysed that are announced, pre-constructed and under construction in gigawatts (GW)

These different pathways nevertheless create a common risk: **gas capacity built to address near-term system needs can become embedded** in power systems for decades, prolonging fossil-fuel dependence. Recent disruption to energy flows through the Strait of Hormuz (representing around 20% of global LNG trade) further exposes the weaknesses of gas as a long-term energy security strategy.

LNG-dependent power systems remain exposed to international fuel prices, shipping constraints and geopolitical chokepoints. The disruption illustrates that expanding fossil-fuel supply does not eliminate these vulnerabilities when fuels remain dependent on concentrated production and transport routes.

Governments would therefore do well to strictly limit further gas capacity and require that alternatives are exhausted before new gas is added to the system. This could include:

- investment in domestic renewable generation
- measures to address the underlying system constraints through increased interconnection, grid investment, storage, other forms of flexibility and energy efficiency
- requirements for large new sources of demand, such as data centres, to contribute to the additional grid and flexibility capacity they require.

Where existing gas capacity is retained, governments should:

- prioritise limited life extensions over new-build capacity
- operate remaining gas plants increasingly as strategic reserve with clear limits on their use
- establish a pathway towards fully abated generation in the 2030s.

Electrification and rising power demand

Global momentum: Setting new targets

The global conversation on electrification has been gaining pace in 2026. An electrification target of 35% by 2035, in line with 1.5 °C scenarios, forms a key part of **Türkiye**'s COP31 Action Agenda – dubbed the "35-by-35" target;[48] and related initiatives are attracting wider policy attention, including Electrify Now – a global coalition of business, think tanks, civil society and governments.[49]

The recent energy security concerns following the Strait of Hormuz crisis (see Chapter 1) have reinforced this agenda, especially for major fossil fuel importers: price volatility has strengthened the case for electrification to reduce their import dependence and improve strategic autonomy and economic resilience.[50]

More broadly, this reflects a shift in energy transition strategies towards increasing electricity's role in transport, buildings and industry. Electrification is a necessary step in the whole-economy transition to clean energy: it moves end uses away from the direct combustion of fossil fuels, transferring that demand onto the electricity system, where it can increasingly be met through renewable generation.

The carbon reduction impact of electrifying these sectors, however, depends on the power system supplying that electricity. Electrification and clean energy must scale together so that fossil fuel use is replaced by renewables-powered electricity, not shifted upstream into power generation. Where additional demand is met by coal or gas generation, emissions reduction benefits are missed. Therefore, **for the "35-by-35" electrification target to be consistent with a 1.5 °C pathway, it must go hand in hand with a fall in the global share of fossil fuels in total energy supply from 81% in 2023 to 48% by 2035.**[51]

---

[48] UNFCCC, 9 June 2026, **COP31 Presidency announces new targets on global electrification, cutting waste, resilient cities; press conference transcript**

[49] European Commission, 24 June 2026, **EU at London Climate Action Week: Joining forces to expand electrification and reduce methane emissions**; E3G, We Mean Business Coalition and Global Renewables Alliance, 2026, **Powering Up: Global Business Perspectives on Electrification**

[50] IEA (IEA), 2024, **Strategies for Affordable and Fair Clean Energy Transitions: Price shocks and affordability** (webpage, accessed 21 September 2026)

[51] IRENA, May 2026, **Transitioning away from fossil fuels: A roadmap powered by renewables, electrification and grid enhancement**, pp. 7, 13 (PDF)

Electrification is only one factor in the expected increase in global power demand; others include industrialisation, rising incomes and appliance use, cooling requirements and new loads such as data centres – all depending on the national context. The IEA forecasts global electricity demand to grow by an average 3.6% annually between 2026 and 2030.[52] Meeting this additional demand with clean power will require renewables deployment to be matched by investment in grids, storage, distribution networks, demand-side flexibility, affordability and energy efficiency.

Electrification should therefore form part of a coordinated energy transition that both enables renewables to meet a larger share of final energy demand and supports existing global commitments (on renewables, efficiency and the transition away from fossil fuels).[29] Countries should also ensure that developers of new data centres are incentivising the deployment of additional renewable generation capacity, to avoid the risk that this demand is met by captive fossil fuel generation capacity.

Different contexts: Getting targeting and sequencing right

The case for electrification is strengthened by the efficiency gains associated with many electric technologies. EVs, heat pumps and electric cooking technologies can deliver the same services using substantially less energy than fossil fuel-based alternatives.[53] For economies where power sector decarbonisation is already relatively advanced, electrification offers a route to extending emissions reductions into sectors where fossil fuel use is entrenched. Electrifying heat and other end uses can therefore translate progress in the power sector into wider economy decarbonisation. For instance:

- The **UK**'s grid has become significantly cleaner since 1990: 52.1% of electricity was generated by renewables in 2025,[54] and the UK is planning to expand this to close to 100% by 2030. However, gas use for domestic heating remains a major source of emissions.[55]
- Similarly, in **Brazil** renewables generated 86.8% of the electricity mix in 2025 but only provided 26.1% of energy for transport.[56] Electrifying transport can extend the benefits of Brazil's relatively clean power system into a sector still reliant on fossil fuels.

The role and sequencing of electrification will differ significantly across countries. **China** stands out for the pace and scale of electrification across its economy, reaching 30% in 2025,[57] with the pace of electrification expected to accelerate over the 15th Five Year Plan,

---

[52] IEA, 2026, **Electricity 2026**

[53] IEA, November 2024, **Energy Efficiency 2024**; the IEA notes that electrified technologies including EVs and heat pumps can be several times more efficient than fossil fuel-based alternatives.

[54] Department for Energy Security and Net Zero, 30 July 2026, **DUKES 2026 Chapter 5: Electricity** (PDF)

[55] Department for Energy Security and Net Zero, 13 December 2024, **Clean Power 2030 Action Plan: A new era of clean electricity – main report** (PDF)

[56] EPE (2026), **Brazilian Energy Balance 2026: Summary Report – Base Year 2025**, pp. 7–8

[57] People's Daily, 19 January 2026, **For the first time globally, China's total electricity consumption exceeded 10 trillion kWh in 2025 – what does "10 trillion" mean?**, republished by Xinhua (webpage, accessed 16 September 2026)

targeting 35% by 2030.[58] However, continued reliance on coal generation for power impacts the potential for emissions reduction – in 2025, 42% of China's electricity was generated from clean sources, and 54% from coal.[59] This highlights the importance of the generation mix underpinning the system change.

Besides China, most countries are yet to see increased electrification rates, although policy measures including the rapid rollout of EVs due to tax breaks in Vietnam, or **Ethiopia**'s ban on importing gasoline and diesel vehicles (since 2024), will impact rates going forward.[60,] For many advanced economies, electrification is increasingly the next step in decarbonising sectors that remain reliant on fossil fuels, particularly transport and heating. In EMDEs, the policy context is more diverse:

- In **Indonesia**, electrification can support industrialisation, manufacturing and wider economic growth. The country has significant nickel reserves, an expanding manufacturing base and growing investment in EV and battery supply chains. These provide a strong foundation for developing clean industries and moving up the global value chain, aligning with the government's Golden Indonesia 2045 vision for industrial development and economic transformation.[61] In the nickel industry, Indonesia is targeting an 81% emissions cut and fully renewables-powered processing by 2045; this will require clean electricity to be implemented across existing operations and scaled with industrial demand increase.[62]
- In **Nigeria** and **Ethiopia**, as in many lower-income countries, enabling reliable energy access is the priority and precondition for electrification. In Nigeria, only 62.5% of the population had electricity access in 2024, while households experience on average seven outages per week, typically lasting 12 hours, reinforcing reliance on diesel and petrol generators.[63] In Ethiopia, only 44% of the population had at least a basic level of electricity service in 2025, leaving around 71 million people without a sufficient access.[64]

These different circumstances provide an important nuance to reaching the "35-by-35" target in cases where electrification concerns access and reliability rather than fuel switching. In contexts where a wide-reaching grid does not exist, distributed renewables systems and mini-grids can help to expand clean energy access rapidly. In the IEA's energy

---

[58] National Development and Reform Commission (NDRC) and National Energy Administration (NEA), June 2026, **New Energy System Development Plan for the 15th Five-Year Plan Period**, p. 2 (PDF)

[59] Ember, September 2026, **China Energy Trends** (webpage, accessed 16 September 2026)

[60] Climate Policy Database, 2024, **Electric Vehicle Import Mandate and ICE Vehicle Ban** (webpage, accessed 21 September 2026); Reuters, 20 April 2026, **Vietnam plans to extend tax incentives for EVs until 2030** (webpage, accessed 21 September 2026)

[61] Secretariat of the 2025–2045 RPJPN, 2024, **Golden Indonesia 2045: National Long-Term Development Plan 2025-2045** (webpage, accessed 5 August 2026)

[62] World Resources Institute, 6 January 2026, **Nickel's Climate Cost and Indonesia's Push for Cleaner Production** (webpage, accessed 5 August 2026)

[63] World Bank, August 2025, **New World Bank Program to Expand Electricity Access to Six Million People Across Ethiopia**

[64] World Bank Group, 16 June 2026, **Under Mission 300, A New Way of Doing Business Connects Over 50 Million People to Electricity Across Africa**

access pathway, just after 2035, 30% of new electricity connections come from mini-grids and 25% from stand-alone systems, with decentralised solutions particularly suited to places where grid extension is not feasible in the near term.[65] A global electrification agenda clearly needs to accommodate different national circumstances and avoid assuming a uniform pathway.

The same applies to finance. Electrification faces many of the wider energy transition's existing barriers, including high capital costs, limited fiscal space and underinvestment in grids and storage. Financing therefore needs to reflect different country contexts and reach beyond large generation projects to the distributed systems, local providers, small and medium-sized enterprises (SMEs) and end-use investments where electrification takes place. Chapter 3 gives more details.

In summary, electrification is a necessary step in the transition to clean energy but must be delivered holistically as part of a wider system transformation to enable a whole-economy transition away from fossil fuels – alongside renewable generation, storage, efficiency measures, improvements to grids and to energy access. Managed in this way, electrification can reinforce the transition to cleaner power systems, including by transforming previously fossil fuel dependent sectors, improving energy efficiency and supporting wider green industrialisation and economic development for the long term.

Grids and system resilience

Transmission and distribution grids are the backbone of the energy transition. It is a global challenge to maintain and strengthen them to meet the needs of increasing demand, greater penetration of renewable energy and growing populations to prevent them becoming a bottleneck. Our analysis of the countries covered in this report shows that grid constraints are a critical barrier to delivering a secure, affordable and clean energy system, reflecting the global picture.

▶ Physical constraints are the most visible bottleneck

Australia's electricity grids, built for centralised coal plants near cities, face backlogs for remote renewables projects, with less than 1.5% of a 372 GW prospective pipeline currently under construction.

China's 15th Five-Year Plan explicitly identifies grid investment, transmission and storage as priorities, noting that grid constraints are preventing renewables from displacing coal in the power mix. In the past decade alone (2017 to July 2026), China has added 347 GW of coal capacity to its power sector (on net).

[65] IEA, 2025, **Achieving access for all – World Energy Outlook 2025**

Germany's north–south transmission expansion remains insufficient to move wind power from where it is generated to industrial demand centres in the south and west.

Indonesia's archipelagic grid requires an estimated US$1 billion more in annual transmission investment; yet coal overcapacity in Java-Bali reduces the state utility's incentive to integrate variable renewables.

Japan's grid capacity and interregional transmission constraints are compounded by dispatch rules that prioritise coal- and gas-fired power plants, which face minimum operating output constraints of 30–50% of capacity, limiting the grid's ability to accommodate renewable generation.

Nigeria's grid unreliability pushes both supply and demand away from the grid and towards largely fossil-based off-grid power. Its grid delivers a peak of only around 5.7 GW against roughly 20 GW of demand. On average, in January 2026, only 36% of the country's 13.6 GW of installed generation capacity was available to supply electricity, equivalent to approximately 4.9 GW and below the grid's reported peak delivery of 5.7 GW.

Poland's rapid renewables growth is increasingly outpacing the power system's ability to connect and absorb: nearly 1.4 TWh of renewable electricity was curtailed in 2025, twice the 2024 level, predominantly because of balancing constraints.

South Africa's Northern, Eastern and Western Cape (the renewables-richest regions) have no remaining evacuation capacity, leaving some 72 GW of advanced-stage projects unable to connect and delaying the move away from coal, which currently supplies 81% of electricity generation.

South Korea's renewable resources are concentrated in coastal and rural areas, while industrial demand is centred in the northwest Seoul–Gyeonggi region and the southeastern Ulsan–Pohang corridor; transmission expansion has lagged materially.

Source: E3G country analyses in the annexes to this report

These examples demonstrate that grid constraints represent more than a barrier to renewables deployment. They are becoming a constraint on the wider transition: without sufficient transmission, distribution and flexibility, countries cannot simultaneously integrate rising renewable generation and electrify transport, industry and other sources of energy demand.

However, while this is a global issue, the nature of the challenge differs, as we have just seen – meaning the type of grid improvement required will reflect the different contexts and paths of electrification, and wider decarbonisation of power systems.

The challenges: Expanding conventional grids

Improving grids will be vital to unlocking accelerated deployment of renewables, where delays in accessing grid connections and high curtailment rates are challenges in many countries, as the examples above show. The **UK** illustrates the scale of the challenge even in a mature power system particularly well: the government has unlocked a £28 billion programme of grid investment (between 2026 and 2031) to expand and modernise established systems to accommodate growing renewable generation and electrification, while its National Energy System Operator has estimated that around £89 billion of investment could be needed through the 2030s.[66] As well as the volume of investment needed, the speed at which it must be done is a significant challenge. The UK has launched Great British Grid, a publicly owned body, to increase investment and speed up projects.[67]

In **China** too, rapid growth in wind and solar has made grid expansion and system flexibility increasingly important, with renewables curtailment highlighting the costs of insufficient network capacity and system integration.

The challenges: Distributed grids as alternative and complement

Grid investment is also central to closing the global energy access gap in countries like **Ethiopia** and **Nigeria** which have well over 140 million people between them who do not have access to electricity.[68] While expanding conventional grids remains essential, extending networks to remote and dispersed communities can be expensive and slow. The challenge here is not simply to connect people, but to provide electricity that is reliable and affordable enough to support households, businesses and economic development.

Distributed energy can provide an alternative as well as a complement. Solar systems, batteries and mini-grids can bring power to communities cheaply and quickly; at the same time, they provide a pathway towards broader grid integration over time. In countries with weak or unreliable grids, or high electricity costs, these solutions can play a transformative role in expanding, or securing, access. Examples include:

- **Nigeria**: lack of access
- **South Africa**: unreliable grid supply
- **Brazil** and the **Philippines**: high electricity costs.

However, this strategy represents both an opportunity and a challenge: lacking, unreliable or expensive grid access incentivises distributed renewable energy, yet their growth can put existing grids and national utilities under increasing pressure, sometimes leading to increased prices for a smaller customer base without reform.

---

[66] National Audit Office, September 2026, **Upgrading the electricity transmission network** (PDF)

[67] Department for Energy and Net Zero, September 2026, **Great British Grid to speed up connections and cut bills**

[68] World Bank, May 2026, **Access to Electricity: Who Remains Without Power?**

Opportunities: Collaborating on strategic grid infrastructure

Countries must treat grids as strategic infrastructure: planning ahead for future demand, accelerating connections, improving system flexibility and creating the financial conditions for investment and working together. In fact, collaboration on grid infrastructure will be increasingly important, and this can take many forms, including the following:

- best practice and expertise
- interconnection and regional power tools
- financing (see also Chapter 3).

It is increasingly important to share best practice, technical assistance and knowledge on grid management, modernisation and expansion, as well as on regulatory systems. For example, as penetration levels of variable renewable energy steadily increase it is vital for grid operators and utilities to learn and understand best practices. This can be a valuable part of knowledge dissemination from the Global North to other nations. Such exchange could take the form of formal agreements on knowledge sharing (such as the Memorandum of Understanding signed between the electricity system operators of Great Britain, Northern Ireland and Ireland in March 2026),[69] or more informal arrangements.

Interconnection and regional power pools will be another particularly impactful area for countries to lead on together. Building on existing examples is an achievable first step and increased cooperation on smaller projects will help provide stepping stones and an enabling environment for delivery of more ambitious efforts. Examples include:

- The ASEAN power grid in **Indonesia** and the **Philippines**, which aims to strengthen regional interconnections and cross-border electricity trading to improve energy security and connectivity.[70]
- The Western, Eastern and Southern African Power Pools for **Nigeria**, **Ethiopia** and **South Africa** respectively, which support cross-border electricity trade, regional grid integration and more reliable power supply.[71]
- Larger regional initiatives, such as blueprints to connect Africa's power pools into a continental-scale sharing system, or Mediterranean initiatives such as the EU's T-MED programme in the Mediterranean, could deliver wider benefits through coordinated renewable deployment, infrastructure investment and regional electricity integration.[72]

[69] National Energy System Operator (NESO), 13 March 2026, **Electricity network operators strengthen cooperation to accelerate decarbonisation**

[70] ASEAN Centre for Energy, **ASEAN Power Grid** (webpage, accessed 30 October 2026)

[71] Economic Community of West African States (ECOWAS), **West African Power Pool**; Eastern Africa Power Pool, **About the EAPP**; South African Department of Electricity and Energy, **Southern African Power Pool**

[72] European Commission (2026), **Trans-Mediterranean Renewable Energy and Clean-Tech Cooperation Initiative (T-MED)**

In the EU, interconnection and market arrangements between countries like **Germany** and **Poland**, and with the **UK**, have brought significant benefits. Taking forward projects to collaborate on shared North Sea offshore wind resources and interconnection would be an ambitious next step.

Grid infrastructure is capital-intensive, has long payback periods and it can be difficult to incentivise private finance. Financing it remains a major challenge globally, but particularly across EMDEs, where high costs of capital, currency risks and the financial position of utilities can constrain investment. To address these barriers cooperation between countries will be required in the following areas:

- providing concessional finance for those most in need
- partnering on financing projects across borders and regions
- cooperating on de-risking and regulatory environments which can help finance to flow
- pushing for more effective financing and guarantees from international financial organisations and MDBs, following the example of the ASEAN Power Grid Financing Initiative, launched by the Asian Development Bank and World Bank to finance interconnection across the region.

Chapter 3: Finance in the power transition

Clean energy investment is growing too slowly and is not reaching the markets and projects that need it most. Closing these gaps will require not only more capital, but more country-led platforms that build credible pipelines, align finance with national as much as global priorities and tackle context-specific barriers to implementation.

Global clean energy investment is lagging behind

The past five years have seen increasingly ambitious multilateral commitments on the global energy transition, for example through the COP28 UAE Consensus and the Santa Marta TAFF process. However, as we have seen, the world is not reducing emissions at the pace necessary to meet the temperature goals of the Paris Agreement. In part this is because global financial flows remain far removed from a Paris-aligned trajectory:

- While global climate finance reached a record US$2 trillion in 2024, even the lowest estimate of annual investment needs averages US$6.2 trillion between 2031 and 2035 – more than three times current levels.[73] With annual growth in climate finance slowing to just 6% in 2024, flows are not on track to close this gap.[74]
- It is estimated that this year, 2026, global energy investment will reach around US$3.4 trillion, of which US$2.2 trillion will be directed towards clean energy, including renewables, grids, storage, nuclear, low-emissions fuels, efficiency and electrification. However, the final third, US$1.2 trillion, will be invested in fossil fuels.[75]

This is at a time when there are arguably increasing headwinds for energy transition finance, including scepticism and fatigue for the JETP model (see below), increasing supply-chain costs through the Middle East crisis (see Chapter 1), distrust of multilateralism, and costly, growing sovereign debt burdens.

These **global figures also mask persistent regional disparities**: EMDEs outside China account for less than 30% of global energy investment and around 20% of power sector investment, despite being home to two-thirds of the world's population and facing rapidly

[73] Climate Policy Initiative (2026), **Top-down Climate Finance Needs**
[74] Climate Policy Initiative (2026), **Global Landscape of Climate Finance 2026**
[75] IEA, 2026, **World Energy Investment 2026** (PDF)

rising demand for energy services[76] – meaning they require almost US$4 trillion in climate finance annually to 2030.[77] The need to rapidly accelerate the pace and scale of the energy transition is thus especially great in EMDEs. Their share of global energy investment growth will need to rise from around 10% over the past decade to more than 50% over the next ten years. Yet their financing costs are already at least double those of advanced economies and China, making that shift much harder to achieve.[78]

The critical task of reducing the cost and perceived risk of investment in emerging economies can be achieved in various ways, including through guarantees, political-risk insurance and currency-risk protection, alongside greater public and development finance. National and regional development banks can help turn government plans into investable pipelines, while larger institutions provide capital and risk-sharing at scale.

Clean energy investments are also not reaching the places where they are most needed, even when they are available. Discrepancies between the amount of finance pledged and finance allocated or delivered are telling: just 14.5% of the total JETP envelope in **Indonesia** was approved as of February 2026[79] (more on JETPs below), reflecting the challenge of aligning finance with national priorities.

Against a backdrop of declining Official Development Assistance (ODA) and growing constraints on public finance,[80] the transition finance challenge extends beyond mobilising additional capital and identifying investment needs. **It also requires better coordination and more effective deployment of fragmented public and private finance.**[81] Key levers here include:

- using scarce grants where they add the most value
- deploying guarantees and other risk-bearing instruments more strategically
- strengthening national development banks
- connecting international finance to credible country platforms.

Given the fact, therefore, that funding challenges are not the same everywhere, despite being global, the work to address them effectively must be integrated into country-level delivery efforts and broader coalitions and coordination spaces (such as the Santa Marta TAFF process), including:

---

[76] IEA, 2026, **World Energy Investment 2026** (PDF)

[77] Climate Policy Initiative, 2026, **Global Landscape of Climate Finance 2026** (PDF)

[78] IEA, 2026, **World Energy Investment 2026** (PDF)

[79] Institute for Energy Economics and Financial Analysis, 5 February 2026, **Building credibility in Indonesia's energy transition: Insights from the ETM and JETP Indonesia**

[80] OECD, 2026, **ODA projections for 2026 and the near-term: Implications for vulnerable countries and sectors.**

[81] UN Trade and Development, 2026, **All roads lead to reform: A financial system fit to mobilize $1.3 trillion for climate finance.**

- diverting public financial flows away from fossil fuels
- freeing up finance for clean energy
- delivering on the burgeoning diplomatic focus on electrification as a means of energy security.

Building on and reshaping financial collaboration

Just Energy Transition Partnerships and country platforms

The first Just Energy Transition Partnership (JETP) was announced at COP26 in Glasgow in 2021, with South Africa becoming the first recipient of international support under this model. Since then, JETPs have emerged as an important mechanism for aligning international political support and finance behind nationally led energy transitions. They have helped establish political and institutional foundations for accelerating clean energy transitions in participating countries.

For example, JETPs have elevated energy transition on government agendas, established coordination and delivery structures, and contributed to regulatory change:

- **South Africa**'s JET Implementation Plan, project management unit, Funding Platform and Investment Register have strengthened the architecture for transition implementation. The country has also supported electricity-market reforms.
- **Indonesia**'s JETP delivery unit has provided mechanisms to coordinate investment and policy, as well as contributing to introducing restrictions on new coal.

Progress with JETPs has nonetheless been more difficult than hoped. But the challenges that many JETPs face underline that transition finance requires institutional and policy reform alongside capital:

- Political and institutional changes have disrupted JETP implementation.
- Weak coordination and uncertainty over institutional responsibilities have complicated delivery.
- The limited availability of grant funding has been a major issue, with most support provided through loans; for instance, grants account for roughly 6% of the US$12.8 billion pledged to South Africa[82] and around 1.4% of the US$21.4 billion committed to Indonesia.[83]

[82] The Presidency, Republic of South Africa, 6 March 2025, **JET Grant Register** (PDF)

[83] Institute for Energy Economics and Financial Analysis, 5 February 2026, **Building credibility in Indonesia's energy transition: Insights from the ETM and JETP Indonesia**

- Issues around project preparation, regulation and risk allocation have constrained the conversion of headline commitments into investment.

Individual retirement projects should not be treated as the sole test of the model. The proposed Cirebon coal-retirement transaction in Indonesia, for example, was pursued through the Asian Development Bank's Energy Transition Mechanism rather than the JETP itself,[84] although it benefited from the political momentum and international coordination surrounding the partnership. Its ultimate cancellation illustrates the wider political, regulatory and financial challenges of coal transition, rather than providing a standalone verdict on JETPs. In fact, the difficulty in progressing individual projects makes the case for joined up systems, such as JETPs and Country Platforms, which can better tackle issues at a country level with political and financial backing.

The next generation of country platforms should be more strongly country-led, with clear institutional mandates and coordination mechanisms rooted in existing national architecture. International partners should adapt support to local political and economic realities, while linking finance to observable delivery milestones, including grid upgrades, market reform and just transition outcomes. Financing should make greater use of national development banks, guarantees and other instruments that can address local-currency, project-origination and risk-allocation challenges.

In sum, the central lesson is not that JETPs have failed, but that **political commitments and financial pledges must be converted into country-owned delivery systems**.

Turning capital into transition delivery

Bankability and revenue constraints can matter as much as the availability of capital.

Nigeria and South Africa both demonstrate that substantial domestic capital and project pipelines do not automatically translate into investment. In Nigeria, weak project preparation, limited developer capacity and uncertain offtake are compounded by below-cost tariffs and poor revenue collection, leaving otherwise available capital unable to find bankable projects. In South Africa, the constraint is less a shortage of projects than a revenue and offtake problem: Eskom's financial weakness undermines its credibility as an offtaker, preventing otherwise viable projects from reaching financial close. Both cases, therefore, suggest that transition finance needs to address the underlying conditions that make projects investable, including project preparation, credible offtake, and sustainable revenue models, rather than focusing only on increasing the volume of capital.

[85] Ember, August 2026, **Electricity Data Explorer**

Country platforms are increasingly emerging as one way to bridge this gap between capital, project pipelines and implementation.

Rather than simply mobilising additional finance, mechanisms such as Nigeria's Climate Investment Platform, **Brazil**'s Climate and Ecological Transformation Investment Platform, and **Türkiye**'s Industrial Decarbonisation Investment Platform seek to organise investment priorities, strengthen project preparation and connect projects with appropriate public and private finance.

The COP31 Climate Implementation Bridge pushes this logic further, focusing on translating national climate priorities into investment-ready portfolios and directing finance towards credible pipelines rather than creating another financial institution. These mechanisms can therefore help convert available capital into investable projects, although parallel regulatory and sectoral reforms should also follow to tackle deeper constraints, particularly weak revenue models, uncertain offtake or non-cost-reflective tariffs.

Investment treaties

Investment treaties, part of the rules governing cross-border investment and trade, impact on transition efforts. For instance:

- Investor–state dispute settlements (ISDS) can constrain governments' ability to regulate the industries and supply chains underlying traded goods.
- Fossil fuel investors have used ISDS to challenge measures such as coal phase-outs and restrictions on oil and gas extraction, creating potential costs for governments pursuing the energy transition.

Reviewing existing treaties, removing or reforming ISDS provisions, and excluding them from new agreements could therefore give governments greater policy space to introduce climate and industrial policies. Coordinated reform through trade, investment and climate forums could help ensure that international economic rules support the shift towards low-carbon production and trade.

Conclusion: *Advancing power transitions in a fragmented world*

Towards a new architecture of practical cooperation

The rationale for power sector transition is changing. The multilateral level remains critical to maintaining ambition and accountability, negotiating, agreeing and monitoring climate commitments. At the same time, **in a more fragmented geopolitical environment, a broader ecosystem of practical cooperation is required to make real progress at the pace needed.**

This is even more true given that clean power systems are increasingly being pursued for a wider set of reasons, as we have seen, such as to:

- reduce exposure to volatile fossil fuel markets
- improve economic resilience and competitiveness
- future-proof electricity systems against changing technologies and rising demand.

