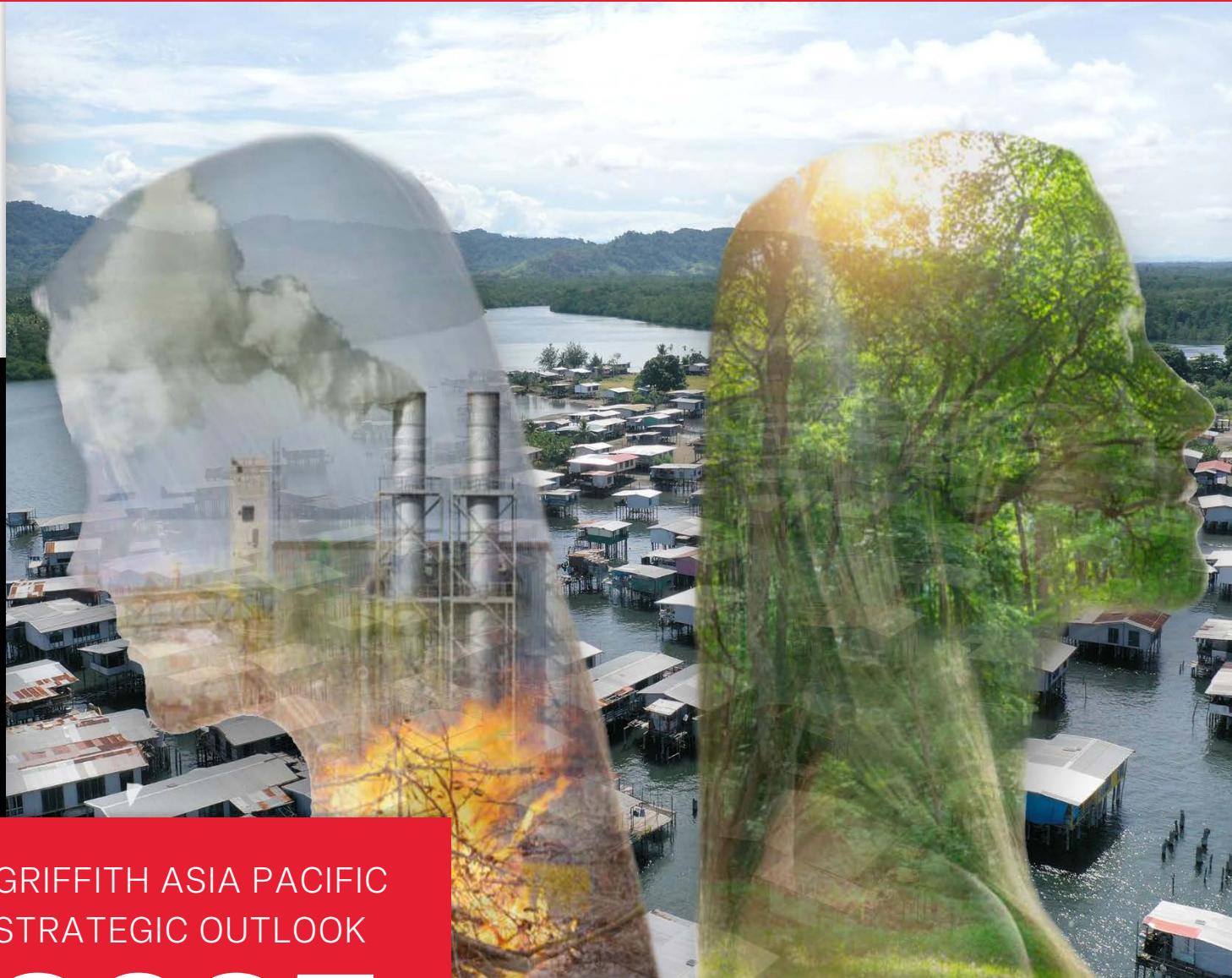


Time to develop an Asia-Pacific Green Development Agenda

Christoph Nedopil, Dhruba Purkayastha, Hemant Mallya, Kavita Vij, Nitin Bassi and Shuva Raha



GRIFFITH ASIA PACIFIC
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POLICY BRIEF

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Introduction

The green transition in Asia and the Pacific remains complex— with high uncertainty in 2025 and the years to come. Yet, time is of the essence: according to the World Meteorological Organization (WMO), 2024 was the warmest year on record and the first year to breach the 1.5 degrees Celsius above pre-industrial levels mark.¹ Costs associated with climate change are increasing and estimated to be USD 144 billion in 2014 – a 16 per cent increase (five times faster than global GDP growth), according to Swiss Re, the world's largest reinsurance company.² The Asia-Pacific region is bearing the brunt of this "climate breakdown," as termed by UN Secretary-General António.³ In 2024, devastating floods, early-onset heat waves, and thirteen typhoons impacted numerous Asia and Pacific countries.

