

30 days Series 20 by Zhang Kaihui

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# NAVIGATING THE NET ZERO TRANSITION

SPOTLIGHT ON SOUTHEAST ASIA, JAPAN AND THE REPUBLIC OF KOREA

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2023

KING&WOOD  
MALLESONS  
金杜律师事务所

INTRODUCTION

In 2023, we look to scaling efforts in Southeast Asia, Japan and the Republic of Korea – here’s why...

We are fast approaching the first milestone to limit temperature rises under the Paris Agreement and avoid the worst climate impacts: ‘peak emissions’ by 2025.

The reality of the ground we need to cover to reach global decarbonisation targets is driving policies, investment and innovation. To do this effectively and within the desired timeframes it’s critical that we embrace collaboration by working together, sharing knowledge and simply connecting people.

In 2022 we paired with the Australian China Business Council (ACBC) to explore the opportunities that could come from cross-border collaboration between Australia and China in our Climate Report.

This year we look to Asia’s east. We share insights from our people across the region, combined with those of pre-eminent local law firms who, like us, are helping clients on their net zero journey.

Specifically, we look at policy settings in Singapore, Indonesia, Philippines, Vietnam, the Republic of Korea and Japan. All fall within the World Bank’s East Asia & Pacific region and demonstrate the challenges and opportunities seen globally: a mix of developed nations that rank high for climate readiness and are relatively familiar for multinationals and investors, and rapidly growing and urbanising nations that are among the most climate-vulnerable in the world.

The importance of conversations and collaboration

Conversations were key to our 2022 KWM-ACBC Climate Report. We spoke with Chinese investors working with local communities to build solar farms in regional Australia. We talked about sponge cities proliferating across China and experts leading similar initiatives in Australia sharing their knowledge. We highlighted Australia’s deep research in areas like seaweed-based feed to reduce meat industry emissions. These discussions continue among colleagues and clients.

Similarly, this report is designed for conversations, not bookshelves. We look to Singapore’s incentive scheme to ‘green’ buildings, Indonesia’s offshore floating solar plant, ecotowns in the Philippines, the energy trade opportunities between Vietnam and Australia, in the Republic of Korea hydrogen cities and how Japan has opened public trading for carbon credits.

The private sector is moving and will play a vital role in accelerating change. Reach out to your local KWM expert for insights on the challenges and opportunities ahead. What are you seeing?

 Visit the [KWM global ESG page](#) for insights on global regulatory settings, business responses and trends.

OUR REGIONAL ESG LEADERS



MICHAEL LAWSON  
PARTNER IN CHARGE,  
SINGAPORE



CLAIRE ROGERS  
HEAD OF ESG STRATEGY,  
AUSTRALIA



BOHYOUNG KIM  
INTERNATIONAL PARTNER,  
CHINA



YOSHIKI TSURUMAKI  
PARTNER,  
JAPAN

Economies demanding or driving change?

Without change, lower income countries will take more than a century to reach the same level of climate resilience as richer countries. Those vulnerable countries are increasingly undertaking mitigation efforts.

CLIMATE CHANGE RESILIENCE RANKING			CLIMATE CHANGE PERFORMANCE INDEX	
Country (Income group)	Vulnerability (food, water, health, ecosystem, habitat, infrastructure)	Readiness (economic, governance, social)	2023	YoY
Vietnam (lower middle)	128	93	40	3
Philippines (lower middle)	121	135	11	1
Indonesia (lower middle)	103	102	26	1
Japan (upper)	62	13	50	5
Singapore (upper)	59	1	N/A	
Republic of Korea (upper)	51	6	60	
Total rankings: 185 (Notre Dame Global Adaptation Initiative; ‘1’ being least vulnerable, most ready)			Total rankings: 63 (mitigation efforts across emissions, renewable energy, climate policy)	

Data from the [University of Notre Dame’s Global Adaptation Initiative](#) highlights mixed fates, ranking countries based on climate change vulnerability and readiness for 2021.

‘There is no one-size-fits-all for foreign investment, but there are two constant must-haves to maximise the chance of success. One is bringing global experience. The second is embracing communities and local knowledge.’

Michael Lawson, KWM Partner in Charge, Singapore



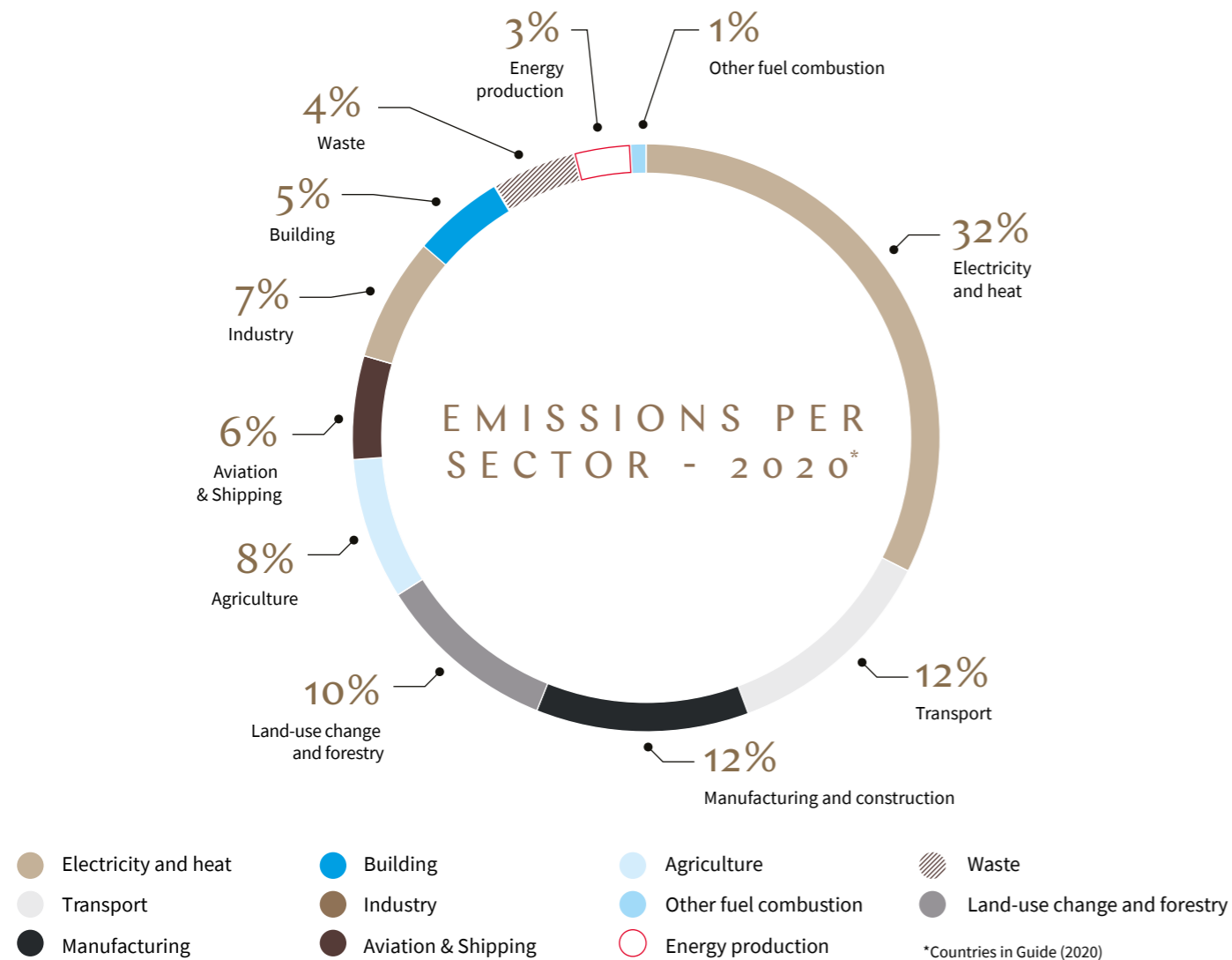
## EMISSION TRENDS OVER THE DECADE FROM 2010

Overall emissions remained stubbornly high in the decade to 2020 for countries covered in this guide, before showing signs of a decline. While emissions for some (like the Philippines and Vietnam) rose dramatically with economic growth, elsewhere they fell (as in Japan off the back of increased renewables use and a slowing economy).

Key insights in order of emissions levels:

- **Indonesia** – overall decline in emissions driven by land use and forestry initiatives
- **Japan** – the most sustained falls in emissions since 2010 including due to a range of ‘green’ initiatives
- **Republic of Korea** – overall emissions steadily rose for much of the decade before starting to dip from 2019, on the back of falling electricity and heat emissions

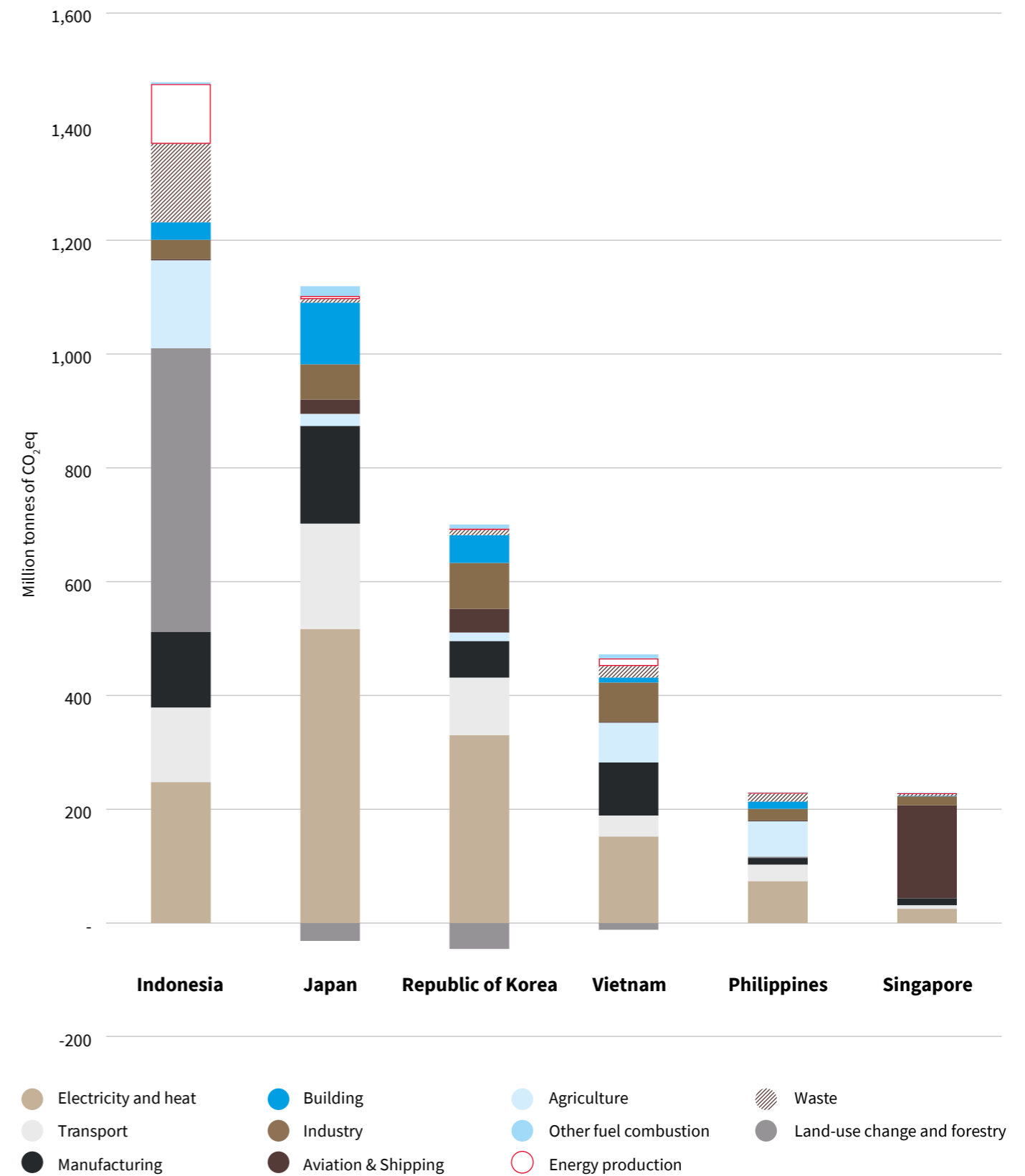
- **Vietnam** – emissions from the electricity and heat sector tripled over the decade with the growing economy; along with prosperity-related increases in industry and manufacturing and construction
- **The Philippines** – a more than doubling of emissions across industrial activities and electricity & heat and a near doubling in the building sector sent emissions up by almost 40% over the decade; electricity & heat growing to 1/3 of all emissions
- **Singapore** – emissions steadily rose for most of the decade largely due to the aviation & shipping sector (generating approximately ¾ of emissions)



Source: <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>

## EMISSIONS PER COUNTRY - 2020

Million tonnes of carbon dioxide equivalent



Source: <https://ourworldindata.org/co2-and-greenhouse-gas-emissions>

# WHAT IS HAPPENING ACROSS THE REGION?

In our country chapters, we look at initiatives to encourage the transition to a net zero economy – across energy transition, carbon markets, financing, transport, housing and buildings and agriculture. Here is a brief snapshot.

## Energy transition

The International Energy Association’s (IEA) calls the climate challenge essentially an energy challenge. Scaling clean energy investment is key.

**Southeast Asia** is expected to have the second-highest energy demand growth until 2050 under IEA estimates (only India ranks higher).

**Vietnam** and **Indonesia** entered Just Energy Transition Partnerships in 2022, bringing global support to transition away from coal power.

In **Indonesia**, international help (including from World Bank initiatives like the [Sustainable Landscape Management Program](#)) is needed to reach the upper end of targeted emissions cuts of 32% to 43% by 2030. Almost half of emissions come from deforestation and fires.

For the **Philippines**, hydro and geothermal power feature heavily. The nation is focused on the job opportunities the transition will bring [around 189,000 direct jobs in 2021 alone](#).

**Singapore** has put [clean hydrogen](#) at the heart of its decarbonisation strategy and has entered transition-related partnerships with Australia, the UK and France.

**Japan** and the **Republic of Korea** are similarly densely populated with geography ill-suited to renewables such as solar and wind that dominate elsewhere. Like Singapore, their energy mix will feature clean hydrogen (set to account for nearly 40% of global hydrogen imports combined by 2050). Offshore wind and nuclear will also meet the challenge of decarbonising fossil-heavy industrials. The nations will attract more than US\$175bn in combined energy investments by 2050 under IEA estimates.

## Carbon markets

















Carbon markets will play a crucial role in mobilising funds and incentivising decarbonisation activities. Progress and initiatives vary. For Singapore, ambitions extend to becoming a global hub for carbon credit trading.

**Singapore, Indonesia**, the **Republic of Korea** and **Japan** have carbon markets and levies / taxes in various stages – see the summary from the Asia Securities Industry & Financial Markets Association (ASIFMA) below.

The **Philippines** has no explicit carbon pricing mechanisms, but one is on the cards under a suite of new low-carbon legislation that is pending.

**Vietnam** is planning to pilot a voluntary emissions trading scheme from 2026, initially covering steel, cement and thermal power. Implementation is expected from 2028. A national crediting mechanism is due in 2026.

## Carbon markets in motion

	CCM	VCM	Carbon Levy
Indonesia			
Japan			
Republic of Korea			
Singapore			
 In force  Under development  Under consideration  not yet contemplated			

Source: ASIFMA, Upscaling carbon markets across APAC.

## Financing

Finance is the unavoidable metric and driver common to every country. Investment in clean energy in emerging and developing economies must grow more than threefold by 2030 to get on track for net zero emissions by 2050. Developing nations may need more than US\$1t a year to make significant progress. To increase investor confidence and certainty, sustainable finance taxonomies that are widely understood and applied are essential.

We outline positive moves across the region, most notably via the [ASEAN Taxonomy Board’s recently released](#) Taxonomy for Sustainable Finance.

‘Mobilizing the private sector is also instrumental to achieve progress towards our collective climate ambition.’

US Secretary of the Treasury Janet L. Yellen, Statement on the World Bank Development Committee, October 2023

## Transport

Among the biggest emitting sectors is transport – and all the covered countries have initiatives to electrify and / or move to cleaner fuels including biodiesel blends and green hydrogen.

**Singapore** has a ‘car-lite’ vision, including by phasing out internal combustion vehicles within 15 years and having ‘EV-ready towns’.

**Indonesia** plans to have 13 million electric motorbikes on roads by 2030 under a national strategy that is in progress, as part of wider electrification and biofuel plans to address high road transport emissions.

The **Philippines** will undergo a massive transport system expansion and has set targets for biodiesel blends, EVs and charging stations.

**Vietnam’s** young EV market is set to grow to 3.5m by 2040 and initiatives stretch to buses, airfield vehicles, waterways, railways and ports.

The **Republic of Korea** is set to become a leading global supplier of eco-friendly cars, and at home wants at least half of all vehicles on roads by 2040 battery-powered or fuelled by hydrogen.

**Japan** has a heavy focus on hydrogen fuel-cell cars, buses and fuelling stations. Shipping and aviation are in the early stages of research and demonstration projects.

## Housing and buildings

**Singapore** has prioritised the ‘greening’ of buildings via a scheme to boost the energy performance of existing buildings and accelerate green tech in new ones.

**Indonesia** has enacted new standards to boost the green performance of public housing.

The **Philippines** is prioritising climate-resilience in housing in response to intense natural disaster risks. A code encourages green building but is not mandatory.

**Vietnam** has a relatively small number of green buildings – but is showing signs of interest in enhancing policies as urbanisation grows. Cities are taking steps to become sustainable and smart.

The **Republic of Korea** has ‘zero energy’ targets for new buildings and incentives to remodel existing buildings.

**Japan** has a net zero energy target for new constructions (half by 2030) and is incentivising the development of next-generation solar cells.

## Agriculture

**Singapore** is aiming to meet a third of nutritional needs via locally produced food by 2030 – addressing food security concerns. Urban farming is key.

**Indonesia’s** plans to turn its forests from a source of over 40% of country emissions (via deforestation and fires) into a net carbon sink by 2030.

The **Philippines** is similarly prioritising forest cover in a bid to reduce deforestation, as well as encouraging climate-resilient agricultural practices.

**Vietnam** is embracing innovation and initiatives to modernise its agriculture sector ahead of expected growth, including making it more environmentally friendly. A high-tech focused partnership with Australia tackles challenges like food productivity and climate resilience.

The **Republic of Korea** is turning to sewerage infrastructure and rainwater runoff to address severe flood risks. Environmental practice policies including payments encouraging organic production are updated every five years and there is a need for them to go further.

**Japan** aims to cut industrial food waste by 1/5 in the next 6 years, and have the sector run on zero carbon emissions by 2050.



# INTERNATIONAL COLLABORATION

When global leaders and stakeholders meet for COP28 (the 28th UN Climate Change Conference of Parties) in Dubai, United Arab Emirates for almost a fortnight from 30 November 2023, they will focus on fast-tracking efforts across four priorities: the energy transition; climate finance; nature, people, lives and livelihoods; and ensuring inclusivity.

Yet regardless of **priorities**, across every COP there is one constant: **collaboration**. Working together is key to net zero efforts generally, both at COP and beyond. In our 2022 KWM-ACBC Climate Challenge report, we looked at the opportunities that could come from collaborating across Australia and China.

As we look to other pockets of Asia in this guide, it is worth reflecting on the rise of international collaboration efforts propelling the region towards decarbonisation. For further details on each arrangement, please refer to the end of each country chapter. Recent global partnerships demonstrate the growth and opportunity areas necessary for a clean transition.

‘It is our collective responsibility to deliver for many across the globe who are imparting their trust upon us. Together, let us turn pledges into projects and let us turn ambition into action. Let us unite, act and deliver.’