Climate progress remains a critical outcome, but it is increasingly reinforced by these wider economic and strategic interests.

This points towards a more diverse architecture of international collaboration alongside the multilateral climate process: while the COP process remains essential for establishing the direction of global climate action, this global framework needs connecting to the regional and bilateral (as well as sectoral and other) relationships through which much of the transition will be delivered. The special value of such agile cooperation lies in its ability to bridge the gap between global ambition and the investment, infrastructure and capabilities needed to deliver it.

Bilateral cooperation will be particularly important. As our analysis and country profiles show, these partnerships can be built around mutual economic and security interests instead of requiring agreement on the full range of climate policy. They can therefore be more responsive to national circumstances, allowing cooperation to focus on concrete projects and capabilities rather than on shared targets alone.

Regional initiatives and alliances provide another crucial layer of collaboration. Platforms such as the Asia Zero Emission Community (AZEC), ASEAN energy cooperation (APAEC), Clean Energy Transition Partnership (CETP), the International Solar Alliance (ISA)

and the Powering Past Coal Alliance (PPCA) demonstrate how countries can work in smaller groupings around shared technologies, markets or transition challenges. These multilateral institutions provide an avenue for growing renewable energy generation, knowledge sharing on energy transition subjects and accelerating clean energy transitions – while also meeting development and climate objectives.

▶ AZEC serves as an example of regional initiatives

Established by **Japan** with its ASEAN neighbour countries and **Australia**, the community provides a loose framework for the member countries' energy-related cooperation, ranging from high-level direction-setting discussions to concrete deal-making towards tangible projects.

While concerns have been raised about whether AZEC's project portfolio is sufficiently aligned with its own zero emission framing, the following could all provide insights into how to design similar regional energy initiatives:

- its convening function which fosters high-level cooperation
- the promise of financing for member countries' transition needs
- flexibility in its operations.

The emerging TAFF process provides another avenue for cooperation, with the first Conference on Transitioning Away from Fossil Fuels (held in Santa Marta, in April 2026) providing a new forum for countries to develop practical roadmaps for phasing out coal, oil and gas. Initiatives associated with G20 presidencies can similarly provide political momentum and a platform for translating broader commitments into more targeted cooperation.

Although a more fragmented world may make universal agreement harder, it can also increase the value of practical cooperation between countries whose interests align. The task is therefore not necessarily to recreate a single model of international climate cooperation, but to build multiple routes through which countries can pursue shared economic and strategic interests while accelerating the transition to clean power.

Annex 1: Country transition profiles

Methodology

Our methodology combines **quantitative analysis** of countries' energy, economic and emissions profiles with **qualitative political economy analysis** of policy developments, political and institutional dynamics, stakeholder interests and international positioning.

Evidence was drawn from:

- quantitative datasets
- government policies and documents
- academic and institutional research
- relevant stakeholder and political intelligence.

Where available, the analysis also builds on insights generated through **E3G's Political Economy Mapping Methodology**, which combines quantitative indicators with qualitative thematic analysis, stakeholder engagement and iterative testing.

Full country profiles

Based on this mixed-methods analysis, each full country profile addresses the overarching question: **why does the country's transition pathway look the way it does?** The evidence is synthesised across three analytical dimensions:

- Political economy context: the key political, economic and structural characteristics shaping the country's transition pathway and its likely direction.
- Enabling and constraining conditions: a summary of the political, economic and practical factors accelerating or inhibiting transition that can be leveraged – including infrastructure, institutions, industrial interests, finance, and domestic and external incentives.
- Opportunities for international cooperation: areas where collaboration could address implementation barriers, reinforce domestic incentives or advance transition objectives aligned with national economic, energy and political priorities.

The choice of the ten countries analysed here is set out in the Summary above.

Focus of our analysis

Importantly, the analysis is neither a ranking of countries nor an assessment against a single model of transition. Different starting points, resource endowments, economic structures and political priorities create different transition pathways. The methodology instead seeks to identify the conditions shaping those pathways, where momentum or constraints are emerging, and where cooperation could most effectively support country-led implementation.

The analysis is deliberately forward-looking, considering not only current policies and energy mixes but also emerging political and economic incentives likely to influence the direction and pace of transition. International cooperation is assessed in terms of where it can reinforce nationally relevant priorities and implementation incentives.

COUNTRY PROFILE

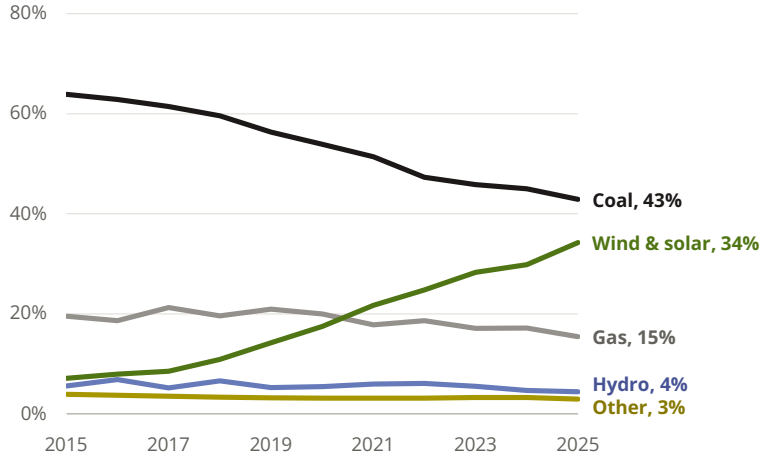
Australia at a glance

Australia is scaling renewables and critical minerals to become a clean energy superpower, but dependence on coal and LNG export revenue creates uncertainty over its dual fossil fuel and clean energy identity.

Key transition conditions: Abundant renewables, critical minerals and Asia-Pacific trade ties, but fossil export revenue, grid and approval delays, and state control of coal timelines slow delivery.

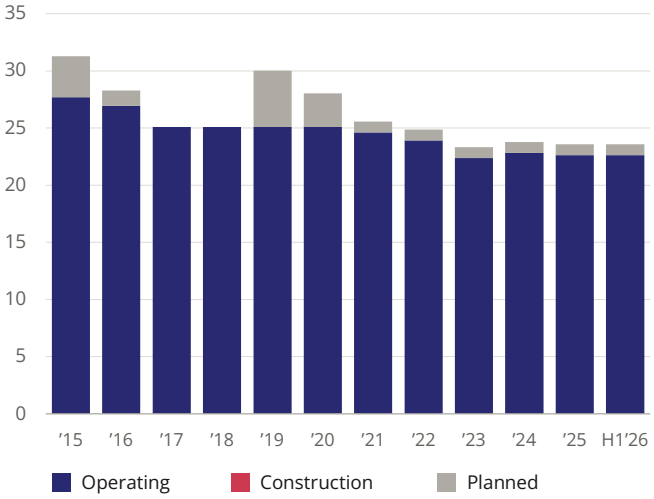
Electricity generation by source

2015–2025

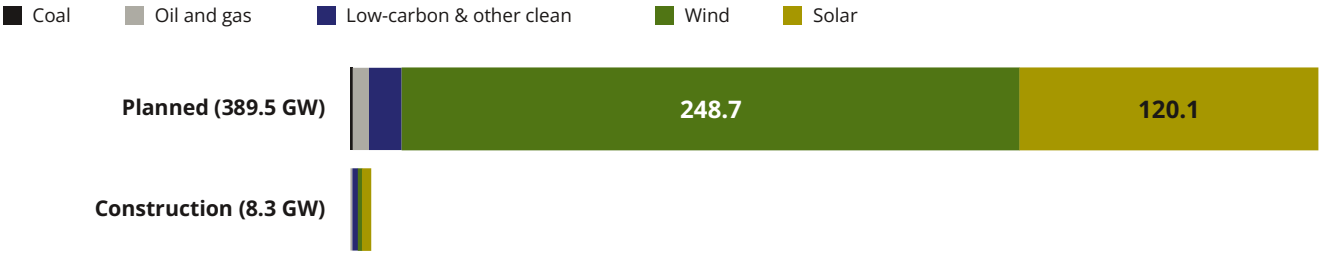


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Coal 0.9, Oil and gas 6.6, Low-carbon & other clean 13.1 GW (planned) · Oil and gas 0.8, Low-carbon & other clean 2.3, Wind 1.6, Solar 3.6 GW (construction)

Power system landscape

Fossil fuels power **61.4%** of electricity, with coal alone at 42.7%, the second highest in the OECD. There is no national coal phase-out date; the last plant is due to retire in 2046. Queensland coal outages rose 83% in H1 2026.

Clean transition trends

Target of **82%** renewable electricity by 2030, but the pace is too slow. Solar supplies 19.7% and wind 13.7%. Less than 1.5% of the pipeline is under construction: 5.1 GW of a prospective 374.2 GW.

Enablers and bottlenecks

The **A$22.7bn** Future Made in Australia package and the OECD's largest solar and wind pipeline offer a base. But projects face connection backlogs and approvals of up to seven years, and fossil fuels still earn about 25% of export income.

Opportunities for international cooperation with *Australia*

- **Transition dialogues with trading partners offer an opening:** clean industries keep exports competitive, and Southeast Asia's clean economy could bring US$10bn a year by 2030.
- **COP31 is a platform to advance the transition away from fossil fuels:** as President of the Negotiations, Australia could reiterate No New Coal and clarify its coal phase-out plan.
- **Clean electrification can build credibility and cut costs:** switching from gas can save A$500–1,900 a year, and EV drivers save around A$1,400.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Australia's profile

Outline and domestic political economy context

Fossil fuels power 61.4% of Australia's electricity mix,[85] **with coal alone at 42.7% – the second highest in the OECD and the 12th largest operating fleet globally**.[86] Gas's share is, however, shrinking, at 16.4% in 2025.[87] Australia has also committed to no new unabated coal-fired power generation in 2021,[88] but has no national coal phase-out date. The last coal plant is due to retire in 2046, though modelling by the Australian Energy Market Operator (AEMO) indicates a 2030s phase-out is technically feasible and aligned with climate goals.[89] Meanwhile, the ageing coal fleet is increasingly unreliable and pushing up power prices for consumers and heavy industry: a spike on 8 July 2026 saw the National Electricity Market prices average above AUD 300/MWh for most of the evening peak,[90] after an old coal plant failure at a moment of high demand triggered six other coal units to rebid upwards. Climate and Energy Minister Chris Bowen acknowledged that coal is no longer a reliable baseload, citing an 83% rise in Queensland coal outages in the first half of 2026[91] against zero renewables-caused outages caused in several consecutive years – underscoring the case for an orderly transition to renewables backed by storage and other reliable capacity, which consistently drive prices down in Australia.[92]

The share of renewables is increasing, though not fast enough to meet the 82% renewables-based electricity target by 2030. Solar and wind currently supply 19.7% and 13.7% of the mix, respectively.[93] Delivering the target requires converting Australia's project pipeline – the largest for solar and wind in the OECD and the third largest globally[94] – into operating capacity, but less than 1.5% is under construction (5.1 GW of a prospective 374.2 GW). Just one in ten investors believes Australia will meet its renewables target.[95]

Australia is a major fossil fuel producer and exporter. It is the world's second-largest LNG exporter behind the US,[96] with 83% of domestic LNG production exported[97] and Australian gas accounting for ~20% of global LNG trade.[98] Amid elevated domestic petrol

---

[85] Ember, August 2026, **Electricity Data Explorer**
[86] Global Energy Monitor, July 2026, **Global Coal Plant Tracker**
[87] Ember, August 2026, **Electricity Data Explorer**
[88] Argus Media, November 2024, **Cop: Australia backs no new coal power call**
[89] AEMO, June 2024, **2024 Integrated System Plan (ISP)**
[90] Renew Economy, July 2026, **Coal closure plan urgently needed as unreliable clunkers push power prices through roof**
[91] ABC News, August 2026, "**Chris Bowen speaks about Australia's energy future at National Press Club**"
[92] Clean Technica, June 2026, **Electricity Prices Fall Across Australia As Renewables Build Momentum**
[93] Ember, August 2026, **Electricity Data Explorer**
[94] Global Energy Monitor, February 2026, **Global Solar Power Tracker** and **Global Wind Power Tracker**
[95] Renew Economy, July 2026, **"They are losing patience:" Just one in 10 investors believe Australia will meet renewables target**
[96] International Gas Union, July 2026, **2026 World LNG Report**
[97] IEEFA, December 2025, **Australian Gas and LNG Tracker**
[98] Australian Government, Department of Industry, Science and Resources, February 2022, **Global Resources Strategy commodity report: liquefied natural gas**

prices, high inflation and the smallest stockpiles of any IEA member,[99] the federal government has introduced a domestic gas reservation scheme requiring exporters to allocate up to 20% of production to the domestic market from July 2027.[100] Oil and gas producers have meanwhile made record profits since the Iran conflict began, with Woodside Energy – Australia's largest producer – reporting nearly a 30% revenue jump to A$6 billion in Q2 2026.[101] Australia is also the world's second-largest coal exporter behind Indonesia:[102] coal makes up 67% of total energy exports and is mined in nearly every state,[103] with over 80% shipped to China, India, Japan, South Korea, Taiwan and Vietnam.[104] Yet with seven of Australia's top ten trading partners (68% of two-way trade) holding 2050 net zero targets,[105] and fossil fuels generating ~25% of export income, significant revenue is at risk as decarbonisation accelerates; in fact, this makes clean power and green industry expansion the fastest route to keep exports competitive.

Despite being a major fossil fuel exporter, Australia is highly exposed to the volatile international oil market: refined oil products meet 58% of final energy consumption, over 90% of which is imported – largely from Asian refineries themselves dependent on Middle Eastern crude, placing the vulnerability two steps upstream.[106] If Asia-Pacific refiners prioritise domestic supply amid the Strait of Hormuz, Australian imports are jeopardised – as when China, a source of one-third of Australia's jet fuel in 2025,[107] halted fuel exports in March 2026.[108] Geography compounds this: even rerouted crude must still pass through narrow chokepoints – the Indonesian straits of Malacca, Lombok and Sunda carry ~83% of Australia's maritime imports and ~90% of exports.[109] Clean energy expansion, efficiency gains and electrification would all reduce this exposure.

Australia's flagship transition initiative, the "Future Made in Australia", is framed primarily around industrial and economic upsides – exporting green hydrogen, metals and renewable energy[110] – rather than direct climate commitments such as a coal phase-out date. Announced in the 2024–25 budget with A$22.7 billion committed over the next decade, it is pitched around boosting economic growth and deepening partnerships across Asia-Pacific, including with Southeast Asia and with other

[99] The Guardian, July 2026, **Australian households face prospect of interest rate hike and petrol prices rising above $2 a litre**; IEEFA, March 2026, **The perfect storm to boost energy security**

[100] EnerData, May 2026, **Australia imposes 20% domestic quota on LNG exports from 2027**

[101] The Sydney Morning Herald, July 2026, **Oil and gas giant becomes one of Australia's biggest winners from Iran war**

[102] IEA, July 2026, **World Energy Balances**

[103] IEA, **Australia: Coal** (webpage, accessed 14 August 2026)

[104] IEEFA, July 2024, **Australia's coal export market: Shifting trade dynamics with Asia**

[105] Climate Change Authority, October 2021, **Trade and investment trends in a decarbonising world** (PDF)

[106] Department of Climate Change, Energy, the Environment and Water, August 2025, **Australian Energy Statistics 2025**

[107] Hydrocarbon Processing, March 2026, **China's fuel export ban to further tighten Asia supply**

[108] Financial Review, March 2026, **Australia exposed in global scramble for fuel**

[109] E3G, March 2026, **Chokepoints: A systemic threat to energy security for oil and gas importers**.

[110] The Treasury, Australian Government, 2024, **Future Made in Australia**

Commonwealth members.[111] This framing has become even more useful since the Iran conflict weighs on economic growth and the cost of living: economists warned of Australia's weakest GDP growth since the 1990s if the conflict persists.[112] Indeed, by August 2026 costs were still climbing,[113] making a coal phase-out a harder political sell. Emphasising jobs and industrial competitiveness let the government pursue the transition without making politically costly climate commitments.

This political caution is compounded by federal–state fragmentation: since energy generation, land use and electricity distribution sit with the states, Canberra cannot set a firm national coal phase-out date without their support. Queensland's current state government illustrates this, having reversed its predecessor's 2035 coal phase-out pledge by extending existing coal generation to 2046 and withdrawing support for clean alternatives.[114] Victoria mirrors the risk: the opposition, favoured to potentially win November 2026's election, has campaigned on extending coal, expanding fossil gas and cancelling a key renewables transmission project.[115]

Australia faces major hurdles in deploying its planned renewable energy projects due to grid connection bottlenecks and regulatory delays. Its electricity grids were built for centralised coal and gas plants near cities, not for remote, decentralised solar and wind farms.[116] A lack of high-voltage transmission lines has also created backlogs for projects trying to connect to the network.[117] Regulatory delays stem from lengthy approvals – development applications often take up to seven years in states like New South Wales – and from local opposition to large-scale wind, solar and transmission line footprints.[118]

Summary of key domestic transition factors

- **Enabling conditions for Australia include abundant renewable resources, space, critical minerals, industrial capabilities and trade ties across Asia-Pacific.** The **"**Future Made in Australia" package leverages these to build export-oriented green hydrogen, metals and clean energy industries, positioning Australia as a potential clean energy superpower and a major producer of green tech. Combined with the world's largest solar and wind project pipeline, these advantages offer a credible route to a decarbonised, export-competitive economy.

---

[111] Department of the Prime Minister and Cabinet, Australian Government, May 2022, **The Australian Government's strategic priorities**

[112] Financial review, April 2026, **Households brace for cost-of-living shock as conflict drives up prices**

[113] Australian Bureau of Statistics, August 2026, **Selected Living Cost Indexes, Australia**

[114] Financial Review, April 2025, **Queensland tears up transition targets and will keep coal for longer**; Australian Mine Safety Journal, September 2022, **Qld coal will be phased out by 2035, says authority**; The Conversation, June 2025, **The Queensland government is cancelling renewable energy projects. Can the state still reach net zero?**

[115] Renew Economy, August 2026, **Victoria Coalition says it may keep old coal lunkers running, and will scrap plans to move away from gas**

[116] Ampacimon, May 2026, **Australia's grid is leaving renewable energy on the table**

[117] Clean Energy Investor Group, November 2025, **Transmission Bottleneck Analysis** (PDF)

[118] Nexa Advisory, February 2024, **Delays of planning of renewable projects in NSW** (PDF)

- **Constraining conditions include its continued dependence on fossil fuel export revenue, unreliable ageing coal generation and infrastructure barriers** – grid backlogs and slow regulatory approval are delaying renewables. Political fragmentation compounds this: since coal phase-out timelines sit with the states, Canberra cannot set a firm national date, and individual states can reverse course regardless of federal ambition. Cost-of-living pressures make climate commitments politically costly at both national and state levels.

Opportunities for international collaboration

1. **Strengthen energy transition dialogues among Asia-Pacific partners.** Many of Australia's trading partners are swiftly decarbonising, spurred by the largest fossil fuel supply shock in history in spring 2026. For Australia, significant revenue is at risk as these fuels represent a quarter of Australia's export income. Expanding clean power deployment at home and promoting future clean industries abroad is the cheapest and fastest route to keep Australia's exports competitive in a net zero world. Southeast Asia's clean economy could be worth US$10 billion per year[119] to Australia by 2030 if it positions itself as a key player in clean energy supply chains.

2. **Advance the implementation of the transition away from fossil fuels at COP31 as President of the Negotiations** by supporting the TAFF roadmap and sharing lessons from its own coal-to-clean shift. Reiterating its No New Coal commitment would embed this as a milestone in the TAFF process; joining the PPCA would be a further, more ambitious signal. The lack of clarity on Australia's coal phase-out is already unsettling clean energy investors,[120] thus risking its credibility as a transition destination and its clean energy superpower ambitions. A clear coal phase-out plan, led by transmission and firmed renewables delivery, would give investors the certainty needed.

3. **Advance clean electrification – such as rooftop solar, batteries and EVs in Australia**. Doing so will give the country credibility on the international stage as well as cut costs domestically, which matters as fuel prices rise after the Strait of Hormuz closure, adding to inflation that will persist even once this crisis ends.[121] Electrification insulates households and businesses from these shocks: switching from gas can save a household A$500–1,900 a year, and EV drivers save around A$1,400 annually versus petrol.[122] Business leaders agree – 61% expect rising energy costs from the global energy crisis, and 78% say current shocks make electrification more urgent.[123]

---

[119] Kaya Partners, 2025, **Maximising Australia's green growth: Leveraging trade and aid policy to drive Australia's green exports agenda**

[120] Renew Economy, July 2026, **Coal closure "interventions" are stifling investment in the very projects needed to replace them**

[121] The Conversation, July 2026, **Australians brace for higher fuel prices as US-Iran conflict resumes (again)**

[122] The Australian Climate Council, March 2026, **Fuel shock: why clean energy is our best defence**.

[123] WMBC, E3G, GRA, Public First, June 2026, **Global Business Poll: Powering Up. Business perspectives on electrification across 18 countries**

COUNTRY PROFILE

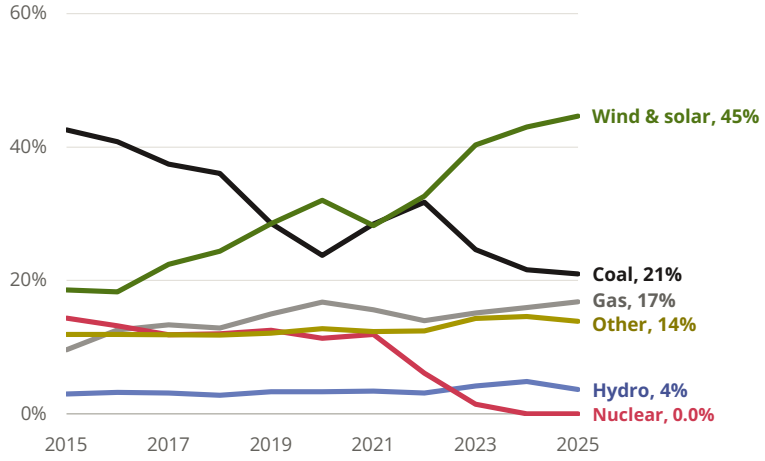
Germany at a glance

Germany has made strong progress towards a renewable power system, but climate neutrality by 2045 needs grid expansion, clean flexible power and faster electrification of transport, buildings and industry.

Key transition conditions: Strong renewable build-out, storage growth and a sizeable cleantech industry, but grids, system integration and end-use electrification must move much faster.

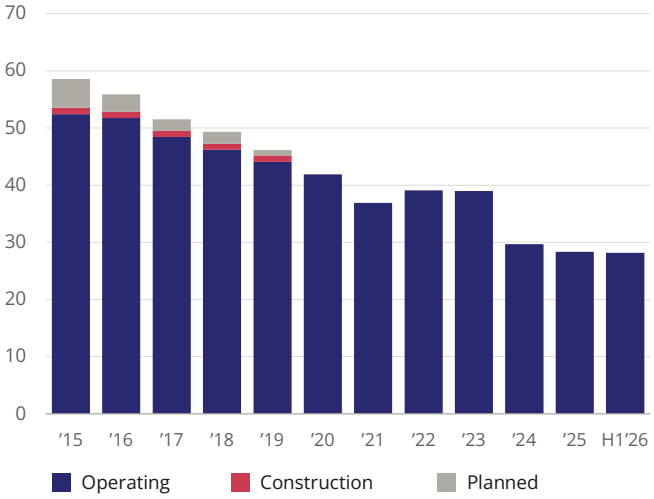
Electricity generation by source

2015–2025

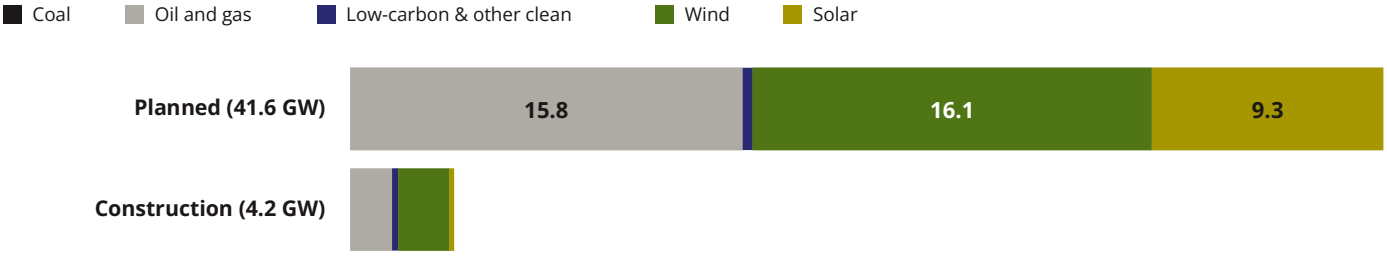


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Low-carbon & other clean 0.4 GW (planned) · Oil and gas 1.7, Low-carbon & other clean 0.3, Wind 2.1, Solar 0.2 GW (construction)

Power system landscape

Clean sources supplied around **59%** of electricity in 2025, and wind and solar out-generated fossil fuels for the first time. Yet oil, gas and coal are about 78% of total energy supply, all imported. Coal power ends by 2038.

Clean transition trends

Target of at least **80%** renewable electricity by 2030. By mid-2026 Germany had reached 58% of its solar, 61% of its onshore wind and 36% of its offshore wind targets. New capacity rules are likely to favour hydrogen-ready gas plants.

Enablers and bottlenecks

Battery storage has reached around 25 GWh and about 46 GW of permitted onshore wind awaits construction. But around **9.4 TWh** was curtailed in 2025, smart meters cover only 5.5%, and network charges are about 29% of household prices.

Opportunities for international cooperation with *Germany*

- **Clean industrial partnerships around key supply chains are an opportunity,** such as a cleantech corridor with India covering wind, solar, batteries, grids and green hydrogen.
- **North and Baltic Sea cooperation can deepen**, moving from shared targets to joint spatial and grid planning, cost sharing and harmonised tenders.
- **German diplomacy can strengthen the EU's capacity to act** through coordinated external policy, strategic partnerships and an integrated strategy for growth and decarbonisation.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Germany's profile

Outline and domestic political economy context

Clean energy resources accounted for around 59% of Germany's electricity generation in 2025. Wind and solar alone provided around 47%, with onshore wind accounting for around 24% of generation, solar for 17% and offshore wind 6%.[124] Fossil fuel generation has meanwhile fallen substantially over the past 15 years.[125] In 2025, wind and solar together generated more electricity than fossil fuels for the first time.[126]

Germany targets at least 80% of gross electricity consumption to come from renewable sources by 2030; this is backed by capacity targets of 115 GW of onshore wind, 215 GW of solar PV and 30 GW of offshore wind, which require deployment to accelerate beyond recent rates.[127] In fact, by mid-2026, around 61% of the onshore wind, 58% of the solar and 36% of the offshore wind targets had already been reached. The onshore wind pipeline is particularly strong: around 51 GW of permitted capacity was not yet in operation by September 2026. If ultimately commissioned, together with the 71.3 GW already operating, this would exceed Germany's 115 GW target for 2030.[128] However, recently proposed reforms to renewable support schemes and grid management have raised concerns that growth will slow down rather than accelerate.[129]

Increasingly, Germany's critical challenge is grid integration rather than renewable generation itself. Much of its wind generation is concentrated in the north while major industrial demand centres lie in the south and west, creating persistent north–south transmission bottlenecks. The growing difficulty of integrating available clean power into the system is illustrated by around 9.4 TWh of renewable generation being curtailed in 2025 to manage grid congestion.[130] Germany also lags behind in areas such as grid digitalisation, standardised connection processes and smart-meter deployment, which reached only 5.5% of metering points in 2025.[131] Battery storage is expanding rapidly,

---

[124] Bundesnetzagentur, January 2026, **Bundesnetzagentur publishes 2025 electricity market data**

[125] Federal Statistical Office (Destatis), 2025, **Environmental-Economic Accounts – Energy Accounts 2006-2023 (Umweltökonomische Gesamtrechnungen – Energiegesamtrechnung, 2006-2023)** (PDF)

[126] Carbon Brief, 28 July 2026, **Analysis: Wind and solar power overtake fossil fuels in Germany for first time ever**

[127] Federal Ministry of Justice, 2023, **Renewable Energy Source Act (Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz – EEG 2023)**

[128] Bundesnetzagentur, October 2026, **Statistics on electricity generation capacity from selected renewable energy sources – September 2026 (Statistik zur Stromerzeugungsleistung ausgewählter erneuerbarer Energieträger - September 2026)** see Table 2 and 9 (PDF)

[129] Clean Energy Wire, 29 July 2026, **Q&A: Will Germany's electricity grid reform slow down the energy transition?**

[130] SMARD, March 2026, **Grid congestion management volumes remained stable over the year (Maßnahmenvolumen im Gesamtjahr stabil)**

[131] Bundesnetzagentur, March 2026, **Roll-out of intelligent metering systems (Roll-out intelligenter Messsysteme)**

reaching around 25 GWh by the end of 2025;[132] but storage, transmission and demand-side flexibility will need to expand further as variable renewable generation continues to grow.