The climate emergency will affect the global community, but the effects will not be distributed equally. Of the top countries most at risk from the negative effects of climate change, 50 per cent of them are Asian and Pacific Islands regions, including Fiji, Sri Lanka, the Philippines, Japan, and India.⁴ The Economic Survey in India stated that India is the seventh-most vulnerable country, with 93 per cent of days in 2024 marked by significant climate events such as heatwaves, cyclones, and floods.⁵ An analysis by the Council on Energy, Environment and Water (CEEW) suggests that three out of four districts in India are extreme event hotspots, with 40 per cent of the districts exhibiting a swapping trend, i.e., traditionally flood-prone areas are witnessing more frequent and intense droughts and vice-versa.⁶

Addressing the green transition in Asia and the Pacific remains highly complex: Countries in the region include behemoths like China and India, a range of Emerging Markets and Developing Economies (EMDEs), Small Island Developing States (SIDS), and Least Developed Countries (LDCs). It is a highly sensitive geopolitical theatre with millennia of civilisational history and deep colonial scars that today houses about 4.3 billion people.⁷ It includes some of the world's most densely populated and some of the most remote areas, some of the richest and some of the most marginalised, vulnerable, and economically weak communities. This complexity requires decision-makers and implementing partners to urgently develop and apply more nuanced, country-specific and subnational approaches for a successful green transition that protects people, planet and profits and creates jobs. In short, **we need to create an Asia Pacific Green Development Agenda.**

The urgency for the Asia Pacific Green Development Agenda is further exacerbated by the increasing volatile political environment with key outside partners like the US, the EU and Russia competing for influence and power while wobbling on their own green growth agendas: the US reversed and undermines its interest and ability to lead on climate change, a likely conservative election outcome in Germany in February 2025 potentially undermines the ambitious EU's green transition plans, and a possible re-evaluation of Australia's regional strategy might be due after its election in early 2025. Similarly, frustrations about traditional multilateral organisations mount in the region for their failures to address climate and biodiversity risks.

Already, we are seeing that Asia-Pacific countries are expanding their own and more tailored regional and global ambitions on green growth:

- China has brought its rapid infrastructure development strength via its Belt and Road Initiative (BRI) and accelerated green collaboration through programmes like the BRI International Green Development Coalition.
- India has led the creation of intergovernmental organisations like the International Solar Alliance (120 members) and the Coalition for Disaster Resilient Infrastructure (42 members, including Brazil, the UK and the US).
- India also influenced the Group of 20 (G20) to set up the G20 Working Group on Disaster Risk Reduction during its Presidency in 2023.⁸

- Singapore announced a new green finance and capital markets initiatives to strengthen financial cooperation with China in November 2024.⁹
- The Pacific Islands launched the KIWA initiative in 2020 to help Pacific Island countries adapt to climate change.¹⁰

What are aspects of Asia-Pacific Green Development Agenda and how should Asia-Pacific economies address the opportunities and challenges of the green transition? Can Asian and Pacific economies open a new economic chapter to lead the way in sustainable growth, offering ever more economic and competitive solutions?

The Asia Pacific Green Development Agenda builds on the five major challenges we highlighted in our 2024 Green Transition Opportunity policy brief, where we see various levels of progress, as shown in Table 1.

Table 1: Integrating the 2024 and 2025 Asia Green Transition Policy brief

1	Accelerating the energy transition, including greening the dominant state-owned enterprises	We see that significant progress has again been made with record renewable energy installations in China, India and Vietnam, while several countries saw policies and initiatives for a faster green transition: For example, Queensland, Australia legislated a 30 per cent emission reduction below 2005 levels by 2030, 75 per cent below 2005 levels by 2035 and net zero emissions by 2050. ¹¹ The US-led Just Energy Transition Partnership (JETP) seems to have failed, and the new US administration has frozen funding for JETP. ¹² While at least 12 GW of new coal fired power plants have become operational in the region, led by China and India, China approved 66.7 GW of new coal fired power plants in 2024 (and installed 400 GW of wind and solar since 2023). ¹³ JETPs also failed in Vietnam and are unlikely to pick up further with the change in the US government. ¹⁴ COP29 has derailed Global North contribution to climate investments in developing countries—unclear NCQG does not provide any commitment on public finance from developed countries.
2	Green finance policy and practice	Progress in green finance, as the lubricant for the green transition, has been mixed in the region. Issuance of green bonds has stagnated in the region, yet several countries have strengthened non-financial environmental (and social) disclosure standards. China's new disclosure standards are more ambitious than the US SEC's regarding climate-related emissions, with more standards in the works. More regional disclosure standards mention the International Sustainability Standards Board (ISSB) standards on financial disclosure (IFRS), signalling harmonisation. ¹⁵ Similarly, progress on the new quantified finance goal as a major outcome of COP29 in Baku was seen as a disappointment by most recipient countries in the region. Funding needs of 7.4 trillion USD for climate and 1 trillion USD for biodiversity have been identified. ¹⁶
3	Addressing biodiversity risks and creating USD 4.3 trillion of annual economic value and generate 232 million jobs in the region	Progress in biodiversity protection and unleashing business opportunities through nature-positive business has been mostly negligible. Rather, more nations such as Tuvalu, Cook Islands, Fiji and Tonga are considering deep sea mining with all its negative environmental consequences (and out of lack of alternatives). At the same time, no significant agreements have been reached on biodiversity protection. ¹⁷
4	Climate smart business by improving board governance	The lack of regulatory progress also allows some boards to accelerate the rejigging of their business and risk models to consider a greener business approach. Yet, legal risks for businesses and their leaders continue to increase, and the EU as a major market continues to implement its carbon border adjustment mechanism (CBAM), providing better opportunities for low-carbon businesses and at the same time would not necessarily shift the Global South to low carbon production. ¹⁸ Therefore, the jury is still out on CBAM effectiveness.
5	Just transition considerations addressing issues such as job security and livelihoods	Some progress has been made in the just transition through training programs (including those sponsored by the Australian government in the region, for example, through the Australian Awards program under the Department of Foreign Affairs and Trade (DFAT)). Similarly, with growing energy needs across the region due to electrification and the need to build out energy and related infrastructure, new jobs will be created, possibly offsetting the job losses with governments even trying to ensure close replacement of jobs (e.g., Queensland's major coal port Gladstone sees significant investment in green energy and aims to place itself as a premier hub for green energy technology and exports).