Dr Sultan Ahmed Al Jaber COP28 President-Designate UAE Special Envoy for Climate Change, Oct 2023



REPUBLIC OF KOREA + GERMANY

**Energy Partnership**

Accelerate decarbonisation, renewables & green hydrogen



JAPAN + EU

**Green Alliance**

Sustainable energy & finance, environmental protection & regulatory cooperation



REPUBLIC OF KOREA EXPORT-IMPORT BANK + GLOBAL GREEN GROWTH INSTITUTE

**MOU to support developing countries climate change responses**

Green investments in developing countries



JAPAN + AUSTRALIA

**Partnership on decarbonisation through technology**

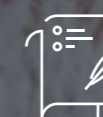
Decarbonisation, R&D on clean hydrogen, CCUS, carbon recycling, clean fuel, ammonia, iron ore energy efficiency and LNG



JAPAN + AUSTRALIA

**Clean Hydrogen Trade Program**

Hydrogen exports



INDONESIA AND JAPAN

**Memorandum of Cooperation**

Decarbonisation technologies - hydrogen, ammonia & CCUS



SINGAPORE + INDONESIA

**MOU: Understanding Cooperation on Climate Change and Sustainability**

Carbon credit projects, CCS, renewable energy solutions



SINGAPORE + AUSTRALIA

**Green Economy Agreement**

Trade & investment, carbon markets, clean energy and green & transition finance

Dec 2019

May 2021

Apr 2021

Oct 2021

Jun 2021

Nov 2021

Jan 2022

Jan 2022

Mar 2022

Oct 2022



JAPAN + ASEAN

**Asia Energy Transition Initiative**

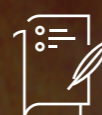
Energy transition in Asia



JAPAN + UAE

**MOC on Hydrogen**

Hydrogen & supply chains



REPUBLIC OF KOREA + AUSTRALIA

**Low and Zero Emissions Technology Partnership**

Emerging technologies, trade systems, hydrogen (supply, power generation, EVs), low emissions steel and iron ore, critical minerals



SINGAPORE + AUSTRALIA

**Initiative on Low Emissions Technology for Maritime and Port Operations**

Low emissions fuels and technologies - clean hydrogen



JAPAN + INDONESIA

**Cooperation Agreement on Decarbonisation Technologies**

Decarbonisation technology - hydrogen, ammonia and CCS



INDONESIA + US, JAPAN, CANADA, DENMARK, FRANCE, GERMANY, ITALY, NORWAY, UK, EU

**Just Energy Transition Partnership (JETP) should provide Indonesia with US\$10 billion**

Power-sector emissions affordable loans, grants, equity investments



SINGAPORE + FRANCE

**Digital and Green Partnership**

Smart transport, smart cities and agri-food technologies



INDONESIA  
AND NORWAY

**MoU Partnership  
in Support of  
Indonesia's Efforts  
to Reduce GHG  
Emissions from  
Forestry and  
Other Land Use**

Sustainable forest  
management, forest  
rehabilitation and  
land use policies



VIETNAM + EU

**Just Energy  
Partnership Funding**

Accelerate peaking of  
GHG emissions and  
transition to clean  
energy



REPUBLIC OF  
KOREA + UAE

**Strengthening  
Strategic Partnership**

Conventional and  
clean energy, nuclear  
energy, hydrogen



REPUBLIC OF  
KOREA + UK

**Joint statement  
of cooperation on  
energy transition**

Renewables (including  
offshore wind) and  
nuclear power



SINGAPORE  
+ UK

**Singapore  
Financial Dialogue  
- Cooperation in  
Sustainable Finance  
and FinTech**

Transition finance  
and sustainability  
disclosures



REPUBLIC  
OF KOREA +  
PHILIPPINES

**Partnership  
Agreement for Air  
Quality in Philippines**

Air quality monitoring  
and improve initiatives



VIETNAM +  
AUSTRALIA

**Green Economy  
Program**

Sustainable business  
collaboration

Sep  
2022

Dec  
2022

Jan  
2023

Apr  
2023

May  
2023

Jul  
2023

Aug  
2023

Oct  
2023



REPUBLIC OF  
KOREA + EU

**Green Partnership**

Green transition,  
climate and  
sustainable finance  
and facilitating  
transitions in third  
world countries



INDONESIA  
+ UK

**Extension of the  
Indonesia-UK  
Cooperation Program  
Towards Indonesia's  
Low Carbon Energy  
Transition**

Support for achieving  
Indonesia's Net Zero  
Emission target

#### Multilateral and government organisations back green projects... a region-wide selection

- **UN Green Climate Fund** – approximately 228 projects with US\$48.3 billion in total value; finance from developed to developing countries; headquartered in Songdo, Republic of Korea
- **European Investment Bank** – opened its Southeast Asia and Pacific office in late 2022 with priorities including climate and sustainable infrastructure projects; around €2.6bn of projects in pipeline at the time
- **Asian Development Bank** – projects supported including the Philippines' Romblon solar-PV mini-grid and Vietnam's wind power projects to generate 422 gigawatt-hours of electricity and avoid an average of 162,430 tons of CO<sub>2</sub> emissions annually
- **International Labour Organisation** – funding to support the creation of green jobs in the Philippines, including by greening enterprises
- **Japan International Cooperation Agency** – initiatives including hydropower projects in the Philippines (Laguna, Ifugao and Isabela)
- **Export Finance Australia** - US\$32 million (\$41 million) loan to build onshore wind farms in the Quang Tri province of Vietnam with a total capacity of 144MW

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# REGIONAL HIGHLIGHTS

In 2023, we look to scaling efforts in Southeast Asia, Japan and Republic of Korea - here are some leading examples of each country's net zero ambitions.

## REPUBLIC OF KOREA

Set to become leading global supplier of eco-friendly cars

## JAPAN

Securing clean hydrogen imports as a key decarbonisation strategy along with local nuclear and offshore wind

## VIETNAM

Opportunities as a leading global manufacturer of solar PV and potentially green hydrogen

## THE PHILIPPINES

Dramatic emissions cuts and a focus on climate resilience in housing and buildings

## SINGAPORE

Ambitions to become a global hub for carbon trading, ESG finance & low-carbon fuel trading

## INDONESIA

Opportunities as a leading source of nickel for EV batteries

## ASEAN Taxonomy Board

Taxonomy for Sustainable Finance (to improve investor confidence and certainty)

# SINGAPORE

## CHAPTER

# 1

### OPPORTUNITIES



Energy Trading



Electrification



Investment



Green Finance



Carbon Markets

### CHALLENGES



Geography



Natural Disasters



Energy & Food Security

Population of  
**5.6**  
Million

GHG emissions  
**39.8**  
Million tonnes

**1**  
Climate change  
resilience  
ranking

Net zero by  
**2050**

The net zero transition presents significant opportunities for Singapore, with its export-oriented, innovation-hungry, open economy. Yet it also carries significant challenges. Singapore is managing water and food scarcity, and rising sea levels threaten its low-lying landmass.

At the same time as limiting the negative impacts of climate change, Singapore must meet the high energy demands of its manufacturing sector which accounts for 2.1% of the world's total merchandise trade (approximately US\$1.36b in 2022).

Among Singapore's strengths is its role in global energy markets. Singapore has the potential to leverage its status as a regional trading hub in the renewable energy space. The population-dense nation (among the world's highest, with 7,688 people per km<sup>2</sup>) has another key strength: the government's willingness to meet climate challenges with proactive policies to welcome investment and innovation.

Singapore has had national climate targets for almost 15 years. It exceeded its 2009 pledge to cut emissions by 16% below 'Business-As-Usual' levels by 2020: the cuts amounted to 32%.

Singapore has set ambitious energy targets for 2030, including improved energy efficiency, increased solar PV capacity and a 36% reduction in emissions intensity.

# ENERGY TRANSITION

## CHALLENGES

Singapore has limited renewable energy capabilities due to resource constraints. Land mass is limited, and average wind speed is lower than that needed to operate wind turbines.

The resulting reliance on imports feeds into its efforts to build a green hydrogen supply chain and invest in urban solar power, storage, energy efficiency and grid effectiveness. However, critical uncertainties remain around battery storage systems and low-carbon energy technologies such as hydrogen. The pace of digital technology advancements in the power sector depends on the affordability of supporting infrastructure.

Efforts are underway to establish the country as a prominent Liquefied Natural Gas (LNG) trading hub in the world despite Singapore not producing any LNG. This would position Singapore as a regional leader in this transitional fuel and give it a platform to similarly act as a hub for clean fuels like green hydrogen. The liberalisation of its gas market and emphasis on transparency have placed it ahead of other Asia Pacific nations, despite liquidity challenges.

## OPPORTUNITIES



Hydrogen



regional connections



energy efficiency



offshore wind

**Imports** will bring access to cleaner and cost-effective energy sources generated beyond its borders. Singapore is prioritising renewable energy imports and developing a diversified portfolio of import partnerships with a regional grid and trading platform.

**Low-carbon hydrogen** will help to decarbonise the sector under Singapore’s National Hydrogen Strategy. This includes collaborating with stakeholders to establish a robust hydrogen supply chain and investing in necessary infrastructure.

**A hydrogen import terminal** will support Singapore’s aim to incorporate hydrogen into its net-zero electricity supply mix by 2050, meeting up to half of the nation’s electricity needs. Singapore plans to build the terminal in the mid-2030s (along with other hydrogen infrastructure) and have it operational by 2040.

**Solar deployment and energy storage systems** will help to manage solar intermittency. Singapore is exploring innovative deployment options and advanced solar photovoltaic technologies.

**Urban solar generation** forms part of this strategy. Singapore is investing in research into cost-effective and efficient solar power generation in the urban environment, including on public housing and water reservoirs.

**Low-carbon supply alternatives**, such as carbon capture, utilisation and storage, geothermal, biomethane, nuclear fission small modular reactors and nuclear fusion technologies, are under consideration to allow Singapore to quickly adopt promising technologies when they become viable.

**A multi-layered grid** is planned, to manage the growth of distributed energy resources (DERs) and enhance grid reliability. This will involve the development of advanced control and communication systems, as well as physical infrastructure enhancements, to oversee and control DERs at both transmission and distribution levels.



### Shining a light on crops

The SolarLand 2 (SL2) is the largest ground-mounted utility-scale solar farm in Singapore. Covering 116,000 square meters at Changi Business Park and less than two years’ old, SL2 has over 35,000 solar panels. The project is expected to generate 23.9 GWh electricity and supply enough clean energy to power 3,365 households. A community urban farming initiative will plant suitable crops below the solar arrays, in time.

# CARBON MARKETS

Although Singapore is prioritising mitigation, it aims to leverage carbon markets to address residual and hard-to-abate carbon emissions - and become a global hub.

Singapore has a mandated carbon tax and a voluntary carbon market. But its carbon exchanges are the stand-out. The initiatives enable the global exchange of carbon credits and will help its pursuit of becoming a carbon services global hub by 2030.



A **carbon tax** was introduced in 2019. Around 50 industrial facilities were subject to the tax in 2023. To support its net zero target, Singapore will increase the carbon tax with a view to reaching S\$50-80/tCO<sub>2</sub>e by 2030, this will strengthen the price signal and impetus for businesses and individuals to reduce their carbon footprint in line with national climate goals. From 2024, high-quality international carbon credits can replace up to 5% of emissions covered by the tax, with the potential for further increases in the future.

The **voluntary carbon market** holds significant growth potential, with global demand projected to increase significantly by 2030 and 2050.

The **development of international carbon markets** is backed by Singapore, which is committed to facilitating negotiations and developing local capabilities and services.

Singapore has **two international carbon exchanges**. The AirCarbon Exchange and Climate Impact X are world-leading and support its goal of achieving global hub status.

**Global platforms for trading carbon credits**

Singapore’s first international carbon credit exchange, **AirCarbon Exchange (ACX)**, was established in 2019. Since then more than 16MtCO<sub>2</sub>e have traded and there are more than 200 active trading members across 30+ countries. ACX operates as a voluntary market for carbon credits, using blockchain technology to streamline transactions and ensure efficiency. The exchange offers seven types of tokenized carbon credits. The exchange is expanding its international presence through partnerships, including collaborations to develop carbon credit markets in Indonesia and the UAE.

Another global marketplace for carbon credits, Climate Impact X (**CIX**), launched in May 2021. CIX focuses on Natural Climate Solutions projects. Using blockchain, it leverages satellite monitoring, connecting an ecosystem of partners and machine learning to the enhance transparency, integrity and quality of carbon credits. A public-private partnership involving DBS Bank, Singapore Exchange, Standard Chartered and Temasek, CIX has three platforms and aims to facilitate larger-scale trading with standardised contracts. Sylvera, a UK-based carbon credit rating agency, provides third-party ratings for CIX.

# FINANCING

Singapore will also promote innovative and credible green and transition financing solutions and markets to support decarbonisation efforts and climate risk mitigation.

Singapore will continue to promote consistent, comparable and reliable climate data and disclosures. This is to guide decision making by financial market participants, engage key financial institutions to foster sound environmental risk management practices and deepen climate scenario analysis and stress testing to identify climate-related financial risks.

A **green and transition taxonomy** is critical. The Monetary Authority of Singapore aims to contribute to local and regional taxonomy efforts and global initiatives to improve the compatibility of taxonomy frameworks. The Green Finance Industry Taskforce convened by the Monetary Authority of Singapore has launched three public consultations.

A **traffic light classification system** adopted by the Green Finance Industry Taskforce differentiates an activity's contribution to climate change mitigation.

**How a ‘traffic light’ system will steer activities to go green**

- Green: activities that contribute substantially to climate change mitigation consistent with a net zero outcome or are on a pathway to net zero by 2050.
- Amber: transition activities, including those transitioning towards green within a certain time frame, or enabling significant emissions reductions in the short term.
- Red: harmful activities not currently compatible with a net zero trajectory.

**Disclosure and reporting requirements** is also key. The Monetary Authority of Singapore has been working with the Singapore Exchange and other government agencies to set out a roadmap for key financial institutions and listed companies to make International Sustainability Standards Board (ISSB)-aligned disclosures on a risk-proportionate basis.  
  
**A code of conduct** on disclosing how transition risks are factored into data products and ESG ratings is in progress. The Monetary Authority of Singapore is working with the finance industry to co-create the code.

**Public and private sector initiatives**

GenZero is Temasek Holdings’ investment platform for decarbonisation and climate change mitigation. It invests in opportunities from early-stage companies and solutions to more mature ones that are ready to scale.

GenZero has three investment focus areas:

- technology-based solutions that deliver deep carbonisation impact through climate-driven technologies
- nature-based solutions that help protect and restore our natural ecosystems to general climate impact while benefitting local communities and biodiversity, and
- carbon ecosystem enablers which refer to companies and solutions that support the development of an effective, efficient and credible carbon ecosystem.

Singapore has committed US\$10 million in new funds to invest in low-carbon technology, aiming to support the development and adoption of sustainable solutions. The investment will contribute to Singapore's efforts in decarbonization and advancing its position as a hub for green innovation and clean technologies.



STEAL, SHARE, TAKE RISKS: WORLD BANK’S BID TO SCALE PRIVATE FINANCE

*‘We need the scale, resources and ingenuity of the private sector.’*

World Bank president Ajay Banga

The World Bank provided [almost US\\$40bn in climate finance](#) in 2023 – a record high, amounting to 41% of all of its financing. In the five years to 2023, it cut 230m tonnes of carbon emissions annually. One of its arms, the IFC has mobilised US\$162b in private sector investments from US\$5.6b of shareholder capital.

Yet it wants to move faster and it wants the private sector to join and take more risks - to look beyond ‘algorithms and expertise’.

In October 2023 the World Bank [revealed its new playbook](#), based on a poverty-free ‘livable planet’ vision. Five of its eight global challenges are linked to net zero efforts: Adaptation and Mitigation; Energy Access; Food and Nutrition Security; Water Security and Access; and Protecting Biodiversity and Nature.

When it comes to good ideas, [World Bank president Ajay Banga](#) said they should ‘steal shamelessly – and share seamlessly’ – along with those moving the needle, including the private sector. In 2024 it will release usable data from its Global Emerging Markets Risk Database, to encourage risk taking & investing. New financial tools to enable US\$157b in additional lending capacity over the next decade include a hybrid capital instrument and portfolio guarantee mechanism.

Banga has singled out for focus:

- **Sound, transparent voluntary carbon markets:** ensuring credit integrity, avoiding greenwashing via validation (showing the value of monetising & protecting natural resources)
- **Spending better:** repurposing US\$6t from the economic costs of fertiliser runoff, unnecessary air pollution & overfishing every year to incentivise sustainable practices
- **Working with credit rating agencies:** unlocking capital and pricing via a better understanding of the World Bank’s work.

Banga also established a [Private Sector Investment Lab](#) comprising 15 world leading CEOs, including from banks and asset managers. The key is making projects bankable, with a focus on scaling transition finance and increasing renewable energy.

Prudential Chair Shriti Vadera is co-chair, members include:

- Macquarie – Shemara Wikramanayake, CEO
- Standard Chartered Group – Bill Winters, Chief Executive
- Temasek – Dilhan Pillay Sandrasegara, CEO
- HSBC Holdings – Noel Quinn, CEO
- Mitsubishi UFJ Financial Group – Hironori Kamezawa, CEO
- AXA – Thomas Buberl, CEO
- BlackRock – Larry Fink, CEO.

TRANSPORT

Singapore is promoting the adoption of electric vehicles (EVs) by expanding charging infrastructure, providing grants and incentives, and supporting research and development in technology. The government is also looking at holistic ways to reduce transport emissions, including a ‘car-lite’ vision, implementing a congestion pricing scheme and policies to reduce private vehicle ownership.



EVs

Strong government support, including investing in extensive charging infrastructure development and implementing grants, is aimed at increasing the number of EVs on the roads. Singapore aims to phase out internal combustion engine vehicles by 2040 and is making significant progress in [promoting EV adoption and establishing a robust EV ecosystem](#).

Legislative reforms have bolstered the support for the switch to EVs in Singapore. The Electric Vehicles Charging Act 2022 of Singapore, passed on 30 November 2022, aims to reduce the carbon emissions of road transport in Singapore by:

- i. promoting the safe use of EV chargers through the regulation of supply
- ii. expanding the network of accessible charging points through infrastructure development measures, and
- iii. ensuring the safe undertaking of regulated activities, and the reliability of the network of charging points and provision of EV charging services.



# HOUSING AND BUILDINGS

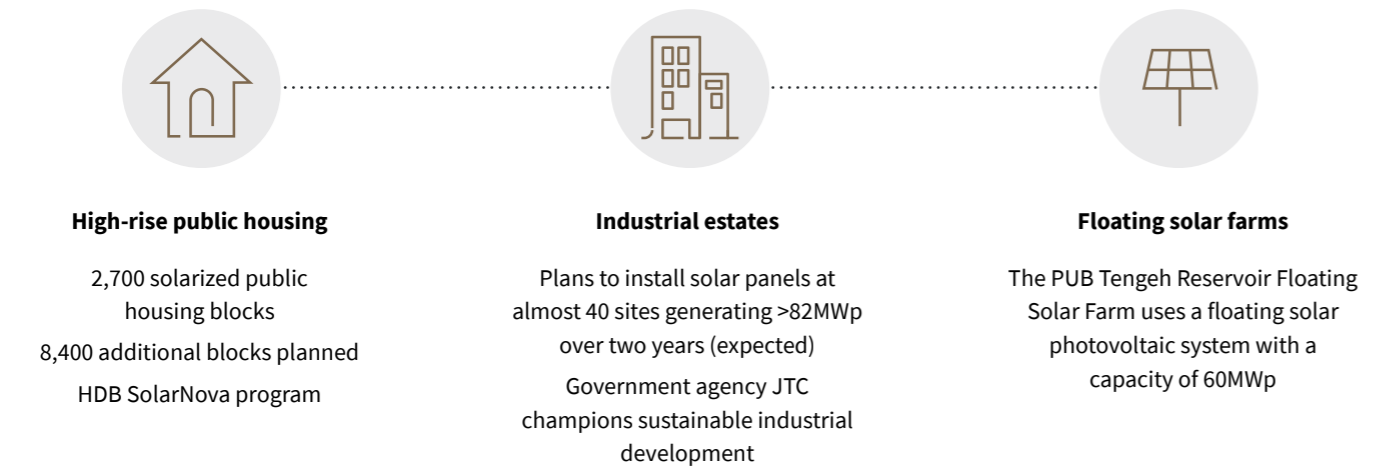
Various programs and policies encourage the private sector to adopt sustainable building designs and green technologies, including mandated minimum standards for larger buildings. The ‘green’ transformation of the building sector is also driven by the public sector that is leading by example, including via creative solar initiatives.

**Sustainable** - construction in the private sector Incentive schemes and legislative regulations encourage the adoption of sustainable building designs.

First, the ‘sticks’. The Building Control (Environmental Sustainability) Regulations 2008 sets minimum environmental sustainability standards for new buildings and existing buildings that undergo major retrofitting. This applies to:

- i. New buildings with a gross floor area of 2000m<sup>2</sup> or more, first submitted for planning permission between 15 April 2008 to 30 November 2021.
- ii. New buildings with a gross floor area of 5000m<sup>2</sup> or more, first submitted for planning permission from 1 December 2021 onwards.

**Solar programs:** Efforts to increase the use of solar power across the urban environment to achieve 1.5GWp of installed solar capacity by 2025 and 2GWp by 2030 include:

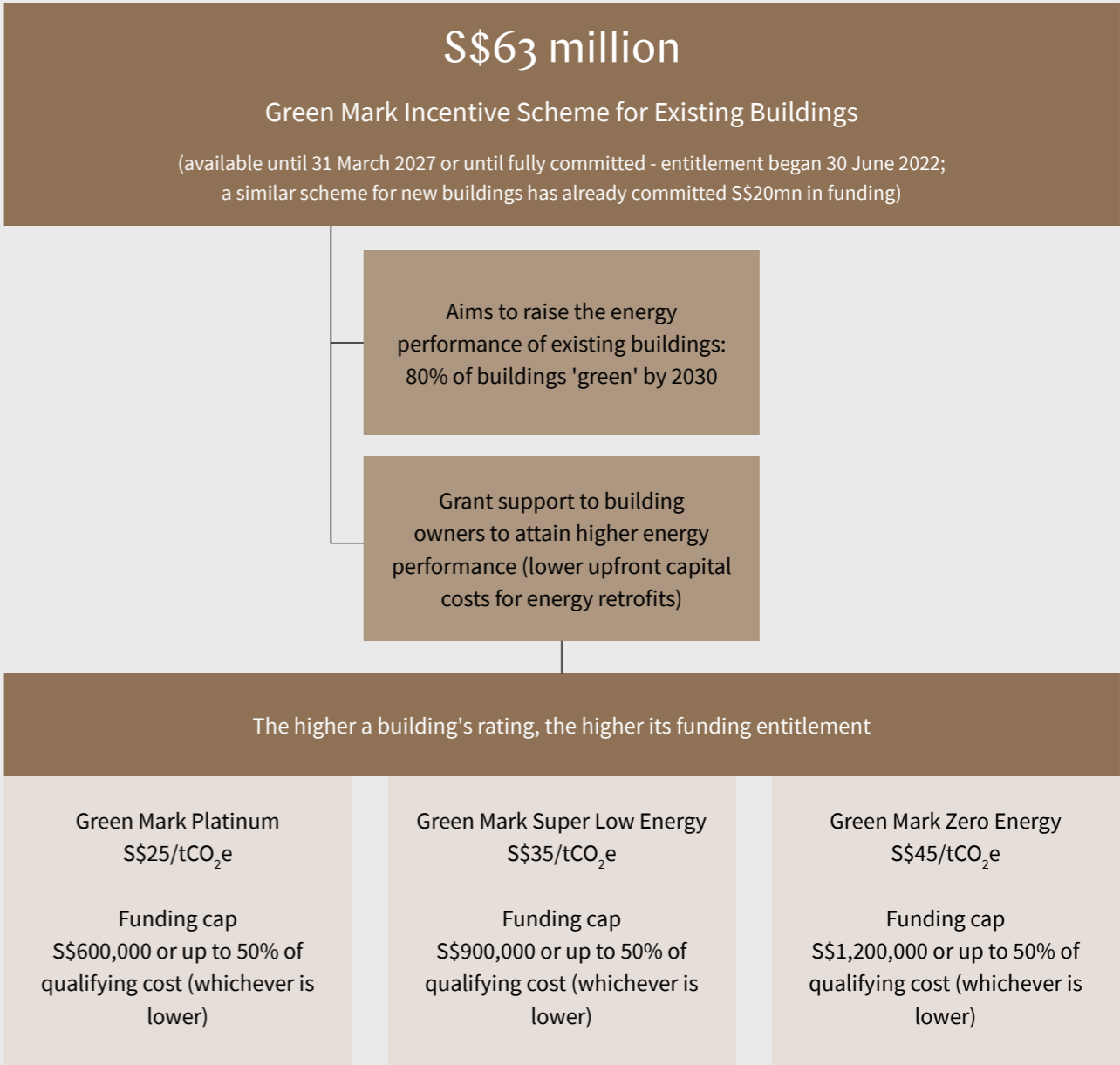


**Cool buildings**

Innovative cooling systems and net-positive energy performance feature in landmark energy efficient buildings like the [Zero Energy Building \(ZEB\)](#) at BCA Braddell Campus and the NUS School of Design and Environment 4 building. The ZEB is a key infrastructure for driving Singapore's building energy efficiency, providing a live demonstration platform and showcasing innovative technologies.