Germany remains structurally dependent on imported fossil fuels, with oil, gas and coal accounting for around 78% of total energy supply in 2024.[133] As a net importer of all three, its energy system and economy remain exposed to global energy prices and geopolitical disruption. This is particularly significant given Germany's energy-intensive, export-oriented industrial model. Industry accounts for around 23% of gross value added[134] and 29% of total energy consumption, while energy-intensive manufacturing represents around 17% of manufacturing value added but roughly 75% of industrial energy use.[135] Energy costs and supply security are therefore central to industrial competitiveness, a vulnerability made particularly visible by the loss of Russian pipeline gas over recent years.

Within the power sector, Germany's fossil fuel dependence is shifting rather than disappearing. While coal declines, gas is assuming a more strategic role in energy security and system flexibility. Germany has a legal target to phase out coal generation by 2038 at the latest;[136] to date, this transition has remained broadly on track as renewable deployment, EU carbon pricing and political commitment have progressively reduced coal's role. However, the final phase remains politically sensitive, particularly in eastern regions where coal production remains closely tied to employment, regional economic structures – and perceptions of an unequal transition.

Gas, by contrast, has not undergone a comparable structural decline and is increasingly expected to provide flexible, dispatchable capacity as coal retires and variable renewable generation expands. This has become more economically and geopolitically challenging since Germany ended its heavy reliance on relatively cheap Russian pipeline gas after 2022.[137] Regardless of these difficulties, the Merz government has introduced a capacity mechanism to ensure sufficient controllable capacity is available by 2031, reflecting the need for security of supply. Formally this mechanism is technology-neutral; however, its long-duration requirements – designed to cover extended periods with little wind or solar – favour technologies capable of sustained generation, with hydrogen-ready gas plants likely to play a significant role alongside storage and other flexible resources.[138]

---

[132] Federal Ministry for Economic Affairs and Energy, June 2025, **New energy storage for Germany**

[133] IEA, 2024, **Germany** (webpage, accessed 8 September 2026)

[134] Federal Statistical Office (Destatis), 2026, **EU comparison: Germnay and the other Member States**

[135] Federal Statistical Office (Destatis), 2024, **Importance of energy-intensive industries in Germany (Bedeutung der energieintensiven Industriezweige in Deutschland)** (webpage, accessed 8 September 2026).

[136] Federal Ministry of Justice, 2020, **Coal Phase-out Act (Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung)**

[137] Agora Energiewende, 11 May 2022, **Breaking dependency on Russian gas: perspectives from France and Germany**

[138] Federal Ministry for Economic Affairs and Energy, September 2026, **Green light for secure electricity supply: European Commission approves ad-hoc capacity mechanism under thee Strom VKG (Grünes Licht für sichere Stromversorgung: Europäische Kommission genehmigt Ad-hoc-Kapazitätsmechanismus des StromVKG)**

Managing the competitiveness and distributional consequences of decarbonising sectors where fossil fuels remain deeply embedded remains a challenge as Germany's power transition advances. In transport, Germany's large automotive industry and combustion-engine-based supplier networks mean electrification is a contested industrial transition. The scale of employment and value embedded in existing automotive supply chains makes protecting jobs and domestic value creation central to managing the shift;[139] on the other hand, intensifying competition in EVs, particularly from **China**, makes successful electrification increasingly important to Germany's future industrial competitiveness.[140]

In buildings, affordability and political acceptability similarly shape the transition. Fossil gas and oil remain deeply embedded in Germany's existing housing stock,[141] meaning decarbonisation requires millions of households and property owners to replace heating systems and absorb high upfront costs. The controversy surrounding the 2023 heating law, replaced in 2026 by a new one, illustrates how tangible household costs can constrain the pace of transition: the Merz government's new heating law continues to permit gas and oil heating, adding an expensive obligation to gradually blend in climate-neutral fuels – officially still retaining Germany's 2045 climate-neutrality objective.[142]

Affordability has become central to the politics of Germany's transition. Although energy prices have fallen from the peaks of the 2022 fossil gas supply crisis, household and non-household energy costs remain above pre-crisis levels:[143] network charges, for example, account for around 29% of household electricity prices in 2025,[144] meaning lower renewable generation costs do not automatically translate into lower bills. This sharpens political debate over who bears the costs of the transition and has reinforced government efforts to reduce energy prices for households and industry.[145]

Summary of key domestic transition factors

- **Germany benefits from strong renewable build-out and rapidly growing storage deployment as well as a sizeable clean energy industry.** In 2023, green technologies

[139] Federal Ministry for Economic Affairs and Energy, 2023, **Automotive Industry (Automobilindustrie)** (webpage, accessed 8 September 2026)

[140] Federal Government of Germany, 9 September 2025, **Chancellor's speech at the opening of IAA Mobility 2025: Shaping the transformation of the automotive industry (Rede des Kanzlers anlässlich der Eröffnung der IAA Mobility 2025: Den Wandel der Autoindustrie gestalten)**

[141] Federal Statistical Office (Destatis), June 2024, **2022 Census: three-quarters of all dwellings heated by oil or gas**

[142] Reuters, 13 May 2026, **German cabinet agrees to replace green-friendly heating law**

[143] Destatis, September 2026, **Electricity and gas prices for households fell in the first half of 2026 (Strom- und Gaspreise für Haushalte im 1. Halbjahr 2026 gesunken)**

[144] Bundesnetzagentur, 2026, **Monitoring repot 2025 (Monitoringbericht 2025)** (PDF)

[145] Federal Ministry of Finance and Federal Ministry for Economic Affairs and Energy, 3 September 2025, **Strengthening Germany as a business location, securing jobs and relieving the burden on consumers: The German Federal Government adopts measures for lower energy prices (Standort Deutschland stärken, Arbeitsplätze sichern und Verbraucher entlasten: Bundesregierung beschließt Maßnahmen für niedrigere Energiepreise)**

generated around 9% of total gross value added,[146] accounted for more than 8% of exports and had grown by roughly 5% annually on average since 2010. Russia's invasion of Ukraine in 2022 marked a critical juncture: by exposing the economic and security risks of dependence on imported fossil fuels, it strengthened the case for domestic clean energy as a source of resilience and competitiveness. Germany's September 2026 TAFF roadmap consolidates existing measures to reduce fossil fuel dependence through renewables and electrification.

- **Converting these advantages into a secure and affordable transition will require much faster progress on grids, system integration and end-use electrification.** Germany needs to expand both its transmission and distribution grid much faster to address connection queues and enable north–south transmission of wind energy. The transition also requires significant smart-meter rollout and demand-side flexibility, alongside quicker electrification of its vehicle fleet and existing building stock. To secure political support, Germany will need to ensure the transition's system costs are manageable and distributed fairly.

Opportunities for international collaboration

1. **Build strong and strategic clean industrial partnerships around key supply chains**. Germany is particularly exposed to geopolitical competition over critical resources and cleantech supply chains. It needs to build on its existing diplomatic base to turn selected relationships with major economies into deeper partnerships fostering cleantech manufacturing supply chains, trade and investment. **India**, for instance, is a promising partner, with scope for a cleantech corridor combining European demand, finance, market access and technology leadership with its growing manufacturing capabilities in wind, solar, batteries and green hydrogen. A closer relationship would help both sides diversify concentrated supply chain dependencies.

2. **Deepen energy cooperation across both the North and Baltic Seas**. Germany can use regional cooperation on offshore wind, interconnectors (that allow the trading of electricity between territories) and hydrogen infrastructure to meet three objectives at the same time: to access more renewable power, lower system costs and strengthen energy security. North Sea cooperation could move beyond shared capacity targets: what is needed now is joint spatial and grid planning, clearer cross-border cost-sharing and trading arrangements, harmonised support schemes and tender requirements, and better coordinated supply chain and security planning.[147] The same model can also be expanded in the Baltic Sea region, given Germany is already part of emerging cooperation on critical infrastructure protection and the Baltic Offshore Grid Initiative.

3. **Encourage Germany's diplomacy to strengthen European geopolitical and economic capacity.** German foreign policy can strengthen the EU's ability to act

[146] Umweltbundesamt, 25 June 2025, **GreenTech Atlas 2025**

[147] E3G, 2026, **Empowering Europe: Delivering the security and economic benefits of North Seas wind** (webpage, accessed 9 September 2026)

geopolitically, including through coordinated EU external policy and strategic partnerships, investment in the transition and an integrated European strategy for growth and decarbonisation. As Germany works on its coal phase-out, just transition and TAFF roadmap, its learning could provide a basis for deeper European and international cooperation on reducing fossil-fuel dependence while supporting competitiveness and social cohesion.

COUNTRY PROFILE

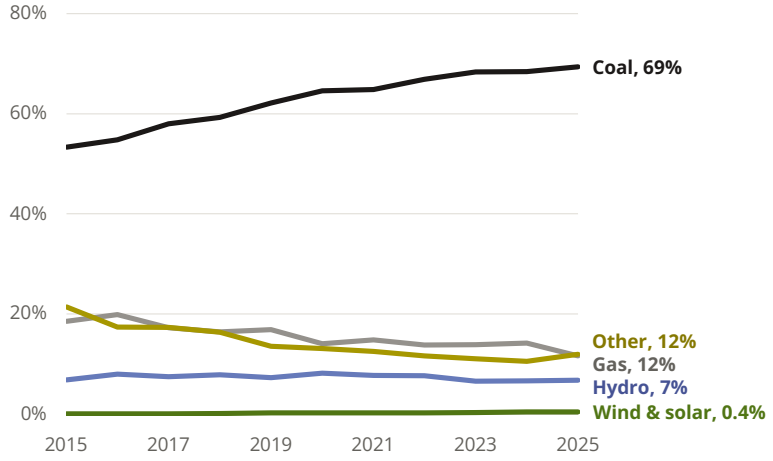
Indonesia at a glance

Indonesia is pursuing a development-led energy transition, scaling renewables and clean industries where they support industrialisation, while coal remains central to electricity generation and economic transformation.

Key transition conditions: Strong industrial and resource advantages for clean industries, but coal remains embedded in the development model.

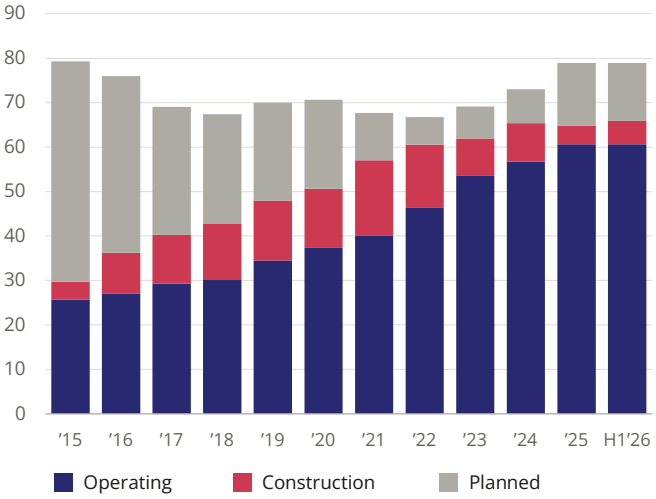
Electricity generation by source

2015–2025

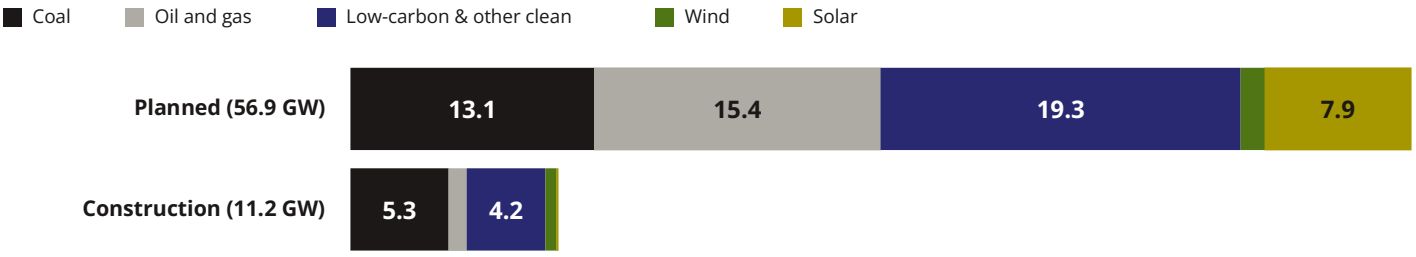


Coal capacity by status

2015–H1 2026



Capacity under development by source



Wind 1.3 GW (planned) · Oil and gas 1.0, Wind 0.6, Solar 0.1 GW (construction)

Power system landscape

84% of electricity comes from fossil fuels; coal alone is 56%. Renewables stuck near 15% for decades. 3rd-largest coal producer, and the world's largest coal exporter.

Clean transition trends

Record **836 Mt** of coal generation in 2024, plus 1.9 GW of new coal built for nickel and EV industrial estates. Nickel, EV and battery supply chains anchor the "Golden Indonesia 2045" vision, targeting 100% renewable-powered nickel processing.

Enablers and bottlenecks

World-leading nickel reserves and a roadmap to cut nickel emissions 81% by 2045 support clean industry. But grids get $1.4bn a year against **$2.4bn** needed, Java-Bali coal overcapacity persists, and JETP excludes captive coal.

Opportunities for international cooperation with *Indonesia*

- **Clean manufacturing partnerships can support the Golden Indonesia 2045 vision:** low-carbon nickel and battery chains, and storage-backed power for industrial estates.
- **Financing cooperation could reach beyond the grid**, engaging industrial developers and investors to address privately financed captive coal.
- **Enabling infrastructure is a further opening:** technical assistance for power system planning, grid modernisation and storage deployment.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Indonesia's profile

Outline and domestic political economy context

Indonesia is one of the world's largest coal producers (third largest after China and India) and exporters (first worldwide), while also remaining heavily coal-dependent domestically. Fossil fuels continue to dominate its energy system: 84% of electricity is generated by fossil fuels, with coal accounting for about 56%;[148] Also, in 2024, fossil fuels supported about 63% of total energy consumed.[149] Renewables remained relatively stagnant despite ambitious targets, with their share of electricity generation and final consumption hovering around 15% for decades.

In 2024, Indonesian coal production hit record levels, surpassing its target by almost 18% (836 Mt compared to 710 Mt)[150] and exceeding the 2023 record of 775 Mt. Indonesia also commissioned 1.9 GW of new coal-fired power generation capacity in 2024,[151] the third-highest in the world after China and India, built to support sites that process nickel, cobalt and aluminium for the rapidly growing EV sector.[152] The updated electricity supply plan ("RUPTL 2025–2034") downgraded its 2030 renewable targets, from 20.9 GW of new clean power capacity to 18.6 GW,[153] falling further short of the JETP's investment plan. Although the plan projects a quadrupling of clean energy production by 2034 (from 44 TWh to 172 TWh), coal and gas generation is also expected to increase by 40% (from 295 TWh to 407 TWh) over the same period[154] – a trend that will likely mask grid-level green gains. Separately, the government has announced a more ambitious 100 GW solar programme, with an initial 30 GW procurement phase, which could significantly accelerate the transition if realised.[155] However, this ambition is not yet reflected in the existing RUPTL, highlighting the gap between high-level commitments and formal electricity planning.

Physical and institutional constraints also slow renewable deployment in Indonesia.[156] Its fragmented archipelagic grid requires substantial investment in transmission infrastructure: US$2.4 billion on average annually is required, compared with US$1.4 billion on average annually realised.[157] Coal-fired overcapacity in the Java-Bali

---

[148] Azura Yumna Ramadani Purnama, 04 June 2026, **Kapasitas Pembangkit Listrik April 2026 108 GW, Batu Bara 56%** (Power Generation Capacity April 2026 108 GW, coal 56%)

[149] IEA, July 2026, **Indonesia**

[150] Fransiska Nangoy, **Indonesia's 2024 coal output hits record high** (webpage, accessed 5 August 2026)

[151] Global Energy Monitor, 3 February 2025, **Boom and Bust Coal 2025**, page 19 in full PDF

[152] Hans Nicholas Jong, 23 April 2025, **Indonesia defies global coal retreat with captive plant boom**

[153] Centre for Research on Energy and Clean Air, 2025, **Indonesia's RUPTL outlines faster growth in fossil fuel use, downgrades ambition for clean energy**

[154] Centre for Research on Energy and Clean Air, 2025, **Indonesia's RUPTL 2025-2034: Fossils first, renewables later**

[155] Cabinet Secretariat of the Republic of Indonesia, 14 August 2026, **Gov't to Strengthen Energy Self-Sufficiency through Solar Farm, National EV Project**

[156] Institute for Energy Economics and Financial Analysis, December 2025, **After years at an energy crossroads, can Indonesia pivot in 2026?**

[157] Institute for Energy Economics and Financial Analysis, May 2026, **Unlocking Indonesia's transmission grid investment**

system, reinforced by long-term take-or-pay contracts, also reduces incentives for the state electricity utility − PT Perusahaan Listrik Negara − to integrate additional renewable capacity.[158] Outside Java-Bali, most isolated mini-grids and small island grids remain heavily diesel-dependent,[159] lacking the storage and hybrid infrastructure needed to absorb variable renewable energy at scale. Together, these factors illustrate that Indonesia's transition challenge is not only about expanding renewable generation but also about addressing the transmission, grid and planning constraints that act as barriers to integrating it into the power system.

Indonesia's energy transition primarily centres on economic transformation and national development, not climate leadership. The government's primary focus has been on driving an ambitious 8% annual GDP growth target; this is pursued partly by centralising state investment via the new Danantara sovereign wealth fund[160] and partly by tightening state control over strategic commodity exports,[161] as an expression of resource nationalism.[162] This same logic extends to clean energy policies which primarily aim to support industrial upgrading, domestic manufacturing and energy independence. This causes the tension between Indonesia's clean manufacturing ambitions and its emissions trajectory, as economic development and industrialisation remain heavily dependent on coal, with many nickel and EV supply-chain facilities powered by captive coal plants[163] – even as climate commitments require a gradual reduction in fossil fuel use. Coal also remains politically resilient because it provides affordable, locally abundant energy that fuels industrial growth (especially downstream industries), export earnings and energy security**.** Although economic studies evidence the link between renewables and industrial competitiveness, energy affordability and supply security,[164] this reasoning has not been adopted by the government in its policymaking.

A challenging aspect of Indonesia's transition is that the coal-industrial base that must be restructured to achieve real decarbonisation of the power system is privately owned and financed; this is true especially from the perspective of international initiatives like JETP, which is designed to intervene at state-level policy. The JETP Indonesia's study of captive coal manifests this mismatch: the Government of Indonesia and International Partners Group (IPG) narrowed its scope to the on-grid system only, excluding from the mechanism's accountability framework the fast-growing, most emissions-intensive segment of Indonesian coal that is built by private/foreign industrial

[158] Institute for Energy Economics and Financial Analysis, November 2025, **Transforming Indonesia's coal dependence into clean energy opportunities**

[159] Institute for Energy Economics and Financial Analysis, April 2026, **Advancing Indonesia's 100GW solar programme through de-dieselisation for energy security**

[160] Asia House, 2025, **Danantara Indonesia: The Rise of a Sovereign Wealth Powerhouse**

[161] Fulcrum, 15 June 2026, **Prabowo's Nickel State: Indonesia's Search for Power**

[162] Eve Warburton, 2024, **Nationalist enclaves: Industrialising the critical mineral boom in Indonesia**, The Extractive Industries and Society, vol. 20, 101564, **10.1016/j.exis.2024.101564**

[163] Lowy Institute, 2025, **The future of Indonesia's green industrial policy**

[164] Institute for Energy Economics and Financial Analysis, June 2026, **Strengthening Indonesia's energy security by reducing coal dependence**

capital outside the grid and directly tied to nickel and EV.[165] Another example is the cancellation of the early retirement plan for the coal-powered plant Cirebon-1[166] due to financial risks: the plant was owned by a foreign commercial consortium (Marubeni, Korea Electric Power Corporation or KEPCO, and Indika Energy); its early retirement required replacement costs at a scale that JETP's approved capital could not match (US$8.4 billion, versus US$3.1 billion),[167] and indeed was not designed to reach. This transaction was pursued through the Asian Development Bank's Energy Transition Mechanism rather than the JETP itself.[168]

The "just" aspect of the transition adds another layer of contestation, especially regarding its impact on employment. Coal-producing provinces and industrial regions remain highly dependent on mining-related employment and revenues.[169] While trade unions and labour groups generally support the transition, they oppose strategies they see as threatening workers' livelihoods without credible social protection or industrial planning.[170] Grants are typically used to support this "just" aspect of the transition, such as reskilling and risk-mitigation programmes for workers and vulnerable groups. However, as of 2025, the share of grants in Indonesia's JETP funding is 2.6% of the IPG's pledge and 0.3% of the combined pledge of the Glasgow Financial Alliance for Net Zero and the IPG.[171]

Summary of key domestic transition factors

- **The strongest enabler is Indonesia's significant industrial and resource advantages for a clean economy**. World-leading nickel reserves, growing manufacturing capacity, expanding investment in EVs and battery supply chains, and substantial renewable resource potential provide a strong foundation for scaling clean industries, particularly where renewable deployment supports industrial competitiveness and affordability. In fact, renewable energy, EV manufacturing and green industrial investment are increasingly framed as ways of achieving the government's "Golden Indonesia 2045" vision[172] and moving up the global value chain. The government has released a decarbonisation roadmap[173] for the nickel industry in

[165] Centre for Research on Energy and Clean Air and Global Energy Monitor, 2026, **Out of sight, out of control: 31 GW of captive coal is jeopardising Indonesia's economic and emissions goals**; JETP Indonesia, November 2025, **Captive Power Study**

[166] Divya Karyza, 5 December 2025, **Govt backtracks on early retirement of Cirebon-1 coal plant**

[167] Jayanty Nada Shofa, 5 December 2025, **Indonesia's JETP Money Jumps to $21.4 Billion Despite US Exit, $3.1 Billion Greenlit**

[168] Asian Development Bank, 3 December 2023, **New Agreement Aims to Retire Indonesia 660-MW Coal Plant Almost 7 Years Early**

[169] International Institute for Sustainable Development, 2025, **Coal Transition Impacts and the Approach to Inclusive Just Transition Policies in Indonesia**

[170] Indah Budiarti, 08 March 2024, **Fighting for a Just, Democratic and Constitutional Energy Transition in Indonesia**

[171] Institute for Energy Economics and Financial Analysis, February 2026, **Building credibility in Indonesia's energy transition: Insights from the ETM and JETP Indonesia**

[172] Secretariat of the 2025–2045 Rencana Pembangunan Jangka Panjang Nasional (RPJPN), 2024, **Golden Indonesia 2045: National Long-Term Development Plan 2025-2045** (webpage, accessed 5 August 2026)

[173] Director of Energy, Mineral, and Mining Resources of Indonesia, 2025, **Decarbonisation Roadmap of Indonesia Nickel Industry**

particular – a cornerstone of its industrial priorities – targeting an 81% emissions reduction by 2045, alongside a transition to 100% renewable electricity for nickel processing.[174]

- **The main constraint is that coal remains embedded in Indonesia's development model**. Cheap domestic coal, supported by Domestic Market Obligations that secure local supply and price caps that maintain affordability, underpins electricity affordability and industrial competitiveness. Captive coal plants powering nickel and mineral processing further deepen this structural dependence, creating a long-term emissions lock-in. An implementation gap also exists between state-led transition mechanisms and privately financed industrial emissions: the fastest-growing sources of emissions sit outside the reach of mechanisms such as the JETP, limiting their ability to drive system-wide decarbonisation despite progress in the on-grid power sector.

Opportunities for international cooperation

1. **Enhance industrial decarbonisation and green supply chain management as enablers of delivering its "Golden Indonesia 2045" vision.** International collaboration on clean manufacturing standards (including a low-carbon nickel and battery supply chain), on storage-backed renewable power for industrial estates and on market creation for low-emission products would support Indonesia's energy transition; at the same time, it would also align with economic priorities and agendas, which are to upgrade its industry for high-value manufacturing, to improve its export readiness and competitiveness (to meet trade partners' market regulations) and its ability to attract foreign investment.

2. **Develop innovative financing cooperation to address privately financed industrial emissions, going beyond the on-grid power system.** The current platforms to help finance the energy transition, such as JETP, are primarily scoped to support Indonesia's on-grid electricity system; however, much of the country's emissions growth comes from off-grid captive coal plants serving industrial estates. Exploring new financing, regulatory and commercial approaches that engage industrial developers, private investors and multinational supply-chain actors to support the decarbonisation of captive coal would increase the impact of international initiatives.

3. **Align infrastructure investment with electrification and renewable deployment.** Indonesia's interest in expanding electricity access and renewable deployment creates an opportunity to address persistent constraints in transmission infrastructure, grid integration and system planning, particularly across its fragmented archipelagic grid. International cooperation could support Indonesia in translating these priorities into grid modernisation, transmission expansion and storage deployment through concessional finance, investment partnerships, and technical assistance, helping turn renewable ambitions into deployable capacity.

[174] World Resources Institute, 6 January 2026, **Nickel's Climate Cost and Indonesia's Push for Cleaner Production**

COUNTRY PROFILE

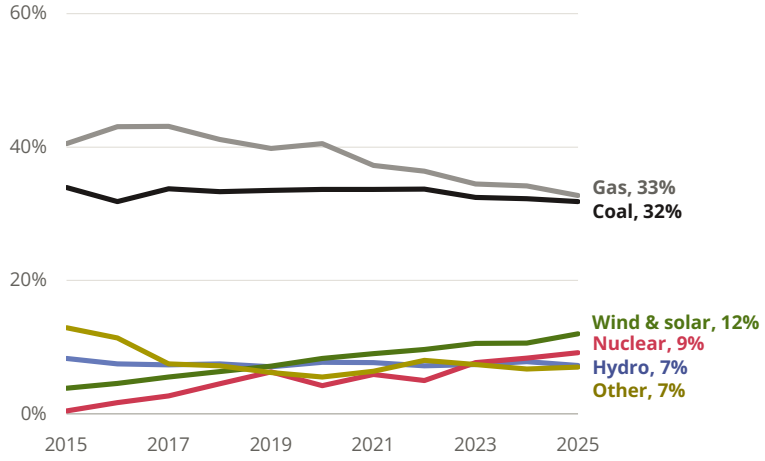
Japan at a glance

Japan's industry-led, security-driven transition puts resilience and competitiveness before rapid decarbonisation: policy backs nuclear and fossil-adjacent options, while wind and solar face grid and permitting barriers.

Key transition conditions: Import dependence gives renewables a strong security case, backed by business demand, but policy favours diversified fossil supply, and grid and permitting barriers persist.