Source: Authors.

For this year's outlook, we identified six major issues that require significant attention to keep building the green transition opportunity:

1. The US environmental and aid policy reversals affecting many Asian and Pacific economies' green transition
2. Critical minerals as an opportunity for growth versus resource nationalism
3. Carbon trading—an economic and financial opportunity
4. Indigenous solutions in climate action
5. Industrial decarbonisation
6. Ensuring water supply

1. US environmental and aid policy reversals

The new US administration has changed its approach to international development, affecting all of Asia Pacific and their green transition ambitions:

- Multilateral engagement has changed through the withdrawal from the Just Energy Transition Partnership (JETP) and the withdrawal from the COP processes to limit climate change.
- Trade relations are changing where the US is further expanding import restrictions (e.g., through tariffs or other regulatory measures) on green technologies like solar panels, batteries and electric vehicles targeting particularly Chinese manufacturers in China and other Asian markets.
- Bilateral policy and financial engagement on climate and other environmental issues has been scaled back or stopped, for example, the immediate halt of all USAID projects, as well as re-evaluation of the US-China climate dialogues as well as other fora affecting Pacific and Asian economies.¹⁹

The US reversal in environmental and aid policy will have multiple direct effects on Asia-Pacific economies:

- Available development financing for green transition is reduced (e.g., JETP, USAID), affecting the deployment of technologies and capacity-building support for decision-makers in policy and regulatory bodies. The US mobilised around USD 5.8 billion in international climate finance in 2022 to have USD 9.5 billion in 2023 (later data are not available).²⁰ This could, for example, affect coal retirement and energy transition efforts in Indonesia and Vietnam as two important JETP participants.
- Employees in factories producing green technologies for export to the US might be negatively affected (e.g., Chinese-invested solar manufacturers in Vietnam or Malaysia had to throttle production due to US sanctions).²¹
- Multilateral and bilateral fora, like the UN negotiations on climate change and biodiversity protection, are losing credibility with the US as the world's second largest emitter, disrespecting and potentially undermining international negotiation results. This includes any negotiations on loss-and-damage funds—particularly important for small island developing states such as Pacific Island countries, the Maldives and other less developed countries disproportionately affected by climate change (such as Bangladesh).

Indirect effects also need to be understood and dealt with, including:

- Reduction of financial flows from private investors and philanthropic organisations with significant exposure to the US who are wary of political risks when engaging in topics related to climate change or environmental protection, affecting both businesses and civil society organisations
- Change of political will in Asia Pacific countries to actively address climate change. In February 2025, the Indonesian government signalled it might withdraw from the Paris climate agreement, arguing that Indonesia should not be held to higher green transition standards than the US.²²
- Regional businesses might reconsider their risk-return profile for green and brown activities and projects and decelerate their green transition ambitions and investments due to unclear policy and trade directions.

While the full effects of the US environmental and development policies are not yet fully understood, decision-makers in Asia-Pacific economies should consider the following recommended actions.

Recommended actions

RECOMMENDATION 1

Stay calm and prepare clear negotiation strategies

Understanding the signals in the noise of US policy change remains crucial, as various changes might be proposed or even announced but only be used as a negotiation strategy rather than being fully implemented. Asia-Pacific decision-makers should have clear negotiation strategies based on basic principles, including a minimum and a maximum desired outcome (e.g., for green trade support, for climate capacity and finance). Decision-makers, whether in business, finance, or policy, should have a clear understanding of their US counterparts' negotiation needs (e.g., US embassy partners will have to implement top-level decisions) and strategies (e.g., potentially very transactional).

RECOMMENDATION 2

Foster Asia-Pacific independence by building alternatives through regional and sub-national initiatives

Asia-Pacific countries and stakeholders should create and strengthen alternative fora to collaborate on environmental-related topics, including regional initiatives (e.g., small island nations banking alliance, ASEAN, Mekong countries) that allow countries to both address localised green transition needs and allow them to be more independent from international partners. To strengthen financial support, partnerships with like-minded and net-donor nations (e.g., EU, China, India, Australia, Singapore) should be strengthened, and subnational partnerships developed (e.g., California).

RECOMMENDATION 3

Create technological alliances for resource and capability sharing

Decision-makers should foster knowledge and technological exchange through new platforms and agreements on intellectual property rights applicable to regional usage to lower costs and accelerate the dissemination of these technologies (e.g., a shorter IP protection time for green technologies available for Asia-based manufacturers). This should also include stronger alliances for technical knowledge sharing, e.g., on green SOE governance, coal retirement or green finance (e.g., with support from OECD, ADB, as well as university partners in Asia-Pacific economies).

RECOMMENDATION 4

Utilise and highlight opportunities

Asia-Pacific is the fastest growing economy in the world, with massive economic and technological opportunities. Over the past years, Asia-Pacific economies have become technological and financial leaders of green transition, having lowered financing and technology costs to the point that the green economy is a business case rather than a pure social responsibility argument. An accelerated green transition opens massive employment and commercial opportunities (as discussed in last year's Griffith Asia Pacific Outlook) due to lower energy, health and environmental costs. Wasting this opportunity will not increase but likely decrease competitiveness and high-quality development desired across the region.