In public housing, the Housing and Development Board uses smart technologies, like ‘Smart Fans’, to improve energy efficiency.

## Incentivising the ‘greening’ of new buildings



**Public sector procurement:** New public sector buildings and major retrofitting projects [must achieve the highest Green Mark Platinum Award](#). Under the [GreenGov.SG initiative](#), all new and existing buildings (upon major retrofit) are to achieve Green Mark Platinum Super Low Energy Standards or equivalent, where feasible. The Housing & Development Board uses recycled aggregates in non-structural concrete and the [National Environment Agency](#) is testing treated Incineration Bottom Ash as an alternative material in road construction.



AGRICULTURE

Singapore’s relatively small landmass, urban density and water scarcity highlight its vulnerability to climate impacts on food supplies. The government is adopting an opportunity lens, looking to transform the agricultural industry in response to the challenges.

Its ambitious ‘30 by 30’ goal is to produce 30% of the nation’s nutritional needs by 2030, on 1% of land. Technology and innovation are central to this ambition. Urban farming research (including climate-controlled vertical methods) and water supplies are among key focus areas in the transition to sustainable agriculture.

‘Previous agricultural revolutions tapped on the domestication of animals, mechanisation, and the use of fertiliser to feed the world’s population. We are now at the cusp of the fourth agricultural revolution. With climate change posing challenges to the production of food, the industry needs to adopt technology to overcome the challenges and produce more, in a sustainable manner.’

Minister for Sustainability and the Environment Grace Fu, Oct 2022

**Water supplies:** Demand for water is expected to double by 2060 in line with economic growth. Limited land for water collection and storage means Singapore faces water scarcity, despite its abundant rainfall given its position on the equatorial rain belt. The ‘Four National Taps’ is Singapore’s diversified water supply system. It includes local catchment water, imported water, NEWater (reclaimed water) and desalinated water.

**Developing Sustainable Urban Farming:** The National University of Singapore’s Research Centre on Sustainable Urban Farming has researched urban farming practices to improve food security since 2022. The centre grows food plants in controlled environments that cut the dependency on factors like farmland, weather and water supply.



DELIVERING GROWING BENEFITS - GROGRACE

GroGrace is an urban farm launched by the Urban Farming Partners Singapore. The 650sqm farm is one of the beneficiaries of the Singapore Food Agency's S\$50m Agriculture Productivity Fund. Set across four growing floors, GroGrace is about four times more productive than conventional indoor farms with its ability to produce 70kg of leafy greens per square metre.

The farm is designed to be more energy efficient. One way it does this is through the harvesting of rainwater to facilitate the plants' growing process. The farm will also serve as a training centre for future upscaled facilities utilising patented Dutch horticulture technologies.

INTERNATIONAL COLLABORATION



The **UK & Singapore** agreed on the need to [cooperate in sustainable finance as part of an annual financial dialogue](#) in 2023. This includes supporting the development of global sustainability disclosure standards.



**France & Singapore** signed the [France-Singapore Digital and Green Partnership](#) in 2022 and agreed to develop a workplan comprising cooperative projects with clear and tangible outcomes in various sectors, such as smart transport, smart cities and agri-food technologies that harness digital and green technologies.



**Australia & Singapore** signed a [landmark Green Economy Agreement](#) in late 2022, flagging seven priority areas including trade & investment, carbon markets, clean energy and green & transition finance. This will strengthen ties & support new green growth sectors across the region.



**Australia & Singapore** signed the Initiative on Low Emissions Technology for Maritime and Port Operations in November 2021 – an AU\$30m partnership to accelerate the development and deployment of low emissions fuels and technologies, like clean hydrogen, in maritime and port operations.

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# INDONESIA

## CHAPTER 2

### OPPORTUNITIES



Renewable Energy



Critical Minerals



Hydrogen



Investment

### CHALLENGES



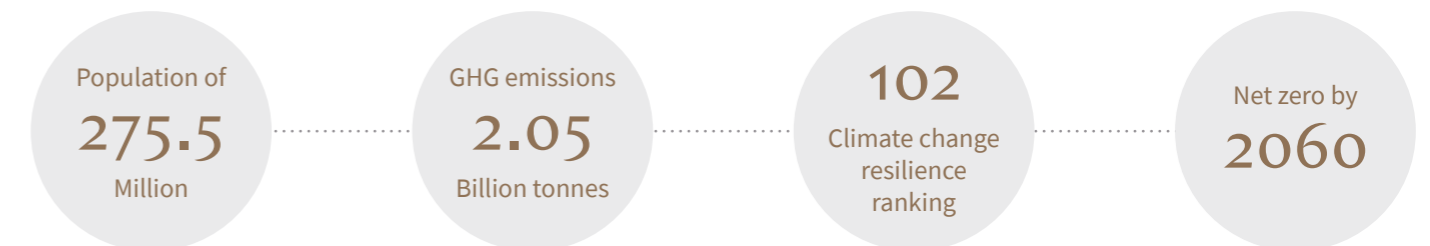
Geography



Natural Disasters



Energy & Food Security



Indonesia is at a critical juncture in shaping its energy future. The archipelago nation faces the challenge of boosting energy supply by ensuring universal electricity access for its people by 2040, while cutting carbon emissions to reach its net zero target by 2060.

Indonesia is one of the fastest growing economies globally, reducing poverty levels across its population of almost 280m. Now, climate change threatens its diverse ecosystem. Communities are vulnerable to flooding, rising sea levels and heatwaves.

Indonesia has an ambitious target of net zero by 2060. The government's eagerness to transition away from fossil fuels, towards renewable energy and low-carbon hydrogen, led it to ask the International Energy Agency to develop a path to net zero.

That path – the [Energy Sector Roadmap released in late 2022](#) - highlights the challenges and opportunities for Indonesia.

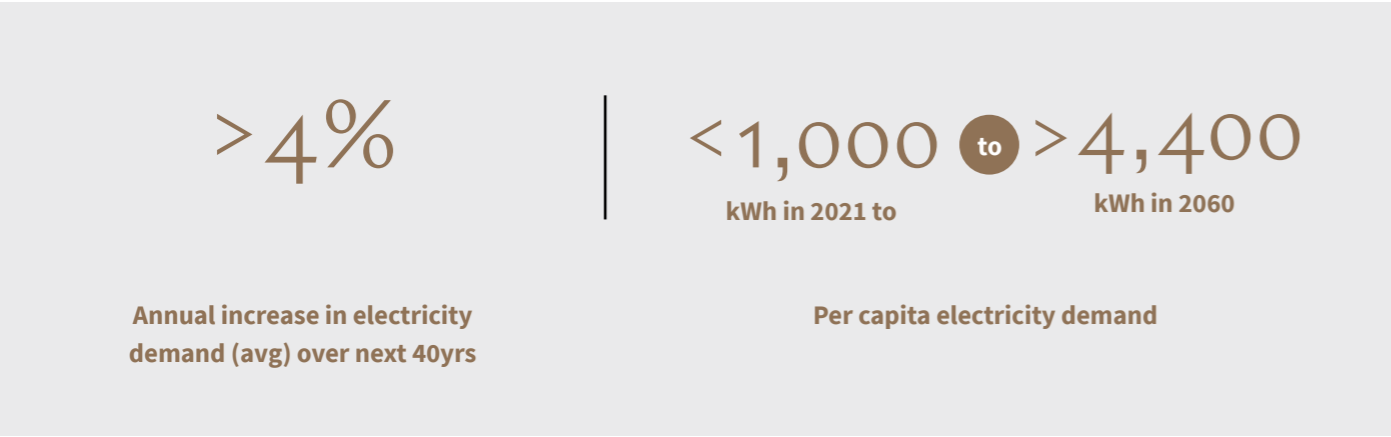
Indonesia leads the world in coal exports and oil imports, yet it has enviable assets to help the transition to renewables. The abundance of natural resources presents investment and innovation opportunities, including in solar, wind and geothermal power. This will have to happen: the government's Announced Pledges Scenario projects an expansion of the total energy supply and a 20% decrease in energy sector CO<sub>2</sub> emissions by 2040.

The shift to renewables in Java and Bali highlights the path forward for Indonesia. The 'greening' of buildings and vehicles, and the electrification of industrials are also focus areas.

The government controls and manages all natural resources, including renewable energy resources, in accordance with the Indonesian Constitution. A series of regulations and policies steer Indonesia's transition towards renewable energy. These serve as guidelines and a roadmap for government initiatives and monitoring, private sector investments, and licensing in the renewable energy sector.

ENERGY TRANSITION

CHALLENGES



Indonesia’s energy transition will happen as it manages the persistent rises in electricity demand associated with its development.

The government has introduced a range of policies to address the challenge, including banning new coal-fired power stations, with certain exemptions.

Commitments to cut reliance on fossil fuels and reduce emissions are also motivated by conditions built into international support, including financial aid from the United States and Japan.



**Industrials (manufacturing, food processing & construction)** have higher energy demands than the global average, contributing over 40% of final energy consumption and 50% of CO<sub>2</sub> emissions in Indonesia. The sector is expected to grow by approximately 50% by 2030 and 300% by 2060 under the [Master Plan of National Industry Development](#), including substantial growth in the chemicals sub-sector.



**Steel and ammonia** production is high in Indonesia – ranking second and twentieth globally for stainless and crude steel, respectively. Ammonia production serves various industrial applications. The emissions intensity makes it a critically important candidate for decarbonisation – yet it’s among the harder to abate sectors.

**The power plants floating offshore**

Resting on top of the Cirata reservoir, about 100km from Java, is the largest floating solar power plant in Southeast Asia – and among the biggest in the world.

Due for completion towards the end of 2023, the project introduces a spread of solar panels to the dam, which is already the source of hydro-electric power.

The new solar plant is not only a breakthrough for the archipelago nation – where traditional grids are difficult – but it showcases the opportunities available for others facing similar conditions.

It is expected to provide 145MW of power.

OPPORTUNITIES

**Electrification is a key focus, with much of the energy coming from renewable sources. Hydrogen is projected to play a role too, with its production by 2060 requiring electricity approximately equal to the country's current total electricity demand.**

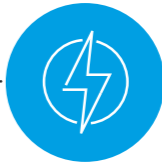
Any renewables generators intending to develop a project in Indonesia must pay close attention to the regulations and internal procurement guidelines of the government-owned power distributor, Perusahaan Listrik Negara (PLN). Initial discussions with PLN are also imperative for the preparation of a project. PLN, as the main provider for the transmission, distribution and retail sale of electricity in Indonesia, is one of the key players in the renewables industry, acting as both supplier and purchaser of electricity.



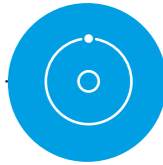
Solar



Geothermal



Electrification



Hydrogen

**Solar, geothermal, hydro, wind, biomass or biogas power** are expected to attract investment following a new pricing system. Introduced in late 2022, it replaces the tariff regime that put a price on renewable projects based on 85-100% of the average local generation costs – competing with lower-cost fossil fuel plants. The new regime applies maximum benchmark prices based on the type and size of the power plant. In addition, the government provides fiscal incentives for renewable energy projects such as income tax facilities, import facilities, land and property facilities, geothermal development support, and/or financing support or guarantee facilities through state-owned enterprises assigned by the government.<sup>1</sup>

**Carbon Capture Storage (CCS) / Carbon Capture Utilization and Storage (CCUS)** is expected to help reach Indonesia’s net zero emission target. The government, through the Ministry of Energy and Mineral Resources, has issued Minister of Energy and Mineral Resources Regulation Number 2 of 2023 concerning Implementation of CCS, as well as ACCUs in Upstream Oil and Gas Business Activities. This regulation covers, among other things, the monetisation of CCU/CCUS projects through carbon trading. Currently, 15 CCS/CCUS projects in Indonesia are in the study or preparation phase. Most of these projects aim to be operational before 2030. The total CO<sub>2</sub> injection potential between 2030 and 2035 is [estimated to range from 25m to 68m tons](#).

**Java and Bali show the way forward with solar**

The scaling up of renewables in the Java-Bali power system has significantly cut GHG emissions, improved air quality and created job opportunities in the renewable energy sector. This serves as an example to other regions.

Both Java and Bali, as with the country as a whole, were heavily reliant on coal-fired power plants. A combination of policy reforms, feed-in tariffs and streamlined licensing procedures led to a growth in solar and wind power installations. Collaboration between the government, utility companies and the private sector also fostered a positive investment environment, attracting domestic and international funding.

Solar power capacity increased from 18MW in 2017 to 470MW in 2020, while wind power capacity rose from 30MW to 185MW in the same period.

Efforts to address intermittency issues included the integration of advanced technologies like energy storage systems and demand response mechanisms, ensuring better grid stability.

1 Presidential Regulation No. 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply.



CARBON MARKETS

Indonesia introduced its much-anticipated carbon exchange, known as **IDXCarbon**, on September 26, 2023. **IDXCarbon** is administered and operated by PT Bursa Efek Indonesia,<sup>2</sup> the same entity responsible for overseeing the Indonesian Stock Exchange (IDX), under the regulatory oversight of the Financial Services Authority (Otoritas Jasa Keuangan or OJK).

IDXCarbon currently serves as a trading platform for both emissions trading and offset trading. Indonesia is in the process of developing both the mandatory or compliance market and the voluntary market, with the compliance market initially planned for implementation in the energy sector before expanding to other sectors.

The initial phase of a mandatory carbon trading scheme for coal-fired power plants was launched in 2023. This aims to cut Indonesia's coal dependence and promote renewable energy. The scheme sets emissions quotas and requires power plants exceeding these quotas to buy carbon credits.

- In the first phase, **99 coal-fired plants owned by 42 different business entities** connected to the state-owned power grids are covered, with a potential reduction of 36m tonnes of CO<sub>2</sub> emissions by 2030. Based on [publicly available information](#), 55 of these are owned by PLN group, with others owned by independent power producers. This initiative aligns with Indonesia's policy objectives and contributes to the broader development of carbon markets in Southeast Asia and internationally.

Other sectors can participate in carbon trading

**Energy, waste, industrial process and product usage, agriculture forestry and other land usage (AFOLU)** are among project sectors listed in the Carbon Economic Value Regulation<sup>3</sup> as capable of generating carbon credits, and/or such other sectors as may be applicable with the development of science and technology.

- Emissions reductions generated from these projects can be registered and verified through a national certification referred to as Sertifikat Pengurangan Emisi Gas Emisi Rumah Kaca or SPE-GRK for offset trading, or they can secure technical approval for emissions ceiling for business actors (Persetujuan Teknis Batas Atas Emisi bagi Pelaku Usaha or PTBAE-PU) for emissions trading.
- Whether a project can obtain SPE-GRK or PTBAU-PU will depend on whether there is a maximum emission ceiling determined by the relevant government authority. PTBAU-PU is applicable for projects that have a maximum emission ceiling, for example emission reduction from CFPPs.

FINANCING



The government's pledges anticipate that renewable energy and networks will account for approximately one quarter of annual investment. Private funds could finance more than half of total energy investment, with debt and off-balance sheet financing tripling to support significant investments in solar PV and wind generation. Accelerating the energy transition in Indonesia requires [investment of up to US\\$1t by 2060](#) for renewable energy generation and transmission.

Public finance to mobilise private funding

Public finance plays a [strategic role in mobilising private funds](#) for investments in the government's pledges. Public finance is used to attract higher levels of private investment by responding to market signals and government policies.

- **Public financial institutions** play a crucial role in attracting investments in high-risk areas, mitigating risks and encouraging private sector participation in sustainable development.
- **State-owned enterprises** contribute by funding infrastructure and supporting clean energy transitions, addressing technological and social implications.
- **Development finance institutions** give vital support to improving financial performance of state-owned enterprises like PLN, facilitating the phase-out of coal and enabling the transition to clean energy.

Government actions that could boost private funding

The IEA has identified government actions that could attract more funds:

1. **Clarify tariffs:** Provide clear / predictable revenue streams for renewable electricity projects. Transparent tariff structures enhance private capital appeal by reducing risk.
2. **Implement multi-stage procurement programs:** Introduce procurement programs offering long-term visibility for investors and financiers. This will combine with concessional funds and technical assistance from development finance institutions to mitigate risks.
3. **Introduce competitive mechanisms:** Competitive mechanisms (for example, auctions to assign generation capacity) to encourage competition and reduce renewable project costs.
4. **Create an investment-friendly environment:** Implement supportive policies, regulations and incentives to attract international investment in the renewable energy market.

Indonesia's call for investors

At the B20 Investment Forum 2022 held in November 2022, the President of Indonesia highlighted the potential for renewable energy in Indonesia, offering opportunities to investors to collaborate with Indonesia to build a green economy. Several MoUs, worth over USD 5b, were signed during the forum. These agreements have the potential to support the achievement of net zero emissions. One of the notable agreements is a strategic alliance agreement between an Indonesian company and German companies to collaborate on renewable energy projects in Indonesia, including waste power plants. In the first phase, the parties aim to establish an intermediate waste-to-energy processing facility in Jakarta, capable of processing 2,000 metric tons of waste daily, generating 42MW of electricity.

2 PT Bursa Efek Indonesia (BEI) had been licensed by the OJK through the issuance of OJK Decree No. KEP-77/D.04/2023 dated September 18, 2023. For a detailed elaboration on IDXCarbon, refer to <https://idxcarbon.co.id/id>.  
3 Carbon Economic Value and Achievement of Nationally Determined Contribution Target and Control of Greenhouse Gas Emissions in the Context of National Development, dated October 29, 2021; refer to Article 7(2).



TRANSPORT

Transport accounts for a third of Indonesia’s final energy consumption and 40% of CO<sub>2</sub> emissions. Most – 90% - comes from road transport (cars and trucks).

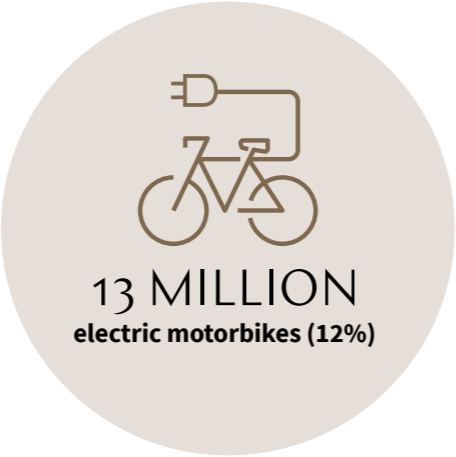
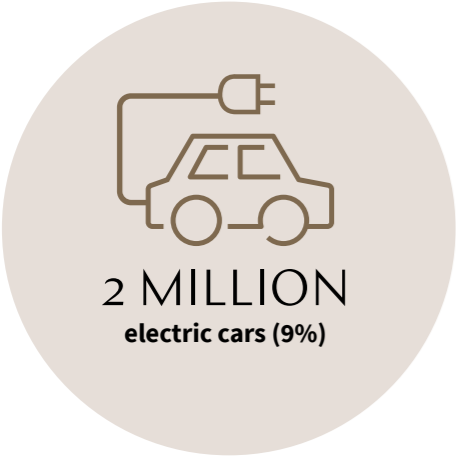
The nation’s growth in prosperity has seen transportation energy consumption increase by 70% since 2010 (currently approximately 2,150 PJ). Government incentives aim to increase the share of EVs by 2060 across two/three-wheeler motorbikes, buses and light commercial vehicles.

Electrification of Transport & Low Emissions Fuel Switching

Biofuels and electrification will accelerate the decarbonisation of transport, bringing down the sector’s use of oil from nearly 90% to 20% by 2060. Biofuels initially displace oil in the existing vehicle fleet, with electricity gaining prominence and accounting for 50% of road transport energy demand by 2060. EV adoption improves fuel economy by 14% in 2030 and 76% in 2060.

- For **heavy transport**, incentives encourage biodiesel blending and fuel efficiency improvements.
- In **aviation**, Indonesia aims to reduce oil reliance via sustainable aviation fuels.
- In **maritime shipping**, alternative energy sources such as clean hydrogen, ammonia and biodiesel blending diversifies fuel consumption.