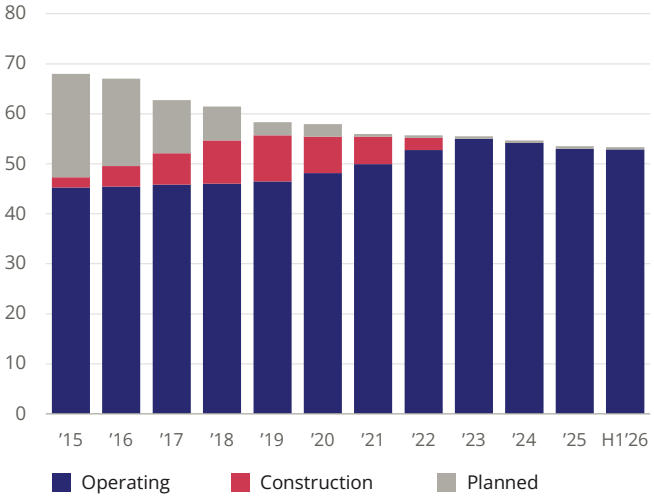
Electricity generation by source

2015–2025

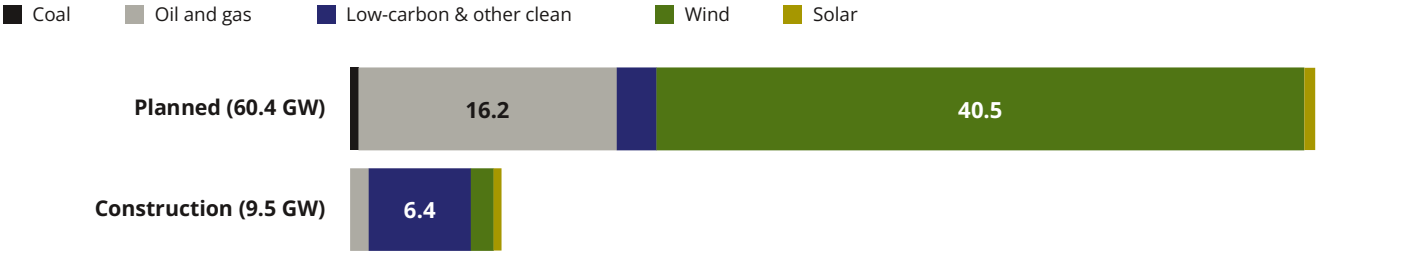


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Coal 0.5, Low-carbon & other clean 2.5, Solar 0.7 GW (planned) · Oil and gas 1.2, Wind 1.4, Solar 0.5 GW (construction)

Power system landscape

Over two-thirds of electricity comes from fossil fuels: about a third each from coal and gas, almost all imported. Net imports were **87.4%** of energy supply in 2024. Japan is the only G7 country without a coal phase-out date.

Clean transition trends

Target of **60–70%** non-fossil power by 2040, without the policies yet in place to reach it. Wind is just over 1% of the mix, and support for large-scale solar has ended. Almost 18 GW of new gas capacity is being built.

Enablers and bottlenecks

63% of businesses say renewables would improve energy security, and Japan has the largest national group of RE100 companies. Yet thermal plants are exempt from curtailment below 30–50% of output, and land-use rules raise costs.

Opportunities for international cooperation with *Japan*

- **The renewables shift can be framed as Indo-Pacific security** through strategic dialogues, critical mineral diversification and credible supply chain standards.
- **Energy system and cybersecurity cooperation is an opening:** technical exchanges on regulatory design and smart-grid protection can make renewables a source of resilience.
- **Regional support can align security with decarbonisation:** AZEC could move closer to other initiatives, with partnerships on grids, storage and offshore wind.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Japan's profile

Outline and domestic political economy context

Over two-thirds of Japan's electricity mix is powered by fossil fuels: roughly one-third from coal and one-third from gas – almost all of which is imported.[175] Indeed, Japan is overall very dependent on energy imports which accounted for 86.2% of Japan's total energy supply in 2025.[176] This import dependence means Japan has the lowest energy self-sufficiency rate among the G7, and supply security underpins the country's strategic energy plan. The remaining third of electricity comes from clean energy resources. Japan is targeting 60–70% non-fossil power by 2040, but the policy and regulatory environment is not yet in place to achieve it.

Japan's heavy dependence on imported coal, oil and gas is costly, especially given that it is one of the most vulnerable countries in the world to disruptions at maritime chokepoints. Between 2010 and 2022, Japan spent 3% of its GDP annually on fossil fuel imports.[177] This is eating into export revenue: in 2023, roughly ¥26 trillion (US$185 billion) – a substantial share of earnings from exports, such as automobiles and semiconductor equipment – went towards importing crude oil and gas.[178] It is also feeding inflation: rising energy costs have weakened the yen, which hit a 40-year low in July 2026,[179] widening the trade deficit[180] and making imports still costlier as the currency falls. Meanwhile, 95% of crude oil imports flow through both the Strait of Hormuz and the Strait of Malacca.[181] Japan's overall chokepoint exposure is assessed as medium to high – on a par with the EU but higher than South Korea, China and Singapore, placing it among the countries most acutely exposed to disruptions at key maritime routes.[182] Faced with disruption at the Strait of Hormuz, Japan's response has been to draw on its extensive stockpiles and diversify crude oil and LNG sourcing – securing physical oil supply through to March 2028,[183] though this does not shield it from international price volatility.

Decarbonisation gains traction when it serves industrial policy and energy security, not when it threatens affordability, reliability and industrial interests. Japanese energy policy is formally guided by the principles of "S+3E" (safety, energy security, economic efficiency, environmental protection); yet geopolitical shocks, a weak yen and rising electricity demand have pushed the first three to the fore. Stimulating growth is a key government priority, with an ambitious target of more than doubling the current growth

---

[175] Ember, **Electricity Data Explorer** (webpage, accessed 06 August 2026)

[176] IEA, **Japan** (webpage, accessed 06 August 2026)

[177] The Climate Group, June 2024, **Japan's energy security opportunity**

[178] Government of Japan, February 2025, **Strategic Energy Plan**

[179] Reuters, August 2026, **Japan's executives call for FX stability as weak yen intensify import-cost pressure**

[180] The Japan Times, July 2026, **Japan's trade deficit widens as yen and Iran war inflate imports**

[181] Energy Institute, June 2026, **2026 Statistical Review of World Energy**; E3G, March 2026, **Chokepoints: A systemic threat to energy security for oil and gas importers**

[182] E3G, June 2026, **Japan's Fossil Fuel Supply Faces Unavoidable Chokepoint Risks: Reducing Fossil Import Dependence Is Central to Japan's Long-Term Energy Security**

[183] The Japan Times, July 2026, **Japan's trade deficit widens as yen and Iran war inflate imports**

rate to exceed 1% annual real growth;)[184] this is pursued by investing in supply chain resilience and critical sectors such as AI, advanced semiconductors, defence and space. This push for AI infrastructure and power-intensive semiconductor manufacturing underlies Japan's latest strategic energy plan: it anticipates electricity demand to grow through over the coming years until at least 2035 – reversing the downward trend seen since 2007 due to declining population figures and efficiency gains.[185] The Ministry of Economy, Trade and Industry (METI), favours an orderly transition that protects industry and is centred on nuclear, LNG, hydrogen/ammonia, CCS and next-generation solar; this policy sits alongside efforts to shore up Japanese energy security specifically by diversifying its fossil fuel import sources, building domestic stockpiles and also reviving nuclear power.

These priorities leave little room for conventional renewables in Japan. Prime Minister Sanae Takaichi supports as-yet commercially unviable perovskite cells over conventional solar power;[186] her government has ended financial support for large-scale solar projects, citing risks to Japan's natural environment and considering reliance on Chinese-made solar panels and cleantech supply chains as a critical national security vulnerability.[187] Wind constitutes just over 1% of the power mix,[188] despite vast potential: the IEA estimates technical potential for offshore wind to cover more than nine times of Japan's projected 2050 electricity demand.[189] –Land use restrictions have pushed up construction costs for both solar and wind, making new renewables pricier in Japan than elsewhere in the G7.

Coal remains central to heavy industry and energy security as Japan sees coal-generated thermal power as a reliable baseload to offset renewable variability.[190] Dispatch rules reinforce this: thermal plants are exempted from curtailment below 30–50% of output, giving them priority over renewables when grid capacity is constrained.[191] Japan committed to ending new coal plant construction in 2023 but remains the only G7 country without a fixed coal phase-out date. One pre-permit project, GENESIS Matsushima[192] – awaiting a further environmental impact assessment, would entail constructing a new 500 MW coal facility within an existing 40-year-old plant in Nagasaki. Japan is also pursuing ammonia co-firing in coal plants, targeting 20% by 2030 and 100% by 2050, despite high costs,[193] technical limitations and uncertain emissions benefits. In fact, studies suggest this could prolong coal use, raise lifecycle emissions and heighten energy security risks by

[184] Reuters, June 2026, **Japan targets more than doubling real growth to over 1% in economic blueprint**

[185] Government of Japan, February 2025, **Strategic Energy Plan**

[186] Reuters, October 2025, **Japan's conventional solar stocks tumble after Takaichi victory**

[187] Reuters, December 2025, **Japan to tighten regulations on mega-solar projects to protect nature, landscape**

[188] Ember, **Electricity Data Explorer** (webpage, accessed 12 August 2026)

[189] IEA, November 2019, **Offshore Wind Outlook 2019**

[190] Ministry of Economy, Trade and Industry, June 2023, **Annual Report on Energy for FY22 (Energy White Paper 2023)**

[191] Institute for Energy Economics and Financial Analysis, August 2025, **Grid governance, utility obligation reform, and local engagement can reignite Japan's renewable energy growth**

[192] Global Energy Monitor, July 2026, **Matsushima power station**

[193] EEFA, July 2026, **Japan's ammonia co-firing strategy constrained by cost, supply, and timing**

depending on ammonia imports via vulnerable sea routes[194] – a concern echoed by South Korea's recent rejection of similar co-firing plans.[195]

Despite declining gas demand, Japan is building almost 18 GW of new gas capacity,[196] with METI proposing in June 2026 to build or replace 39–55 GW of LNG-fired capacity by 2040.[197] Its Long-Term Decarbonised Power Source Auction – a capacity market scheme designed to make large, capital-intensive power investments financially viable – risks locking in excessive LNG capacity based on uncertain future demand from data centres, semiconductor plants and electrification. Although demand projections for financial year 2040 range widely (0.9–1.1 trillion kWh), METI uses the upper end to justify further gas investment; this is despite LNG originally being framed as time-limited. The fourth auction (January 2027) proposes 6 GW of LNG-only capacity,[198] which is more than the 5 GW allocated to all other "decarbonised" sources combined. This risks entrenching fossil dependence and creating stranded-asset risks, rather than prioritising the flexibility and renewables a resilient transition needs.

Japan aims to position itself as a key regional energy infrastructure provider through the Asia Zero Emission Community (AZEC), launched in 2022, extending its domestic transition approach to Asia. Though framed around growth, security and emissions reductions, AZEC's emphasis on Japanese technology and exports has driven fossil fuel-related investments, raising concerns about misalignment with the region's clean energy goals.[199] These concerns have sharpened with AZEC 2.0, launched in 2026 in response to energy market turbulence: its US$10 billion POWERR Asia initiative has so far focused mainly on alternative fuel procurement and regional fossil fuel stockpiles, with clean technology not central to Japan's offer.[200]

Summary of key domestic transition factors

- **Japan's import dependence and chokepoint exposure create a strong underlying case for energy security through diversification, which businesses increasingly see renewables as best placed to deliver**: 63% believe a renewables-based system would improve energy security.[201] Japan hosts the world's largest national contingent of RE100 companies, whose growing demand for renewable electricity is pressuring the government to accelerate grid access, land-use reform and renewable capacity

[194] E3G, April 2023, **Challenging Japan's Promotion of Ammonia Co-firing for Coal Power Generation**
[195] Nikkei Asia, August 2026, **South Korea to reconsider plan for ammonia use in coal plants: energy minister**
[196] Global Energy Monitor, January 2026 release, **Global Oil and Gas Plant Tracker**
[197] Agency for Natural Resources and Energy, METI, 5 June 2026, p. 6, **Long-Term Decarbonized Power Source Auction** (資料4). This proposes targeting 39–55 GW of new or replacement LNG-only generation by 2040 and notes that thermal power plants generally require around seven years of construction.
[198] METI, Agency for Natural Resources and Energy, 5 June 2026, presentation to the Electricity Stable Supply Working Group, Material 4, pp. 1–18, **Long-Term Decarbonised Power Source Auction [「長期脱炭素電源オークションについて」]**
[199] E3G, October 2025, **Getting the Asia Zero Emission Community right**
[200] The Japan Institute of International Affairs, April 2026, **Japan's Bold Moves for Energy Resilience in Asia: POWERR Asia and AZEC 2.0 Japan's New Flagship Regional Initiatives**
[201] WMBC, E3G, GRA, Public First, June 2026, **Global Business Poll: Powering Up. Business perspectives on electrification across 18 countries**

growth.[202] Rising electricity demand from AI and semiconductor growth strengthens the case for expanding domestic renewable generation capacity.

- **Japan's challenges are less about the available renewable technologies than about the political and structural conditions needed to deploy them at scale.** The government's response to recent shocks has not included accelerating domestic renewables. Renewable expansion and fossil fuel phase-out are further hindered by a mix of power system bottlenecks (e.g. grid capacity and interregional transmission issues, curtailment), regulatory constraints (e.g. slow permitting processes, land-use regulations) and concerns about securing competitive clean technology supply chains.

Opportunities for international collaboration

1. **Reposition Japan's renewables shift as an Indo-Pacific security strategy.** Existing strategic and security dialogues between Japan and the wider region, can be used to collaborate on a coordinated narrative framing its shift from fossil fuels to renewables as a security priority for the wider Indo-Pacific. Japan has the expertise to coordinate regional finance, and the leadership to strengthen collective resilience against geopolitical and market disruption. Practical partnerships to diversify critical mineral dependencies, and joint work on credible supply-chain standards, could further support more resilient, distributed clean-industrial value chains across the region.

2. **Deepen energy systems and cybersecurity cooperation.** Countries with growing renewables penetration and wider regional peers could pursue technical exchanges with Japan on how robust regulatory design and smart-grid cyber protections can turn renewables into a source of resilience rather than a liability. This constructive, solutions-oriented approach can help counter deeply rooted anti-renewables narratives in Japan that emphasise the risks of dependence on Chinese-sourced clean energy components.

3. **Align international energy transition support with energy security and decarbonisation imperatives.** Japan and the international community should work closely with growing Asian economies to expand finance for the region's clean energy ambitions. Japan can strengthen AZEC alignment with other international decarbonisation initiatives,[203] and – drawing on its technological expertise – can also play a strong role in advancing partnerships in power grids, storage, energy-efficient electrification and offshore wind.

[202] RE100 is a global corporate renewables initiative, led by Climate Group, bringing together over 400 influential businesses across over 150 markets worldwide. Its members have all committed to using 100% renewable electricity in their operations by 2050 at the latest.

[203] E3G, **Getting the Azia Zero Emission Community right**, October 2025

COUNTRY PROFILE

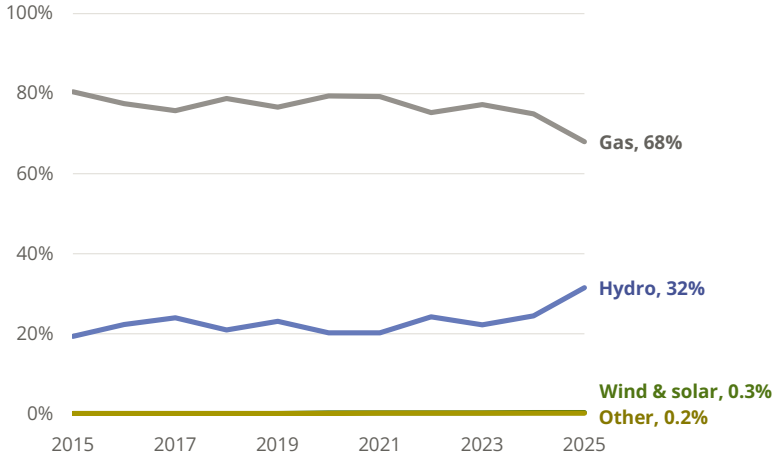
Nigeria at a glance

Nigeria's transition is access-led and increasingly decentralised, with distributed renewables expanding around a fragile gas-dependent grid, while oil and gas remain central to economic security.

Key transition conditions: The Electricity Act 2023 and fast-growing distributed energy open space for local power markets, but a weak grid and the centrality of oil and gas constrain change.

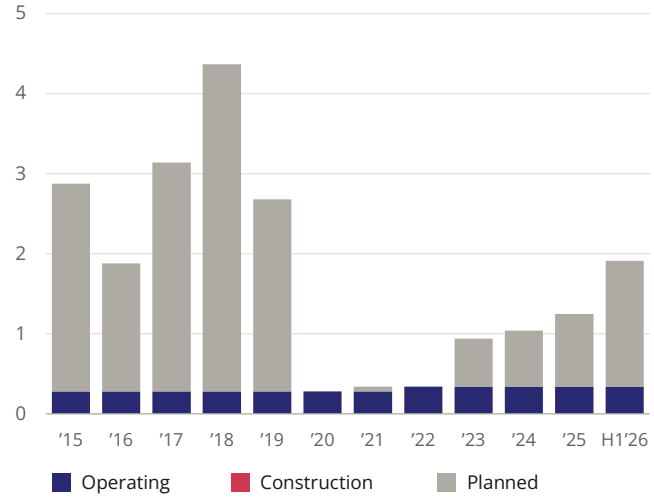
Electricity generation by source

2015–2025

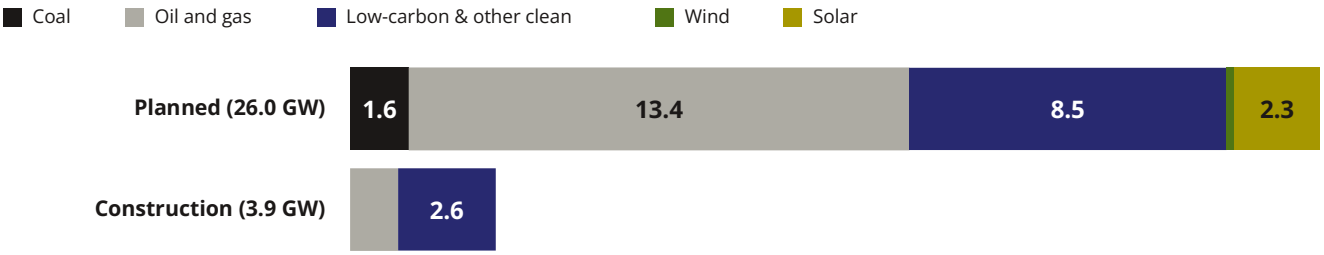


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Wind 0.2 GW (planned) · Oil and gas 1.3 GW (construction)

Power system landscape

Gas supplies **77%** of grid electricity, hydropower around 23% and solar under 1%. The grid delivers a peak of about 5.7 GW from 13 GW installed, against roughly 20 GW of demand. 86–110 million people lack reliable power.

Clean transition trends

DARES has reached roughly **5.3 million** of its 17.5 million 2028 goal; solar home systems (about 38% of target) lead, renewable capacity build-out lags furthest. The Electricity Act 2023 shifted authority to states. Gas is treated as a bridge fuel.

Enablers and bottlenecks

Pension assets reached **$22.85bn**, up 51% in two years, and over 14 GW has been licensed since 2017. But only about 1% of pension assets reach infrastructure, electricity tariffs sit below cost, and 36% of capacity was available in early 2026.

Opportunities for international cooperation with *Nigeria*

- **A coordinated country platform could align partners** on project preparation, aggregation and blended finance, turning underused domestic liquidity into deployable capital.
- **Distributed grid integration can be scaled:** metering and network upgrades for net billing, with DARES-style aggregation and results-based finance at grid scale.
- **Diversification beyond oil and gas is an emerging area,** building on the Beyond Oil and Gas Alliance Fund's early analytical work towards concrete policy.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Nigeria's profile

Outline and domestic political economy context

Nigeria relies on non-renewable energy for almost all its energy needs, with fossil fuels – mainly oil products and gas – accounting for over 50%, biofuels and waste 45% and hydropower roughly 1%.[204] Biomass barely registers in electricity data, given it is consumed almost entirely off-grid for household cooking and heating. On the grid, gas supplies 77% of generation; the remaining share of around 23% is made up of clean resources, mainly hydropower, with solar under 1%.[205] Coal plays no meaningful role in grid-connected power generation. Nigeria's transition challenge is not a coal phase-out but reducing gas dependence, improving electricity supply reliability and expanding affordable access.

Nigeria is a net exporter and producer of crude oil and gas, **and a net importer of oil products, in aggregate.**[206] Nigeria holds Africa's largest gas reserves (~215 trillion cubic feet) and its second-largest oil reserves (~37 billion barrels),[207] the ninth- and eleventh-largest globally.[208] However, these large reserves have not translated into reliable domestic supply: only around half of gas production is used domestically, while a significant share is exported, mainly as LNG.[209] In fact, oil and gas generated around 30% of government revenue[210] and over 80% of export earnings[211] in 2025, leaving public finances and the currency's value highly exposed to production and price swings.

The unreliability of Nigeria's grid functions as a structural barrier precisely because it pushes both supply and demand towards largely fossil-based off-grid rather than renewable sources. On the demand side, households and businesses bypass the grid and turn to alternatives**.** Households without reliable electricity default to firewood and charcoal; both grid-connected and unconnected users alike also rely on petrol and diesel generators to fill the gap left by a grid[212] that delivers only around a peak of 5.7 GW of an installed 13 GW against roughly 20 GW of demand – leaving between 86 to 110 million Nigerians without reliable access.[213] On the supply side, the same unreliability discourages

---

[204] IEA, 2023, **Nigeria** (webpage, accessed 6 August 2026)

[205] US Energy Information Administration, 2025, **Nigeria** (webpage, accessed 6 August 2026)

[206] IEA, 2023, **Nigeria** (webpage, accessed 6 August 2026); It briefly became a net petrol exporter for the first time in its history in March 2026, though the margin was narrow, and Nigeria still imports substantial volumes of other refined products and feedstocks; see The NG Guardian, April 2026, **Reps committee hails Dangote Refinery as Nigeria becomes net petrol exporter**.

[207] Nigerian Upstream Petroleum Regulatory Commission, 1 April 2026, **Media Release on The National Annual Petroleum Reserves Position As At 1st January 2026**

[208] Worldometer, 2025, **World Oil and Natural Gas Statistics** (webpage, accessed 6 August 2026)

[209] US Energy Information Administration, 2025, **Nigeria** (webpage, accessed 6 August 2026)

[210] International Monetary Fund, 9 June 2026, **IMF Executive Board Concludes 2026 Article IV Consultation with Nigeria**

[211] Nigeria's National Bureau of Statistics, **Foreign Trade in Goods Statistics** (webpage, accessed 6 August 2026)

[212] World Bank Group, May 2026, **Access to Electricity: Who Remains Without Power?**

[213] Africa Policy Research Institute, 2026, **Enhancing Nigeria's Clean Energy Transition: Mapping Chinese Investment and Strategic Priorities**

exactly the kind of investment that could green the system. Only 36% of all installed capacity was available in early 2026 – just 4.9 GW of 13.6 GW on average, well below even the system's peak capacity – and the grid frequently operates outside normal frequency.[214] Even well-sited utility-scale solar or wind projects most likely face this same delivery uncertainty once connected to the grid; this means investors and developers price in higher risk or avoid grid-tied renewable projects altogether. The result is a self-reinforcing bypass economy on both ends: demand-side responses are overwhelmingly biomass and diesel rather than rooftop solar or storage,[215] while the supply-side responses are capital retreats from grid-connected renewables. Coordinated initiatives such as the World Bank's Mission 300 and its flagship programme, the Nigerian Distributed Access through Renewable Energy Scale-Up (DARES),[216] as well as national policies like Net Billing Regulations 2026[217] are beginning to target this mismatch; nonetheless, the underlying grid instability remains the core unresolved challenge for Nigeria.

The country's energy transition focuses less on phasing out a single dominant fuel than on closing the country's large energy-access gap and making electricity reliable enough to support households, businesses and industrial growth. Its Energy Transition Plan (ETP)[218] treats gas not as a fuel to be phased out but as a bridge, providing dependable electricity, supporting renewables' expansion and improving clean cooking and transport access. The Electricity Act 2023 has meanwhile shifted authority to states, opening space for locally tailored electricity markets.[219] The social and economic case for transition is therefore framed around poverty reduction, industrial development and improved energy access as much as reducing emissions.

Nigeria's transition challenge is not necessarily a shortage of ambition, capital or even licensed projects, but a bankability and delivery-efficiency gap. Its pension fund assets alone reached around US$22.85 billion, up 51% in two years (2026),[220] yet around 1% of these total assets are allocated on actual infrastructure, far below the regulatory benchmark[221] – potentially up to 25%, depending on the fund category.[222] Banks, meanwhile, deposited a cumulative 336.24 trillion naira (~US$233 billion) in excess liquidity with the Central Bank of Nigeria in 2025 alone, rather than lending it into the real economy.[223] Nor is it a shortage of projects on paper: the Nigerian Electricity Regulatory Commission issued 645 new licences between 2017 and 2025, with total licensed capacity

[214] Olalekan Adigun, 9 February 2026, **NERC report shows grid frequency breaches, 36% availability in January 2026**

[215] World Bank Group, 2026, **National Energy Compact for the Federal Republic of Nigeria** (PDF)

[216] World Bank Group, 2023, **Nigeria- Distributed Access Through Renewable Energy Scale-Up Project**

[217] Nigerian Electricity Regulatory Commission, 2026, **Net Billing Regulations 2026** (PDF)

[218] Nigeria's Energy Transition Plan, 2024, **Objectives**

[219] Policy and Legal Advocacy Centre, 2023, **Nigerian Electricity Act 2023** (PDF)

[220] CNBC Africa, 14 July 2026, **Nigeria pension assets jump 51% to $22.8 billion, regulator says**

[221] National Pension Commission of Nigeria, June 2026, **Monthly Industry Summary May 2026** (PDF)

[222] National Pension Commission of Nigeria, 2025, **Revised Regulation on Investment of Pension Fund Assets** (PDF)

[223] This Day, 5 January 2026, **Banks Deposit With CBN Reached N336.24trn in 2025 on Credit Risk Concerns**

exceeding 14 GW whilst actual generation remained flat.[224] The gap is bankability. Developers routinely arrive with weak feasibility studies, unclear off-take arrangements and thin governance track records that financiers cannot underwrite regardless of available capital; renewable projects also carry high capital intensity that smaller developers struggle to absorb, leaving only a small pool of local firms able to deliver bankable projects at scale.[225] Underneath this sits a revenue problem: electricity tariffs remain below cost-reflective levels, costing the Federal Government 1.93 trillion naira (~US$1.3 billion) in subsidies in 2025 alone;[226] distribution companies' weak collection of bill payments further undermines lenders' confidence regardless of individual project quality. What is needed is not more capital, but a mechanism that aggregates small projects into fundable scale, standardises project preparation and gives capital a single credible "front door" into the sector.

Nigeria's emerging country-platform effort addresses this gap directly. Currently, there is no single interface that connects climate funds, carbon markets, Development Finance Institutions' capital and blended instruments. Moreover, the existing policy architecture remains fragmented enough to undermine investor confidence. The emerging new design explicitly rejects a "donor-driven replica of other JETPs", favouring instead a development-rooted, multi-stakeholder model.[227] Nigeria's mini-grid ecosystem is a test case for what this kind of coordination can achieve. DARES is designed to bundle technical assistance, standardised project templates and results-based financing to make distributed projects bankable at scale, targeting over 17.5 million Nigerians and the displacement of 250,000-plus polluting diesel generators; it reached roughly 5.3 million people and delivered just over 1 million solar home systems by 2026,[228] including legacy pre-DARES programmes.[229] This highlights the potential of deliberate coordination (pre-packaged, bankable structures, aggregation and blended finance applied together) to convert stranded ambition into deployed projects. What remains to be seen is whether this logic can scale from the off-grid space, where it has been piloted, to the grid-scale pipeline, where the bulk of Nigeria's 14 GW of stranded capacity and underused institutional capital actually sit.