2. Critical minerals opportunities or resource nationalism with coercion

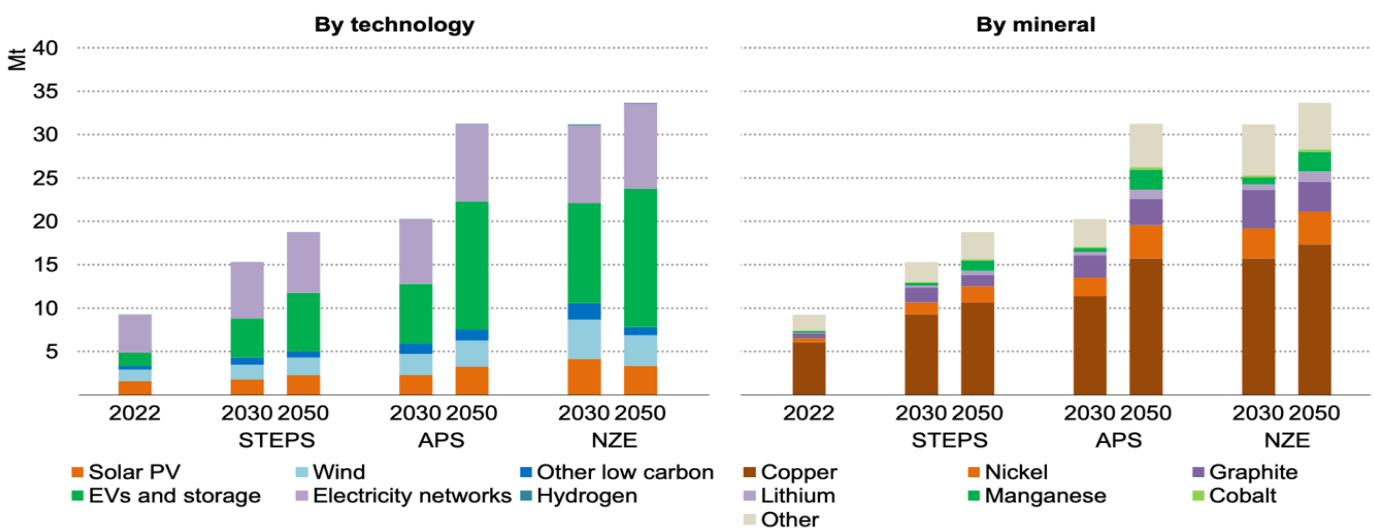
Critical minerals, such as lithium, cobalt and rare earth elements, serve as foundational materials for technologies that enable the shift to a low-carbon, sustainable economy. As these minerals are vital for renewable energy production, energy storage, and electrification, the International Energy Agency has estimated that the transition towards net-zero emissions will triple the demand for critical minerals by 2030, positioning the APAC region as a key player in the global market.²³

Indonesia has become the world's largest producer of nickel, expanding its production from under 800,000 tons in 2020 to 2.03 million tons in 2023, contributing 55 percent of the global output, while Australia possesses the world's second largest reserves of lithium, cobalt, copper, and nickel.²⁴



A part of the nickel industry in Kolaka, South East Sulawesi Province, Indonesia. (Wikimedia Commons)

Figure 1: Critical minerals demand for clean energy



IEA. CC BY 4.0.

Notes: STEPS = Stated Policies Scenarios; APS = Announced Pledges Scenario; NZE = Net Zero Emissions by 2050 Scenario. Includes most of the minerals used in various clean energy technologies, but does not include steel and aluminium.

Source: International Energy Association (IEA), 2023.²⁵

The definition of critical minerals varies across jurisdictions, and governments have been scrambling to understand and strengthen their access to critical minerals supplies. In February 2024, Australia included nickel on its critical minerals list.²⁶ South Korea unveiled its critical minerals strategy in February 2023, followed by India, which launched a similar strategy in July 2023. Meanwhile, Mongolia is working to amend its Minerals Law to introduce, for the first time, a list of "minerals of strategic importance".²⁷ These new government strategies are likely to employ regulatory tools such as subsidy programs, tax incentives, and streamlined permitting processes to accelerate development. They may also restrict foreign investment to safeguard and expand domestic critical minerals production. For countries in the region with high critical mineral needs and limited domestic supply (e.g., Japan and South Korea), multilateral alignments and partnerships with resource-rich nations have been pursued.