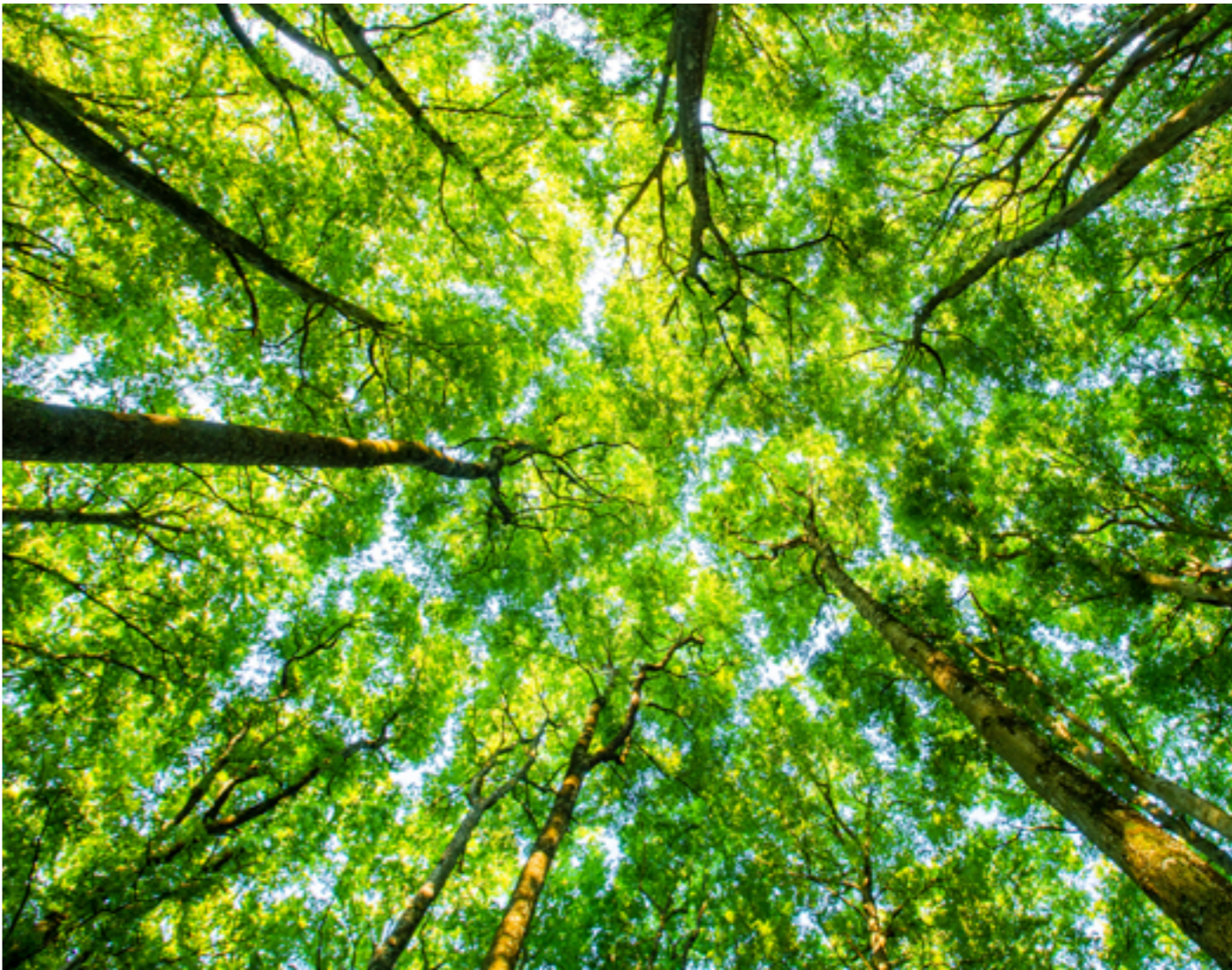
Electromobility Policies: A focus on EVs



...on the road by 2030 under by 2030 under Indonesia’s National Energy Grand Strategy, currently being prepared<sup>4</sup>

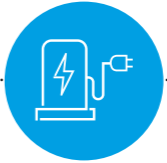
To accelerate electromobility, the Presidential Regulation on the Acceleration of the Battery Electric Vehicle Program sets targets for low-carbon emission vehicles in local production. Two/three-wheeler motorbikes and buses are expected to electrify rapidly.

<sup>4</sup> 'Indonesian Govt Supports EV Charging Application', Ministry of Energy and Mineral Resources Press Release No. 045.Pers/04/SJI/2021, dated February 1, 2021.



Low-carbon  
emission vehicles

Aimed to comprise 20% of domestic car production by 2025 and 30% by 2035.



Charging  
infrastructure

PLN must collaborate with state-owned and private enterprises to develop EV charging infrastructure. The Provision of Electric Charging Infrastructure for Battery-Based Electric Motor Vehicles establishes regulations for charging infrastructure types and electricity charging tariffs.



Batteries

The government established the Indonesia Battery Corporation (partnership between four state-owned companies) to support the development of the domestic EV battery industry.

Indonesia has the largest reserves of nickel, a lithium-ion battery component. This presents export opportunities.



HOUSING AND BUILDINGS

23%

of final energy  
consumption

9%

of emissions

75%

of the nation's  
electricity

**Enhancing building envelopes** and implementing zero carbon-ready building energy codes, to reduce energy demand and emissions, are among measures the government plans to implement.

**Retrofitting existing buildings** and reforming building energy codes are essential for enhancing energy efficiency.

**Green buildings.** The government and the Ministry of Public Works and Public Housing have enacted regulations governing the technical standards applicable for green building. These will be mandatory for buildings within the criteria set out under the Ministry of Public Works and Public Housing Regulation on Green Building Performance Assessment.<sup>5</sup>

These standards focus on:

- achieving significant, measurable improvements in saving energy, water and other resources...
- through the application of green building principles at each stage of implementation...
- in accordance with their respective functions and classifications.

The green building principles include reducing the use of land, materials, water, natural resources and human resources, reusing resources and using recycled resources. The green building concept is currently being applied to the development of the National Capital City, Indonesia's new capital, located in East Kalimantan.



5 Government Regulation No. 16 of 2021 on the Implementing Regulation of Law No. 28 of 2002 on Buildings; Ministry of Public Works and Public Housing Regulation No. 21 of 2021 on Green Building Performance Assessment.

AGRICULTURE

A dramatic turn-around for Indonesia's agriculture forestry and other land use could come in the next decade: the sector could go from contributing more than half (56%) of the nation's GHG emissions, to absorbing emissions as a carbon sink.

With international support to boost investment and technology, this could happen as soon as 2030. Without support it would take an additional 20 years.

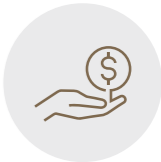
The Long-Term Strategy for Low Carbon and Climate Resilience 2050 sets out ambitions and suggests technologies to achieve them, including:



Low-emission rice varieties  
and water-saving rice  
cultivation systems



Use of manure for biogas  
and improvements  
in livestock feed and  
management practices



Reduction in the use of  
synthetic fertiliser

The strategy focuses heavily on climate adaptation in the agriculture sector through plans to:



Improve crop  
productivity and  
cropping intensity










Optimise the use  
of idle land



Reduce food waste



INTERNATIONAL COLLABORATION

	<b>UK &amp; Indonesia</b> signed an extension of the <a href="#">Indonesia-UK Cooperation Program Towards Indonesia's Low Carbon Energy Transition</a> in August 2023. The UK boosted support for achieving Indonesia's Net Zero Emission target and the program runs until 2027; including GBP6.5mn (IDR135bn) to maintain and improve initiatives.
	<b>US &amp; Indonesia</b> entered a <a href="#">Memorandum of Understanding (MoU) for the Indonesia-United States Clean Energy Working Group in May 2023</a> . This includes cooperation on super grids and/or smart grids, reducing use of diesel generators, small modular reactor (SMR) technology, cybersecurity, digitalisation, and CCUS and storage. Businesses were invited to collaborate.
	<b>Norway &amp; Indonesia</b> signed an MoU in September 2022. The <a href="#">Partnership in Support of Indonesia's Efforts to Reduce Greenhouse Gas Emissions from Forestry and Other Land Use</a> Collaboration includes areas such as sustainable forest management, forest rehabilitation, knowledge exchange and land use policies.
	<b>Australia &amp; Indonesia</b> signed a <a href="#">Climate and Infrastructure Partnership</a> in June 2022. This establishes an AU\$50 million fund to unlock investment into climate and clean energy-focused Indonesian small and medium-sized enterprises.
	<b>Singapore &amp; Indonesia</b> entered a <a href="#">Memorandum of Understanding Cooperation on Climate Change and Sustainability</a> in March 2022. The partnership covers research, technical exchanges, and financing solutions for carbon credit projects, carbon capture and storage, and development of renewable energy solutions to support regional decarbonisation.
	<b>Japan &amp; Indonesia</b> signed a <a href="#">Memorandum of Cooperation</a> in January 2022, aimed at developing and deploying decarbonisation technologies such as hydrogen, ammonia and CCUS for a 'realistic' transition.
	<b>The Just Energy Transition Partnership</b> from 2022 should provide Indonesia with US\$10b from 2022 (including from the US, Japan, Canada, Denmark, France, Germany, Italy, Norway, UK, EU).



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# THE PHILIPPINES

## CHAPTER 3

### OPPORTUNITIES



Geothermal Power, Wind



Renewable Investments



EVs



Forestry

### CHALLENGES



Natural Disasters



Energy & Food Security



Poverty



The Philippines is among the world's most vulnerable countries to climate change. Increases in the frequency and intensity of typhoons, changes in rainfall patterns, rising sea levels and increasing temperatures all pose a serious threat to the archipelago nation's ecosystems and its 115 million+ population. This makes poverty-reduction efforts even harder.

This [vulnerability](#) is why adaptive measures feature heavily in the National Climate Change Action Plan 2011-2028 (NCCAP). The NCCAP also has mitigation measures and the Philippines has [set an emissions-reduction target under the Paris Agreement](#). This is despite the fact that its share of global CO<sub>2</sub> emissions is [minuscule in comparison to developed economies](#), like the vast majority of developing economies.

The government has developed innovative policies to combine investment incentives with green growth, in a bid to leverage the energy transition to tackle climate change and poverty together. This includes 'green jobs', tax deductions for training and tax-free equipment imports. The nation's shift to clean and efficient energy technologies is likely to generate an additional [95,023 jobs](#) in the first year of the 2020-2040 Philippine Energy Plan.

ENERGY TRANSITION

CHALLENGES

The Philippines’ **energy sector** is the nation’s largest contributor of GHG emissions, with fossil fuels sourcing approximately 87% of energy consumption. The energy transition in the Philippines is complicated by the nation’s rapid urbanisation and energy security challenges. The share of renewable energy fell slightly in the decade to 2019, due to a dramatic increase in coal power generation.

Despite this, the Philippines has set ambitious renewable energy targets including reaching 50% of energy supply by 2040. Substantive hurdles include a complex permitting process and grid interconnection issues.

OPPORTUNITIES



Geothermal



Energy efficiency



Nuclear energy

The Philippines has made significant efforts to increase the uptake of renewable energy, backed by other Southeast Asian countries and entities. In its commitment to cut coal use, the government enforced a moratorium on building new coal-fired power plants effective in October 2020 which continues to be in effect under the present administration.

Tax breaks and feed-in tariffs introduced more than 15 years ago incentivise renewable energy development and use. The Renewable Energy Act, which sets out the measures, also introduced a Renewable Energy Trust Fund to finance research and support development. More recently, the complex permitting process was streamlined via an online platform introduced in 2019 under the Energy Virtual One-Stop Shop Act (EVOSS Act).

The Feed-in Tariff (FiT) policy is credited as the main reason renewable installations increased between 2014 and 2019. Solar, wind, biomass, ocean technology and run-of-river (ROR) hydropower are among technologies covered. The FiT gives fixed payments per kilowatt hour of electricity produced from renewable energy resources (excluding generation for own use). Priority connection to the main grid is another benefit.

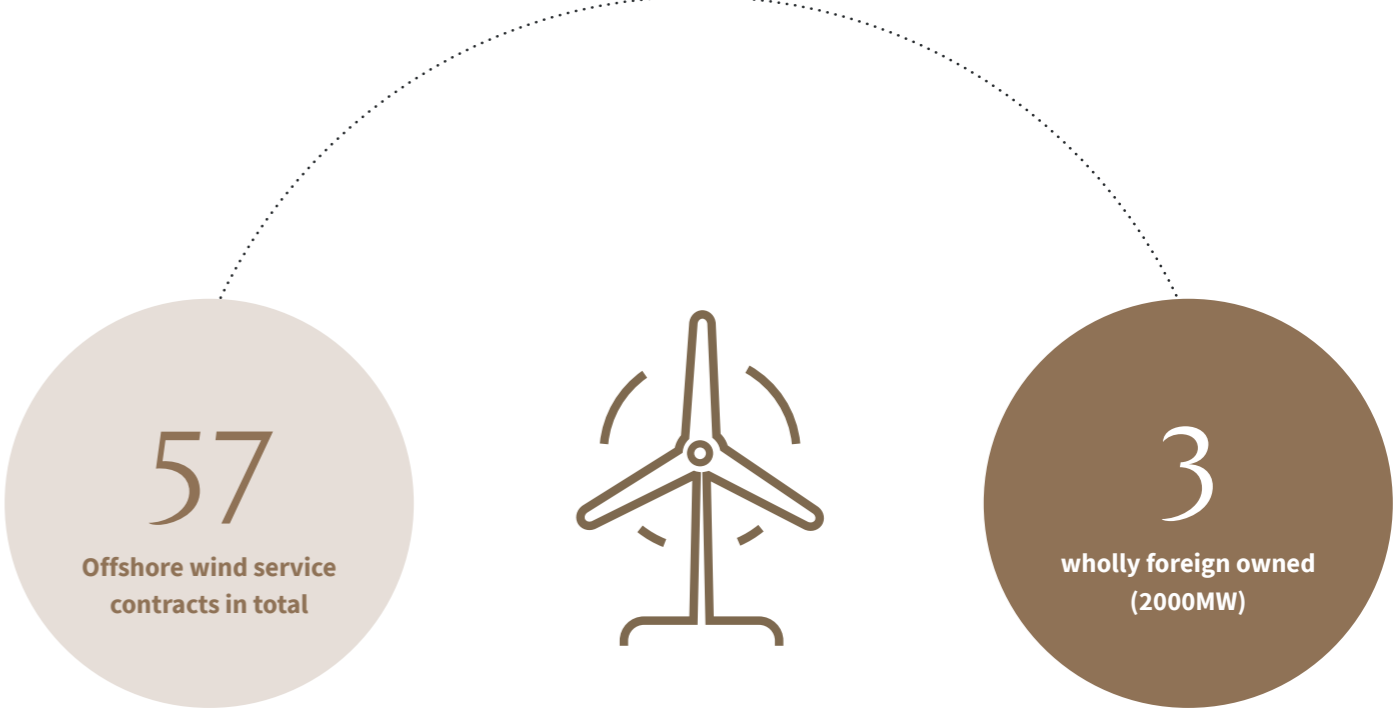
**Hydro and geothermal power** provide most of the renewable energy today, and are expected to remain the highest sources by 2030.

**Wind power** is targeted to become the third largest source of renewable capacity by 2030, requiring significant investment to take it from 427MW in 2019 to 2378MW.

**Solar power** increased by 958MW of capacity between 2011 and 2019 – the most of all renewable energy sources. The Asian Development Bank (ADB) has supported the Romblon solar-PV mini-grid and the Malalison mini-grid with pay-as-you-go smart metering.

Wind behind sails of foreign investors

Copenhagen Infrastructure New Markets Fund became the first foreign firm allowed to have 100% foreign interest in Philippine wind energy in March 2023, when it signed offshore wind service contracts with the Department of Energy. The agreement covers three offshore wind projects that are expected to offset 2.9m tonnes in CO<sub>2</sub> emissions a year and generate energy sufficient to power 1m households. Waters offshore Camarines Norte and Camarines Sur, Northern Samar, and Pangasinan and La Union will house the 2000MW (combined) wind farms.



The off-grid solar power switching on homes

More than 1.2 million households had no electricity access as at 2020. This off-grid prevalence is where renewable energy holds a transformative power. The PV Mainstreaming Program, supported by the European Union’s Access to Sustainable Energy Programme, connected more than 5000 homes with a Solar Home Systems (SHS).

The SHS comprises of a 50-watt peak solar panel, a 24Ah battery, four LED bulbs, a transistor radio, flashlight and mobile phone charging cables.

The program is ongoing. Pursuant to the country’s goal of total electrification by 2028, the National Electrification Commission, in Technical Advisory No. 12 series of 2023 (September 6, 2023), requested that electric cooperatives submit a list of potential barangays / beneficiaries with the number of households for PV Mainstreaming / SHS on or before October 6, 2023.



## CARBON MARKETS

The Philippines has no explicit carbon pricing mechanisms. This may change under the pending [Low Carbon Economy Act](#) which will introduce a new domestic cap-and-trade system. However there is no timeline for when this carbon pricing mechanism is expected to become operational.

In the meantime, fuel excise taxes on petroleum products serve as an [indirect form of carbon pricing](#).



## FINANCING

A sustainable finance taxonomy was introduced by the government in 2021. The [Sustainable Finance Guiding Principles](#) seek to give investors and other market participants a ‘common understanding’ of which activities are considered sustainable, improving clarity and certainty. This principles-based framework follows the approach of other Southeast Asian taxonomies.

The Philippine central bank, Bangko Sentral ng Pilipinas (BSP), is steering banks towards sustainability by implementing the [Sustainable Finance Framework](#). Pursuant to this, banks are expected to integrate sustainability principles into their investments.

### Adaptation finance emerging

**There are some examples of adaptation focused investments.**

- The UNFCCC’s [Green Climate Fund](#) granted US\$10m to the development of Multi-Hazard Impact Based Forecasting and Early Warning Systems.
- The [Philippine People’s Survival Fund](#) was established by the Philippine government to support community adaptation programs, such as the installation of buffers and gabions along the Mamcas and Piyanga rivers to protect riverine communities from flood events.

### Mitigation finance dominated by power

US\$153  
BILLION

Investment needed between 2020 and 2040  
to meet clean energy targets

The government has taken several measures to encourage green investment, including:

- Stimulating investments via the Energy Efficiency and Conservation Act in 2019.
- Allowing 100% foreign ownership of large-scale geothermal energy projects since 2020.
- Allowing 100% foreign ownership of renewable energy projects since December 15, 2022.
- Establishing the Renewable Energy Trust Fund.

79%

Share of the power sector

- Extending up to 80% of the total renewable energy project cost for private entities and up to 90% for public entities, under the Land Bank’s Renewable and Efficient Alternative Energy Financing Program.

The ADB included the Philippines as one of the pilot countries in its Energy Transition Mechanism, a program launched in 2021. The program aims to use concessional and commercial capital to accelerate the retirement or repurposing of fossil fuel plants and replace them with clean energy alternatives. The ADB is currently engaged in a full feasibility study in the Philippines and is working extensively with the government to prepare an investment plan under the Climate Investment Funds Accelerating Coal Transition Program.

TRANSPORT

Rapid population and urbanisation growth has increased transport sector emissions. The Philippine government is aiming to improve efficiency by increasing the uptake of alternative fuels and expanding mass transport systems.



Biodiesel

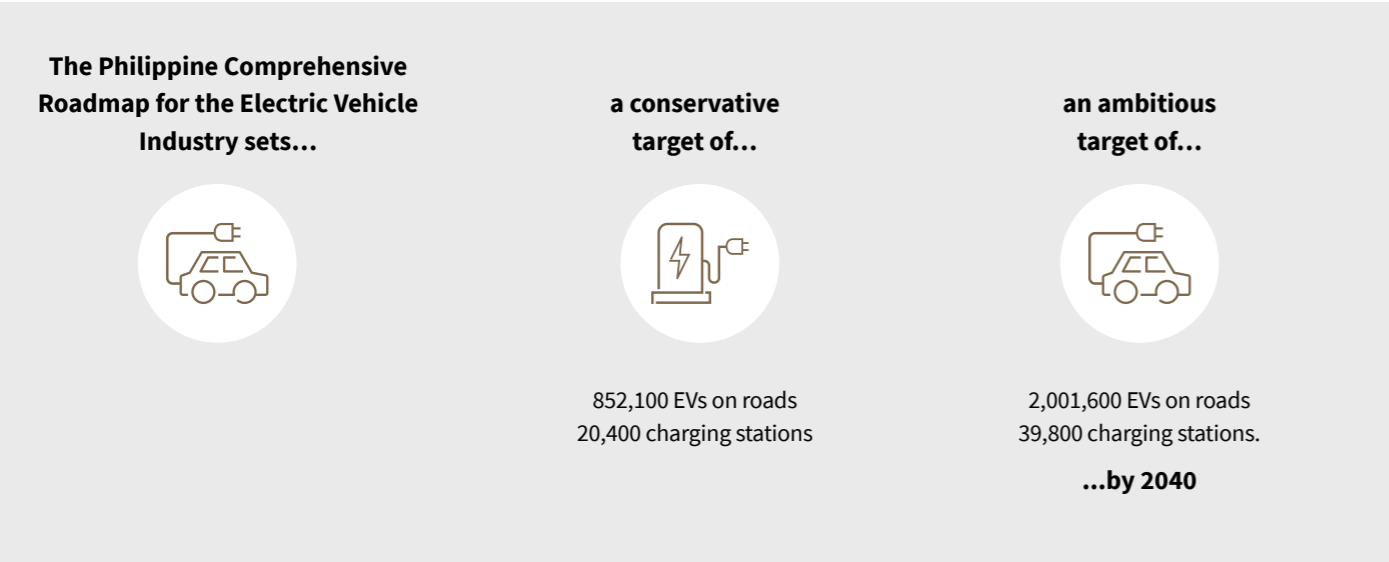
A biodiesel blend target of 20% by 2030 is part of the NCCAP. [Biofuel producers are offered tax breaks](#), duty-free importation of equipment and machinery, and exemptions from wastewater charges amongst other incentives.



Electric vehicles

Electric vehicles attract incentives including a 30% discount for EV owners on vehicle registration and inspection fees for 8 years under the 2022 Electric Vehicle Industry Development Act (EVIDA Act). The import duty rates on electric vehicles, parts, and components are [temporarily reduced to 0%, 1%, or 3%](#) (from 3%, 20%, or 30%) until March 1, 2028.

Long term (2035-2040) Philippine Comprehensive Roadmap



HOUSING AND BUILDINGS



Ecotowns for adaptation

In 2021 Typhoon Rai tore through various regions of the country, affecting almost two million people and leaving thousands displaced. Many residential buildings desperately need climate-proofing.

Ecologically stable and economically resilient towns ‘ecotowns’ are the NCCAP’s response to the lack of climate resilient residential buildings in The Philippines.

[Ecotowns](#) are municipalities located within key biodiversity areas that are also highly vulnerable to climate change due to geography and high poverty rate. There are more than 30 demonstration sites across the country (36 by late 2023). These are distinct from similar projects in other countries that focus on mitigation, such as low carbon-footprint buildings. Ecotowns undertake vulnerability and natural resource assessments, aiming for ‘above-sound’ hazard analyses.

The [Climate Adaptation Support Service \(CASS\)](#) is linked. This provides income to those most in need within key biodiversity areas. CASS beneficiaries living in a forest zone may have to participate in reforestation efforts and those in coastal communities may be asked to ensure their household waste does not end up in protected marine areas.

Ecotowns focus on adaptation measures including...



crop diversification



construction of landslide protection facilities



installation of shelters for heat waves

Ecotowns are designed to...



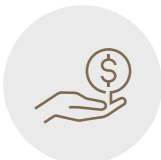
mitigate environmental impacts and protect ecosystems



efficiently use land, energy, water and food



minimise waste outputs



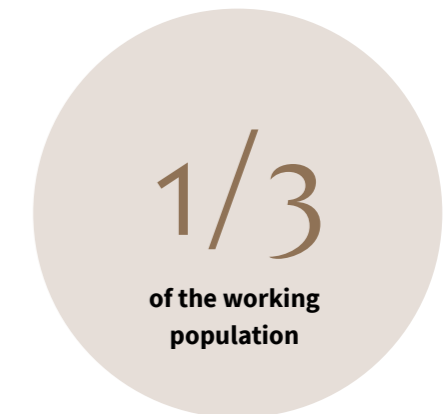
create sustainable jobs.