Summary of key domestic transition factors

- **The strongest enabling conditions are the gradual decentralisation of the electricity sector under Nigeria's Electricity Act 2023, the growth of distributed energy (mini-grids, solar home systems, commercial solar) and access to sizable**

[224] Energy For Growth Hub, 22 December 2025, **Nigeria's Energy Transition Is Stalling Between Ambition and Delivery: Insights from licensing data from 2017 to 2025**

[225] Africa Policy Research Institute, 2025, **Energising Africa: enabling private sector development in renewable energy**

[226] Nigeria Electricity Regulatory Commission, 2026, **2025 Annual Report and Accounts** (PDF)

[227] Africa Policy Research Institute, 2025, **Insight Brief: Global South Peer Learning Workshop on Country Platform and Just Energy Transition**

[228] World Bank Group, 2026, **Implementation Status and Results Report: Nigeria Distributed Access through Renewable Energy Scale-up Project (P179687)** (PDF)

[229] ODI Global, 30 June 2026, **The World Bank says Mission 300 'accelerated' 50 million electricity connections in Africa. We checked**

domestic and international capital. These create room to build local electricity markets and expand supply faster than conventional grid extension, provided the capital deployment gap is addressed.

- **The biggest constraining factors are the continued weakness of Nigeria's national grid**, which continues to push households and investors alike away from grid-connected solutions, and **the deep economic and political centrality of oil and gas**, positioned in Nigeria's own strategy as a transition fuel rather than a target for phase-out. This dual dependency makes a rapid fossil fuel shift difficult, both economically and politically, and raises the risk that new gas infrastructure becomes a long-term fixture rather than a bridge.

Opportunities for international collaboration

1. **Operationalise a coordinated country platform.** A country-led platform, building on announced but not yet disbursed vehicles like the Nigerian Climate Investment Platform and National Climate Change Fund,[230] could coordinate international and domestic actors around earlier-stage project preparation (technical studies, financial modelling, standardised documentation, aggregation models bundling smaller projects into institutional-scale portfolios) alongside capital-mobilisation instruments (blended finance, guarantees, local currency structures, clearer pension fund frameworks) that convert Nigeria's underused liquidity into deployable capital. This should also include stronger local content requirements and closer federal and state coordination, so project readiness is not undermined by fragmented rules or unequal access for domestic developers.

2. **Scale distributed energy into a more integrated electricity system.** DARES and the Net Billing Regulations 2026 are beginning to address the electricity delivery challenge from different angles – expanding distributed renewables and enabling surplus power to flow into distribution networks, though both remain at an early stage. International cooperation could help scale these approaches by supporting the metering and network upgrades needed to integrate distributed generation. This would help translate electrification ambitions into delivery models suited to Nigeria's network constraints, investment conditions and increasingly decentralised electricity market.

3. **Support Nigeria's broader diversification beyond oil and gas.** The multinational Beyond Oil and Gas Alliance (BOGA) Fund's Nigeria programme offers an early foundation: it is building analytical and policy capacity to assess the economic risks and opportunities of moving beyond oil and gas, including impacts on revenue and associated industries and workers. International collaboration could further support translating these analytical findings into concrete diversification policy; Nigeria's needs as a fossil fuel exporter could then also inform the wider transition away from fossil fuels (TAFF) architecture for producer economies.

---

[230] Presidential Villa, State House, 14 January 2026, **National Statement by President Tinubu at the Abu Dhabi Sustainability Week (ADSW) 2026**

COUNTRY PROFILE

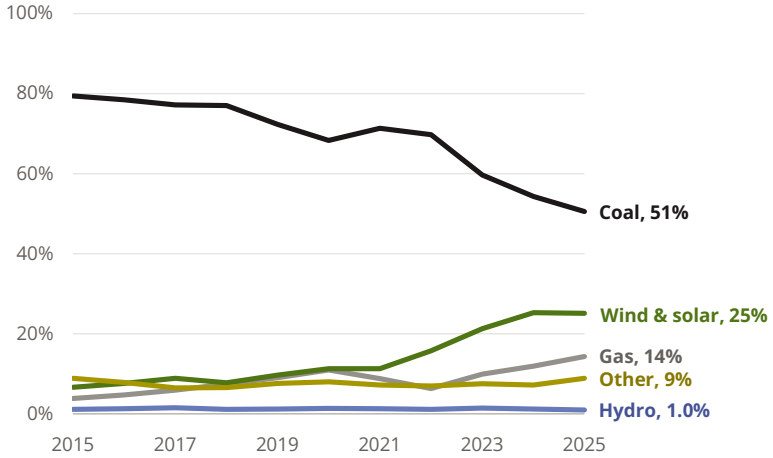
Poland at a glance

Poland is rapidly diversifying its power system, but deep coal lock-in, energy security concerns, an ageing and inflexible grid, and major gas investment alongside renewables constrain its transition.

Key transition conditions: Strong business support and market momentum pull policy forward, but deployment is outpacing what the coal-based system, grids and storage can absorb.

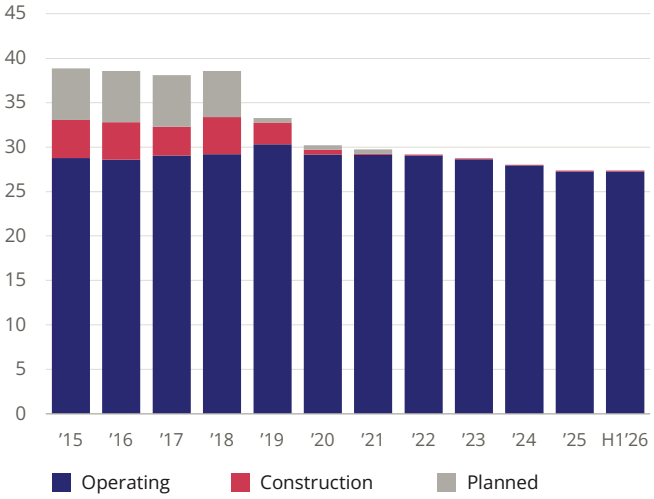
Electricity generation by source

2015–2025

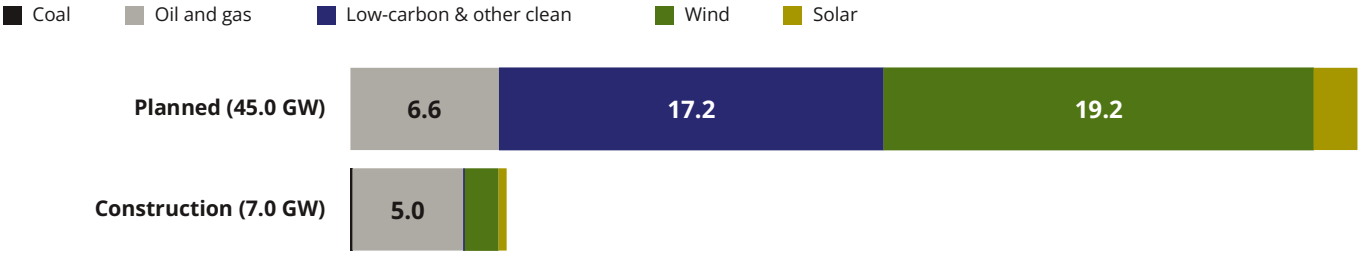


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Solar 2.0 GW (planned) · Coal 0.1, Low-carbon & other clean 0.1, Wind 1.5, Solar 0.4 GW (construction)

Power system landscape

Coal supplied approximately **54%** of electricity in 2024 and fossil fuels around 69%; wind and solar provided about a quarter. Imports cover around 82% of gas and 97% of oil demand. Coal should fall below 13% by 2034.

Clean transition trends

4.7 GW of solar was added in 2025. The updated national plan sees renewables at about 52–53% of electricity by 2030, with offshore wind above 9.3 GW by 2032. Poland makes about 60% of Europe's lithium-ion batteries.

Enablers and bottlenecks

92% of business leaders back a shift from fossil fuels, and prosumer storage grew tenfold in two years to 0.6 GW. Yet nearly **1.4 TWh** was curtailed in 2025, twice the 2024 level, and almost 4,900 grid connections were refused.

Opportunities for international cooperation with *Poland*

- **Regional just transition experience can be shared:** Poland's coal regions have built strong bottom-up models for worker transition and economic diversification.
- **Cleantech manufacturing partnerships are an opening** on critical mineral processing, recycling and batteries, drawing on Poland's industrial base.
- **The Baltic Sea can become a clean energy and security hub** with Germany, Denmark, Sweden and the Baltic states: offshore wind, cross-border grids and infrastructure protection.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Poland's profile

Outline and domestic political economy context

Poland remains heavily reliant on fossil fuels across its wider energy system, although its power sector is transitioning more rapidly. In 2024, fossil fuels accounted for around 83% of total energy supply, with oil and coal each providing around 33%, followed by gas at 18%. Fossil fuels also remain deeply embedded in final energy use, accounting for around 61%, while electricity accounted for 17%.[231] The electricity sector itself is further ahead: fossil fuels supplied around 69% of generation in 2024, including approximately 54% from coal, while wind and solar together provided around 25%.[232]

Within this still carbon-intensive system, renewable power is expanding rapidly, and policy ambition is beginning to catch up. Wind is Poland's largest clean electricity source, while solar deployment has accelerated particularly quickly: 4.7 GW was added in 2025 alone, taking available PV capacity to 25.9 GW, compared with 11.2 GW of onshore wind.[233] Poland's updated National Energy and Climate Plan, adopted in June 2026, envisages renewables reaching around 52–53% of electricity generation by 2030 and 66–69% by 2040.[234] Offshore wind is emerging as a major new pillar, with government support awarded to around 3.4 GW of new capacity through Poland's first competitive offshore auction in December 2025; total offshore capacity is expected to exceed 9.3 GW by 2032.[235] Onshore wind, however, remains politically constrained, illustrated by President Karol Nawrocki's 2025 veto of legislation that would have further eased turbine-distance requirements.[236]

Poland also has a significant industrial stake in the clean energy transition, particularly through battery manufacturing. Poland produces around 60% of Europe's lithium-ion batteries, making it a major European battery hub.[237] Its largest battery producer, LG Energy Solution Wroclaw, has operated on 100% renewable electricity since 2019, showing how clean power is already embedded in parts of Poland's emerging industrial base.[238] Industrial interests are therefore aligning more closely with the transition, meaning decarbonisation is linked to the country's competitiveness, to future investment and its position in European cleantech value chains.

---

[231] IEA, 2024, **Poland** (webpage, accessed 9 September 2026)

[232] Ember, 14 April 2026, **Poland**

[233] Forum Energii, 2026, **2025 wrapped by Forum Energii – a rapid review of the most interesting power - sector data from 2025** (webpage, accessed 9 September 2026)

[234] Ministry of Energy, 8 June 2026, **The Council of Ministers adopted the National Energy and Climate Plan. The document was developed by the Ministry of Energy (Krajowy Plan w dziedzinie Energii i Klimatu przyjęty przez Radę Ministrów. Dokument opracowało Ministerstwo Energii)**

[235] Ministry of Climate and Environment, 18 December 2025, **Over 3.4 GW of capacity contracted in the first offshore auction (Ponad 3,4 GW mocy zakontraktowano w ramach pierwszej aukcji offshore)**

[236] Reuters, 21 August 2025, **Polish president vetos bill easing rules about building wind farms**

[237] European Commission, 2025, **2025 Country Report – Poland** (PDF)

[238] The EV Report, 6 May 2022, **LG Energy Solution Wins E-Mobility Leader Award for Efforts in Zero-Emission Mobility**

Grid capacity and system flexibility are becoming immediate physical constraints on further renewable deployment. Rapid solar and wind growth is increasingly outpacing the power system's ability to connect and absorb new generation: in 2025, nearly 1.4 TWh of renewable electricity was curtailed, twice the 2024 level, predominantly because of balancing constraints.[239] Poland's generation fleet remains dominated by relatively inflexible coal units, while storage and demand-side flexibility are only beginning to scale. Grid access is also increasingly constrained, with almost 4,900 connection applications refused in 2025. [240] Poland's transmission system operator is beginning to respond to these pressures as it plans major grid reinforcement and modernisation through to 2034.[241] Therefore, the challenge is not simply to add renewable capacity, but to accelerate network investment, storage and increasing flexibility both for demand and generation.

Poland remains a substantial net energy importer, particularly of oil (both crude and products) and gas, and therefore exposed to international fuel markets. Domestic oil and gas production is small relative to demand; in 2024, imports supplied around 82% of gas demand and 97% of oil demand.[242] Reliance on imported fuels carries geopolitical and economic costs, although supply has been successfully diversified away from Russia, as Poland continues to spend heavily on imports from elsewhere. Overall import dependency has reached around 45%, and net import expenditure on energy resources around 112 billion zloty (US$28 billion), of which around 80% was accounted for by fossil fuels. [243] This restates the security case for expanding domestically generated resources, particularly renewables. Gas is nevertheless gaining importance in the near-term transition: gas power generation in Poland rose from 20.5 TWh in 2024 to 24.4 TWh in 2025 as new gas plants entered operation and wholesale gas prices fell.[244] Poland envisages nuclear power to provide much of its firm low-carbon generation in the long term, with the country's first large-scale plant (3.75GW) currently planned to enter operation between 2036 and 2038.[245]

Coal remains central to Poland's energy system and retains considerable political value as both a source and a symbol of domestic energy sovereignty, though this rationale is weakening. Although declining, coal remains the dominant resource, accounting for around one-third of total energy supply and more than half of electricity generation. Polish households burned 6.8 million tonnes of coal in 2023, around 75% of all

---

[239] Forum Energii, 2026, **2025_wrapped by Forum Energii – a rapid review of the most interesting power - sector data from 2025** (webpage, accessed 9 September 2026)

[240] Energy Regulatory Office, 7 July 2026, **The Accelerator, the Digital Twin, an offshore wind power auction and the initial decisions shaping the hydrogen market – the Report on the Activities of the President of the Energy Regulatory Office in 2025 is now available**

[241] Polskie Sieci Elecktroenergetyczne, **Development of the transmission system** (webpage, accessed 10 September 2026)

[242] Forum Energii, 2025, **Energy Transition in Poland**

[243] Ministry of Climate and Environment, 3 April 2026, **Is renewable energy one of the pillars of Poland's energy security? (Czy OZE jest jednym z filarów bezpieczeństwa energetycznego Polski?)**

[244] Forum Energii, 2026, **2025_wrapped by Forum Energii – a rapid review of the most interesting power - sector data from 2025** (webpage, accessed 9 September 2026)

[245] National Atomic Energy Agency, 2025, **National Report of the Republic of Poland on Compliance with the Obligations of the Convention on Nuclear Safety: 10th National Report of Poland** (PDF)

coal used to heat individual households across the EU.[246] Poland's large coal resources have long provided an indigenous energy source that reduced reliance on foreign suppliers, closely associating coal with security of supply and national sovereignty, particularly given the country's experience of dependence on Russian energy. This helps explain successive governments' reluctance to commit to an early coal phase-out even as its economics have deteriorated. However, the material basis for this way of thinking is weakening as domestic production declines; indeed, Poland has already become a net importer of hard coal.

Coal's political durability is also rooted in its concentration in mining regions, such as Silesia: here relatively secure, well-paid employment has underpinned regional prosperity, identity and status, raising concerns that replacement industries may not offer equivalent security.[247] The 2021 social agreement between government and mining unions therefore schedules a gradual series of closures of hard-coal mines through to 2049.[248] However, the power system trajectory is faster: competition from renewables, declining coal use (even if still high) and EU policies including the EU ETS are pushing coal generation down: Poland's transmission system plan projects coal to generate less than 13% of electricity by 2034,[249] and the latest NECP projects only a marginal role for coal by 2040.[250] The political challenge is therefore less whether coal declines than how that decline is managed, and whether workers and mining regions are offered credible economic alternatives.

Summary of key domestic transition factors

- **Strong business support and market momentum are accelerating Poland's transition, increasingly pulling policy in the same direction.** Polish business leaders show strong support, as 92% say Poland should transition away from fossil fuels.[251] Deployment is already moving rapidly, with 4.7 GW of solar added in 2025 − the fourth consecutive year of similarly high additions − and three-quarters of new capacity coming from larger on-grid installations. The updated NECP therefore represents an important step towards aligning national planning with a transition already advancing through the market.

- **The transition is constrained by a mismatch between rapid renewable deployment and the pace at which Poland's legacy power system and infrastructure can adapt.** An ageing, relatively inflexible coal-based generation fleet, limited storage and delayed grid expansion already contribute to renewable curtailment

[246] Forum Energii, 18 September 2025, **Heating Sector Transition in Poland 2025 Edition**

[247] OECD, 2026, **Local Identity, Pride, and Branding in Place Transformation**

[248] Ministry of State Assets, 28 May 2021, **Social contract for mining signed (Umowa społeczna dla górnictwa podpisana)**

[249] Polskie Sieci Elecktroenergetyczne, 2 January 2025, **Transmission Grid Development Plan 2025-2034 (Plan rozwoju sieci przesyłowej na lata 2025-2034 uzgodniony)**

[250] Ministry of Energy, 8 June 2026, **The Council of Ministers adopted the National Energy and Climate Plan. The document was developed by the Ministry of Energy (Krajowy Plan w dziedzinie Energii i Klimatu przyjęty przez Radę Ministrów. Dokument opracowało Ministerstwo Energii)**

[251] We Mean Business Coalition, E3G, Global Renewable Alliance and Public First. 2026, **Powering up: Business perspectives on electrification** (PDF)

and connection constraints. This creates a sequencing challenge as renewable capacity and coal displacement are progressing faster than the systems that are needed to accommodate them, from the physical infrastructure to flexibility and socially negotiated arrangements to secure jobs. Political fragmentation is another risk to implementation, for example, with differences between the government and presidency creating uncertainty over the pace of reform.

Opportunities for international collaboration

1. **Share just transition learnings from the experience of Poland's coal regions.** They have developed comparatively strong bottom-up transition models that can offer lessons to coal-dependent regions elsewhere. Poland could use this regional experience to strengthen international cooperation on supporting jobs and skills through the transition, and economic diversification.

2. **Build strategic cleantech manufacturing partnerships around Poland's industrial strengths.** Poland's established battery-manufacturing and critical minerals base provides an entry point for international cooperation to build more resilient value chains through partnerships on critical mineral processing, recycling, battery manufacturing and upstream supply diversification.

3. **Make the Baltic Sea a regional clean energy and security hub.** Poland can deepen cooperation with the Baltic states, Germany, Denmark and Sweden on offshore wind, cross-border grids and protecting critical infrastructure; it can do so by building on the Baltic Offshore Grid Initiative and existing cooperation about energy systems around information sharing, repair capacity and security surveillance. Such regional cooperation should integrate grid planning, resilience and security by design to accelerate renewable deployment and strengthen wider European energy security.

COUNTRY PROFILE

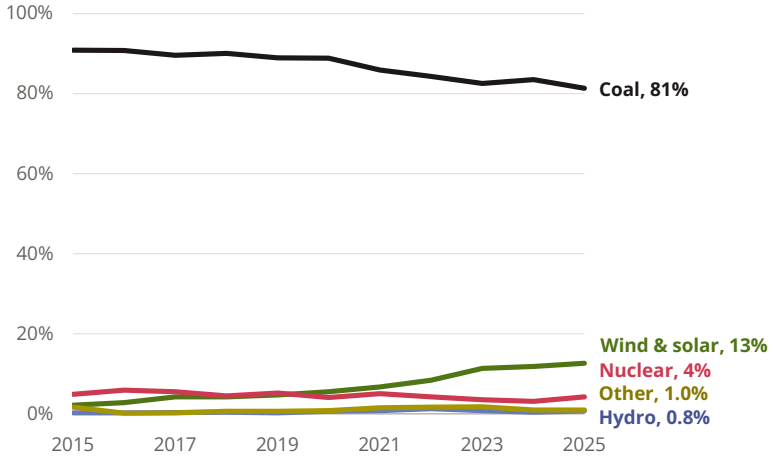
South Africa at a glance

South Africa's transition is progressing as energy insecurity and market reform drive renewables and private participation in the power sector, but coal remains entrenched and expanding gas risks fossil lock-in.

Key transition conditions: The electricity crisis has made renewables, storage and grids practical security solutions, but institutional and distributional limits matter more than capital.

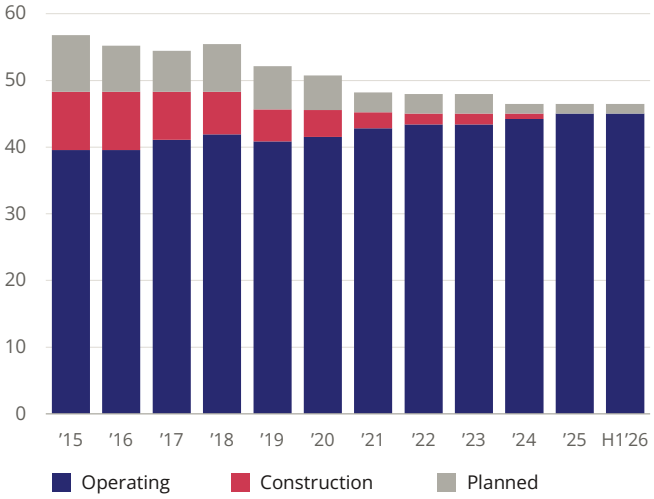
Electricity generation by source

2015–2025

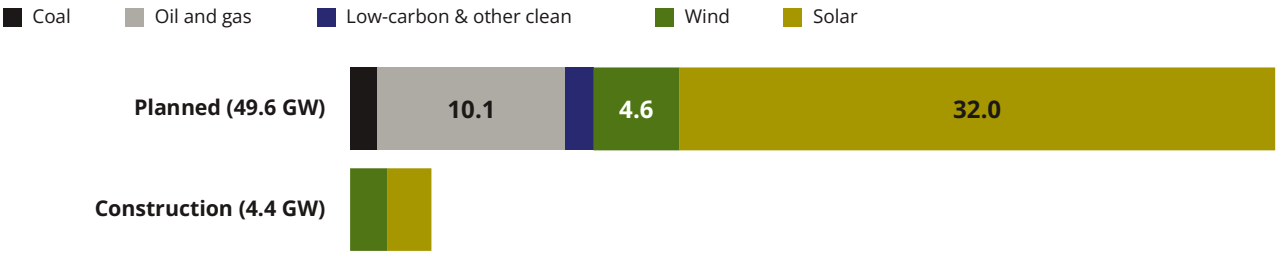


Coal capacity by status

2015–H1 2026



Capacity under development by source



Coal 1.5, Low-carbon & other clean 1.5 GW (planned) · Wind 2.0, Solar 2.4 GW (construction)

Power system landscape

Coal supplies around **81%** of electricity and 40% of industrial energy use. The coal workforce is geographically concentrated, which makes phase-out politically difficult. Renewable capacity now exceeds 16 GW.

Clean transition trends

A pipeline of roughly **220 GW** of renewable projects, some 72 GW at an advanced stage, enough to replace Eskom's planned coal retirements in the short to medium term. New law mandates unbundling Eskom. Gas-to-power plans risk lock-in.

Enablers and bottlenecks

Substantial domestic capital, more than 250 registered JET projects and reform written into law support delivery. Yet about **800 km** of lines are built a year against 1,450 km needed, and a distressed Eskom is not a creditworthy offtaker.

Opportunities for international cooperation with *South Africa*

- **The JETP can act as an investment catalyst**, helping turn more than 250 registered projects into bankable investments by de-risking and crowding in capital.
- **Transmission and storage finance is a priority area:** supporting NTCSA's capitalisation and separation from Eskom, and a market that gives projects reliable revenue.
- **A Clean Trade and Investment Partnership** around platinum-group metals and green iron and steel could support green industrialisation and turn CBAM into an opportunity.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

South Africa's profile

Outline and domestic political economy context

Renewable energy is expanding across South Africa, with total installed capacity exceeding 17 GW,[252] primarily driven by businesses and households seeking relief from electricity shortages and price increases, as well as increased private investment. The country also has a pipeline of roughly 220 GW of renewable projects, with some 72 GW at an advanced stage.[253] Renewables increasingly align with the state's core energy priorities − energy security, affordability, jobs, public ownership, justice and economic competitiveness − by offering more reliable, affordable power to households and industry during the supply crisis. At a macro level, however, the link between renewables and national economic competitiveness remains largely prospective, weakening the economic case for fast-tracking reform.

Coal remains dominant in the electricity supply, with around 81% of generation;[254] it also remains important in debates around energy sovereignty and economic development as South Africa is a coal producer and exporter as well consumer. Coal and coal products are also a backbone of major industries and local economies, accounting for 40% of industrial energy consumption.[255] Its workforce is geographically concentrated: Mpumalanga in the east accounted for roughly 72–87% of national coal mining employment (2011–2019),[256] so that coal mining, coal power, supply chains, local government revenue and community livelihoods are tightly interwoven across the province – even more so in coal towns in the province, such as eMalahleni. This extensive dependence makes the phase-out challenging both politically and economically.

Another structural barrier in South Africa is grid connectivity. The 72 GW of advanced-stage projects in the pipeline alone could replace coal retirements planned by Eskom, the state-owned utility that dominates South Africa's power system, in the short and medium term; however, new grid capacity is highly constrained, with most availability already allocated. Accounting for planned expansions, no evacuation capacity remains from the Northern, Eastern and Western Cape − the regions richest in renewables.[257] The National Transmission Company South Africa's controlled curtailment strategy raises hosting capacity but leaves it constrained overall. The build-out of the grid also lags the required

[252] NTCSA, October 2026, **System Status Reports**: utility-scale solar and wind rose from 5.7 GW (2021) to 7.9 GW (2026), with a further 9.4 GW of estimated rooftop PV, making it around 17 GW in total, excluding hydro and biomass. Rooftop PV, now the largest component, was not separately estimated in 2021.

[253] South African Wind Energy Association, 31 October 2025, **SAREGS 2025 & IRP 2025 What It Means for South Africa's Wind Energy Industry**

[254] Ember, 22 April 2026, **South Africa**

[255] IEA, 2023, **South Africa** (webpage, accessed 5 August 2026)

[256] Haroon Bhorat et al. 2024, **Just Transition and the Labour Market in South Africa**

[257] Eskom, 2023, **Generation Connection Capacity Assessment (GCCA) 2025** (PDF)

pace: annual construction stands at roughly 800 km yet must accelerate towards an average of 1,450 km, peaking near 2,700 km, to integrate new renewable generation.[258]

The primary tension in South Africa's energy political economy is not merely a contest between coal and renewables, but more fundamentally over how the power sector is owned and governed: the entrenched, Eskom-centric monopoly versus electricity market liberalisation and private developers. The loadshedding crisis – which peaked in 2023, a record year with some 332 days of power cuts –[259] exposed the fragility of Eskom's ageing, coal-dominated fleet and lent urgency to reform; however, it left unresolved how to open the sector to competition while ensuring security of supply and managing Eskom's financial stability. Coal is bound up with Eskom's vertically integrated state monopoly and, as noted, a perception of delivering sovereignty, employment, the Black Economic Empowerment policy and regional development. Renewables, by contrast, are associated with foreign and private capital and with an open, competitive sector: the very liberalisation codified in the Electricity Regulation Amendment Act of late 2024, which mandates unbundling Eskom and creating an independent transmission and market operator.[260] Eskom's own position is ambivalent: it resists the unbundling that would end its monopoly, yet under the Integrated Resource Plan 2025[261] is itself building new capacity across renewables, storage and gas, opening to private participation– seeking to lead the new sector while maintaining coal for security.