Box 1: Mineral Partnership examples in the region

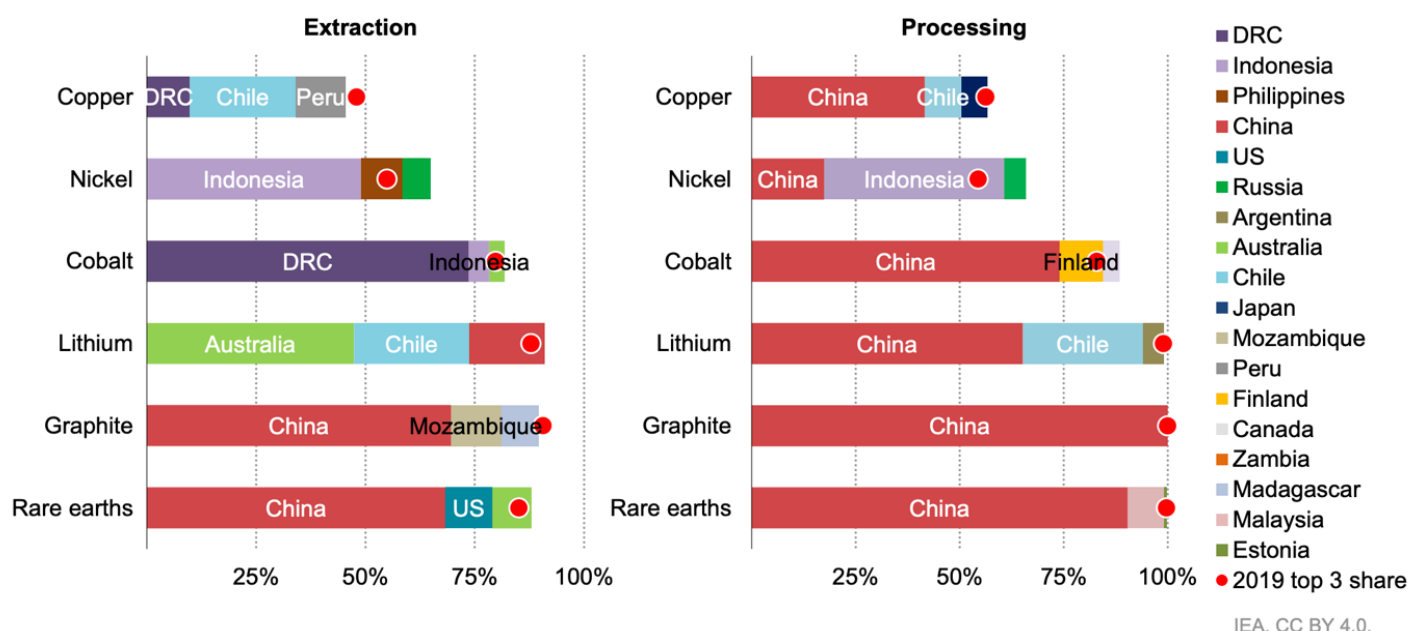
- Japan: Introduced a Critical Minerals Strategy focused on stable supply chains and partnered with Australia to strengthen these networks.²⁸
- Australia: Announced its 2023–2030 Critical Minerals Strategy in June 2023 and signed a memorandum of understanding with Indonesia in November 2023 on battery manufacturing and critical minerals processing [29]. In March 2024, both countries launched the A\$200 million Australia–Indonesia Climate and Infrastructure Partnership (KINETIK) to foster energy and battery technology cooperation.³⁰
- India: Partnered with Australia to develop supply chains for its growing economy and technological advancements.³¹

Yet the narrative surrounding the growth of the critical minerals sector due to the rising demand driven by the global transition towards clean energy is more complex. The development of national policies and intergovernmental alignments has transformed the market for critical minerals into a strategic geo-economic issue with increasing "resource nationalism". In particular, a more aggressive US critical minerals strategy limits imports and secondary imports from foreign entities of concern.³² For example, under the US Inflation Reduction Act (IRA), subsidies will be granted to EVs that contain a certain percentage of critical minerals "extracted or processed in the United States or in a country with which the United States has a free trade agreement." By contrast, EVs that contain battery components manufactured by a foreign entity of concern or with batteries containing any critical minerals extracted, processed or recycled by a foreign entity of concern will not be eligible for subsidies.³³

A key driver of these developments is China's dominant position in the extraction and processing of rare earths and other minerals (see Figure 2), as well as its status as the largest overseas investor in critical minerals in the region:³⁴

- In the first half of 2023, Chinese investment in Indonesia's critical minerals sector had reached USD 3.6 billion—double that of the previous year.³⁵
- China has used its dominance in the sector and has imposed several rounds of targeted export restrictions and licensing requirements in 2023 and 2024 to deter other countries from compliance with US or allied countries' restrictions.³⁶

Figure 2: Share of the top three producing countries in total production for selected resources and minerals, 2022



Notes: DRC = Democratic Republic of the Congo. Graphite extraction is for natural flake graphite. Graphite processing is for spherical graphite for battery grade. Sources: IEA analysis based on S&P Global, USGS (2023), Mineral Commodity Summaries and Wood Mackenzie.

For US-aligned Asia Pacific countries (e.g., Australia, Japan, South Korea and to a lesser extent, India),³⁷ the consequence is more intense scrutinising or even undoing of existing Chinese direct investment on national security grounds³⁸. Asian nations, such as the Philippines (with large nickel reserves) and possibly Indonesia, might need to reduce reliance on China and prioritise reshoring and friendshoring with investment from “aligned partners” in downstream production and manufacturing.³⁹ Whether this will be possible is the question. All of these countries—including Australia—rely on foreign investment and trade in the mining sector—particularly with China. For example, Australia exports much of the minerals to China and other countries for value-added processing due to limited domestic processing capacity.⁴⁰ Similarly, other regional players that restrict the export of unprocessed minerals (such as Indonesia and Malaysia) depend on Chinese investors and partners to meet that requirement. It remains to be seen whether Asian countries will move in a similar direction as Mexico⁴¹ and Chile,⁴² which have sought to nationalise their lithium industries (which, in turn, has led the current Chinese owners to seek a solution ahead of the ICSID).⁴³

Apart from political risks, Asian mining partners have to deal with significant environmental impacts: some estimates suggest that mining one ton of rare earths can result in 2,000 metric tons of waste material. Local communities and environmental groups have already opposed new investments, particularly in areas with continuing land disputes and high environmental integrity. Environmental concerns are particularly salient in deep sea mining with a focus on Pacific economies. The discovery of polymetallic nodules, particularly in the Clarion-Clipperton Zone located in the Pacific Ocean, containing cobalt, nickel, and manganese, has initiated significant interest from Pacific economies and investors alike (e.g., Nauru, Cook Islands, Tonga). Already now, of the 31 contracts in the data portal of the International Seabed Authority (ISA) under the UN, 17 are in the Clarion-Clipperton Zone (and 5 in the Western Pacific Ocean).⁴⁴ However, as “the harms of deep-sea mining on migratory fish patterns, marine biodiversity, and long-term ecosystem health are unknown and may be immediate and irreversible”⁴⁵ affecting fisheries and tourism on which many Pacific islands depend “the rush to mine this pristine and unexplored environment risks creating terrible impacts that cannot be reversed”.⁴⁶ To counter these effects, more efforts have been made in 2024 to improve the trading of “clean” minerals in contrast to “dirty” minerals led by Australia’s mining company Fortescue.⁴⁷

Price volatility is another risk in mineral investment. The sharp drop in lithium and nickel prices from their late 2022 peak has created uncertainties for investors and mining companies. Australian mining giant BHP closed its nickel business and wrote down AUD 5.4 billion in 2024 due to the increased supply of nickel from Indonesia and the resulting price volatility.⁴⁸ Additionally, developing technological expertise and infrastructure for downstream production remains a slow, high-risk process.