## ECOTOWN SITES



## AGRICULTURE



The agriculture sector is extremely sensitive to the impacts of climate change with the majority of damage caused by typhoons, followed by droughts and then floods. Dam and irrigation infrastructure throughout the country is not yet climate resilient. There is a concentration of climate-vulnerable dams and irrigation infrastructure in Luzon, where 60% of the country's irrigated rice is produced. If this infrastructure fails, food security would likely take a significant hit.

The government's Climate Adaptation Support Service provides income in exchange for mitigation and adaptation efforts to those most in need within key biodiversity areas.

### The Adapting Philippine Agriculture to Climate Change Project (APA)

In response to the serious threats climate change poses to the Philippines' agriculture sector the government has partnered with the UNFCCC's Green Climate Fund on an [adaptation project](#). The APA is primarily focused on improving institutional capacities through the provision of localised climate information services and through the adoption of climate-resilient agriculture practices, such as the planting of drought resistant seeds and use of organic fertilisers.

The government grants tax and other incentives under the [2022 Strategic Investment Priority Plan](#) to food security related products and services that are critical to competitively ensure food security or in support of green/organic agriculture.



The Philippine government made reforestation a key priority in response to high emissions from the sector, adopting a UNFCCC forestry emissions reduction program (REDD++).

A new 2022-2031 strategy is in development. This must address data indicating that the natural forest cover only slightly increased – by 3.03% from 2015 to 2020 - suggesting more is needed.



The 2010-2020 the Philippine National REDD+ Strategy with the UNFCCC sought to prepare forestlands managers across the country to assume responsibility in implementing REDD+ programs.

Biofuel products are incentivised by the Philippine government via tax breaks for producers, duty-free imports of equipment and machinery, and exemptions from wastewater charges under the Renewable Energy Act of 2008 and the Biofuels Act of 2006.

The National Greening Program (NGP) aimed to plant 1.5 billion trees in 1.5 million hectares of lands of the public domain from 2011 to 2016. By the end of 2015, Executive Order No. 193, series of 2015 was issued to expand the coverage of the NGP (the Enhanced NGP) to rehabilitate all the remaining unproductive, denuded and degraded forestlands by 2028.

The Department of Environment and Natural Resources Administrative Order No. 2021-43 provides the Guidelines on the Establishment of the Carbon Accounting, Verification, and Certification System for Forest Carbon Projects (CAVCS Guidelines). This supports investments in activities that sequester carbon dioxide and avoid emissions from forest degradation.

## BATS, TURTLES AND THE QUIRINO FOREST

Within one decade, more than 12,530 hectares of forest cover was destroyed in the municipalities of Maddela and Nagtipunan. Located in the Quirino Province of North Luzon, this negatively affected agricultural productivity.

The REDD+ Quirino Forest Carbon Project aims to change this. Completion is due in 2029, 20 years after it started. The Project aims to reforest the areas bordering the national park and improve the livelihood of the local community through the establishment of agroforestry. The region has already seen increases in habitat for at least five globally threatened species including the Philippine pygmy fruit bat and the Cantor's giant softshell turtle.

## INTERNATIONAL COLLABORATION



**The Republic of Korea & The Philippines** entered the [Partnership Agreement for Air Quality in the Philippines](#) in August 2023. Officially between the Korea International Cooperation Agency and the Philippine Space Agency, the agreement aims to enhance air quality monitoring in the Philippines.



**International organisations** and **nations** supporting the **Philippines** on projects include:

- **Asian Development Bank** projects supported include the Romblon solar-PV mini-grid and the Malalison mini-grid with pay-as-you-go metering
- **The UNFCCC's Green Climate Fund** supports numerous projects
- **The International Labour Organisation** supports the creation of [green jobs](#)
- **The Japan International Cooperation Agency** has supported projects including hydropower in Laguna, Ifugao and Isabela
- **The European Union** backed a PV Mainstreaming project via its Access to Sustainable Energy Programme

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# VIETNAM

## CHAPTER 4

### OPPORTUNITIES



Economic Growth



Renewable Energy



Critical Minerals



Electric Vehicles

### CHALLENGES



Green Finance Availability



Geography



Natural Disasters



Energy & Food Security

Population of

**95.2**  
Million

GHG emissions

**570.3**  
Million tonnes

**93**

Climate change  
resilience  
ranking

Net zero by

**2050**

Vietnam is among the fastest growing markets in ASEAN. Strategically located in the centre of Southeast Asia, its GDP, foreign direct investment and middle-income population have all grown over the past decade. Vietnam's share of annual global emissions is relatively small - approximately 0.88% in 2021 - for a population of almost 100 million, or roughly 1.2% of the world's people.

The country is severely affected by climate change. With 3,260 km long coastline, many low-lying cities and river delta regions, Vietnam ranks first in the world for exposure to flooding alongside Bangladesh. The World Bank estimates Vietnam lost around US\$10 billion in 2020 due to climate impacts. Without appropriate adaption and mitigation measures, climate change could cost Vietnam around 12% to 14.5% of GDP annually by 2050 according to their estimates.

The Prime Minister approved measures to implement Vietnam's commitment to achieving net zero emissions by 2050. Vietnam aims to unconditionally reduce 15.8% of total GHG emissions by 2030, and conditionally reduce its contribution by 43.5% of total GHG emissions by 2030 compared to BAU under the updated 2022 Nationally Determined Contribution (NDC).

# ENERGY TRANSITION

## CHALLENGES



### Heavy reliance on fossil fuels

**Heavy reliance on fossil fuels** has seen electricity and heat generation account for the vast majority of Vietnam's emissions. Electricity consumption has surged alongside its rapid economic development and population growth. In the decade to 2020 consumption more than doubled - [from 89.94 TWh to 225.95 TWh](#).

**Clear government policies and incentives** will play an important role in the pathway to decarbonisation for Vietnam, as one of the most coal-dependent countries globally. The government and Prime Minister Pham Minh Chinh are focused on increasing the share of renewable energy and improving energy efficiency to reduce emissions. More than 70% of targeted GHG emissions reduction by 2030 is planned to come from electricity and heat generation.

#### Vietnam's coal exit strategy includes:

- no new coal-fired power projects after 2030 and the phasing out coal power capacity after 2035 (under [The National Strategy on Climate Change](#) up to 2050, in line with commitments as a signatory to the COP26 global pledge).
- converting all coal-fired power plants to alternative fuels or retiring them by 2050 under the [Power Development Plan 8 \(PDP8\)](#) released on 15 May 2023.
- reducing domestic coal production to 33 million mt / year by 2050 and coal imports to 50 million mt in 2045 under the [National Energy Masterplan](#), from 41 million – 47 million mt/year in 2030 and 85 million mt in 2035 respectively.



### Integrating the power grid to transmit renewable energy

**Integrating the power grid to transmit renewable energy** sources has lagged the construction of projects, as in many other countries. This limits the output of clean electricity and is a disincentive to investors. The high initial capital investment required to reduce GHG emissions is not matched by the limited domestic market demand for energy-saving technology and renewable energy.

**Gas** will play a transitional role, with natural gas production targets rising from [5.5 billion-15 billion CU](#) ('Carbon Units') m/year by 2030 to 10 billion-15 billion cu m/year by 2050.

**Bankability issues** in connection with the model power purchase agreements (**PPA**) for renewable projects are the key concern for sponsors and financiers which may impede the ability to procure international project finance for large-scale renewable projects.

The direct PPA (or corporate PPA) program has not been put in place. EVN and its subsidiaries are still playing as monopoly offtakers in the market.

The attractive feed-in tariffs (**FiTs**) are no longer available to solar and wind power projects that have failed to achieve the commercial operation dates by the relevant deadline prescribed by the Prime Minister.

## OPPORTUNITIES



### Solar

**Solar** presents enormous opportunities in Vietnam, both as:

- the world's [third largest manufacturer](#) of solar PV modules, and
- one of the fastest growing solar power markets in the world. In 2020, capacity increased by over [10 megawatts](#) - more than all ASEAN countries combined.

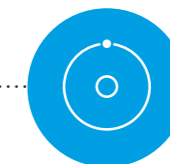


### Energy efficiency

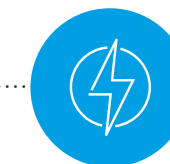


### Offshore wind

**Offshore wind** also has potential across Vietnam's [3000+km coastline](#). Under PDP8 the total planned capacity for offshore wind development is [6,000MW by 2030](#) and will reach up to 91,500MW by 2050.



### Hydrogen



### Hydro

**Hydro, solar, wind and biomass power** are set to provide 48% of Vietnam's installed capacity by 2030, rising to approximately 63% in 2050, under the ambitious [PDP8](#). This significantly increases the National Strategy goal of a [33% share by 2030](#) and a quantum leap from the 15.3% recorded in 2020.

### Trading ideas in Hanoi

Over four days in March 2023, The Australian Energy Trade Mission explored trade and investment opportunities in Vietnam. From grid operation, energy storage solutions and virtual power plants, to green certification system and decarbonisation technology, the opportunities are wide-ranging.

This continues Australia's history of working with Vietnam to develop its economy. One recent example is the 2021 US\$32m (\$41m) loan provided by Export Finance Australia as part of a green syndicated finance facility to build onshore wind farms in Vietnam. The loan facility will enable the development, construction and operation of three wind farms with a total capacity of 144MW located in the Quang Tri province in the central highlands of Vietnam. The projects will generate 422 gigawatt-hours of electricity and avoid an average of 162,430 tons of CO<sub>2</sub> emissions annually.

*'[Australia is] one of Vietnam's strongest energy partners, having supported the first ever 500KV transmission line connecting northern power sources to the central and southern regions back in the early 1990s.'*

[Australia's Ambassador to Vietnam, HR Andrew Goledzinowski](#)

CARBON MARKETS

Vietnam’s carbon pricing efforts includes a carbon tax that is limited in scope and – perhaps more significantly – a new carbon market from 2025 and a commitment to cross-border collaboration.



Hopes for an expanded carbon tax

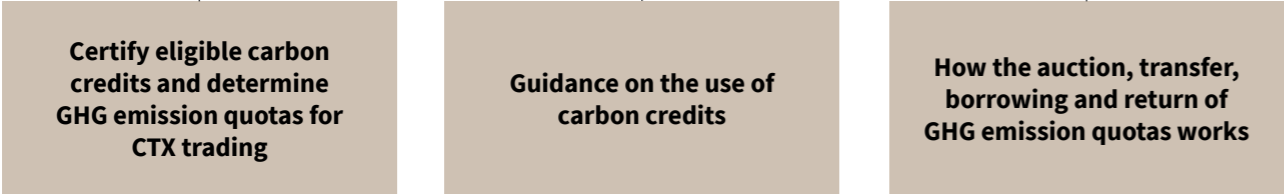
Vietnam has not adopted carbon taxation but is applying environmental protection tax with respect to [certain fuels such as gas and diesel](#). The government is working on a roadmap to apply carbon tax by way of either including in environmental protection tax or introducing as a separate tax.



Regulated emissions trading scheme – pilot from 2025

Vietnam plans to establish and trial the Carbon Trade Exchange (CTX) from 2025 with full operation expected by 2028. The establishment and implementation of the carbon market is provided for in amendments to the [Law on Protection of the Environment](#) and Decree No. 06/2022/ND-CP.

The Ministry of Natural Resources and Environment (MONRE)



By 2027, Vietnam hopes to:

- have formulated carbon credit management regulations, GHG emission quota exchange and carbon credits, and operation rules for the CTX
- experimented with carbon exchange and offsetting mechanisms in key sectors, and
- provided guidance on the operation of the CTX and offsetting mechanisms in accordance with domestic law an international law to which Vietnam is a signatory.<sup>6</sup>

The MONRE and the Ministry of Finance have joined forces with the Southeast Asian Energy Transition Partnership (ETP) to create a pilot CTX simulation tool and learn-by-doing platform for key stakeholders to raise their awareness of carbon pricing. The key findings and lessons learnt from this project will feed into concrete policy recommendations for the government to roll out the [CTX by 2027](#).

Cross border collaboration: Singapore, Australia back Vietnam’s efforts

**Singapore and Vietnam** signed a Memorandum of Understanding (MOU) on Carbon Credits Collaboration in October 2022. This includes the development of ‘[modalities and procedures to enable the transfer of correspondingly adjusted carbon credits that are generated](#)’. The MOU was made under Article 6 of the Paris Agreement and was the first MOU signed between Singapore and an ASEAN member State.

**Australia** will inject AU\$3.3mn and leverage over AU\$3.7mn in [private sector investment](#) and resources to improve the environment in Vietnam for carbon market projects. The deal is part of Australia’s Department of Foreign Affairs and Trade (DFAT) Business Partnerships Platform and supports six new multistakeholder partnerships.



6 Decree No. 06/2022/ND-CP on Mitigation of Green House Gas Emissions and Protection of Ozone Layer.



## FINANCING

6.8%  
GDP

6.8% GDP per year / cumulative  
US\$368b 2022 – 2040

Investments needed to successfully pursue a resilient  
and net zero development pathway

AU\$105  
MILLION

AU\$105 million committed by Australia in June 2023

To increase Vietnam's uptake of clean energy, clean energy  
infrastructure and update mining law to attract foreign  
investment to develop critical minerals resources

Source: [World Bank](#), [Australian Prime Minister Anthony Albanese](#)

### Improving settings for foreign investment

International financial sources must supplement government incentives that encourage private investment and increase public funding (eg through a carbon tax) for Vietnam to satisfy its financing needs. Settings that would make it more attractive for investors include:

- **Stress testing climate-related risks.** About 55% of loans made by banks in Vietnam went to businesses and people in climate-vulnerable regions. The government should consider assessing climate-related risks on the banking sector through stress testing to inform future green finance policies, in line with World Bank advice.

- **Consistent and reliable taxonomy.** Vietnam's membership of the ASEAN Taxonomy might buffer investor uncertainty around sustainable investments (eg green bonds) and mitigate greenwashing risk. Vietnam is also developing a national taxonomy that is expected to align with the EU Taxonomy.

### ASEAN's sustainable finance taxonomy – and the need for labels

The ASEAN Taxonomy Board released the second version of its Taxonomy for Sustainable Finance in early 2023, following consultations. This provides a roadmap for member nations to follow, giving investors critical guidance on attracting sustainable finance to reach goals. For more on the landmark 209-page guide, see [the ASEAN Taxonomy update on KWM Pulse](#).

### The Just Energy Transition Partnership (JETP) raising billions

The government and the [International Partners Group \(IPG\)](#) made a political declaration on 14 December 2022 to establish the JETP. This is expected to encourage more foreign investment.

- The partnership will mobilise an initial amount of at least US\$15.5bn over the next three to five years.
- This is split 50:50 between public sector finance raised by IPG members (EU, UK, USA, Japan, Germany, France, Italy, Canada, Denmark and Norway) and private finance facilitated by [Glasgow Financial Alliance](#) for Net Zero Working Group members.

*'[The JETP is] a long-term, ambitious partnership to support Viet Nam's low-emission and climate resilient development, as well as support Viet Nam to accelerate the just transition and decarbonisation of the electricity system, and develop new economic opportunities to support Viet Nam's transition towards net zero future.'*

*European Commission, Political Declaration, Dec 2022*

### Developing domestic finance and investment

5%

CLIMATE FINANCING  
as a proportion of total financing  
provided by Vietnamese  
banks in 2020

Vietnam's green finance sector is still in its infancy. Domestic financial institutions are in the early stages of understanding green bonds and other capital market instruments. But there is significant potential to increase green finance and use the financial sector to direct capital to 'greener' and sustainable investments.



#### Green Banking Development Scheme.

Launched by the State Bank of Vietnam (SBV) in 2018, the scheme promotes green finance and encourages credit institutions to incorporate environmental and social risks into their credit decision-making processes.



#### Legal framework roadmap.

Vietnam is 'actively implementing a roadmap for an improved legal framework for better attracting green finance and green technology; and encouraging green production and investment', Vietnam's Deputy Prime Minister affirmed at the 53rd World Economic Forum in January 2023. As mentioned above, establishing a national taxonomy is crucial.



#### Need for internal procedures, external expertise.

The lack of internal procedures for and expertise on green finance assessment is a key challenge for many domestic banks. Government policy and incentives will need to play a role to help the financial sector overcome these barriers. Former head of the Banking Strategy Institute Pham Xuan Hoe has called for a professional institution to manage and 'ensure the effective implementation' of in-bound green funds.

## TRANSPORT

### Action towards green movement

Vietnam has an action plan to develop a green transport sector by 2050. This involves developing modes of transport, facilities, equipment and infrastructure operated 100% through electricity or green energy. Approved on 22 July 2022, the Action Program for Transition to Green Energy and Mitigation of Carbon Dioxide and Methane Emissions from Transportation for 2022-2030 (**Transportation Action Program**) sets specific targets for roadways, railways, inland waterways, shipping, aviation and urban traffic.



### Electric vehicle (EV) market should see dramatic growth.

Vietnam's EV market is still in its infancy. But EV sales are expected to increase from a few thousand cars in 2022 to 1 million by 2028, reaching 3.5 million by 2040. Growth is anticipated due to:

- Government incentives including lowering taxes on imports and reducing a portion of registration fees for electric vehicle owners.
- Development of charging infrastructure and enhancements in the manufacturing, assembly, import and use of EVs, under the Transportation Action Program.

### Accelerating EV sales at home & abroad

Vietnamese-founded private automotive company VinFast has projected it will sell between 40,000 and 50,000 electric vehicles in 2023. The leading electric car manufacturer 'promises to bring affordable and luxury electric cars with powerful engines' to market. Exports to North America and Europe have contributed to the almost seven-fold increase in sales since 2022, when the company's only market was Vietnam. According to chairman and founder Pham Nhat Vuong, the company expects to break even by the end of 2024 'if things go as planned'. The company has received a funding pledge of US\$2.5 billion from its parent company Vingroup and Vuong. VinFast currently has a plant in Vietnam and plans to open a second plant in North Carolina in 2025.

Australia – through Export Finance Australia and the Australian Climate Finance Partnership – provided VinFast US\$50 million in support to increase production of public electric buses and establish Vietnam's first national electric vehicle charging network in 2022.



## HOUSING AND BUILDINGS

### Vietnam plans to modernise its urban areas with a focus on the green economy and the digital economy.

The Vietnam Urban Green Growth Development Plan 2030 outlines 5 pillars for a sustainable city: quality, energy consumption, resource conversation, health and safety, environmental impact.



AGRICULTURE



Agriculture, forestry, and fishing sector contribution to GDP in 2022



Agriculture sector annual growth - a record over the recent years

The agriculture sector is Vietnam’s third highest GHG emitting sector – and a sector Vietnam aims to grow. Vietnam has ambitions to be in the [top 15 agricultural developed countries](#) and the top 10 in agricultural processing technology by 2030.

Innovation is needed to cut overall methane emissions by at least 30% below 2020 levels by 2030 – a commitment made at COP26 – and to address the impacts of climate change on the sector. The [Mekong River Delta’s food production](#) systems are unsustainable and increasingly at risk.

By 2050, Vietnam is expected to have a modern, efficient and environmentally friendly agricultural sector. [The updated NDC](#) has set specific goals for the agriculture sector, from the development of biogas to the modernisation of watering and fertilising perennial plants.

- [The Climate Strategy](#) identifies ways the agriculture sector can adapt to climate change and sets objectives and tasks for the sector as a high-emitting industry.
- [The National Strategy on Green Growth \(Green Growth Strategy\)](#)<sup>7</sup> maps out foundations for re-organising production to further develop agriculture while improving climate change resilience in the region. The [Green Growth Strategy](#) was approved by the Prime Minister in October 2021.

**The Australian Centre for International Agriculture Research (ACIAR)** has a 29-year running program of research collaboration with Vietnam. The 2022-23 research program will see 25 ACIAR-supported projects in Vietnam. In June 2022, ACIAR and Vietnam reaffirmed a commitment to developing research into climate change, especially:

- drought-tolerant cropping systems in the Mekong River Delta and the Central Highlands, and
- saline-cropping systems for the Mekong River Delta.

High-tech innovation to transform Vietnam’s agriculture sector

*‘Deeper, stronger ties between our innovation systems is a key goal for our strategic partnership with Australia... innovation – particularly when it is jointly developed and implemented – can transform our society and deliver economic, social and environmental sustainability.’*

*Bui The Duy, Vietnam Vice Minister of Science and Technology*

The Australian Government is boosting innovation in Vietnam’s agriculture sector via technology investments. Under the 10-year, AU\$33.5mn Aus4Innovation program, Australia is offering Innovation Partnership Grants (AU\$2mn in total) to [fund tech-based innovation](#) in Vietnam’s agriculture sector.

The goal is to support projects that tackle challenges in agriculture, like boosting production and processing productivity, using resources more efficiently, developing markets (domestic and export) and addressing climate change adaptation and resilience. Managed and implemented by CSIRO, and delivered in strategic partnership with Vietnam’s Ministry of Science and Technology, the Aus4Innovation program has previously supported three funding rounds, with a total of 12 projects funded, with [all projects delivering successful results](#). The partnership promotes cross-border collaboration and sharing skills and resources to bring economic, social and environmental benefits.

INTERNATIONAL COLLABORATION



**Vietnam & Australia** established the landmark Green Economy Program in October 2023 to strengthen business partnerships. The program aims to equip Australian businesses with the knowledge, capabilities and networks to catalyse sustainable business collaboration with Vietnam.



**EU & Vietnam** were among members of the Just Energy Transition Partnerships entered in December 2022 as part of COP27. This will support Vietnam to accelerate its transition away from fossil fuels to clean energy.

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7 Decree No. 06/2022/ND-CP on Mitigation of Green House Gas Emissions and Protection of Ozone Layer.



# REPUBLIC OF KOREA

## CHAPTER 5

### OPPORTUNITIES



Hydrogen



Green Cities



Investment



Green Finance



Carbon Markets

### CHALLENGES



Geography



Natural Disasters



Energy Security



Among the largest economies in the world by GDP and a powerful member of the G20, The Republic of Korea has developed a strong industrial sector in recent decades. Yet without urgent action to transition to a more sustainable economy, it could lose **3.73%** of annual GDP by 2050.