This same divide helps explain why the international dimension of the transition remains politically contested in South Africa. As an internationally co-financed initiative, the JETP necessarily carries an external-financing logic centred on emissions reductions, even as the process remains domestically driven rather than externally imposed. Labour representatives, such as the Congress of South African Trade Unions, have consistently supported a just transition, linking climate action with workers' rights; however, they argue that the current design of the JETP places insufficient emphasis on just components that safeguard jobs and benefit workers or local communities.[262] Much of the contest therefore concerns ownership and pace, not renewable energy itself: who owns and benefits from the new sector, and how fast it can move. The challenge is thus one of political legitimacy: to build consent – in a polity where the state has long used Eskom as an instrument of public ownership, employment and development – for a transition that is broadly supported though widely seen as pushed at the scale and speed the international

---

[258] Development Bank of Southern Africa, 2025, **Propelling South Africa's Energy Transition through Investment in Transmission Infrastructure** (webpage, accessed 5 August 2026)

[259] Business Report, 2024, **How South Africa's load shedding crisis escalated over 17 years** (webpage, accessed 5 August 2026)

[260] Webber Wentzel, 27 January 2025, **The Electricity Regulation Amendment Act and South Africa's new era of electricity market transformation**

[261] Department of Mineral and Petroleum Resources, Republic of South Africa, 2025, **Integrated Resource Plan 2025: Charting South Africa's energy transition — towards security, sustainability, and economic resilience** (webpage, accessed 5 August 2026)

[262] Etienne Nel, Lochner Marais, and Zolile Mqotyana, 2023, **The regional implications for just transition in the world's most coal-dependent economy: The case of Mpumalanga, South Africa**, Frontiers in Sustainable Cities, 4, https://doi.org/10.3389/frsc.2022.1059312

community expects, and before the country has resolved how to protect supply security and manage distributional impacts.[263]

The governance of transition finance, not merely its volume, is another key concern. Debate often centres on whether international public finance comes as loans or grants, yet the deeper challenge is how external finance interacts with domestic institutions and capacity. Indeed, South Africa has substantial domestic capital that is capable of financing much of the transition, including renewable energy, transmission and industrial investment.[264] Due to Eskom's financial crisis, the issue is revenue, not capital or even projects: it leaves the power sector without a creditworthy off-taker, so otherwise ready pipelines cannot reach financial close. Compounding this are two other gaps: one a packaging gap in suitable instruments and the other a conversion gap in delivery. Concessional finance has been slow to be allocated,[265] and grant funding disbursed to date has gone mainly to technical assistance and project preparation rather than large-scale implementation.[266] As a result, the groundwork is laid but is yet to be converted into investment-ready projects.

Recent LNG and gas-to-power proposals frame gas as a transition fuel complementing renewables and supporting grid flexibility, valued not only for electricity security but for protecting industrial users facing the decline of piped gas from Mozambique.[267] Because industry cannot afford imported LNG on its own, and private developers will not take gas-price risk in a competitive market, the model leans on committed power sector offtake to underwrite the import infrastructure; the bankability of private LNG assets rests on long-term Eskom commitments.[268] This places the chain's riskiest part on Eskom and, through tariffs, on consumers. Gas is embedded as a decades-long fixture rather than a short-term bridge, creating lock-in and stranded-asset exposure precisely where the risk has been socialised.

Summary of key domestic transition factors

- **The strongest enabling condition is South Africa's electricity crisis itself. Loadshedding and supply instability have made renewables, private generation, storage and transmission investment practical energy security solutions**, not just climate policy. This aligns well with the enduring political narrative of improving energy access and driving reforms based on public interest. The principles of a just transition

[263] The reform impulse is itself internal to the state: parts of it, notably the Treasury, support liberalisation because they bear the fiscal cost of Eskom's failures. Thus, the contest is over pace and sequencing as much as direction.
[264] Winile Ximba, 1 April 2026, **South African Pension Funds Outshine $13 Billion Green Transition Funds**
[265] Nick Hedley, 8 February 2025, **As South Africa heads to the polls, voters await stalled 'just energy transition'**
[266] The Presidency: Republic of South Africa, August 2024, **The presidency publishes second instalment of the just energy transition grants register** (PDF)
[267] Eskom, 5 June 2026, **Joint Media Statement- Eskom and Zululand Energy Terminal sign Heads of Agreement to advance strategic gas-to-power development**; Energy Council of South Africa, 2026, **Toolkit 4: Gas** (webpage, accessed 27 Ocotber 2026)
[268] Terence Creamer, 19 June 2026, **Eskom signs agreement with Zululand Energy Terminal as it seeks to advance 3 GW Richards Bay gas-fired power project**

and international support through the JETP are broadly accepted, provided they deliver industrial development, stronger worker protections, local ownership and community benefits.

- **The biggest constraining factors in South Africa are not the overall availability of capital but institutional and distributional**: i**nstitutional capacity, project pipelines and the effective deployment of finance remain greater constraints.** The transition will struggle to gain broad support if it is perceived as market-led and externally driven rather than delivering tangible benefits for workers and communities. The growing role of gas in South Africa's long-term energy and industrial strategy could shape the discourse on energy security, favouring a slower approach to the transition. A critical even if challenging task will be to reform Eskom's monopoly while balancing energy security, market liberalisation and public legitimacy.

Opportunities for international cooperation

1. **Convert South Africa's growing pipeline of more than 250 JET projects[269] into bankable investments by unlocking domestic and international capital – to support not only the transition but also industrial development and energy security objectives.** Funding and matching platforms have been established to support project development. The JETP's growing role as an investment catalyst can help here by crowding in public and private finance, de-risking projects, and accelerating capital deployment as these registered projects enter implementation.

2. **Support the reforms that make transmission and storage investment financeable, targeting the institutions and markets that generate revenue.** Two conditions are pivotal: a well-capitalised National Transmission Company South Africa, fully separated from Eskom, able to borrow against a viable balance sheet to build most of the network; and a competitive electricity market that would give grid and storage projects a reliable revenue stream to finance against. International cooperation can help accelerate these domestically driven reforms. The EU can provide concessional finance and guarantees – working with South African development banks – that de-risk grid and transition investment, as well as technical assistance to support the design of market rules and regulatory architecture, strengthening local institutions.

3. **Build on the Clean Trade and Investment Partnership[270] between the EU and South Africa, for example around specific minerals**, like platinum-group metals. green iron and steel, where the EU can support export-led green industrialisation. By facilitating investment deals under the partnership, the two partners can help convert a decarbonisation obligation such as CBAM into an export-industry opportunity and position South Africa further upstream in clean energy value chains.

---

[269] Parliamentary Monitoring Group, 21 August 2026, **Question NW4210 to the Minister of Electricity and Energy**

[270] European Commission, 20 November 2025, **EU and South Africa sign first-ever Clean Trade and Investment Partnership (CTIP)**

COUNTRY PROFILE

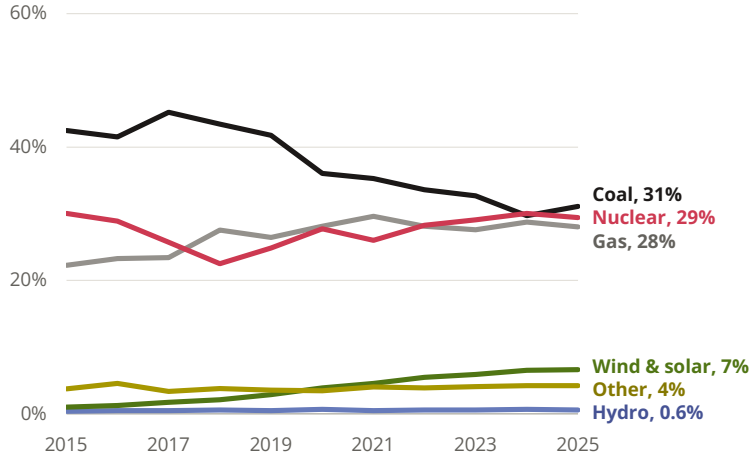
South Korea at a glance

South Korea is reframing the energy transition as an industrial competitiveness and energy security agenda, pursuing decarbonisation through a pragmatic and managed transition.

Key transition conditions: Political will and conglomerates' growing clean energy role drive change, but fossil-dependent industries, grid constraints and high renewable costs limit readiness.

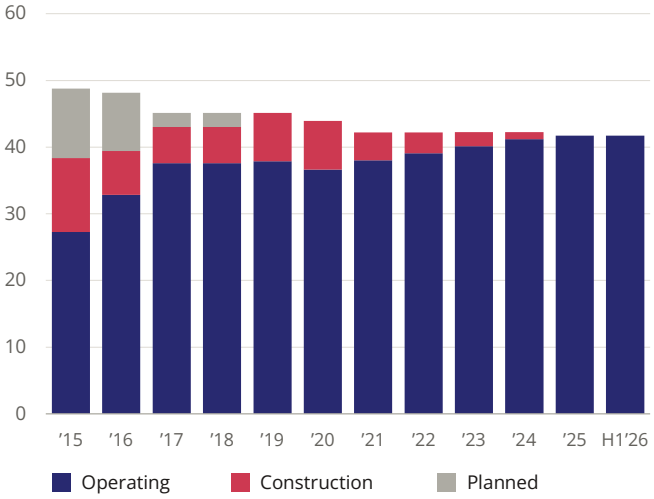
Electricity generation by source

2015–2025

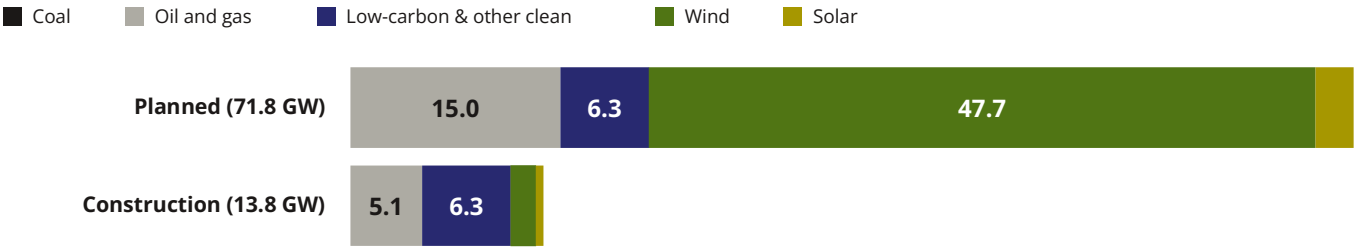


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Solar 2.7 GW (planned) · Wind 1.8, Solar 0.5 GW (construction)

Power system landscape

About **60%** of electricity and over 80% of energy came from fossil fuels in 2024. Nuclear and coal each supply around 30% of power, renewables a modest 10%. Korea is the 5th-largest LNG importer and 4th for crude and coal.

Clean transition trends

Plans target **100 GW** of renewables by 2030 and a coal phase-out by 2040, pledged at COP30 alongside joining the Powering Past Coal Alliance. The 2026 Hormuz crisis has recast the transition as industrial security.

Enablers and bottlenecks

The government has a mandate for renewables and KEPCO reform, and conglomerates are moving into batteries and EVs. But transmission lags, curtailment is growing, and around **60%** of public export finance backs global gas infrastructure.

Opportunities for international cooperation with *South Korea*

- **RE100 demand makes the industrial case for renewables:** cooperation can support grid access guarantees and deployment for strategic industries, alongside the West Coast Energy Highway.
- **The 2040 coal phase-out is a key policy anchor:** credibility rests on closure schedules for the 21 undecided units and clarity on 20 plants designed to run beyond 2040.
- **Keeping fossil fuel options flexible supports security:** shorter-tenor LNG in place of twenty-year contracts, with investment directed to grids, storage and offshore wind.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

South Korea's profile

Outline and domestic political economy context

South Korea relies heavily on fossil fuels for its energy needs, with around 80% of its total energy supply coming from fossil fuels and approximately 60% of its electricity generation in 2025.[271] Coal accounts for 32% of electricity generation, followed by nuclear (29%) and gas (26%), while renewables contribute a comparatively small share (7%). South Korea is developing its 12th Basic Plan for Electricity Supply and Demand, integrating roadmaps and targets to reach 100 GW of renewables by 2030 and a coal phase-out by 2040,[272] as committed to at COP30 when it also joined the PPCA. However, implementation gaps remain, with clean energy progress sitting alongside heavy official reliance on nuclear power as a dominant baseload source and continued dependence on fossil gas and coal.

South Korea's centralised power-market structure presents challenges for renewable integration. Korea Electric Power Corporation (KEPCO) controls transmission and distribution networks and is the main electricity purchaser, while its five generation subsidiaries account for a substantial share of conventional power generation. Existing dispatch arrangements favour baseload generation over flexible resources, and the proposed merger of these subsidiaries introduces further uncertainty over its implications for grid access, competition and the integration of renewables.[273]

South Korea is a net importer of fossil fuels – one of the world's largest importers of crude oil (fourth), coal (fourth) and LNG (fifth) – and a net exporter of oil products.[274] Because the country has no cross-border pipelines and produces virtually no domestic coal and gas, or any substantive amount of oil, it relies almost entirely on maritime tanker shipments for all its fossil fuels to meet its massive industrial and power generation needs. In 2025, South Korea imported approximately 70% of its crude oil and 20% of its LNG from the Middle East,[275] with 95% of these imports passing through the Strait of Hormuz.[276]

Given that South Korea imports almost all its fossil fuels, reducing external vulnerability matters as much as climate logic, with the transition increasingly framed around energy security, economic resilience and industrial competitiveness.

---

[271] IEA, 2025, **Korea** (webpage, accessed 7 August 2026)

[272] Argus Media, 2 February 2026, **South Korea sets out 2026 energy transition plan**; Ministry of Climate, Energy, and Environment, 15 August 2026, **Shifting to an Electricity-Based Nation: Policy Discussions on Electricity Demand and Renewable Energy Deployment Outlook 4th and 5th Policy Forums for the 12th Basic Plan Held**

[273] The Korean Times, 19 June 2026, **Public power generation firms' proposed merger sparks debate**

[274] IEA, 2025, **Korea** (webpage, accessed 7 August 2026)

[275] Korea International Trade Association. 3 March 2026, **Korea's Imports depend on the Middle East for 70% of crude oil and 20% of LNG, raising concerns about the impact of a closure of the Strait of Hormuz on Korean industries (韓 원유 70%·LNG 20% 중동 의존…호르무즈 해협 막히면 韓산업 타격 우려)**

[276] Korea International Trade Association, 3 March 2026, **Inflationary pressure on oil prices as a blockade of the Strait of Hormuz looms… South Korean industry on high alert (호르무즈 해협 봉쇄 현실화에 유가급등 조짐…韓 산업계 '비상')**

Current frameworks treat gas not as an open-ended bridge fuel but as a managed transition asset, leveraging its flexibility to balance short-term swings in nuclear and coal-fired generation while prioritising a structural shift towards a more self-reliant, zero-emission energy mix. The 2026 Hormuz crisis has sharpened this logic considerably: the near-simultaneous disruption of crude oil supply, naphtha input for petrochemicals, and LNG imports exposed the degree to which Korea's energy vulnerability and its industrial competitiveness risk are one and the same problem. The policy implication being drawn is not simply power sector resilience but a broader reframing of the energy transition as industrial security, as well as accelerating the shift to domestic clean energy, as a structural hedge against geopolitical chokepoints. However, because of this very dynamic, the challenges remain twofold: decarbonisation of the power system itself and of industrial sectors.

South Korea's economy is export-driven, with manufacturing above one-quarter of its GDP.[277] It was built on state-directed industrialisation in energy-intensive sectors (the eleventh-highest in manufacturing intensity globally in 2024),[278] such as steel, petrochemicals, shipbuilding, semiconductors and automotive. Its major industrial conglomerates are increasingly positioning themselves as key players in global battery technology and EV supply chains, pursuing significant commercial opportunities in green industries.[279] However, this growing engagement with clean technologies does not fundamentally alter the structural dependence on fossil fuels embedded in South Korea's established industries, making decarbonisation economically and politically costly. Steel production, petrochemical output and the refining industry all depend on fossil fuels not only as energy sources but as primary input materials. For instance, in 2024, South Korean refiners exported a near-record 490 million barrels of petroleum products worth US$45 billion, with over half of all imported crude re-exported as refined fuel.[280] South Korea's shipbuilders also play a leading role in the midstream of the value chain, capturing around 88% of global LNG carrier orders;[281] the government itself directs around 60% of public export finance towards global gas infrastructure,[282] further disincentivising the transition it officially supports.

In South Korea's industrial sectors, a transition requires not only replacing the power source but also the primary input material itself. This makes the transition fundamentally more disruptive to business models, as well as more capital-intensive, and more dependent on technologies such as green hydrogen, bio-feedstocks and carbon capture utilisation that are not yet commercially scaled. Substitution pathways remain immature and costly, and slow uptake of renewable energy means the preconditions for

[277] World Bank Group, 2025, **Manufacturing, value added (% of GDP) – Korea, Rep.** (webpage, accessed 7 August 2026)
[278] IEA, 2024, **Korea** (webpage, accessed 7 August 2026)
[279] IEA, May 2025, **Global EV Outlook 2025**
[280] The Korea Times, 3 February 2025, **Korea's exports of gasoline, diesel hit record high in 2024**
[281] Maritime Gateway, 20 May 2026, **Korean Shipyards Secure 10 LNG Carriers Worth $1.8 Billion**
[282] Solutions For Our Climate, 18 March 2026, **[Press Release] Hormuz Blockade lays bare structural limits of fossil fuel reliance in South Korea and Japan**

either transition (power sector and industrial) are not yet in place. Institutional memory of previous disorderly industrial collapse – epitomised by the 2016 Hanjin Shipping bankruptcy and its cascade of unemployment and state bailouts – also means policymakers are acutely averse to rapid, unmanaged sectoral decline.

Coal accounts for around one-third of generation in South Korea's power sector, but rapid plant closures remain politically and operationally difficult unless replacement capacity is demonstrably reliable. This reinforces a reliability-first approach to planning, particularly given the economy's long-standing dependence on abundant, stable and relatively low-cost fossil-based electricity to support manufacturing exports. The core tension is therefore between an industrial growth model built around affordable power and a transition that requires major investment in clean generation, transmission infrastructure, storage and more complex system coordination. Grid congestion, and a material lag in transmission expansion, further sharpen this tension: renewable resources are concentrated in coastal and rural areas, while industrial demand is centred in the northwest Seoul–Gyeonggi region and the southeastern Ulsan–Pohang corridor.[283] The issue is compounded by how South Korea's power market is designed: structured around baseload and must-run generation, it provides insufficient incentives for storage and the flexible resources needed to integrate renewables; curtailment of already-connected capacity is a growing problem that market reform has yet to resolve.[284] Local resistance to offshore wind farms and solar arrays deepens the bottleneck, as communities are concerned about land use,[285] marine livelihoods[286] and limited local benefits.[287] Coal-producing regions also highlight the need for credible just transition policies that provide employment continuity and regional economic renewal, alongside plant closures. Roughly half of South Korea's coal capacity is located in South Chungcheong, a province already lagging behind in wages and employment, yet replacement generation and associated investment are often located elsewhere,[288] leaving unresolved questions over employment continuity and regional economic renewal.[289] Together, these spatial, structural, economic and distributional pressures reinforce a preference for a gradual, administratively managed transition over rapid market-led disruption.

---

[283] Institute for Energy Economics and Financial Analysis, 2025, **Bottlenecks to Renewable Energy Integration in South Korea** (PDF)

[284] Solutions for Our Climate and Regulatory Assistance Project, 2026, **Reforming South Korea's Power Sector** (PDF)

[285] Solutions For Our Climate, 13 May 2026, **[Statement] South Korea's new Agrivoltaics Act: A Legal Milestone Shadowed by Land-use Barriers**

[286] Seona Park and Sun-Jin Yun, 2024, **Energy justice: Lessons from offshore wind farm siting conflicts in South Korea**, Energy Policy 185 (185), 113972, **10.1016/j.enpol.2023.113972**

[287] Institute for Energy Economics and Financial Analysis, 2025, **Bottlenecks to Renewable Energy Integration in South Korea** (PDF)

[288] Invest Korea, 9 September 2025, **Saemangeum National Industrial Complex, Emerging as a Hub of Future Industries and Renewable Energy**

[289] Sehoon Kim et al. 2025, **Leaving Someone Behind: Coal Phase-Out in South Korea**, Development Studies Series DS25-02, **10.2139/ssrn.5195619**

Summary of key domestic transition factors

- **Key enabling factors include South Korea's political will and industrial conglomerates' growing involvement in the clean energy side of the transition**. South Korea's strategic prioritisation of semiconductors, AI and data centres could also accelerate the transition, as their expansion increases the need for abundant, reliable and increasingly clean electricity. This can strengthen the industrial case for faster renewable deployment and grid modernisation – provided demand growth does not default to nuclear expansion or coal retention as the path of least resistance. The Lee administration currently demonstrates strong political will to transition, with an explicit mandate for renewable energy and with institutional reforms to KEPCO's single-buyer model.

- **The main constraining factors are South Korea's low structural readiness.** Energy-intensive industries remain structurally entwined with fossil fuels as both fuel and input. KEPCO and the Korea Gas Corporation have historically prioritised supply stability and resisted market reforms, a concern heightened by the September 2026 announcement to merge KEPCO's five generation subsidiaries into a single 53 GW entity, which risks further fossil fuel entrenchment and weakens market signals for a renewable-led system.[290] Grid constraints and high cost of renewable deployment – driven by land scarcity, complex permitting, high capital costs and local opposition[291] – also mean that the economic case is still being made rather than won.

Opportunities for international cooperation

1. **Advance South Korea's 100 GW by 2030 renewable energy ambition through international cooperation on clean power deployment and grid reform.** Domestically, growing corporate demand for renewable electricity, driven partly by RE100 commitments[292] and supply-chain requirements, provides a strong economic rationale. International partnerships could complement domestic initiatives such as the West Coast Energy Highway through technology cooperation on grid modernisation and energy storage, alongside joint investment in offshore wind and measures to improve corporate access to clean electricity.

2. **Support implementation of the coal phase-out by 2040 commitment, the most consequential near-term policy anchor, to ensure credibility.** A decision to translate the headline end date into binding closure schedules for 21 coal plants has not yet been made; the question of whether 20 plants with design lives beyond 2040 are retained as emergency backup also requires resolving – this could be a loophole that might otherwise undermine the phase-out commitment. PPCA provides a useful platform for this work as it offers access to just transition expertise and finance, can

[290] The Korea Times, 19 June 2026, **Public power generation firms' proposed merger sparks debate**

[291] IEA, 2025, **Korea 2025 Energy Policy Review**

[292] RE100 is a global corporate renewables initiative, led by Climate Group, bringing together over 400 influential businesses across over 150 markets worldwide. Its members have all committed to using 100% renewable electricity in their operations by 2050 at the latest.

help close the gap with the eight subnational members that preceded national accession – and also possibly push for a more ambitious date than 2040, in line with the OECD-2030 trajectory that the Alliance itself sets.

3. **Enhance green industrial supply chains to foster economic competitiveness and energy security.** South Korea is well placed to deepen cooperation through Asia-Pacific Economic Cooperation and bilateral frameworks, particularly with partners such as Australia, to develop cleaner and more resilient industrial supply chains, including collaboration on critical minerals and low-carbon steel. This could help South Korea decarbonise its energy-intensive manufacturing base while strengthening access to clean industrial inputs and reducing exposure to fossil fuel supply disruption.

COUNTRY PROFILE

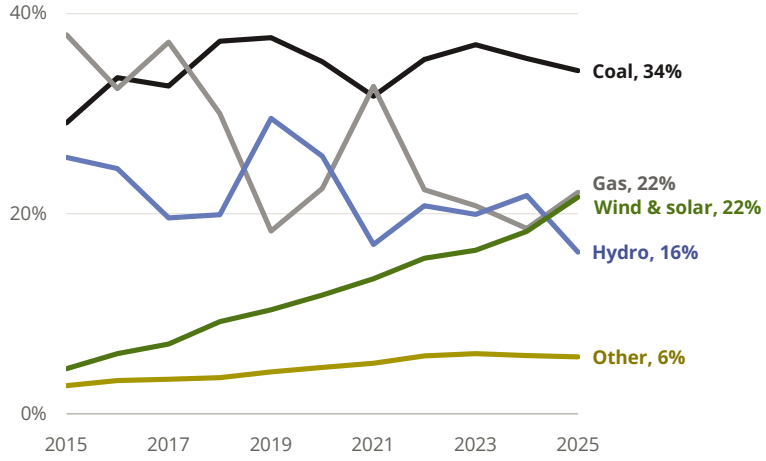
Türkiye at a glance

Türkiye has accelerated its transition in line with its goals of energy security, lower import dependence and net zero by 2053, though progress has been uneven as renewables grow alongside continued fossil fuel use.

Key transition conditions: Renewables already align with Türkiye's core national interests, while coal and gas continue to be treated as strategic security assets.

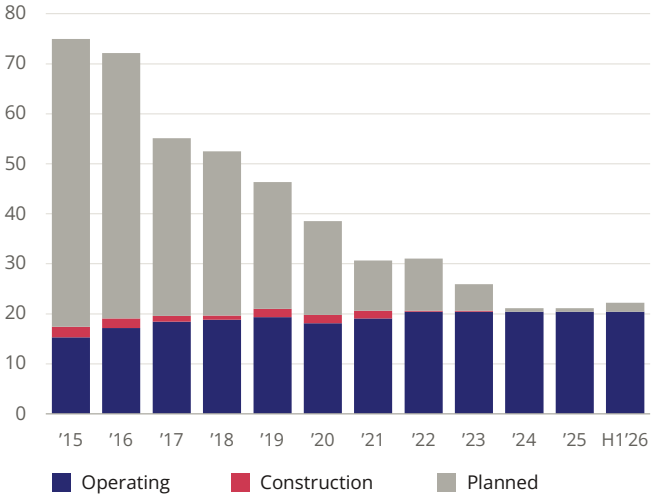
Electricity generation by source

2015–2025

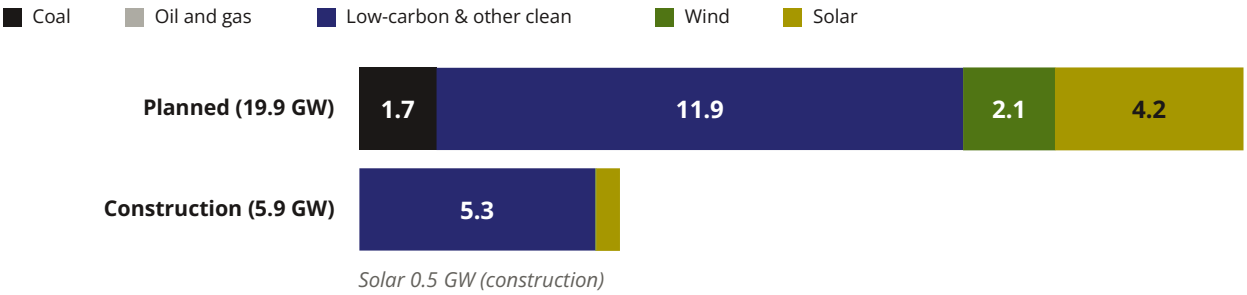


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Solar 0.5 GW (construction)

Power system landscape

57% of electricity came from fossil fuels in 2023, down from nearly 80% in 2013. Renewables are over 50% of installed capacity and about 40% of generation. Nearly all gas, most oil and substantial coal are imported.

Clean transition trends

Solar capacity doubled from 9.7 GW in mid-2022 to 22 GW by mid-2025. Türkiye has committed to **120 GW** of wind and solar by 2035, up from around 30 GW in 2024. No new coal is likely, though a formal commitment is not yet in place.

Enablers and bottlenecks

Renewables fit the "domestic and national energy" agenda, supported by the **$5bn** TIDIP platform and a planned ETS. Permitting delays, grid limits, high capital costs and fossil fuel subsidies could slow progress, and SMEs often lack capital.