Nonetheless, the Asia Pacific region’s pivotal role in the critical minerals market ensures it will remain a focal point in the global clean energy transition. Countries such as Indonesia, Malaysia and Mongolia—with strong ties to both China and the QUAD countries—will face particularly tough decisions if trade disputes intensify further and protectionist regulation (formal and informal) restrictions expand. Resource-rich and resource-seeking countries in Asia and the Pacific need to improve collaboration in building resilient and responsible supply chains for critical minerals and clean energy technologies and overcome resource nationalism for joint benefits. Developing exploration, mining, and processing capacities is essential for integrating mineral-rich Asian economies into global clean energy supply chains. National green clusters, net-zero industrial parks, and economic corridor initiatives can play a pivotal role in linking mineral supply chains to regional value chains, facilitating the clean energy transition.

Recommended actions

RECOMMENDATION 1

Reduce political and resource nationalism risks

- Evaluate the risks of expropriation or forced divestment, particularly in regions with strong resource nationalism.
- Structure investments to leverage existing treaties and agreements and consider partnerships with local entities or state-owned enterprises.
- Ensure comprehensive risk insurance to mitigate potential losses.

RECOMMENDATION 2

Understand geopolitical value and supply chain risks and develop contingency plans

- Assess risks linked to trade tensions, especially those that intensified during the Trump presidency.
- Establish contingency plans to address potential disruptions in material sourcing or offloading.
- Develop contingency plans to ensure uninterrupted operations and secure financial and technical collaborations.

RECOMMENDATION 3

Mitigate economic risks

- Account for price volatility, which can complicate financing and investment decisions.
- Include contractual clauses for exit or mothballing strategies in cases of material adverse changes or liability limitations.

RECOMMENDATION 4

Manage human rights and environmental safeguards

- Prioritise human rights and environmental safeguards throughout the mining value chain.
- Implement continuous risk evaluation and management processes from project initiation to closure, as well as for existing projects.
- Align with evolving global standards, including the UN Secretary-General's 2024 Panel on Critical Energy Transition Minerals, which emphasises safeguarding environmental and social standards across the entire value chain.

RECOMMENDATION 5

Build regional frameworks and capacity-building

- Explore opportunities for establishing regional cooperation frameworks to promote resource-sharing and capacity-building, especially in less developed countries.
- Strengthen governance and management of environmental and social risks.

RECOMMENDATION 6

Strengthen research and investment in Central Asia

- Investigate Central Asia's untapped potential in critical minerals, focusing on countries like Kazakhstan and Uzbekistan, which are already leading producers.⁴⁹
- Support exploration in underdeveloped areas to unlock further opportunities in the region.

RECOMMENDATION 7

Carefully manage deep-sea mining

- Advocate for stringent environmental and social protections to ensure deep-sea mining benefits humankind.
- Support international oversight by organisations like the International Seabed Authority (ISA) with input from local communities and the Pacific Islands Forum.
- Promote a moratorium on deep-sea mining (e.g., until 2030) unless strong safeguards and equitable revenue-sharing models are in place, as advocated by nations like Fiji, Papua New Guinea, and Vanuatu.⁵⁰

3. Opportunities in carbon trading

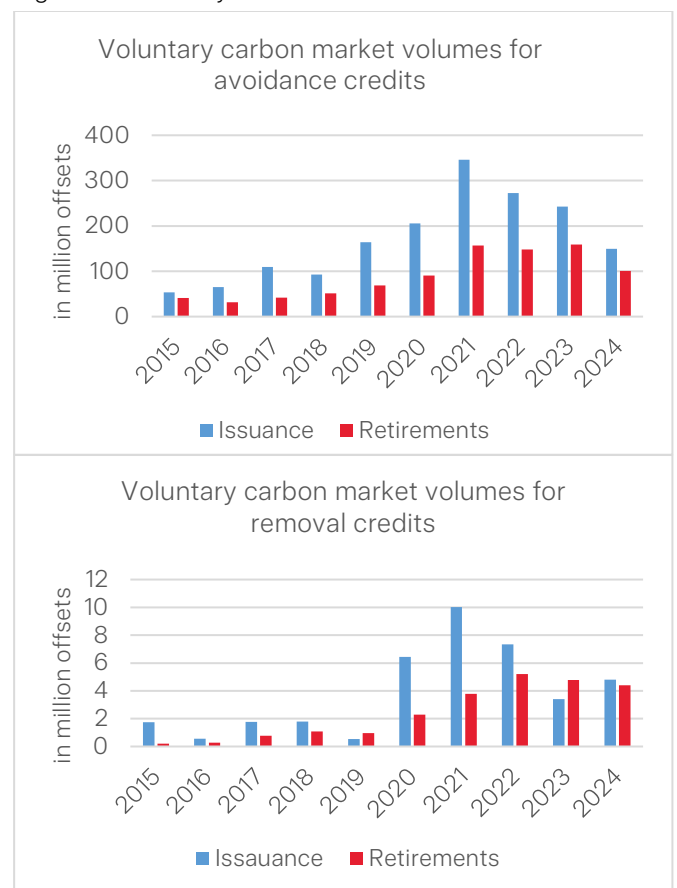
Carbon trading has expanded across Asia and the Pacific. Countries including Thailand (since 2014), China (since 2021), Japan (since 2013), Australia (since 2012, with updates in 2023), and Indonesia (since 2023), have implemented some form of carbon pricing through markets or taxes. India is expected to launch a voluntary market in 2025. This has two key effects.