Climate change threatens devastating impacts to its 51.6 million population. By 2050, heatwaves are expected to last 1,563% longer, ocean acidification will reduce fishing potential and destructive flooding could affect an estimated 420,000 people.

**Urgent investment in a low-carbon future could limit economic costs to 1.15% by 2050.** Renewable energy sources can also help the Republic of Korea to achieve energy security, given it imports almost all of its coal.

The government has **committed** to carbon neutrality by 2050. This ambitious goal faces challenges from the country's energy-intensive manufacturing sectors, growing population and reliance on exports.

But the government's extensive efforts include plans to establish 'hydrogen cities' and transform industrials under its Green New Deal. The Republic of Korea is finalising the next iteration of its strategies, under its legally-binding National Plan for Carbon Neutrality and Green Growth (2023-2042).

ENERGY TRANSITION

CHALLENGES

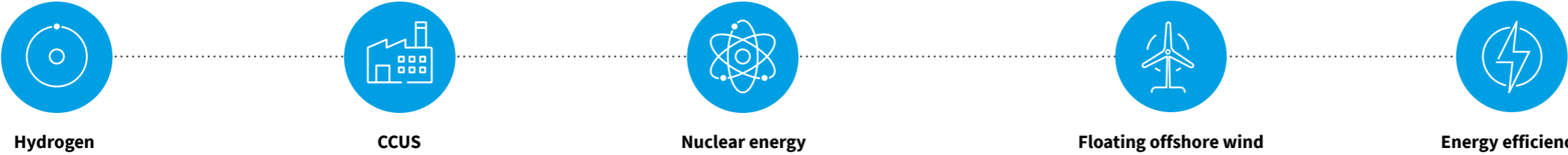


The **electricity and heat generation** sector is the Republic of Korea’s highest emitting sector due to the dominance of fossil fuels in the energy mix. Since signing the Global Coal to Clean Power Transition Statement at COP26, the Republic of Korea has tightened its coal-exit strategy ‘to dramatically phase down coal-fired power generation while ramping up renewable power’. Coal power will reduce to less than a third of generation by 2030 with 28 coal-fired power plants decommissioned by 2036. The complete phase-down of coal is planned by 2050, under the national [roadmap](#) to achieve net-zero by 2050.

**Natural gas** ‘will continue to play a greater role in the future’, and is included in the Korean Green Taxonomy ([K-Taxonomy](#)).

Sustainable growth and enhancing quality of life are key energy transition objectives, as set out in the 3rd National Master Plan for Energy ([3rd Energy Master Plan](#)).

OPPORTUNITIES



The Republic of Korea is aiming to have roughly a third of all energy generated by renewable energy sources by 2040 under its third Energy Master Plan – a dramatic almost five-fold increase from 7.6% in 2017. Stable electricity supply and demand to strengthen energy security are a top priority in the 10th [Basic Plan for Long-Term Electricity](#). Currently, renewable energy accounts for just 8% of the power generation mix, followed by nuclear at 27%, gas at 29% and coal at 34%. But by 2036, the share of renewable power generation is expected to increase to 30.6%.

A significant scale-up in investment in clean energy sources is needed for the Republic of Korea to reach its targets. Renewables aside, the Republic of Korea is among nations [prioritising clean hydrogen technology](#) in a bid to ‘take the lead in spearheading the global hydrogen economy’. [Renewable energy certificates](#) are the primary driver of renewable capacity installation.

The renewable portfolio standard (RPS) scheme was introduced in 2012 to replace the feed-in tariff program. The RPS requires large-scale power generators or integrated energy operators with an installed power capacity of 500 MW or more to procure a government-mandated percentage of electricity from renewable sources via certificates. The annual RPS mandate increased to 12.5% in 2022, with an ambition of 25% by [2030](#).

- **The Northeast Asia Super Grid project** seeks to connect power grids with neighbouring countries such as Japan, China, Mongolia and Russia. This project appears to have stalled since the last research report was published in July 2019.
- **Community projects in farming areas (residents) and industrial complexes** are supported via loans to those that elect to participate in community benefit sharing for renewable energy projects.



- **Solar PV and wind power** will dominate due to strong policy backing and widespread availability. This is despite the Republic of Korea having one of the highest costs of building solar and wind projects in the world due to market distortion from subsidies (like the RPS), its mountainous landscape and smaller average project size.
- **Transmission and distribution capacity infrastructure** investment is critical to support the uptake of renewable energy.

‘[B]eing left behind in the transition could mean losing a competitive edge in the global value chain.’  
The Republic of Korea government

Going up the supply chain

Local companies are among key leaders in renewables supply chains globally – particularly in wind and solar.

- **Hanwha Q CELLS** has led the manufacture of solar PV modules for 18 consecutive quarters in both the US residential and commercial markets. Hanwha Q CELLS plans to invest more than US\$2.5 billion, making it the largest investment into US solar to date.
- **CS Wind Corporation** is a key player in the global market for wind turbine towers. In August 2022, CS Wind and Vestas announced a joint venture to establish a power generation production corporation in the Republic of Korea to respond to increasing renewable energy demand in East Asia and the development of the domestic offshore wind market.



- **Hydrogen:** The local economy is expected to generate up to 43t won from hydrogen by 2040. By 2030 it anticipates producing 1.9 million tonnes of clean hydrogen a year domestically and importing 1.96 million tonnes per year. The nation's hydrogen roadmap includes setting up 'hydrogen cities' and a new hydrogen certification system (from 2024).
- The establishment of a hydrogen value chain is key - from production and storage, to transport and utilisation.
- Hydrogen vehicles and fuel cell technologies will form the backbone of the hydrogen economy.
- The government will (under the first draft of the National Plan for Carbon Neutrality and Green Growth) demonstrate key technologies, establish necessary infrastructure, diversify hydrogen transportation and expand utilisation such as through the construction of hydrogen cities and clusters.



#### When opportunity strikes: Clean hydrogen investments by key domestic players

Major companies have jumped at the opportunity to become pioneers in this emerging sector. Five of the nation's biggest companies have committed over 40 trillion won in investment into hydrogen infrastructure by 2030. In July 2022, the Korea H2 Business Summit (a council established by key players such as Hyundai Motor, SK and POSCO) set up a fund worth 500 billion won over 10 years to:

- Establish domestic and overseas hydrogen production
- Distribution and storage infrastructure, and
- Invest in developing core hydrogen technology.

**Among projects under way are the development of green hydrogen and ammonia plants in the UAE and Malaysia, with plans to import the fuel produced from 2027. Other investments include:**

- **POSCO:** 121 trillion won investment in projects by 2030 to develop EV batteries and hydrogen. In Australia, POSCO was allocated land in Port Hedland, WA, with 'plans to use hydrogen [power] to make high-quality pellets of iron ore...that when used in electric-powered steel furnaces removes highly polluting coal from the process'.
- **SK Group:** 18.5 trillion won investment by 2025 to set up its hydrogen value chain.
- **Hanwha Group:** 1.2 trillion won investment by 2025 to develop its green hydrogen ecosystem.
- **Lotte Chemical:** 10 trillion won investment by 2030 into battery materials and hydrogen.
- **Hyosung Group:** 1 trillion won investment to build green hydrogen production facilities in Sinan, Korea.
- **Korea Zinc:** 8.4 trillion won investment to 2028 in renewable energy and hydrogen projects. In May 2022 Ark Energy Corporation Pty Ltd (the Australian subsidiary of Korea Zinc) acquired 100% interest in Epuron Holdings Pty Ltd, with goals to 'develop a new green energy corridor' from Australia to the Republic of Korea.
- **GS Group:** 21 trillion won investment by 2026 to expand its clean energy businesses (eg small modular reactors to hydrogen).
- **Han-Ho Hydrogen Consortium:** MOU to build a green energy export hub in Queensland signed 2022, to produce 1m tonnes green ammonia a year for export to Korea by 2032. Consortium includes Hanwha Impact, SK Gas, Korea Zinc and its Australian-based subsidiary Ark Energy.

## CARBON MARKETS

**The Republic of Korea's key market-based solution is its carbon price. The Emissions Trading Scheme (K-ETS) launched in 2015, covering 74% of national GHG emissions. Suboptimal performance led the government to cancel auction plans for 3.7 million permits in early 2023.**



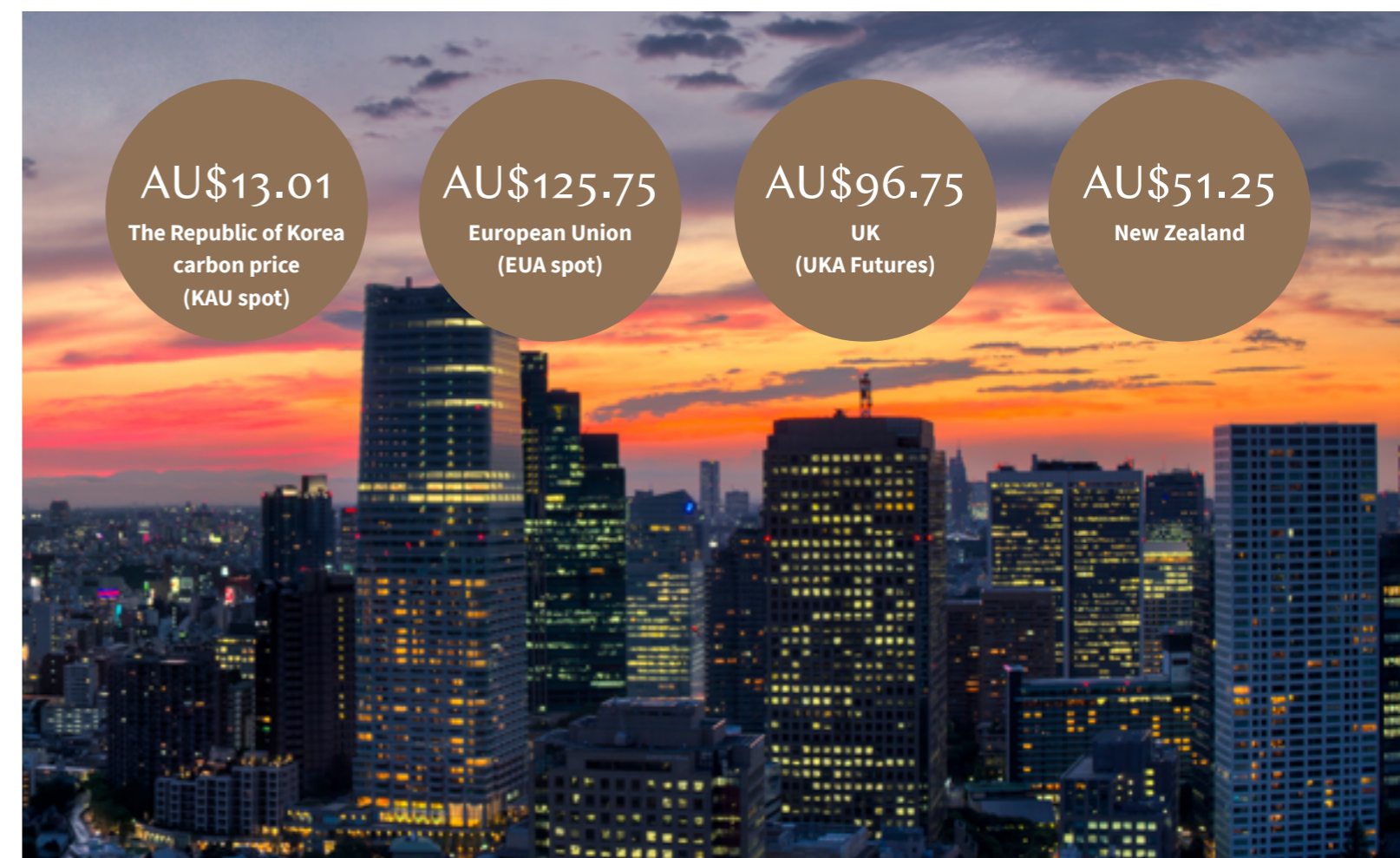
Sectors covered (waste, domestic aviation, transport, buildings, industry and power) capture 684 of the Republic of Korea's largest emitters.



Effective reduction measures, better allocation methods, enhanced market functions and linkage and collaboration with international carbon markets are among improvements set out in the 3rd Basic Plan for the K-ETS (2019).



More changes are expected when the K-ETS cap is updated to align with the Republic of Korea's more ambitious NDC 2030 target (4th Basic Plan for 2026-2030, in progress).

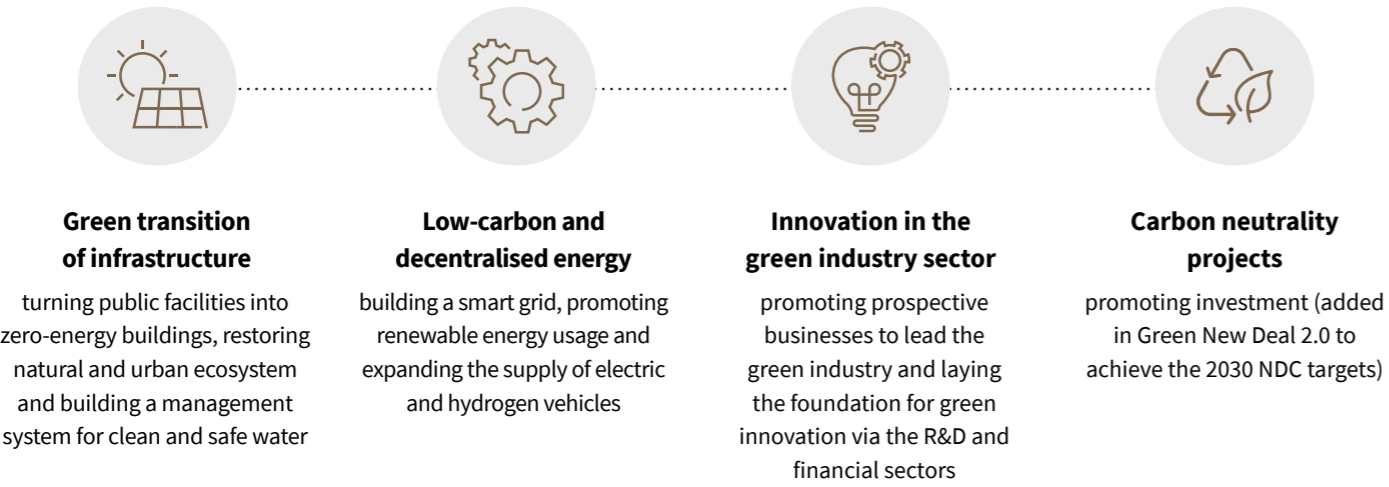


FINANCING

There are two key aspects to green investment in the Republic of Korea: the government’s own funding of green projects via its Green New Deal, and the attraction of private investment including via the setting of a national, non-binding sustainable finance taxonomy – ‘K-Taxonomy’ - in April 2021.

Public investment: Korean Green New Deal

The updated [Green New Deal 2.0](#) provides 61 trillion won (up from 42.7 trillion won) by 2025 across four core pillars of investment, creating more than 600,000 jobs. They are:



In February 2023 the Ministry of Environment announced several financial incentives to promote the growth of green industries, including expanding support for greenhouse gas reduction facilities to 138.8 billion won in 2023, almost tripling the budget for official development assistance projects to 12.4 billion won in 2023 for international environmental cooperation, and amplifying open-call projects to reduce international greenhouse gas emissions.



Boosting private investment, quashing greenwashing: K-Taxonomy

The K-Taxonomy aims to give investor and stakeholder clarity and confidence on what qualifies as a ‘green’ economic activity – therefore boosting investment. To achieve ‘green’ status, an activity must satisfy all three principles:

- 1. Contribute to at least one of six environmental goals.
- 2. Do not cause any serious environmental damage at the detriment of the other environmental goals while achieving the target environmental goal/s.
- 3. Do not violate laws and regulations related to human rights, labour, safety, anti-corruption and cultural property destruction.

The K-Taxonomy classifies green economic activities that contribute to achieving 6 environmental goals:

- 1. greenhouse gas reduction
- 2. adaption to climate change
- 3. sustainable water conservation
- 4. recycling
- 5. pollution prevention and management, and
- 6. biodiversity.

A [pilot that ran from April to November 2022](#) saw six banks and companies issue green bonds totalling 640 billion won for projects including renewable energy generation and zero-emission vehicle infrastructure.

The K-Taxonomy Guideline (**Guideline**) further helps interpretation – in turn, promoting capital flows towards green projects, industry and technologies, and tackling greenwashing.

GREEN SECTOR	TRANSITION SECTOR
Carbon neutrality and environmental protection.  Comprises 64 green economic activities.  <ul style="list-style-type: none"><li>1. Greenhouse gas reduction</li><li>2. Adaption to climate change</li><li>3. Water</li><li>4. Circular economy (eg recycling and using methane gas)</li><li>5. Pollution prevention and treatment</li><li>6. Biodiversity.</li></ul>	Intermediary step towards carbon neutrality.  Fossil fuels included temporarily until 2030; LNG and mixed-gas energy production until 2035 (extension pending).  <ul style="list-style-type: none"><li>1. Greenhouse gas reduction activities at the small and midsize enterprise level</li><li>2. Energy production based on LNG and mixed gas</li><li>3. LNG-based hydrogen (blue hydrogen) production</li><li>4. Eco-friendly ship transportation</li></ul>





US\$400 BILLION

Estimate to transition the transport sector to net-zero  
(excludes infrastructure or fleet replacement)

The Republic of Korea is poised to become among world leaders in ‘green’ car manufacture and supply. During the first half of 2023, the country’s green car export value rose to US\$12.4 billion (from US\$35.7 billion total automobile exports - a record high) – making eco-friendly cars, whether EV, hybrid, plug-in or hydrogen, account for 25% of car exports.

The Republic of Korea has among the highest proliferation of hydrogen fuel cell vehicles: out of the 15,000 new fuel cell cars that hit the road in 2022, two-thirds were in the Republic of Korea. Yet it also has ambitious short-term targets to increase EVs (including cars, buses and freight vehicles) on roads, including by installing 45,000 charging stations by 2025. An EV subsidy scheme has resulted in the Ministry of Environment facilitating the supply of over 402,000 EVs.

Key subsidies for 2023 include:



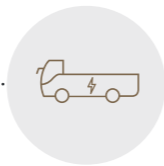
Passenger cars

Increase subsidised EVs by approximately 31% (215,000 units), 1.4 million won to manufacturers to increase low-emission vehicle supply (Hyundai, Kia, Ssangyong, Renault, GM Korea, Mercedes Benz, BMW, Volkswagen, Toyota and Honda), 200,000 won for charging infrastructure for EV manufacturers that have installed a minimum of 100 fast chargers over the past 3 years.



Vans and buses

Preferential treatment (support for 3 million won) for manufacturers if they submit a certified ‘traction battery safety test’ report.



Trucks

12 million won and an increase in the units of from 40,000 to 50,000, plus additional 30% of the grant amount (up from 10%) to vulnerable groups and small business owners.

Green technology: charging ahead with EV batteries

Three out of five of the world’s biggest EV battery manufacturers are from the Republic of Korea – LG Energy Solution Ltd, Samsung SDI Co Ltd and SK On. Together, they control approximately 25% of the global EV battery market share. In April 2023, they announced a plan to jointly invest 20 trillion won to 2030 to develop advanced battery technologies, along with the government.

The trio are also in the process of establishing billion-dollar manufacturing plants in the US to qualify for the US\$369 billion of subsidies under the Inflation Reduction Act. In 2019, the Republic of Korea was the 6th largest supplier of good imports to the US - vehicles was at the top at an estimated US\$21 billion.

Local companies of the Republic of Korea are also partnering with Chinese corporates on battery materials plant projects worth at least \$5.1 trillion won.



# HOUSING AND BUILDINGS

## Zero-energy new buildings and ‘green’ retrofitting for old buildings are key priorities for the Republic of Korea.

- Newly constructed buildings will be ‘zero-energy buildings that self-sufficiently generate their energy needs’ from 2030. This is expected to [increase](#) zero-energy buildings from 2,950 in 2022 to 47,000 by 2030.
- This expands existing Building Energy Management System (**BEMS**) requirements to use various equipment (eg lighting, heating and cooling, ventilation and outlets) to reduce building energy consumption and enhancing energy efficiencies.
- Old private buildings with green remodelling from government support will [increase](#) from 73,000 cases in 2022 to 1.6 million cases by 2030.
- Rooftop solar panels will attract 244.7 billion won under the government’s PV system rebate scheme and other small renewable energy systems.
- Public facilities take first priority in the [Green New Deal](#), focusing on improving energy efficiency. A minimum of 2,890 school buildings will have solar panels installed and eco-friendly insulation by 2025. These projects will be funded both by government finance and public-private partnership via the Build-Transfer-Lease model.

# AGRICULTURE

## Agriculture accounts for less than 5% of emissions in the Republic of Korea and an even smaller proportion of its GDP. Climate measures are focused largely on research and development towards adaptation. The private sector drives incentives towards sustainable farming, as retailers set targets that trickle up the supply chain.

There is a [national framework for the sustainable development](#) of the agricultural sector under which 5-year plans are set. This has included targets for sustainable innovation. But the [OECD has called for more investment](#) and support towards adaptation and incentives to help farmers to adopt climate-resilient systems. The OECD has also called for sustainable water use.

One key government measure is in the [Renewable Energy 3020 Plan](#), via solar PV in rural areas. Active participation from the nation’s farmers is required and long-term, low-interest loans enable them to combine PV installations with farming activities.

Significantly, forest and land use acts as a carbon sink. The Republic of Korea is a signatory to the [Glasgow Leaders’ Declaration on Forests and Land Use](#) signed at COP26, committing to forest conservation, promotion of sustainable development and commodity production, improving rural livelihoods and incentivising sustainable agriculture.

## Green City: Songdo International Business District

The City of Incheon, the third most populous city in the Republic of Korea, has been championing an eco-friendly transformation. Disposable products are not used in the city, and green infrastructure, clean energy and EVs will be boosted by [2025](#).