Opportunities for international cooperation with *Türkiye*

- **COP31 diplomacy can be an opportunity:** the "35 by 35" electrification target, grid investment pipeline and Climate Implementation Bridge offer entry points aligned with domestic priorities.
- **Clean power as energy security offers common ground:** it is presented as protection against volatile markets and as roughly 50% cheaper than fossil generation.
- **Industrial decarbonisation finance can turn compliance into opportunity,** especially for SMEs facing CBAM, paired with technical assistance and knowledge sharing.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

Türkiye's profile

Outline and domestic political economy context

Türkiye has expanded renewable capacity, which now represents over 50% of installed capacity and about 40% of electricity generation. Wind and solar generated around 15% of electricity in 2024. Indeed, solar capacity doubled in three years from 9.7 GW in mid-2022 to 22 GW by mid-2025. Türkiye has also committed to nearly quadrupling its solar and wind capacity from around 30 GW in 2024 to 120 GW[293] by 2035), including 5 GW of offshore wind. The first offshore tender is expected in 2026, with annual additions of 8–10 GW required. Meanwhile, fossil fuel generation has dropped from nearly 80% to approximately 57% (2013–2023).

Despite this shift, fossil fuels remain vital for system reliability and economic reasons, **as Türkiye is both a major importer and consumer of these fuels.** It imports nearly all its gas (even though domestic gas production is scaling rapidly), most of its oil and substantial amounts of coal, to support an economy in which such energy-intensive industries account for around 20% of GDP.[294] This reliance creates macroeconomic, security and political vulnerabilities. While renewable energy growth, clean manufacturing, and export-driven industry decarbonisation are expected to rise, fossil fuel use will persist since domestically produced lignite coal, supported by state subsidies, and growing domestic gas production are promoted as cheap, home-grown energy sources that reduce reliance on imports.

Türkiye's structural dependence is more about fossil fuel imports than fossil fuel production revenues. Energy imports put significant pressure on the economy, making affordable energy central to industrial competitiveness and political stability. This is further supported by the public, as inflation, employment and security top the lists of social and political priorities. Therefore, the government's key themes of energy transition centre on energy security, sovereignty and economic strength. Renewables are part of domestic, affordable energy that benefits industry, making clean energy broadly palatable without deep ideological conflict. However, gas also serves as an energy security[295] and geopolitical goals: LNG imports diversify supply beyond pipeline gas, while expanded LNG and pipeline infrastructure connects suppliers to European markets and supports Türkiye's ambition to become a regional hub.

Türkiye's transition approach supports the expansion of fossil fuel infrastructure as much as clean energy. Renewables, clean technology, as well as LNG, domestic gas and coal can all be justified under the same "domestic, secure, affordable energy" narrative. This creates momentum for diversification but weakens pressure for a structural exit from fossil fuels, especially given the government's established recognition of LNG and domestic gas as critical infrastructure for energy independence and a bargaining chip in Europe.

---

[293] This target is currently under review, with an updated figure expected to be announced later in 2026.

[294] World Bank Group, **Manufacturing, value added (% of GDP)- Türkiye** (webpage, accessed 5 August 2026)

[295] Humeyra Ayaz, 18 May 2025, **New Black Sea gas discovery bolsters Türkiye's geopolitical role**

Another issue is the fiscal stickiness of a coal phase-out, with lenders facing critical transition risk as loans to thermal power plants account for around 2% of Turkish bank assets, with non-performing loan rates above the banking sector average.

No new coal is likely to be built in Türkiye, though a formal "No New Coal" commitment remains politically elusive. Türkiye previously revoked licences for two pre-construction projects, Kirazlıdere and Karaburun, and in July 2026 the courts revoked the Environmental Impact Assessment (EIA) of the Afşin Elbistan A expansion, the last remaining domestic project.[296] However, a new complication has emerged with the Cenal plant fired with imported coal entering the EIA process in June 2026, making the "No New Coal" commitment politically harder to frame while this proposal is live.

Türkiye's export-oriented economic model also impacts its transition, though not in one simple way. Export-oriented firms linked to EU value chains are already responding to the CBAM and supply-chain pressures, while domestic-facing firms and SMEs are less prepared. SMEs are especially important because they make up the majority of firms and employment yet often lack the capital and technical capacity to decarbonise. To support their transition, Türkiye has established the Long-Term Climate Strategy,[297] one of many important milestones, as well as the planned Emissions Trading System (ETS)[298] development and the Turkish Industrial Decarbonisation Investment Platform (TIDIP).[299] It remains to be seen whether these will serve as catalysts for a real transition or more as a measure to protect the competitiveness of its domestic industry.

Historically, **Türkiye has demonstrated a pragmatic approach to climate diplomacy**, **often aligning it with its broader political goals.** For instance, its ratification of the Paris Agreement is often cited as a strategic move, rather than as a purely environmental action,[300] to secure a memorandum of understanding with multilateral finance institutions (the World Bank Group and EBRD) and countries (France and Germany); the funding initially amounted to US$3.5 billion (€3.1 billion), then expanded to a US$5 billion investment plan as the agreement transformed into TIDIP) in 2024. Türkiye's current foreign policy stance – balancing security, economic resilience and strategic independence – reflects ambitions that pull in two directions simultaneously: seeking to become a regional clean industry leader while also expanding its role as an energy transit and trading hub for fossil fuels. Türkiye may aspire to advance both ambitions on the international stage via hosting COP31, framing its energy transit role as integral to a stable and secure energy transition rather than at odds with its climate leadership objectives – though this may generate

[296] Euro News, 14 July 2026, **'Victory' as Turkiye ends major coal plant expansion – but still lacks phaseout plan**

[297] UNFCCC, 2024, **Türkiye's 2053 Long-Term Climate Change Strategy** (PDF)

[298] Turkish Presidency General Secretariat, Directorate General of Law and Legislation, 2025, **Climate Law**

[299] European Bank for Reconstruction and Development, November 2024, **Türkiye launches industrial decarbonisation investment platform**

[300] Jonathan Spicer and John Irish, 14 October 2021, **EXCLUSIVE Turkey set to receive 3.1 bln euro loans to help Paris climate goals – sources**

tensions between how ambitiously Türkiye chooses to act and how it chooses to be seen to act.

Summary of key domestic transition factors

- **The strongest enabling condition is that renewables already align with Türkiye's core national interests.** Wind and solar reduce import exposure, support industrial competitiveness and fit the government's "domestic and national energy" framing.[301] The alignment between foreign policy priorities and climate diplomacy could also further accelerate the transition by increasing international commitments and establishing fast-streamed policy tools.

- **The biggest risks are political economy risks: coal and gas remain politically and strategically protected as security assets in Türkiye.** Issues such as permitting delays, higher financing costs of renewables, grid limitations and uncertain coal phase-out plans could slow down progress. Other factors also all foster caution about a rapid transition – including continued fossil fuel subsidies, volatile macroeconomic conditions, high capital costs, selective financing, and the "too big to fail" status of coal-linked assets.

Opportunities for international cooperation

1. **Focus on COP31-related diplomacy where pragmatic solutions to Türkiye's domestic transition needs (such as integrating renewables into urbanisation and infrastructure planning), or foreign policy priorities, can serve as negotiation points to increase the country's commitments and make them more ambitious.** Indeed, the Turkish COP31 Presidency has placed electrification at the centre of its Action Agenda, seeing COP31 as the start of a global conversation about a "35-by-35" target of 35% of global final energy consumption coming from electricity by 2035. The COP31 Presidency's delivery-focused agenda also features the grid investment pipeline and the Climate Implementation Bridge (see Chapter 3), which all create concrete ways for international partners to support Türkiye's ambition while responding to its domestic priorities.

2. **Support Türkiye in advancing clean electricity as part of its agenda to improve energy security and reduce fossil fuel imports.** Türkiye already frames domestically produced and affordable energy as central to strengthening energy security and reducing exposure to volatile external markets. International cooperation can help Türkiye translate the growing energy security case for clean power into accelerated deployment, including through investment, grid development and other measures. This would reinforce the government's existing emphasis on domestic and affordable energy while helping ensure that energy security concerns drive clean energy expansion rather than further fossil fuel infrastructure and diversification.

[301] Erdal Tanas Karagol et al. 2017, **National Energy and Mining Policy of Turkey** (PDF)

3. **Source industrial decarbonisation finance for Türkiye, especially for SMEs**, to transform compliance with existing international standards, as well as EU trade and supply-chain requirements, notably CBAM, CSRD-related supply-chain pressure and standards alignment, into an economic opportunity. To maximise the benefit of this finance, it should be paired with technical assistance and knowledge sharing on economy-wide decarbonisation, grounded in an understanding of structural barriers specific to Türkiye. The coal phase-out will play a key role here, as it is central to decarbonising the power sector; it is also where barriers are most visible, including: multiple layers of transition exposure for local economies and employment, stranded assets in the coal-related industry and financial-sector assets tied to coal infrastructure.

COUNTRY PROFILE

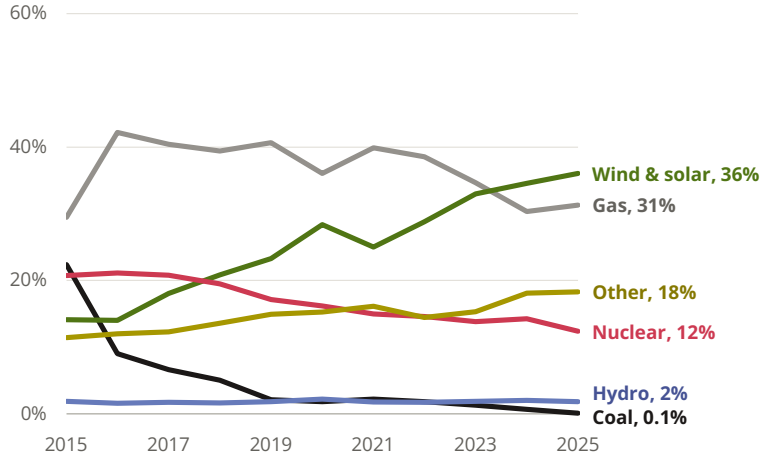
United Kingdom at a glance

The UK's transition has strong momentum from exiting coal and expanding renewables, grids and storage; it now faces the challenge of delivering a clean power system to break away from gas dependence.

Key transition conditions: Binding targets, mature finance and public support underpin delivery, but political contestation, infrastructure bottlenecks and the need for visible benefits slow the pace.

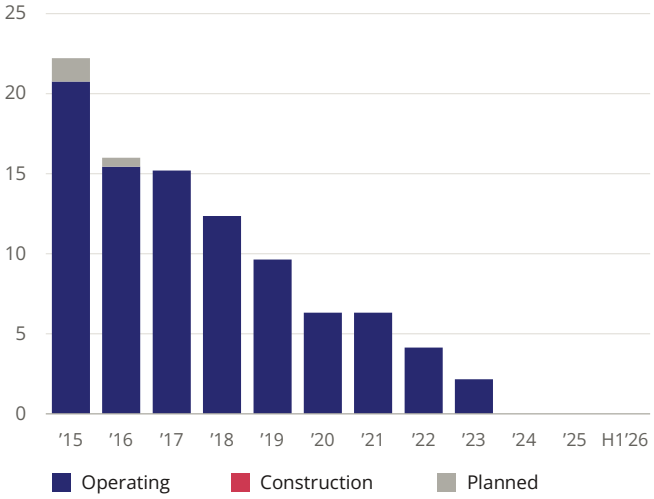
Electricity generation by source

2015–2025

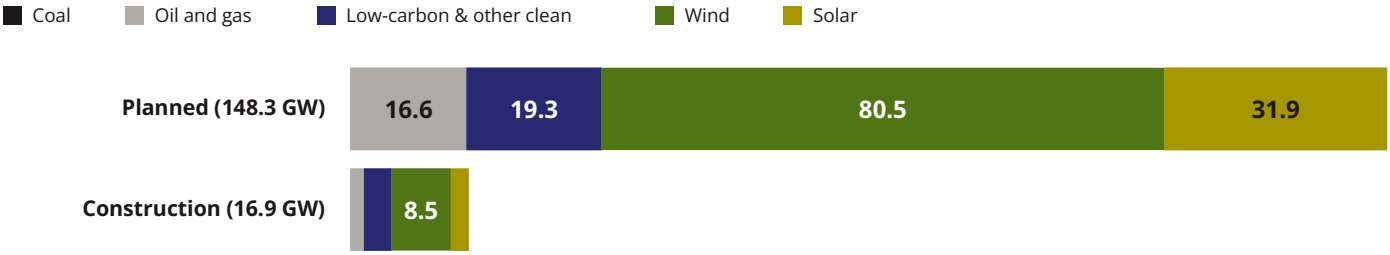


Coal capacity by status

GW, 2015–H1 2026



Capacity under development by source



Oil and gas 1.9, Low-carbon & other clean 4.0, Solar 2.5 GW (construction)

Power system landscape

Renewables supplied **52.1%** of generation in 2025, and power emissions are down 82% since 1990. Coal power ended in 2024, so almost all fossil generation is gas. Import dependence is 43.3%; the 2021–2025 crisis cost over £183bn.

Clean transition trends

Clean Power 2030 aims for an approximately **95%** clean system, with around 80% of generation from wind and solar. Battery storage capacity grew 509% from 2020 to 2025. Fewer than 2% of homes use heat pumps.

Enablers and bottlenecks

Carbon budgets, Contracts for Difference auctions and 74% public concern on climate underpin delivery. Yet about **£40bn** a year is needed to 2030 along with around 80 critical transmission projects, and planning and skills remain bottlenecks.

Opportunities for international cooperation with the *United Kingdom*

- **The 2027 G20 and 2028 G7 presidencies are an opportunity** to link clean energy with growth and security: grid investment, supply chains, development bank reform and coal-to-clean finance.
- **Coalition leadership can move pledges to delivery** through the Powering Past Coal Alliance and the Clean Energy Transition Partnership: clean power finance, grids and just transition.
- **North Seas Energy Cooperation offers a platform for offshore wind,** with a coordinated build-out towards 300 GW by 2050 and a spatial energy plan due in 2027.

Sources: *Ember annual electricity data; Global Energy Monitor annual capacity charge data and coal plant tracker data*

E3G

United Kingdom's profile

Outline and domestic political economy context

The UK has significantly decarbonised its power sector, reducing emissions by 82% between 1990 and 2025.[302] This progress has been driven by increasing the share of renewables in the energy mix, including the development of a major offshore wind sector, while scaling down coal.[303] Renewable sources accounted for 52.1% of generation in 2025.[304] Renewable generation rose by 5.9% from 2024 to a record 153.0 TWh in 2025, driven by record output from wind, solar and bioenergy. Likewise, following the UK's completed coal phase-out in 2024, fossil fuel generation totalled 94.9 TWh in 2025 and remained at a historically low level, with almost all fossil generation coming from gas.[305]

The UK completed its coal-power exit in 2024 with the closure of Ratcliffe-on-Soar, its last coal-fired power station. However, gas remains a significant part of the power mix, and the UK is increasingly reliant on imported fossil fuels due to declining oil and gas reserves in the North Sea.[306] With reserves nearly depleted, the UK also faces the task of finding alternatives, including renewables as long-term domestic energy sources. Net energy imports accounted for 43.3% of total energy supply in 2025;[307] this import dependence leaves the UK vulnerable to fossil fuel price shocks, particularly for gas used in power generation and oil used in transport. The recent global energy crisis caused sharp increases in energy prices for businesses and consumers, costing the UK over £183 billion over the four years from 2021 to 2025.[308]

Through its Clean Power 2030 Action Plan, published under the previous Prime Minister Keir Starmer, the UK is working to produce enough clean electricity to meet annual demand by 2030, with unabated gas used only when essential – in practice, a system approximately 95% clean.[309] The National Energy System Operator pathways envisage around 80% of generation coming from wind and solar, with the largest buildout in new offshore wind, supported by batteries, long-duration storage, interconnectors and consumer flexibility.[310] Delivering Clean Power 2030 requires approximately £40 billion of annual investment between 2025 and 2030, much of it private, including £30 billion for generation and £10 billion for transmission.[311] Around 80 critical transmission projects are

---

[302] Office for National Statistics, 7 July 2026, **Measuring UK greenhouse gas emissions**

[303] Department for Energy Security and Net Zero, 28 March 2024, **2023 UK greenhouse gas emissions: provisional figures – statistical summary** (PDF)

[304] Department for Energy Security and Net Zero, 30 July 2026, **DUKES 2026 Chapter 5: Electricity** (PDF)

[305] Ibid.

[306] IEA, **United Kingdom: Electricity** (webpage, accessed 13 August 2026)

[307] Department for Energy Security and Net Zero, 30 July 2026, **DUKES 2026 Chapter 1: Energy** (PDF)

[308] E3G and Energy and Climate Intelligence Unit, 21 November 2025, **Cost of the fossil fuel crisis in the UK**

[309] Department for Energy Security and Net Zero, 13 December 2024, **Clean Power 2030 Action Plan: A new era of clean electricity – main report** (PDF)

[310] National Energy System Operator, November 2025, **Future Energy Scenarios 2025: Pathways to Net Zero** (PDF)

[311] Department for Energy Security and Net Zero, 13 December 2024, **Clean Power 2030 Action Plan: A new era of clean electricity – main report** (PDF)

also needed, while planning, grid connections, skills, ports and supply chains remain potential bottlenecks. Great British Energy provides a public investment and ownership vehicle, with its success dependent on mobilising private capital and accelerating projects with visible benefits.

Progress is being made to delink energy and gas pricing in the UK, reducing its exposure to price volatility. As of 2026, 15% of Britain's power generation is independent from the gas power price, because it is provided by 10 GW of operational renewable capacity.[312] By increasing the share of clean power through the Contracts for Difference scheme – a government-run mechanism which incentivises investment in low-carbon power infrastructure through auctions that secure a set electricity price per MWh for generators – the share of the market exposed to volatile gas prices is increasingly limited. A record amount of renewables capacity was procured in the latest Contracts for Difference auction round (AR7).[313]

With Andy Burnham serving as the UK's seventh prime minister in a decade, his government will be seeking to maintain investor confidence while pursuing an agenda capable of uniting a fragmented voter base; its political success is likely to be judged by reduced household bills, improved energy security, jobs and regional investment. Against this backdrop, the government faces pressure to support further North Sea fossil fuel development through projects and tie-backs under existing licences and to reconsider future licensing; approving production at the previously licensed Jackdaw gas field in October 2026, while a decision on the Rosebank oil field remains pending at time of writing.[314] However, additional domestic production would be insignificant compared with the global market and have little effect on domestic oil and gas prices. As the North Sea is a mature basin with depleting reserves, new investment is increasingly uneconomic and could require government support, while the region remains a stronghold for British offshore wind power.

The next phase of the transition depends on building a transmission network quickly enough to enable renewables to be built and used at the pace needed, as well as on electrifying heat and transport. The UK has made significant progress on storage, with a 509% increase in battery storage capacity from 2020 to 2025; in fact, together, the UK's operational and commissioned battery storage capacity will provide substantial support for peak demand.[315] This storage capacity, alongside increased end-user flexibility, will be essential to support incoming wind and solar projects.

---

[312] Ember, 13 May 2026, **British power prices are increasingly independent from gas**

[313] Climate Change Committee, 24 June 2026, **Progress in reducing emissions: 2026 report to Parliament**

[314] Department for Energy Security and Net Zero, 21 October 2026, **Jackdaw gas field gets green light**; Institute for Government, updated 22 October 2026, **Jackdaw and Rosebank**.

[315] RenewableUK EnergyPulse, 3 September 2025, **Stacking up the storage: where the UK battery market stands in 2025**

Work is still needed to build the transition from gas to electric heating, with fewer than 2% of UK homes using heat pumps.[316] This is among the lowest rates in Europe, while high electricity prices weaken incentives to switch.[317] Reducing fossil gas use in heating will require more supportive and better-aligned policies to increase heat pump uptake, expand heat networks and improve building insulation. Wider electricity market reform and stronger distribution grids will also be needed to support the transition.

Beyond 2030, the UK government will need to address the hardest-to-decarbonise parts of the electricity system. The UK still plans to use gas power stations as backup when renewable output is low, and there are currently no major investments into alternative technologies. At the same time, much of the UK's existing nuclear fleet is due to retire over the next decade,[318] while annual electricity demand is predicted to increase from around 290 TWh today to as much as 785 TWh by 2050 – nearly three times' current levels – as transport, heating and industry become increasingly electrified.[319] That being the case, the UK will need to continue to expand renewable generation and supportive clean technology to maintain a decarbonised system long term.

Summary of key domestic transition factors

- **Enabling conditions include the UK's legally binding net zero target, statutory carbon budgets and independent scrutiny from the Climate Change Committee. It also benefits from mature financial markets, an established Contracts for Difference mechanism and the Clean Power 2030 driving objective.** The UK is substantially accelerating its low-carbon transition and, while unlikely to hit its clean power target by the original mission aim of 2030, it is estimated to meet this shortly after. Public opinion also provides a broadly supportive foundation for the transition, as 74% of the British public report concern about climate change in mid-2026,[320] and 63% say clean energy makes the UK more energy secure.[321]

- **The UK's transition is constrained less by the economic case for net zero policy than by political contestation, infrastructure bottlenecks and the capacity to translate investment into visible domestic benefits.** The economic case for net zero in the UK is proven, with the Climate Change Committee finding that the cost of net zero by 2050 will be less than a single fossil fuel price shock.[322] Public support also exists,

---

[316] Climate Change Committee, 24 June 2026, **Progress in reducing emissions: 2026 report to Parliament** (webpage, accessed 5 August 2026)

[317] Energy UK, 31 March 2026, **Energy UK Explains: The 'Spark Gap'** (webpage, accessed 2 September 2026)

[318] EDF Energy, 22 July 2026, **UK energy security supported by further nuclear power station life extensions** (webpage, accessed 2 September 2026). Heysham 1 and Hartlepool are now expected to generate until March 2030; the remaining advanced gas-cooled reactor fleet is also due to close on a rolling basis by around the end of the decade.

[319] National Energy System Operator, 14 July 2025, **Future Energy Scenarios 2025: Pathways to Net Zero** (webpage, accessed 2 September 2026)

[320] Ipsos, 7 August 2026, **3 in 4 Britons (74%) concerned about climate change today following heatwave summer** (webpage, accessed 13 August 2026)

[321] Energy UK, 10 June 2026, **Watt Communities Want: Six Insights into UK Public Opinion on Energy** (PDF)

[322] Climate Change Committee, 11 March 2026, **Cost of Net Zero by 2050 less than a single fossil fuel price shock – CCC**

however, its political durability will depend on whether the transition delivers tangible benefits through lower bills, consumer protection, community benefits from new energy infrastructure projects and credible support for workers and regions affected by fossil fuel decline. Additionally, the existing governance and financing frameworks for energy infrastructure must support the coordinated expansion of generation, transmission, storage and flexibility. Workforce skills training must be expanded and incentivised to support delivery, while investment in port infrastructure and domestic manufacturing capacity will be important for maximising the transition's contribution to UK economic growth.

Opportunities for international cooperation

1. **Connect clean energy with growth, security and industrial development on the world stage as part of the UK's 2027 G20 and 2028 G7 presidencies.** Both presidencies will be expected to address the energy crisis and geopolitical instability, while driving solutions for increased resilience. Springboarding from the crisis to developing resilient energy supply chains, the UK's agenda could prioritise grid investment, regional renewable deployment and supply chains, MDB reform to increase access to affordable clean energy finance, and finance for coal-to-clean transitions in emerging economies.

2. **Advance international clean energy partnerships to reinforce the UK's global leadership and influence.** Building on its domestic clean power ambitions, the UK is well positioned to advance international cooperation through the PPCA and CETP. It could do so through greater political engagement, technical assistance and implementation support, alongside an expanded role for the Global Clean Power Alliance Finance Mission in country platforms and initiatives such as the Climate Implementation Bridge (see Chapter 3); such work could help unlock innovative approaches to deploying existing finance and accelerate the clean energy transition internationally, while reinforcing the UK's credibility and influence as a global clean energy leader.

3. **Deepen UK engagement with the North Seas Energy Cooperation (NSEC) to accelerate offshore wind deployment and strengthen regional energy security.** Building on its offshore wind leadership and cooperation with European partners through NSEC, the UK can lead coordinated regional development towards the shared ambition of 300 GW of offshore wind capacity by 2050.[323] With the date and host of the next North Sea Summit still to be confirmed, there is an opportunity to shape an agenda that moves the cooperation from shared planning towards shared investment. A North Seas spatial energy plan endorsed at the Summit could provide a basis for accelerating both offshore wind deployment and cross-border infrastructure, strengthening both UK and European energy security.

[323] UK Government and North Seas countries, 24 April 2023, **Ostend leaders' declaration on the North Seas as Europe's green power plant**

Annex 2: Country transition snapshots

Methodology

Overall, the same methodology has been followed for these shorter snapshots as for the longer profiles in Annex 1. Please see:

- the beginning of Annex 1 for an outline of the mixed methods and range of quantitative and qualitative evidence used for our analysis
- the Summary above for an explanation of the choice of the six countries analysed here – based on their particular systemic, diplomatic or regional relevance to the wider transition.

Brazil's transition snapshot

Key facts

Brazil showed strong leadership in clean power as the host of COP30, with nearly 90% of its electricity generated from non-fossil sources, including 52% from hydropower and about 26% from wind and solar.[324] Brazil also added a record 10.9 GW of capacity (5.6 GW solar and 4.3 GW wind) in 2024,[325] and 7.4 GW of large-scale capacity (2.8 GW solar and 1.8 GW wind) in 2025.[326] Distributed solar is the fastest-growing segment, growing from less than 1 GW (2018) to 40 GW (2025).[327]

Brazil's clean power system, however, sits within a more fossil fuel-dependent wider energy system. Oil products account for around 41% of final energy consumption, reflecting particularly high dependence in transport, while industry accounts for 78% of gas consumption.[328] Brazil imports these refined oil products and gas, leaving parts of its economy exposed to international fuel prices and supply risks despite its abundant domestic fossil and clean-energy resources. Alongside drought-related volatility in hydropower, these vulnerabilities create a strong energy-security rationale for diversification.

At the same time, Brazil is unlikely to shift decisively away from oil soon, given its role as a major fossil fuel producer and exporter.[329] Brazil retained its position as the world's ninth-largest oil producer in 2025, with output rising by 12.3% to a record average of about 3.7 million barrels per day.[330] Oil and other mineral fuels and their distillation products were in fact Brazil's largest export category in 2025, accounting for about 16% of total export value (roughly US$53 billion). Crude oil alone was the single largest export product.[331] Continued production therefore carries significant economic and fiscal value even though fossil fuels supply only a small share of Brazil's electricity.

Development and sovereignty help explain why this economic importance translates into political durability. Domestic energy resources, including oil, biofuel and renewables, are treated as assets for strengthening energy sovereignty and national development.[332] Petrobras – a major national fossil fuel company – in particular, is closely associated with economic development and energy security, while its significance extends beyond the energy sector through employment, incomes and local economic activity. In communities across the areas where it operates, investment in training, education, infrastructure and

[324] IEA, 2025, **Brazil** (website, accessed 12 October 2026)
[325] Argus, 13 January 2025, **Brazil's power gen expands at record rate in 2024**
[326] Taiyang News, 14 January 2026, **Brazil adds 7.4 GW power capacity in 2025, led by solar PV**
[327] US Energy Information Administration, 26 September 2025, **Distributed solar generating capacity is the fastest-growing power source in Brazil**
[328] IEA, 2025, **Brazil** (website, accessed 12 October 2026)
[329] BBC, 18 August 2026, **Brazil's President Lula hails oil discovery near Amazon River**
[330] Brazilian NR, 3 February 2026, **Brazil oil and gas production 2025: New historical record**
[331] TradeInt, 18 March 2026, **Brazil Export Data 2025: Top partners, products analysis**
[332] E3G, 2026, **Navigating the energy transition in Brazil, Indonesia, and South Africa**;

wider social programmes further reinforces its role in local development.[333] Fossil fuels are therefore embedded not only in Brazil's energy system, but also in prevailing ideas of development, employment and sovereignty.