First, according to the IMF, a moderate carbon price of USD 25 per ton (compared to over USD 120 in the European carbon market) could reduce emissions in the region by 21 percent by 2030.⁵¹ Second, governments have generated significant revenues—USD 4.35 billion was collected through compliance markets in the Asia-Pacific in 2023—which can be reinvested in a green and just transition.⁵²

Importantly, after the approval of Article 6 methodological guidelines during COP29 in Baku, cross-border carbon markets can provide extra incentives for Asian emitters and governments to accelerate decarbonisation.⁵³ In addition, voluntary carbon green markets are playing an important role in Asia. VCMs are market-based platforms where companies, organisations, and individuals (as compared to nations under Article 6) buy carbon credits voluntarily to offset their greenhouse gas emissions. In Malaysia, the national stock exchange BCX conducted its inaugural auction of a Malaysian nature-based carbon credit in July 2024, featuring credits from the Kuamut Rainforest Conservation project.⁵⁴ In Indonesia, the national trading platform for domestic allowance IDXCarbon traded 114,486 certificates from two energy projects.

Yet, judging by the money flows, significant upside potentials still have to materialise: 2024 has seen the lowest activity of credit issuances for carbon avoidance since 2019, with 149.7 million offsets, compared to 346 million offsets in 2021 for example. Similarly, removal credits saw relatively low activity.

Figure 3: Voluntary carbon market volumes



Source: Bloomberg

Part of the reason are challenges of supply, demand, and market integrity undermining trust and confidence in carbon credit markets.⁵⁵ On the supply side, the Integrity Council for the Voluntary Carbon Market has established a benchmark for credit quality, particularly against the backdrop of concerns about voluntary carbon market credibility and questions regarding the role of the credits to support corporate action have dampened momentum.

In Asia, particularly among ASEAN member states, as well as India and Japan, significant efforts are underway to establish domestic carbon pricing frameworks. These initiatives are expected to accelerate in the coming years as countries prepare to address the impacts of the EU Carbon Border Adjustment Mechanism (CBAM) by 2026⁵⁶.

Despite the evolution of Asia Pacific carbon markets, they remain fragmented due to varying regulatory environments and diverse trading platforms. Emerging APAC economies, such as Indonesia, Malaysia, and Thailand, host multiple carbon exchanges—including IDX Carbon, BCX, and FTIX. The proliferation of these exchanges has also resulted in low market liquidity and limited price discovery, hindering their ability to drive investment and inform operational decisions.

Recommended actions

RECOMMENDATION 1

Evaluate establishment of harmonised carbon markets with cross-border trading opportunities

- A larger market would increase liquidity for investors and issuers. While some major carbon markets seem to be designed specifically for local needs (e.g., China), others are more based on international norms.

RECOMMENDATION 2

Improve capacity to utilise global carbon trading opportunities under Article 6 of the Paris Agreement

- Local partners (e.g., in agriculture, industry) can financially benefit from global carbon trading if the right knowledge, technical capacity and decarbonisation strategies are implemented.

RECOMMENDATION 3

Create credible governance and framework for ensuring validity and quality of carbon credits based on international best practices

- Utilise new technologies for verification of carbon credits rather than cumbersome administrative and bureaucratic processes.

RECOMMENDATION 4

Utilise the EU CBAM as an opportunity to create champions for export

- These can serve as role models for decarbonisation for other regional players and even SMEs.

RECOMMENDATION 5

Negotiate EU funding for decarbonisation

- Negotiate with EU to fund local decarbonisation projects through part of the proceeds from CBAM under the assumption that CBAM aims to support global decarbonisation rather than function as a trade barrier.

4. Indigenous inclusion in climate action: Asia-Pacific perspective

The Asia-Pacific region is home to numerous Indigenous communities that have dealt with extreme weather events specific to their region for millennia. The knowledge of Indigenous communities has been identified as a valuable source for building climate resilience through mitigation and adaptation strategies. For example, Indigenous rotational farming systems minimise land degradation and maintain ecosystem balance, reducing vulnerability to climate shifts. Indigenous communities cover more than one-fifth (21 per cent) of the world's land (approximately the size of Africa), containing carbon stored in soil and biomass.⁵⁷ Their deep understanding and respect for ecological systems emphasise the critical balance needed between humans and environmental preservation, fostering healthy and resilient ecosystems.

Traditional knowledge systems in climate adaptation

Indigenous communities across Southeast Asia demonstrate effective environmental management through various traditional practices. In Indonesia and the Philippines, agroforestry systems enhance biodiversity; and communities in Thailand and Vietnam employ farming techniques that emphasise water conservation. Indigenous communities in Malaysia maintain ecosystem balance through traditional forest management practices, and river communities have developed effective traditional flood management systems. Pacific Islands' communities' traditional navigation techniques skilfully interpret ocean currents and weather patterns, and their coastal management practices offer innovative solutions in responding to emerging challenges, such as the impacts of the Blue Economy, deep-sea mining, marine pollution, and the establishment of marine protected areas. Indigenous communities have also mastered agricultural methods adapted to salt-water intrusion and developed traditional building techniques specifically designed to withstand tropical cyclones. Communities in South Asia have cultivated resilient practices like in Rajasthan, India, traditional water harvesting systems like 'johads' help manage scarce water resources. Nepal's mountain communities have developed farming techniques that prevent soil erosion on steep terrain. In Bangladesh, coastal communities have adapted to environmental challenges through elevated housing designs. In Sri Lanka, communities rely on traditional weather prediction systems that have been refined over generations.