Located within the city, [Songdo International Business District \(SIBD\)](#) was purpose-built on 1,500 acres of reclaimed tidal flats using US\$35 billion in funding raised since 2001. Green and smart initiatives include:

1. LED streetlights and walking lights, solar energy supplies, geothermal heating and cooling facilities and rainwater storage facilities
2. 20 million square feet of Leadership in Energy and Environment Design-certified (**LEED-certified**) space
3. 40% green space allocated, including a 40-hectare park
4. an automated, interconnected waste management system where '[a]ll waste is sucked directly from households through a network of underground tunnels' to automatic waste processing facilities
5. goal to be an integrated 15-minute city where citizens can satisfy 90% of daily activity by bike or public transport within 15 minutes
6. computers built into buildings and streets, and sensors monitor traffic flow and energy use
7. water pipes divert drinkable water away from being used in showers and toilets demonstrateattracting clean businesses such as clean biotechnology and bioengineering companies, and the Green Climate Fund.

INTERNATIONAL COLLABORATION

	<p><b>The Philippines &amp; the Republic of Korea</b> entered the <a href="#">Partnership Agreement for Air Quality in The Philippines</a> in August 2023. Officially between the Korea International Cooperation Agency and the Philippine Space Agency, the agreement aims to enhance air quality monitoring in the Philippines.</p>
	<p><b>The EU &amp; the Republic of Korea</b> entered the <a href="#">Green Partnership</a> in 2023, strengthening bilateral cooperation and the exchange of best practices to further the green transition. Climate and sustainable finance is a core area. Both parties will become ‘major donors of climate finance’ and facilitate just transitions in third world countries.</p>
	<p><b>Australia and the Republic of Korea</b> agreed to a Low and Zero Emissions Technology <a href="#">Partnership</a> in 2021 to collaborate. Collaborate on existing and emerging low and zero emissions technologies and promote trade systems. Up to AU\$100 million invested each. Early priorities include hydrogen (supply, power generation and fuel cell electric vehicles), low emissions steel and iron ore, carbon capture, use and storage, energy storage, solar and critical minerals supply chain.</p>
	<p><b>Germany &amp; the Republic of Korea</b> entered an <a href="#">Energy Partnership</a> in 2019 to accelerate decarbonisation given shared challenges. This includes renewable integration, efficiency, storage and green hydrogen innovation.</p>
	<p>Initiatives with <b>international organisations</b> include:</p> <ul style="list-style-type: none"><li>• Global Green Growth Institute: An MOU with the Export-Import Bank of the Republic of Korea in 2021 to 'expand the Republic of Korea Economic Development Co-operation Fund by scaling up green investments, including development finance, in fields such as renewable energy (solar and wind), green transportation, and the circular economy in developing countries'.</li><li>• The UN's Green Climate Fund is headquartered in Songdo. The Republic of Korea's government has committed to supporting the fund on a regular basis, including 3.6bn won from 2023 to 2025. The fund acts as a financing vessel from developed to developing countries and has a current portfolio of 228 projects with US\$48.3bn in total value.</li></ul>



KWM KEY CONTACTS - THE REPUBLIC OF KOREA



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BOHYOUNG KIM

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JANET GU

PARTNER,  
CHINA



# JAPAN

## CHAPTER 6

### OPPORTUNITIES



Nuclear energy, Hydrogen, CCUS,  
Offshore Wind



Transport



Buildings



Green Finance



Carbon Markets

### CHALLENGES



Geography



Natural Disasters



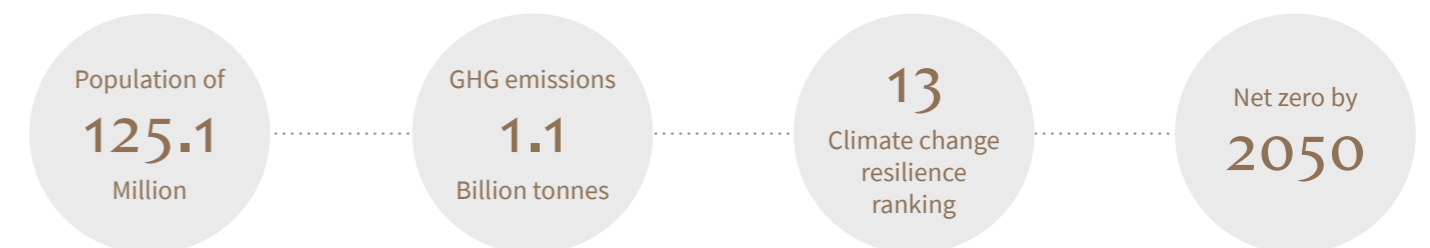
Energy & Food Security



Agriculture



Forestry & Fisheries



Japan is the third-largest economy in the world and among the world's [highest emitters](#). Home to approximately 126.5 million people, Japan consists of several thousand islands most of which are covered by mountains and surrounded by steep shorelines.

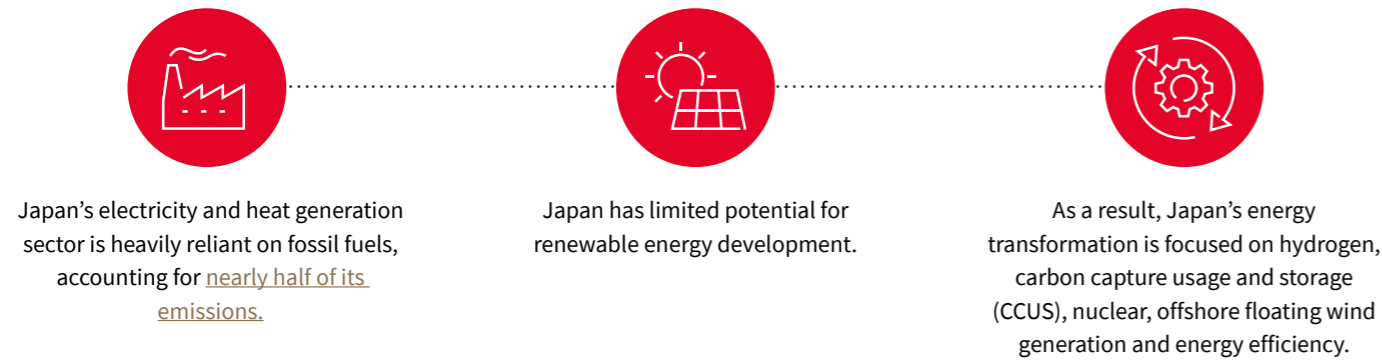
The topography limits renewable energy development and Japan's susceptibility to natural disasters such as typhoons and earthquakes has impacted nuclear generation following the 2011 Fukushima accident. Triggered by the [Great East Japan Earthquake](#), this event tipped Japan's economy into recession. A little over a decade on, Japan's economy is showing signs of recovery – and investors are circling.

For Japan, nuclear has re-emerged as a path to decarbonisation, along with the promise of green hydrogen, offshore wind and energy efficiency. Japan is also one of the world's largest importers of natural gas and is likely to remain as a [key part of Japan's energy generation](#) in the future.

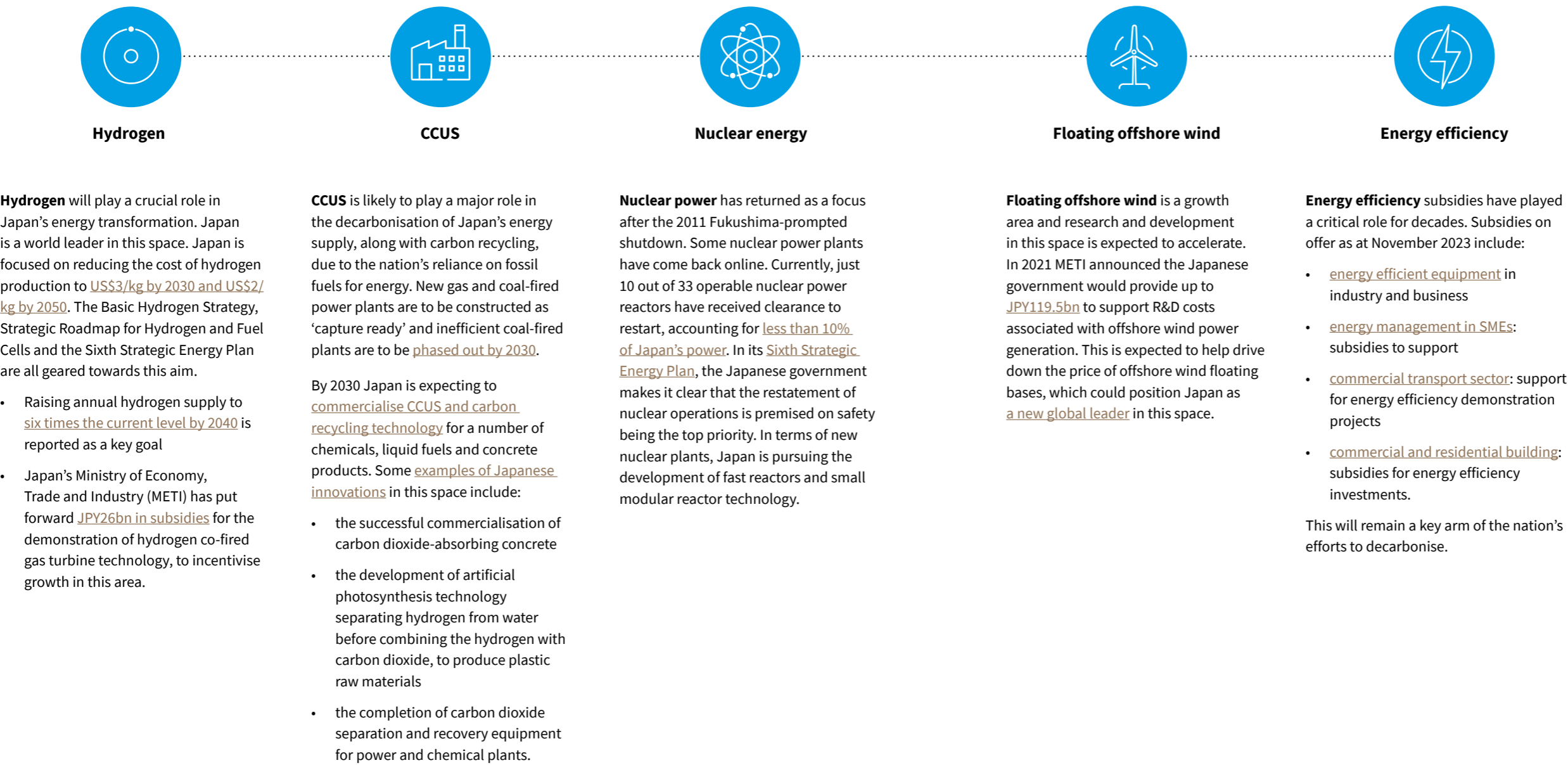
With this background, Japan's nationally determined contribution under the Paris Agreement is an ambitious one: a 46% reduction in GHG emissions in 2030 from its 2013 levels and net zero by 2050.

# ENERGY TRANSITION

## CHALLENGES

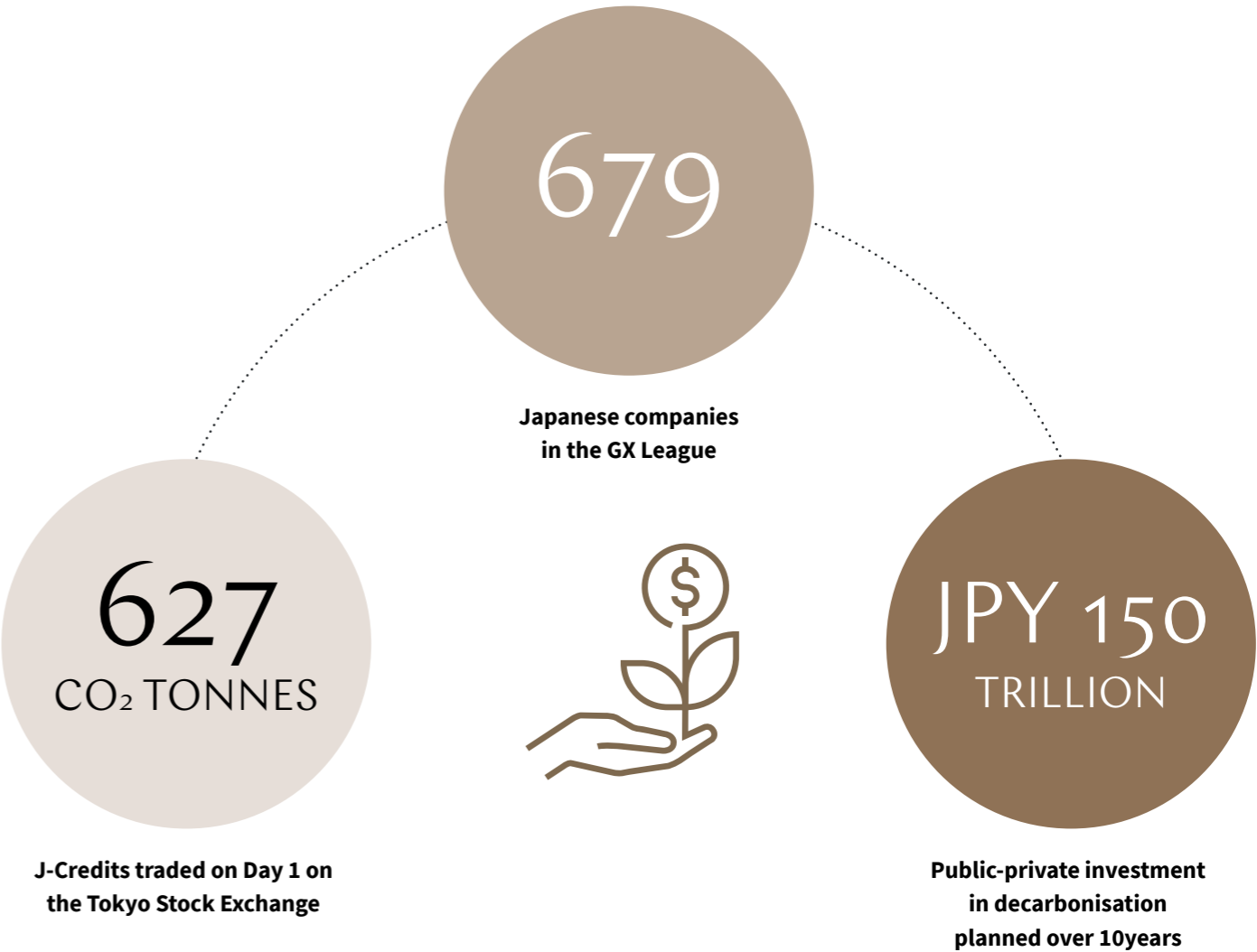
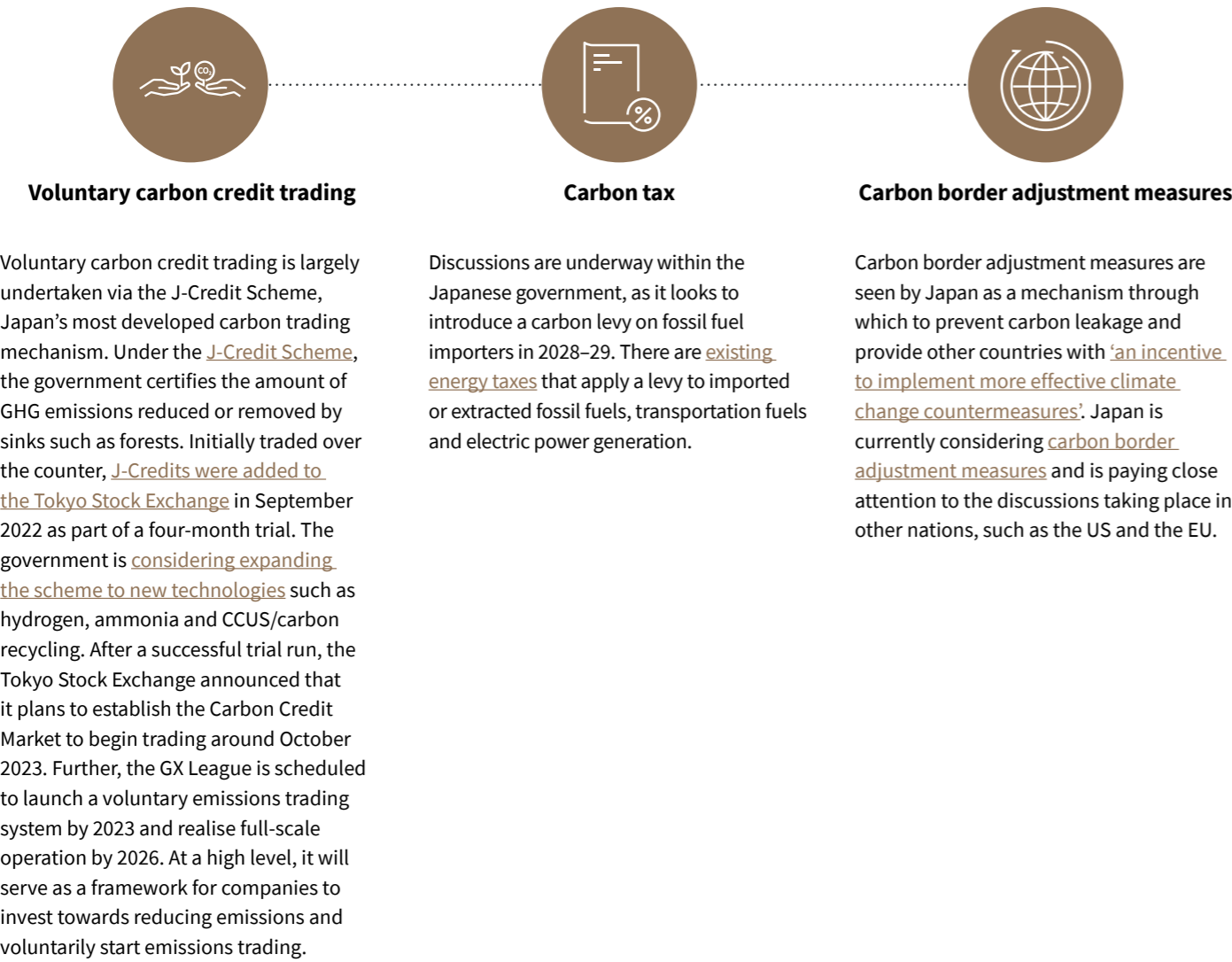


## OPPORTUNITIES



CARBON MARKETS

Three interrelated facets of carbon markets form the heart of Japan’s 2021 Green Growth Strategy to achieving Paris Agreement targets: voluntary carbon credit trading, carbon taxation and carbon border adjustment measures.



**The GX League: super-charging efforts by decarbonising corporates**

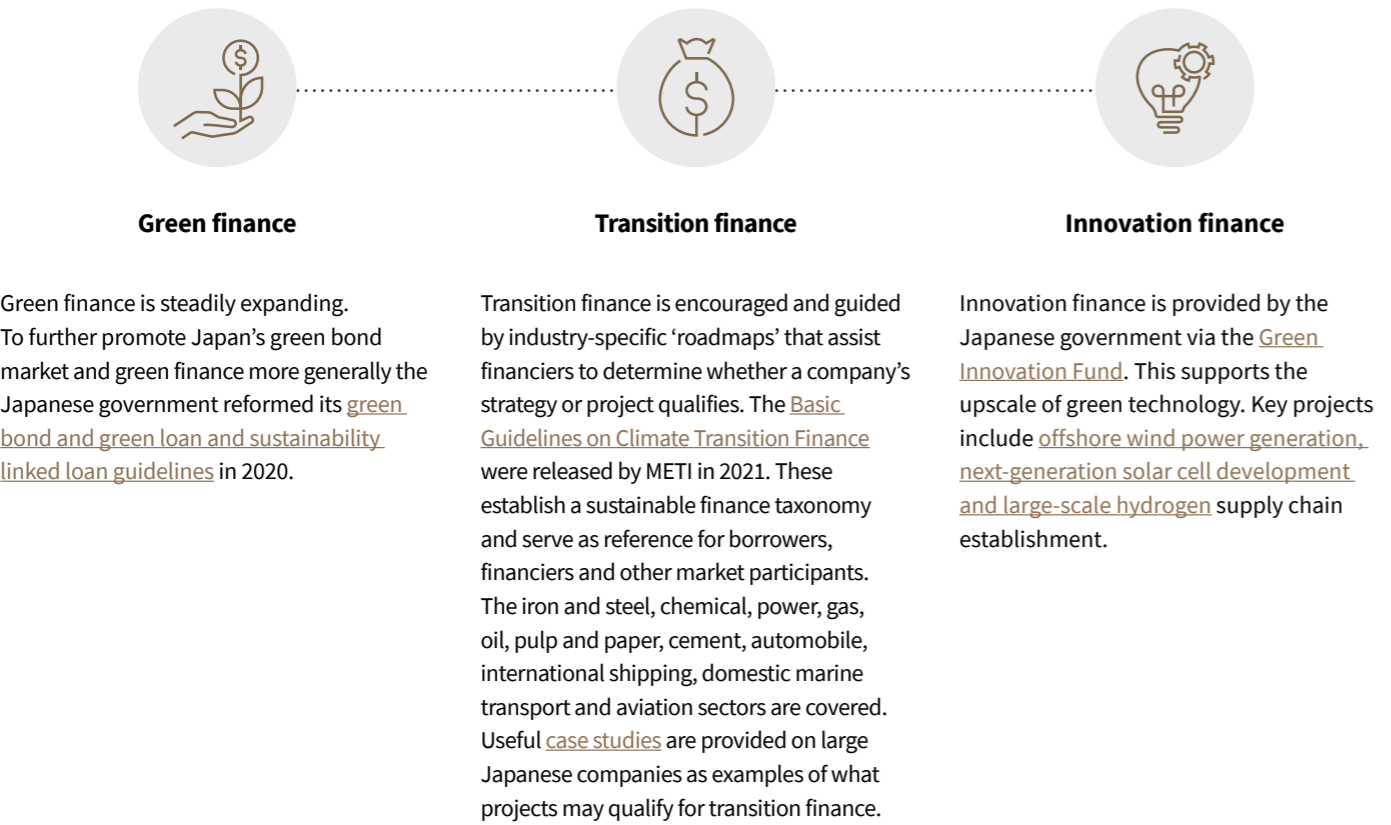
More than 550 Japanese companies that account for 40% of Japan’s emissions form part of the GX League. Set up in April 2022, the network is managed by a combination of government (METI), Nomura Research Institute and Hakuhodo (an advertising firm) officials. The member companies commit to lead supply chain decarbonisation, support the creation of green markets and follow a roadmap to carbon neutrality by 2050. A three-phase timeline includes a target of launching emissions trading system by 2026 and the auctioning of allowances in the 2030s.