This shapes the type of transition Brazil is pursuing. Rather than centring rapid abandonment of existing fossil resources, Brazil's approach combines continued fossil fuel production with the expansion of renewables, biofuels and other cleaner industries. Its emphasis on a just and orderly transition, including internationally, reflects a preference for pathways that accommodate national development priorities and circumstances. This presents a central political-economy challenge: expanding clean industries does not in itself ensure that fossil-fuel dependence will be displaced.

Brazil's enabling conditions are substantial: an already clean electricity system, strong solar and wind resource potential, active climate diplomacy and rising external investment interest from Asia and Europe in its clean technology development.

The biggest risk, hence, is less about technological barriers than about strategic drift. Brazil may continue to expand oil long enough that fossil incumbency becomes harder to unwind later, especially if "environmentally friendly" extractive narratives[334] blur the distinction between lower-impact growth and the genuine decarbonisation needed to secure Brazil's leadership in emerging clean technology and digital economy value chains.

Opportunities for international cooperation

Key areas of opportunity for strategic cooperation are climate diplomacy, finance and industry.

Having hosted COP30, Brazil is continuing its leadership through the Roadmap for Transitioning Away from Fossil Fuels in a Just, Orderly and Equitable Manner (TAFF). Brazil can use this momentum to advance its own energy planning (National Energy Transition Plan – currently in draft format and not yet adopted) and emerging domestic work on transitioning away from fossil fuels.[335] International cooperation can reinforce this domestically led process through technical cooperation and investment in clean infrastructure.

The Brazil Climate and Ecological Transformation Investment Platform (BIP) provides an existing government-led mechanism for matching Brazil's development and climate priorities with international and domestic capital.[336] Cooperation can build on

[333] Petrobras, **Strategic Plan 2050 and Business Plan 2026-2030** (website, accessed 26 October 2026); AgenciaBrasil, 17 September 2025, **Petrobras announces investments in socio-environmental initiatives in Rio (Petrobras anuncia investimentos em ações socioambientais no Rio)**

[334] Climate Action Against Disinformation coalition and the Climainfo Institute, 2025, **A 2,900% Increase in Greenwash: Big Oil Targeted Brazil With Google Ads To Undermine COP30**

[335] FGV, 5 May 2026, **Energy transition plan advances with public consultation open to society**

[336] Glasgow Financial Alliance for Net Zero, October 2024, **Brazil Climate and Ecological Transformation Investment Platform Launches to Help Deliver Brazil's Ambitious Development and Climate Goals**

this model by strengthening project pipelines, blended and concessional finance and coordination between public institutions and private investors.

Brazil's objective of building higher-value domestic clean industries creates scope for deeper cooperation on clean technologies, manufacturing and supply chains. Engagement with major trade partners, particularly the EU, can connect market access, investment and evolving trade rules such as CBAM with Brazil's priorities around industrial upgrading and competitiveness, helping create stronger domestic economic incentives for the transition.

China's transition snapshot

Key facts

Translating China's cleantech prowess into successful climate leadership will depend on reducing coal reliance, overcoming grid constraints and managing growing trade and supply chain tensions. As the world's largest market and manufacturing base for many clean energy technologies, China has positioned itself as central to the global energy transition. Between 2019 and 2024, it accounted for around 40% of global renewable capacity expansion, underpinned by rapid investment in renewables, transmission and increasingly sophisticated power systems.[337] The economic benefit of clean energy is embedded in China's industrial strategy, with global leadership in solar PV, battery storage and EVs providing a source of technological advantage, export growth and economic development.

China's domestic transition is increasingly centred on the combination of renewable deployment and economy-wide electrification. Renewables are expected to remain the backbone of electrification, providing both domestic supply security (by expanding generation capacity) and an export-oriented industrial base. Rapid growth in EV production and adoption, driven by supportive policy, is extending the transition beyond the power sector. This dual approach has been crucial to cushion China from the fossil fuel crisis that emerged from the closure of the Strait of Hormuz, alongside deploying strategic fossil fuel reserves.[338]

China's cleantech advancements are limited by continued reliance on coal, which remains a core part of the power system and still is a source of energy security and system stability. The role of coal is, however, changing, with retrofits and power market reform driving a shift in its primary role, from baseload generation to supporting system flexibility.[339] That said, coal still powered 54.6% of the electricity mix in 2025, and gas a nominal 3%, with renewables comprising 37%.[340] China's 2035 NDC, submitted in 2025,[341] introduced an economy-wide absolute emissions reduction target for the first time, but its headline 7–10% reduction from peak levels has been criticised as overly conservative relative to the pace of China's existing transition.[342] China's 15th Five-Year Plan (FYP), approved March 2026, likewise supports further clean energy deployment and reductions in energy and carbon intensity without establishing a binding near-term coal cap or a clear pathway to "No New Coal".[343] The Coal Industry FYP, subsequently released in August 2026, reiterates the target of coal consumption peaking by 2030, without setting a specific

[337] IEA, 2023, **China - Countries & Regions**

[338] Brookings, 10 August 2026, **Electrostates vs. petrostates: The US, China, and the Hormuz energy shock**

[339] Ember, 10 February 2026, **From baseload to flexibility: How coal's role in China is changing**

[340] Ember, 2025, **Electricity Data Explorer**

[341] UNFCCC NDC Registry, 3 November 2025, **2035年中国国家自主贡献报告** (PDF)

[342] Climate Action Tracker, 25 September 2025, **China's new target unlikely to drive down emissions**

[343] State Council of the People's Republic of China, March 2026, **China's 15th Five-Year Plan (2026–2030)**

timeline within the five-year period or introducing an absolute consumption cap.[344] Ensuring that renewable growth increasingly displaces, rather than supplements, fossil generation will be critical to meeting China's 2060 carbon-neutrality goal.

China's dominance in clean technology supply chains has become a source of ongoing trade tensions. China is the leading refiner for 19 of 20 strategic minerals assessed by the IEA, with an average market share of around 70%; combined with its formidable manufacturing base, this gives China significant economic and geopolitical leverage.[345] However, this concentration has also heightened economic security concerns among trading partners and accelerated efforts in the US, EU and elsewhere to protect their domestic industries and diversify supply chains.

Domestically, grid integration is a key constraining condition for advancing clean energy and absorbing more cleantech supply within China. Rapid renewable deployment has increased pressure on transmission, storage and cross-provincial electricity trading; in some regions curtailment limits the ability of new renewable capacity to feed into the system and displace coal. Investment in grids and storage,[346] identified as priorities in the most recent FYP, are therefore central to unlocking the next phase of China's transition.

Opportunities for international cooperation

- **Engagement with EMDEs on strengthening their voice and demonstrating how the transition can support growth as well as decarbonisation.** China can deepen its existing cooperation with countries across the Global South by combining access to affordable clean technologies and infrastructure investment with greater local value addition and capacity building. Maintaining predictable export procedures would also help build confidence among its partners.
- **Further contribute to multilateral development bank (MDB) reform** and measures to address debt constraints, helping mobilise finance for energy transitions and adaptation in developing economies.
- **Continued engagement with the EU and other partners** can support cooperation on key areas like methane abatement and supporting the multilateral climate regime, even when trade tensions seem to block other routes to cooperation.
- **Promoting just and equitable transitions through its 2027 BRICS presidency.** China can use its presidency to advance more inclusive clean technology value chains, supporting local economic development, decent work and fair outcomes for communities affected by the energy transition.

[344] National Development and Reform Commission (NDRC) and National Energy Administration (NEA), 10 August 2026, **Notice on Issuing the 15th Five-Year Plan for the Development of the Coal Industry (2026–2030)**
[345] IEA, 2025, **With new export controls on critical minerals, supply concentration risks become reality**
[346] Reuters, 15 January 2026, **China's power grid investments to surge to record $574 billion in 2026-2030**

Ethiopia's transition snapshot

Key facts

Ethiopia has the fourth-cleanest energy grid globally, with clean resources making up 99.8% of electricity generation, and hydropower accounting for 97%.[347] Clean power growth over the past 25 years has largely been driven by major infrastructure projects, including the Grand Ethiopian Renaissance Dam (GERD), in operation since 2022, and the Koysha Dam, nearing completion. Largely due to the GERD, installed capacity more than doubled from 4.5 GW to 9.8 GW over the past seven years.[348] The GERD, Africa's largest hydroelectric dam, was financed innovatively and entirely domestically and through diaspora fundraising, without international loans or finance.[349]

However, Ethiopia's overall energy system is still dominated by traditional biomass and imported oil. In 2024, biofuels and waste accounted for 86% of total energy supply, and around 85% of final consumption with electricity making up only 4.3%.[350] Less than half of Ethiopia's population has access to electricity,[351] which partly explains this reliance on biomass. However, even grid-connected households often reserve electricity for lighting and small appliances but still cook with biomass, the most energy-intensive household end use, often because of the cost of electric stoves and unreliable supply.[352] At the same time, Ethiopia produces no oil, so all of its oil products are imported. They account for about 8% of total energy supply and 9% of total consumption, and power almost all transport and much of industry and agriculture.

Ethiopia's transition challenge is therefore less about generating enough clean power than about delivering it across the economy and making sure it is used. The country has built one of the cleanest electricity systems in the world, but that clean power has yet to reach most households, industry and transport. Distribution networks have lagged behind generation, and most energy demand is still met by traditional biomass and imported oil. Closing this gap, through wider access to electricity for clean cooking, industrial use and transport, is central to turning clean generation into a broader energy transition.

Opportunities for international cooperation

Regionally, as a key member of the Eastern Africa Power Pool and chair of its Council of Ministers in 2026–2027, Ethiopia is well positioned to support regional integration,

---

[347] IEA, 2024, **Ethiopia** (webpage, accessed 28 July 2026)

[348] Powers of Africa, 14 July 2026, **Electricity: Ethiopia expands power exports to Kenya**

[349] ENA, 29 March 2025, **New Campaign Launched to Mobilize 3 Million USD from Ethiopian Diaspora for GERD** (webpage, accessed 28 July 2026)

[350] IEA, 2024, **Ethiopia** (webpage, accessed 29 July 2026)

[351] Ibid.

[352] World Bank Group, 2025, **Mission 300: National Energy Compact for the Federal Democratic Republic of Ethiopia**

cross-border trade and wider access to clean electricity, including through projects such as the Ethiopia–Kenya interconnector.

Ethiopia's COP32 presidency offers a platform to advance development-focused transitions and position the country, and Africa, as a leader in climate solutions, resilience, clean energy and sustainable investment. Ethiopia enters the Presidency with a growing climate leadership role, built in part through hosting the 2025 UNFCCC Climate Week in Addis Ababa. As COP32 President, Ethiopia can draw on its clean electricity story and success in domestically funding the GERD to highlight both the transformational potential of renewable energy in Africa and how to overcome the systemic finance and technology barriers that constrain delivery at scale. Its COP Presidency can also advance policy and business interests across the continent by reflecting the asks of the African Group of Negotiators within negotiations; doing so would elevate African-led initiatives across the broader COP framework and build bridges between investors and African partners so that implementation platforms reflect regional priorities and demonstrate delivery.

Ethiopia also hosted the second Africa Climate Summit (ACS2) in Addis Ababa in September 2025, which consolidated Africa's climate agenda and priorities. Three priority themes for Africa from the ACS2 agenda are particularly relevant to shaping the COP32 process: adaptation, green industrialisation and climate finance. Each offers clear areas for international partners to engage in supporting their delivery and implementation. For instance:

1. On **adaptation** support climate-resilient energy and water infrastructure.
2. On **green Industrialisation** reinforce investment in clean energy-powered manufacturing and regional transmission under the Eastern Africa Power Pool.
3. On **climate finance** promote and fund blended instruments for the distribution networks and off-grid solutions needed to close the access gap.

By aligning their support with these ACS2 priorities, international partners can help Ethiopia use COP32 to secure a major energy outcome, one that positions Africa's transition as an economic opportunity while keeping development, energy access and adaptation at the centre of the international agenda.

India's transition snapshot

Key facts

India's rapidly growing power demand is driven by sustained economic growth, urbanisation and increased cooling needs. Rising temperatures and more frequent extreme heat are increasing peak electricity demand, particularly for cooling, thus reinforcing concerns around security of supply and creating pressure for additional generation. Maintaining reliability as demand grows is the central challenge of India's power transition – particularly as both renewable and fossil fuel capacity continues to expand.

At present, electricity generation remains dominated by coal, which accounted for 69.7% of generation in FY 2025–2026, while oil and gas accounted for 1.44%.[353] India has the world's second-largest operating coal fleet after China, with around 250.7 GW in operation in 2025.[354] The fleet continues to expand: a further 10 GW was commissioned in 2025 – just over 10% of the new coal capacity added globally that year.[355] A significant pipeline of proposed capacity remains under development, in line with the government's plan to add around 97 GW of new coal capacity by 2034–2035.[356] Yet even as capacity grows, the amount of electricity generated from coal declined in 2025.[357]

Wind and solar are playing a growing role in meeting India's electricity demand, accounting for 9.5% and 5.8% of electricity generation in in FY 2025–2026, respectively. [358] Together, their share of electricity generation increased from approximately 12.4% in FY 2024–2025 to 15.1% in FY 2025–2026, reflecting year-on-year growth.[359]

India's rapidly accelerating renewable deployment is supported by long-term policy frameworks. India added a record 55.29 GW of non-fossil fuel capacity in FY 2025–2026, nearly double the previous record of 29.5 GW in the preceding year; this included 44.61 GW of solar and 6.05 GW of wind capacity.[360] This expansion is supported by policies aimed at improving energy access, accelerating electrification and attracting investment, alongside efforts to strengthen integration across the national power system, from generation to transmission and distribution. The National Generation Adequacy Plan for 2026–2036 provides a longer-term framework for meeting rising demand while expanding renewables,

---

[353] NITI Aayog, August 2026, **India Climate and Energy Dashboard**

[354] Global Energy Monitor, 2026, **Boom and Bust Coal Report**, p.25.

[355] Ibid, p.11.

[356] Press Information Bureau (PIB), Government of India, December 2025, **Government of India Strategizes Power Capacity Expansion to Meet Growing Peak Demand**

[357] Ember, 2026, **Global Electricity Review 2026 – India**. Details that India's absolute coal-fired electricity generation declined by 44 TWh (2.9%) in calendar year 2025, while coal's share of generation fell from 75% in 2024 to 71% in 2025.

[358] NITI Aayog, August 2026, **India Climate and Energy Dashboard**

[359] Ibid.

[360] Press Information Bureau (PIB), Government of India, April 2026, **India Ranks third globally in Renewable Energy Installed Capacity**

storage and transmission.[361] Achieving capacity targets envisaged in the plan could lead to non-fossil power capacity reaching nearly 70% by 2036.

The key constraint is whether India's power system can absorb renewable growth quickly enough to limit further coal lock-in and ensure that renewables can increasingly displace – rather than simply complement – fossil fuel generation. Integrating much larger volumes of variable renewables – and meeting the energy needs of underserved communities across the country – will require substantial grid expansion, modernisation and storage. The Central Electricity Authority estimates that India could require around 174 GW of storage power capacity (equivalent to 888 GWh of stored energy) by FY 2035–2036, alongside major transmission investment, to maintain system adequacy as renewable penetration rises.[362] This creates significant opportunities for international cooperation on transmission, storage, digitalisation and power-market reform while supporting India's wider energy security objectives. It also makes investment in transmission, storage, flexibility and market reforms critical to accelerating the transition and reducing the need for additional fossil fuel capacity.

Opportunities for international cooperation

Cooperation with the EU and other international partners on clean energy and electric vehicle manufacturing. India's ambition to become a global manufacturing hub for clean technologies and electric mobility manufacturing creates opportunities to link the energy transition to jobs, energy security and industrial development.[363]

Strengthening clean technology supply chains and mobilising investment. Building on India's growing capabilities in battery storage, green hydrogen, advanced grid technologies, solar, electric vehicles and onshore wind manufacturing. Opportunities for cooperation include clean technology trade, supply chain diversification, industrial decarbonisation, grid modernisation and investment in clean energy infrastructure.[364]

Deepening cooperation through the EU–India strategic partnership. The 2026 Joint Comprehensive Strategic Agenda identifies clean technology transfer, investment and strategic value chains as priorities for closer cooperation.[365]

[361] Indian Central Electricity Authority, March 2026, **National Generation Adequacy Plan (2026-27 to 2035-36)**
[362] Ibid. p.i
[363] News On Air, 16 September 2025, **PM Modi: Clean Mobility & Energy to Make India a Global Hub**
[364] E3G, January 2026, **Why clean manufacturing should define the future of EU-India strategic partnership**
[365] EU Commission, 27 January 2026, **Towards 2030: A Joint European Union-India Comprehensive Strategic Agenda**

Mexico's transition snapshot

Key facts

Mexico is implementing the energy transition under the revamped energy policy framework introduced by President Sheinbaum, a former climate scientist;[366] this is closely linked to its wider industrial strategy of expanding clean energy alongside fossil fuel production.[367] Sheinbaum's 2025 energy reforms have established a state-led model in which the Comisión Federal de Electricidad (CFE) is the dominant supplier, requiring that at least 54% of electricity dispatched to the grid be generated by CFE. The independent regulator, Comisión Reguladora de Energía, was dissolved and replaced by a more centralised regulatory body reporting directly to central government. This provides greater clarity over the sector's direction, but centralised decision-making could also present challenges for mobilising sufficient private capital and delivering infrastructure at the speed required. According to CFE's 2026–2030 Development Plan, the company plans to develop 38 utility-scale solar PV and wind projects, totalling 8 GW of capacity, including 4.9 GW of solar, through a mixed public-private investment model.[368]

Mexico's energy system remains heavily dependent on fossil fuels, increasing its vulnerability to energy security risks. Gas accounts for around 62% of electricity generation, while oil products supply 58% of final energy consumption, making both fuels critical to power generation, transport and economic activity.[369] Despite being a significant crude-oil producer and exporter itself, Mexico remains dependent on imported refined fuels. Together with its heavy reliance on US pipeline gas,[370] this creates a concentrated external dependency on US energy supplies and infrastructure, exposing Mexico to both price volatility and supply vulnerability. Expanding Mexico's substantial solar and wind resources could therefore strengthen not only decarbonisation but also domestic energy and economic security.

Grid capacity is likely to be one of the main constraints on delivering on the transition. Mexico requires substantial financing for transmission, distribution, storage and system modernisation; all these measures are key to establishing a stable grid across geographies, meet rising electricity demand and improve reliability, particularly with droughts reducing hydropower generation. Distributed energy offers a complementary way of addressing the issue, including community-owned solar models such as Solar Ejidos; it can help get communities connected quicker, regardless of grid constraints, and for them to earn income from electricity sales.[371]

---

[366] Government of Mexico, 18 March 2025, **Decree establishing the new energy sector laws, including the *Diario Oficial de la Federación* (Energy Planning and Transition Law)**

[367] Government of Mexico, 2025, **Plan México**

[368] Government of Mexico, 2026, **Programa de Desarrollo 2026-2030**

[369] Ember, 2026, **Mexico** (webpage, accessed 8 September 2026)

[370] US Energy Information Administration, 3 October 2025, **Lower fuel prices in 2024 resulted in the lowest U.S.-Mexico energy trade value since 2020**

[371] Indicativa Climatica de México, 2023, **Ejido_Solar**

Opportunities for international cooperation

For Mexico, nearshoring is a key opportunity for strategic cooperation. Its proximity to the US and deep integration into North American manufacturing networks give it a strong position to attract clean technology and other strategic industries seeking to diversify supply chains. Reliable, affordable power supply will be critical to sustaining such investment; grid resilience and cheap and scalable renewables are thus key to boosting Mexico's industrial competitiveness.

Such a strategy would dovetail with Mexico having significant lithium resources, which creates an opportunity to develop a domestic battery value chain; this could support both storage and electrified transport. Mexico could explore how domestic lithium production can feed into battery manufacturing; by linking mineral policy directly to renewable integration and industrial development, the country could gain greater control over strategic clean technology value chains.

Mexico has strong alliances and strategic partnerships with many important economies, including both COP31 Presidencies through MIKTA (Mexico, Indonesia, South Korea, Türkiye and Australia). These could be leveraged to demonstrate the economic and diplomatic potential of broad collaboration.

Philippines' transition snapshot

Key facts

The Philippines' electricity mix is dominated by fossil fuels, with coal and gas constituting more than three-quarters of the country's power.[372] Coal has grown significantly as a proportion of the country's electricity mix over the last two decades: from just over a quarter in 2005 to a peak of around 64% in 2024, before easing to 59% in 2025.[373] The bulk of non-fossil power generation is from hydro (10.3%) and geothermal (8.2%) – the Philippines is the world's third-largest producer of geothermal energy.[374] Wind and solar represent a tiny fraction of electricity generated in the country today, though the government is targeting 50% renewables by 2040, with an interim target of 35% by 2030.

The government has positioned gas as both a transition fuel and a pillar of energy security, enacting the Philippine Natural Gas Industry Development Act in 2025.[375] Gas is filling part of the gap left by the 2020 moratorium on new coal power proposals: as coal's share of generation fell in 2025, that of gas rose from around 14% to 17%.[376] Meanwhile, as the output of Malampaya, the country's only commercial-scale domestic fossil gas source, declined, the Philippines began to import LNG in 2023; a year later, imported LNG supplied around 46% of its gas.[377] With LNG imports projected to rise by 508% between 2025 and 2029, this growing import reliance risks undermining the very energy security that gas is meant to provide.[378]

The Philippines imports 98% of its crude oil from the Middle East, and 97% of its liquid petroleum products and 91% of liquid petroleum gas are imported from Asian refineries dependent on the Persian Gulf.[379] These fuels are used heavily in transport, household cooking and industry, leaving the country vulnerable to supply shocks and price increases. Amid soaring fuel prices in March 2026,[380] the President issued an executive order declaring a state of energy emergency in the country[381] and the government suspended electricity sales on the Wholesale Electricity Spot Market, introducing guidelines to prioritise renewable energy and conserve the critical fuel inventory.[382] Despite these actions, median household spending on electricity rose to approximately 12% of monthly income in June 2026.[383]

---

[372] Ember, **Electricity Data Explorer** (webpage, accessed 12 October 2026)
[373] Ibid.
[374] National Geothermal Association of the Philippines, **Global Geothermal Energy Industry**
[375] United Nations Environment Programme, 8 January 2025, **Philippine Natural Gas Industry Development Act (Republic Act 12120)**
[376] Reuters, 22 July 2025, **Philippines set for first coal power decline in 17 years amid rising LNG use**
[377] IEA, July 2026, **Philippines**
[378] Energy Tracker Asia, 23 July 2025, **Philippines LNG Imports Costing Households Billions**
[379] Philippine Information Agency, March 2026, **How the Strait of Hormuz closure affects our oil prices**
[380] Al Jazeera, March 2026, **Manila's streets empty as fuel prices surge amid Strait of Hormuz crisis**
[381] The President of the Philippines, March 2026, **Executive Order No. 110**
[382] Reuters, March 2026, **Philippines suspends spot power sales as Iran war sends prices soaring**
[383] Reuters, June 2026, **Philippines leads the world in rush to solar as power prices soar**

One of the countries hardest-hit by the impacts of the Hormuz disruption, the Philippines has been the world's biggest spender on solar panels since the strait closure began.[384] This spending spree has been triggered by households and businesses acting to hedge against high power prices, unreliable supply and exposure to imported fuel shocks. The economics have shifted in favour of rooftop solar for those who can afford the upfront cost, resulting in US$407 million in panel imports between March and May 2026, a 145% increase from a year earlier.[385]

This solar surge could displace coal and gas in the power mix, but challenges relating to fossil fuels' embeddedness persist: modelling shows that renewables could exceed the government's 2030 and 2040 energy targets while cutting coal use by a third and gas by nearly two-thirds – thus making it possible to retire inefficient plants before power costs rise.[386] However, coal is locked into power supply agreements that guarantee offtake, meaning coal plants are run at a certain minimum level to fulfil contracted supply obligations, regardless of renewable energy availability or fuel cost. Relying on baseload generation from coal can be costly, as older, less efficient plants may experience outages, making supply less reliable. Building a grid that relies on coal output to remain stable crowds out firmed renewables (such as geothermal, hydro, and solar plus storage) which are not affected by fuel cost spikes. While the government imposed its moratorium on new coal-fired power plants in 2020 and is bullish about growing clean energy deployment, more remains to be done to make space for renewables in the system and end the power sector's dependence on coal, including addressing market dispatch rules that favour fossil fuels, coal power supply agreements and grid congestion issues.

Opportunities for international cooperation

Key opportunities for strategic collaboration include converting growing clean energy momentum in the Philippines into sustained renewable investment and implementation. Renewables are increasingly aligned with domestic priorities around energy security, affordability and resilience; international collaboration can support the Philippines in translating recent policy and market momentum into structural change. There are clear opportunities for cooperation including through ASEAN, with Global North countries such as the UK (previous Energy Transition Council co-chairs with the Philippines) and with international and regional finance organisations and initiatives. This could include mobilising concessional and private finance for utility-scale renewables and storage, while expanding access to distributed solar through credit guarantees, low-cost lending and other financing models that reduce upfront costs for households and businesses. Support for grid upgrades and system flexibility would help ensure that accelerating renewable deployment can be absorbed reliably and at scale.

[384] Ibid.

[385] Ibid.

[386] TransitionZero, March 2026, **The Philippines could outpace its 2040 renewable energy targets**

Abbreviations

AEMO	Australian Energy Market Operator
APAEC	ASEAN energy cooperation
AZEC	the Asia Zero Emission Community
CBAM	the Carbon Border Adjustment Mechanism (EU)
CCC	the Climate Change Committee
CCS	carbon capture and storage
CFE	Comisión Federal de Electricidad (Mexico)
CETP	Clean Energy Transition Partnership
COP	Conference of the Parties of the United Nations Framework Convention on Climate Change
DARES	Distributed Access through Renewable Energy Scale-Up (Nigeria)
EMDEs	emerging and developing economies
FY	fiscal year
FYP	Five-Year Plan (China)
G7	Group of Seven: the seven largest advanced economies and liberal democracies
G20	Group of Twenty: the world's largest 19 economies and the EU
IEA	International Energy Agency
JETP	Just Energy Transition Partnership
KEPCO	Korea Electric Power Corporation
LNG	liquefied natural (fossil) gas
MDB	multilateral development bank
NDC	Nationally Determined Contribution: climate action plan committed to by parties to the Paris Agreement
OECD	Organisation for Economic Co-operation and Development
PPCA	the Powering Past Coal Alliance
SMEs	small and medium enterprises
TAFF	Transition away from fossil fuels
UNFCCC	United Nations Framework Convention on Climate Change

ABOUT E3G

E3G's mission: A safe climate for all

A safe climate for all underpins a future where humans and the natural environment can survive and thrive, where the most vulnerable are protected from climate impacts and economic systems prioritise people and the planet.

To achieve our mission, we build the policy solutions and political conditions for systemic action on climate. We:

- Work to win the politics and geopolitics of climate.
- Build the political conditions and policy solutions to drive the phase-out of coal, oil and gas from the global economy.
- Promote reforms to financial systems to secure the investment needed for mitigation and adaptation.

We are strategic thinkers

We combine deep strategic understanding with policy expertise. We analyse the political economy of climate and develop scenarios of how the future may evolve and what can be done to manage risks and exploit opportunities for action.

We are architects of climate action

We bring diverse stakeholders together to align action and foster dialogue. Through our collaborative approach we build connections and bridges, open windows of opportunity and create coalitions for change.

We are trusted brokers

We work closely with those driving climate politics forward, supporting them to tackle challenges behind the scenes. Governments rely on our knowledge of how to get things done in climate policymaking.



E3G

Berlin
Neue Promenade 6,
Berlin, 10178, Germany
+49 (0)30 2887 3405

Brussels
Norrsken House
Rue du Commerce 72
Brussels, 1040, Belgium

London
4 Valentine Place,
London SE1 8QH, UK
+44 (0)20 7038 7370

Washington
1800 M St NW, Suite 530 South
Washington DC, 20036, US
+1 202 466 0573