Under the roadmap, the plan is to realise over JPY150 trillion of public-private investment in decarbonisation initiatives over the next decade.



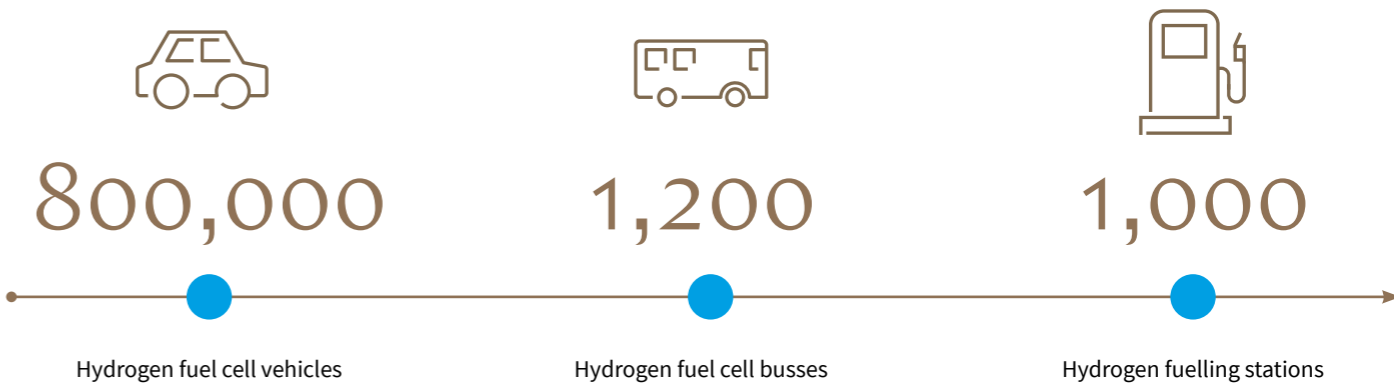
FINANCING

The Japanese government is stimulating the economy to attract private investment into green, transition and innovation initiatives.



TRANSPORT

2030 hydrogen targets



# HOUSING AND BUILDINGS

For over two decades the Japanese government has promoted net-zero energy houses and buildings

The net-zero energy houses and buildings (ZEH/ZEB) initiatives focus on energy-saving renovations, the introduction of high-performance insulation materials, high-efficiency equipment, renewable energy and the promotion and use of wood in buildings.



## Renewable energy

Renewable energy in the form of next-generation solar cells used on domestic and commercial buildings is expected to increase. The Japanese government expects that the country’s mastery of the electronics sector will enable Japanese houses and buildings to make use of next-generation solar cells. Being thinner and lighter in weight, next-generation solar cells could provide a power source for buildings that currently are unable to hold solar cells, such as those with small load-bearing capacity or limited roof space. To incentivise research and development into next-generational solar cells, the Japanese government has committed up to JPY49.8bn and is seeking to achieve a power generation cost of JPY14/kWh or less by 2030.



# AGRICULTURE



Global warming and the associated increase in natural disasters pose a serious threat to Japan’s agriculture, forestry and fisheries sectors.



In response Japan’s Ministry of Agriculture, Forestry and Fisheries (MAFF) released the 2021 Measures for achievement of Decarbonisation and Resilience with Innovation (MeaDRI). At a high level, the MeaDRI aims to completely decarbonise the entire supply chain of the agriculture, forestry and fisheries sectors by 2050 through the introduction of innovative technologies. This includes:

- reducing the use of chemical pesticides and fertilisers
- the utmost use of locally available resources
- restoration of biodiversity
- the dissemination of energy efficient and precision technologies.

The J-Credit Scheme for trading carbon credits, Green Innovation Fund and the direct payments for environmentally friendly agriculture scheme all incentivise the ‘greening’ of Japan’s agriculture, forestry and fisheries sectors.







## PURE SALMON

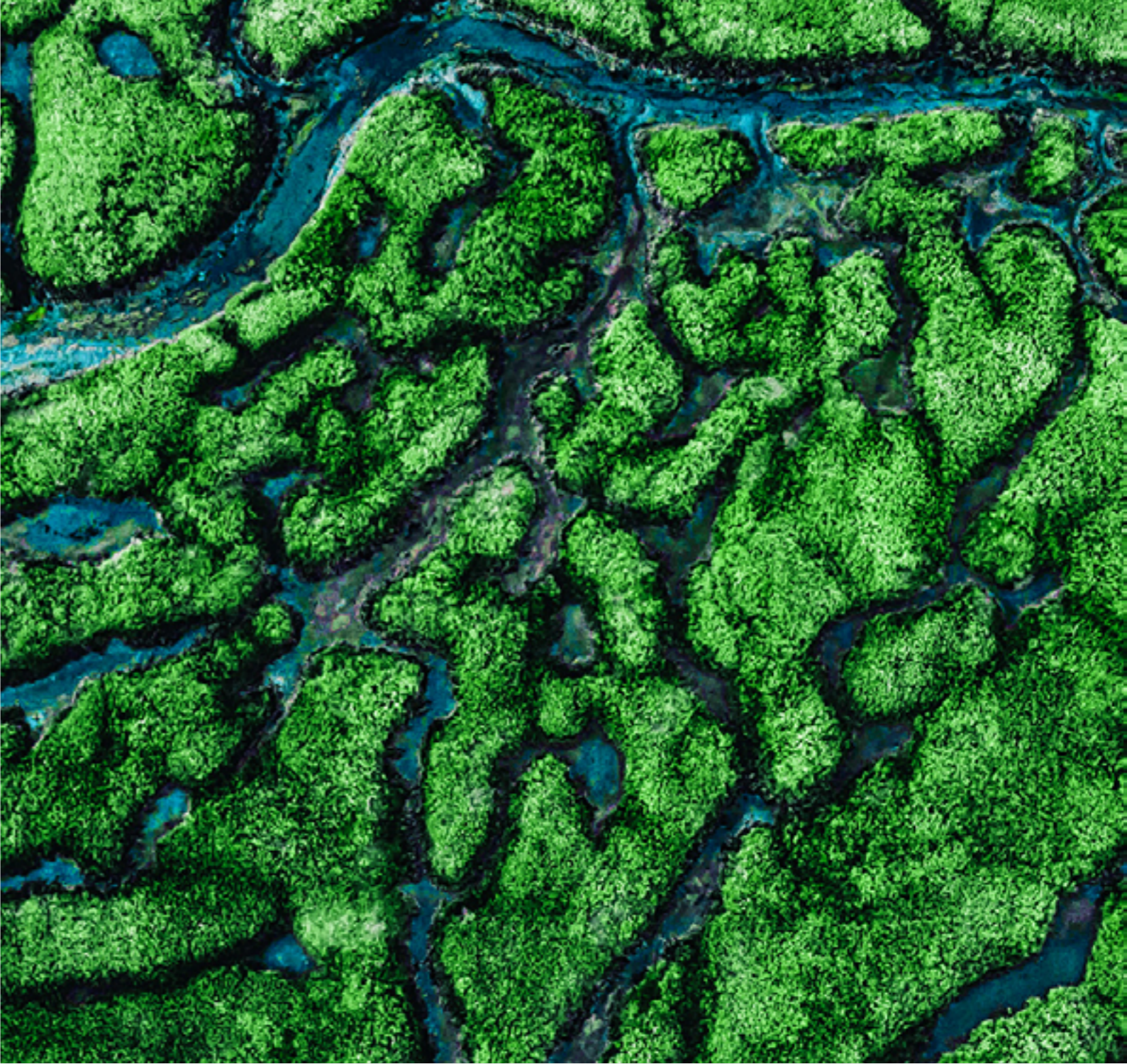
Japan’s need for clean, healthy and sustainable protein is tackled by global aquaculture company Pure Salmon. Japan is among the locations for its Recirculating Aquaculture Systems (RAS). RAS salmon farms are important for adaptation because they are ‘eco-friendly, water efficient, highly productive [and] not associated with adverse environmental impacts, such as habitat destruction, water pollution and eutrophication [and] biotic depletion’. Moreover, RAS compared to conventional aquaculture techniques is less likely to cause disease outbreaks or result in exotic species escape and parasite transmission. Pure Salmon has already started rolling out RAS salmon farms, including in Tsu City, Mie Prefecture, Japan.

Acting for the Pure Salmon, cross-border teams from KWM’s Singapore, Japanese and Australian offices helped Pure Salmon to finance the Mie Prefecture farm.



INTERNATIONAL COLLABORATION

	<b>Indonesia &amp; Japan</b> signed a <a href="#">Memorandum of Cooperation on Decarbonisation Technologies</a> in January 2022, aimed at developing and deploying decarbonisation technologies such as hydrogen, ammonia and CCUS to realise a ‘realistic’ transition.
	<b>Australia &amp; Japan</b> announced a <a href="#">clean hydrogen partnership</a> in January 2022 towards a world-first shipment of liquid hydrogen. This provides trade opportunities for Australian businesses working on domestic hydrogen supply chain projects and is connected to the AU\$150mn Australian Clean Hydrogen Trade Program.
	<b>Australia &amp; Japan</b> entered a <a href="#">partnership on decarbonisation technologies</a> in June 2021. In addition to clean hydrogen, other technologies include CCUS, carbon recycling, clean fuel ammonia, low emissions steel and iron ore and lower emissions LNG production.
	The <b>EU &amp; Japan</b> established a <a href="#">Green Alliance in</a> May 2021, aiming for climate neutrality by 2050. This prioritises sustainable energy, environmental protection, regulatory cooperation, research and sustainable finance.
	<b>UAE &amp; Japan</b> signed a Memorandum of Cooperation on hydrogen in April 2021. The two will ‘ <a href="#">seek to cooperate on matters such as exchanging information on hydrogen policy, constructing supply chains (including hydrogen production and transportation to Japan) and exchanging information toward developing regulations and standards</a> ’.
	Under the <a href="#">Asia Energy Transition Initiative</a> , Japan has committed to providing US\$10b to support the regional shift to renewables, energy efficiency and LNG.



KWM KEY CONTACTS - JAPAN



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CHISAKI KISHI  
  
ASSOCIATE,  
JAPAN



ACROSS THE REGION KEY COMMITMENTS

All countries globally are at different stages of progress when it comes to establishing frameworks or strategic initiatives designed to achieve net zero. Here we have outlined a summary of key commitments and how they compare to one another.

Area	Singapore	Indonesia	The Philippines	Vietnam	Republic of Korea	Japan
 NET ZERO	By 2050	By 2060	No target	By 2050	By 2050	By 2050
 EMISSION REDUCTIONS: GREENHOUSE GAS (GHG)	2030 – 60m MTCO <sub>2</sub> e <sup>8</sup> Peak carbon emissions between 2025 and 2028 at around 65 MTCO <sub>2</sub> e	2030 – 32%-43% (834 – 1,185m tonnes CO <sub>2</sub> e) - BAU 2,869m 2023 – 31.89% (unconditional) -43.2% (conditional) compared to BAU 2.869 GtCO <sub>2</sub> <sup>9</sup> equivalent Peak carbon emissions in 2030 predicted to reach 1,244 MTCO <sub>2</sub> e	2030 – 75% (2.7% unconditional) from 2020 - from agriculture, waste, industry, transport & energy Peak carbon emissions in 2030	2030 – 15.8% (unconditional) & 43.5% (conditional) from 2010 BAU 2050 – ~90% from BAU Peak carbon emissions in 2035 to around 603-692 MtCO <sub>2</sub> e (excluding LULUCF <sup>10</sup> )	2030 – 40% from 2018 2018 – Peak carbon emissions	2030 – by 46% from 2013 BAU
 ENERGY	2030 – energy intensity to improve 36% (0.113 k kgCO <sub>2</sub> e/ S\$GDP) against 2005 baseline 2030 – solar deployment to >2 GWp to meet ~3% of electricity demand & generate electricity for 350,000 houses annually	2030 – Sector CO <sub>2</sub> emissions peaking at 20% above 2021 levels, 20% lower by 2040 ~2040 – energy supply to increase & peak 2060 – total of CO <sub>2</sub> emissions ~100Mt 2060 – Electricity provides half total consumption - low-emissions fuels = 1/5th 2025 – New & renewable energy = >23% (>31% in 2050) 1% reduction in energy intensity per year	2040 – reducing final energy demand by 24% from BAU <sup>10</sup> - 3% pa decrease in energy intensity against a 2005 baseline (-2.2% pa 2005-2021) Integrate hydrogen & ammonia into roadmap plus harness 178GW of potential offshore wind	2030 – energy activities down 20-30% (against 2010 baseline)	2023 – Power generation reduced by 64.5 MTCO <sub>2</sub> e 2040 – consumption 18.6% below BAU level Decrease energy imports & contribute to stable energy supply system Low-carbon power sources, managing electricity demand, increasing transmission/supply efficiency	Generate 22-24% of energy needs from renewables (from 10% pre-Fukushima in 2011) 2030 – Decrease dependence on nuclear from 25% pre-2011 to 20-22% 2030 – Decrease energy generated from fossil fuel from 65% pre-2011 to 56% 2030 – Improve energy efficiency by 35% Promote hydrogen & energy storage
 HYDROGEN	2050 – Up to half of power needs <sup>11</sup>	To contribute to emissions reductions Emissions reduction targets via green hydrogen production (in tonnes of CO <sub>2</sub> ): <ul style="list-style-type: none"><li>2021 – 2025: 198m</li><li>2026 – 2030: 314m</li><li>2031 – 2035: 475m</li><li>2036 – 2040: 796m</li><li>2041 – 2050: 956m</li><li>2051 – 2060: 1,526m</li></ul>	Agreement with Star Scientific (Australian) to develop green hydrogen as a fuel source	2030 – produce 11.49m tonnes of green hydrogen 2050 – produce 18.78m tonnes   of green hydrogen	2040 – targets <sup>12</sup> include: <ul style="list-style-type: none"><li>Supply - 5.26m tons per year</li><li>EV fuel cells - 6.2m (53% exported, 47% domestic)</li><li>Powered transport:<ul style="list-style-type: none"><li>Cars: 2.75m</li><li>Buses: 40k</li><li>Taxis: 80k</li><li>Trucks: 30k</li><li>Fuelling stations: 1.2k</li></ul></li><li>Fuel cell manufacturing: capacity 15GW (7GW exported) - ~2GW for homes &amp; buildings</li><li>2040 – 70% of CO<sub>2</sub> - free Hydrogen Supply produced domestically</li></ul>	2030 – Production cost US\$3/kg (2050 cost US\$2/kg) 2030 – Powered transport: <ul style="list-style-type: none"><li>Cars: 800k</li><li>Buses: 1.2k</li><li>Fuelling stations: 900</li></ul> 2040 – Annual supply to increase 6x - 2m to 12m tonnes

8 Metric tons of carbon dioxide equivalent





9 Gigatonnes of carbon dioxide

10 Land use, land-use change and forestry

11 The Energy Efficiency Roadmap (2017-2040)





KEY COMMITMENTS

Area	Singapore	Indonesia	The Philippines	Vietnam	Republic of Korea	Japan
 <b>CARBON CAPTURE, UTILISATION, AND STORAGE</b>	Low-carbon transition - carbon tax, business transformation, investing in technologies & international cooperation  By 2030 – carbon tax rate rise to SGD 50-80/tCO <sub>2</sub> e (USD 35-56/tCO <sub>2</sub> e)	CCUS to contribute to emissions reductions  Launched carbon credit trading market to reduce emissions		Industries & power plants: <ul style="list-style-type: none"><li>• 2040 – CCUS capacity</li><li>• ~1mn mt/yr</li><li>• 2050 – 3-6mn mt/yr</li></ul> 2028 – domestic carbon market in operation & connected to others regionally & worldwide  2028 – factories & businesses to reduce carbon output, or purchase credits to offset.	2015 – launched Korea Emissions Trading Scheme to reduce emissions	Carbon Capture Utilisation and Storage 2030 – annual CO <sub>2</sub> storage target of 6-12 Mt CO <sub>2</sub> pa 2030 – implement the country’s first full-scale CCUS supply chain 2050 – annual CO <sub>2</sub> storage target of 120-140 Mt CO <sub>2</sub> pa
 <b>COAL, OIL &amp; GAS</b>	Shift away from oil (46% in 2000 to 3% in 2021) and towards fossil gas (96% in 2021) for electricity generation	2050 – eliminate coal generation	2020 – Declared moratorium on new coal power plants	2030 – reduce methane emissions from oil & gas extraction, coal mining & fossil fuel consumption by 30% from 2020 levels  LPG storage units - expand capacity of existing & construct new (domestic demand to reach 3.5–4.0m tons/year in 2025 & 4.5–5.0m tons/year in 2035)	2030 – natural gas 18.8% share of electricity production against a 2017 baseline	2030 – Inefficient coal-fired plants phased out - replaced with decarbonised thermal power using hydrogen, ammonia & carbon capture & storage 2030 – coal fired power generation to drop to 26% of energy mix New gas & coal-fired power plants constructed as ‘ <a href="#">capture ready</a> ’
 <b>AGRICULTURE, FORESTRY AND FISHERIES<sup>9</sup></b>	2025 – 1st integrated waste & used water treatment facility 100% energy self-sufficient  2025 – desal process energy use to decrease from 3.5kWh/m3 to 2kWh/m3 (1kWh/m3 by 2030) 2030 – agriculture to meet 30% of nutritional needs via locally produced food 2030 – Water consumption of 130L per capita per day <sup>13</sup> 2030 – Recycling 70% of waste 2060 – Desal capacity 3x increase to meet 30% long term water needs <sup>14</sup>		Enhancing forest cover across the country a key priority 2028 – no net loss in natural forest cover  Promote agricultural productivity, particularly on rice, corn, high-value crops, livestock, poultry, and fisheries <sup>15</sup>	2030 – GHG emissions reduced by 43% in the agriculture sector 2030 – reduce overall methane emissions from cultivation, animal husbandry, solid waste management, wastewater treatment by at least 30% below 2020 levels	2025 – rearrange sewerage infrastructure by separating foul sewage & rainwater runoff, enabling resilience with 30-year flood risks (30 priority areas identified)	2030 – 20% reduction in industrial food waste (compared to 2016) 2050 – zero CO <sub>2</sub> emissions from these sectors 2050 – 30% reduction in use of chemical fertiliser 2050 – 50% reduction in risk-weighted use of chemical pesticides
 <b>TRANSPORT</b>	2025: <ul style="list-style-type: none"><li>• 8 EV-ready towns</li><li>• chargers at all public housing (Housing &amp; Development Board ‘HDB’) carparks</li><li>• new registrations of diesel cars &amp; taxis to cease</li></ul> 2030: <ul style="list-style-type: none"><li>• 60k charging points (40k public carparks, 20k private premises)</li><li>• new car &amp; taxi registrations: cleaner-energy models only</li></ul>	2030 – 750k 4-wheel battery & 2.45m 2-wheel battery EVs on roads <sup>16</sup>	2030 – Biodiesel blend target of 20% – part of increased uptake of alternative fuels & expansion of mass transport systems  2040 – 852k EVs & 20.4k charging stations  Overall target of 2m EVs & 39.8k charging stations	Electricity & green energy used for: <ul style="list-style-type: none"><li>• buses &amp; taxis: new from 2025, all by 2050</li><li>• vehicles: &gt;50% by 2030</li><li>• vehicles operating in airfields: all by 2040</li><li>• inland waterway vehicles: all new by 2040</li><li>• vehicles &amp; equipment in ports &amp; navigation aids: all (or equivalent measures) by 2050</li><li>• inland railway, ports &amp; wharves: all by 2050</li></ul>	2030 – Sector emissions down 25.9 MTCO <sub>2</sub> e against 2016 baseline 2040 – 50% of vehicles are EV & hydrogen (8.3 and 2.9m respectively)	Mid-2030s – Government committed to comprehensive measures to make EVs account for all new passenger vehicles Promote electrification, biofuel & hydrogen fuel

<sup>13</sup> The National Energy Masterplan  
<sup>14</sup> Public Utilities Board, ‘Our Water, Our Future’ (January 2018)  
<sup>15</sup> Philippine government 3-year agricultural development program (2023-2025)  
<sup>16</sup> Minister of Industry Decree No. 27/2020 on Specifications, Development of Roadmaps, and Provisions Regarding Domestic Component Standards for Domestic Battery Electric Vehicles.



KEY COMMITMENTS

Area	Singapore	Indonesia	The Philippines	Vietnam	Republic of Korea	Japan
 <b>HOUSING AND BUILDINGS</b>	<p>2030 – 80% of buildings (by Gross Floor Area ‘GFA’) Super Low Energy</p> <p>2030 – 80% of buildings (by GFA) are Green Mark standard</p> <p>2030 – public authority (HDB) towns reduce energy consumption by 15% (by GFA)</p> <p>2030 – carbon neutral schools are &gt;20%</p> <p>2030 – Schools net carbon emissions are reduced by two-thirds</p>				<p>2040 – energy intensity of the building sector reduced 38%</p>	<p>2030 – average of all new constructions to be Net Zero Energy Buildings &amp; Net Zero Energy Houses</p>
 <b>RENEWABLES</b>	<p>2025 – solar deployment to increase to &gt;1.5 GWp (and &gt;2 GWp by 2030)</p>	<p>2025 – 23% of total power – &gt;5% biofuel &amp; &gt;5% geothermal</p> <p>2040 – to surpass fossil fuels with share of fossil fuels decreasing to 22% (2060)</p>	<p>2030 – 35% of the total energy supply, increasing to 50% in 2040</p>	<p>2020 – 5% of commercial primary energies (~11% by 2050)</p> <p>2025 – ethanol &amp; vegetable oil output of 1.8m tonnes = 5% of gasoline &amp; oil demand</p> <p>2030 –</p> <ul style="list-style-type: none"><li>• 15%-20% of primary energy consumption (80%-85% by 2050)</li><li>• &gt;47% of power generation (67%-71% by 2050)</li><li>• two renewable energy hubs &amp; export 5-10k MW of renewable energy</li><li>• green hydrogen production of 100-200k mt/year (10-20m mt/year by 2050)</li><li>• 43% of national electricity production (from 35% in 2015)</li></ul> <p>2030 – renewable energy ratio (hydro, wind, solar &amp; biomass) increase to &gt;33% of total electricity production</p>	<p>Renewable sources: 30-35% of energy generation by 2040, up from 7.6% in 2017</p>	<p>Next-gen solar cells: <u>generation target</u> of JPY14 per kWh or less by 2030</p>



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