Traditional weather forecasting

In India, traditional knowledge provides weather prediction methods. The tree Amaltas (*Cassia fistula*) is a unique indicator of rain. It bears bunches of golden yellow flowers in abundance about forty-five days before the onset of the monsoon. This observation is documented in the ancient Sanskrit text "Brahad Samhita", written by Varahmihara, an Indian astronomer in 800 AD. Cloud movement patterns during specific seasons help predict river water levels. Other traditional indicators include animal behaviour patterns: When 'sparrow bathe in dust' or 'many bees enter the hive and none leave', one could expect rain in a couple of days. Similarly, 'crow crying during night and owl crying during the daytime', one can forecast drought. Mangrove reforestation—a practice deeply rooted in coastal Indigenous communities—not only protects against storm surges but also enhances biodiversity and carbon sequestration.



Cassia fistula - Amaltas, Indian Laburnum, Golden Shower Tree or Golden Shower Cassia in Sanjeevaiah Park, Hyderabad, India. (Wikimedia Commons)

Improving inclusion of Indigenous community-based practices

Indigenous people's contributions are often overlooked and discounted due to historical marginalisation, and political and economic power imbalances. They are excluded from decision-making and their rights to land and resources are restricted. Rapid urbanisation, and displacement due to development projects and deforestation are leading to losses of traditional knowledge in the younger generations of the Indigenous communities. To achieve Paris Agreement goals, we need representation and effective participation of these communities in a country's national action plan on climate change. It is essential that we accelerate our efforts to support Indigenous peoples' ability to adapt to climate change and reduce their vulnerabilities. This is not just about climate action – it's about social equity and justice. Any meaningful climate policy must recognise and protect Indigenous peoples' fundamental rights: their connection to ancestral lands, their authority over their territories and resources, their traditional ways of living, and their right to make decisions about their own futures. These rights should

not be treated as optional add-ons to climate policies – they need to be woven into the very fabric of how we approach climate action. There is a need to shift from doing no harm to Indigenous communities to actively working towards inclusion of Indigenous people and mainstreaming their environment related practices.

The way forward

The Asia-Pacific region's climate resilience significantly depends on effectively incorporating Indigenous knowledge and practices into adaptation strategies. Mainstreaming Indigenous and Traditional knowledge and practices into adaptation planning at all governance levels can help improve community resilience to climate change. Integrating them into development policies ensures implementation of participatory, cost-effective and sustainable climate adaptation measures. There is a need to move beyond token inclusion to genuine partnership, ensuring Indigenous communities are central to planning and implementing climate solutions.

Recommended actions

RECOMMENDATION 1

Establish mechanism and platform for indigenous representation

- Establish formal mechanisms for ensuring representation of Indigenous communities in climate policy development and institutional processes.
- Establish platforms, legislation and protocols to facilitate conflict resolution, protect property rights of Indigenous communities.

RECOMMENDATION 2

Create legal framework to protect traditional knowledge

- Create legal frameworks to protect traditional knowledge including intellectual property rights.
- Develop programs to document, preserve and use traditional knowledge in day to day lives.

RECOMMENDATION 3

Mainstream local knowledge into national adaptation plans and society

- Mainstream local, Indigenous, and traditional knowledge and practices into national adaptation plans
- Engage local and community organisations in planning for adaptation measures
- Integrate local, Indigenous, and traditional knowledge and practices into school and college curriculum

RECOMMENDATION 4

Improve finance for implementation indigenous adaptation solutions

- Improve access to institutional finance for Indigenous communities.
- Facilitate investments in eco-tourism projects to create local jobs.

5. Industrial decarbonisation: Policy developments in Asia

Industrial decarbonisation refers to the process of reducing carbon dioxide emissions from the industrial sector and is crucial for Asia to reduce the region's emissions footprint and achieving net zero targets. Asia's transformation into a global manufacturing hub has driven economic growth but also significantly increased emissions. The industrial sector is a major contributor to GHG emissions and many industrial sectors are considered 'hard to abate' because emissions arise from the process of manufacturing and not from energy consumed. With projected industry-led economic growth in Asia, GHG emissions are expected to rise without aggressive abatement policies.

In recent years, India, China, and Japan have emerged as key players in driving industrial decarbonisation through comprehensive policy frameworks and initiatives. These Asian economic powerhouses have implemented ambitious strategies targeting green hydrogen production, carbon markets, steel sector transformation, and renewable energy manufacturing.

India's National Green Hydrogen Mission (2023) aims to produce 5–10 million tonnes of green hydrogen annually by 2030, while establishing the world's first green steel taxonomy with a three-tier rating system. China's 14th Five Year Plan and 2024 Action Plan for Energy Saving set aggressive targets for reducing energy consumption and CO₂ emissions across steel, cement, petrochemical, and non-ferrous metal sectors, alongside expanding its emissions trading scheme to cover 60 per cent of national emissions. Japan's Green Transformation (GX) League represents a collaborative approach between industry, government, and academia, introducing initiatives like the GX-ETS carbon market and climate bonds worth USD 120 billion. The country has also outlined ambitious plans for hydrogen, ammonia, and CCS deployment, targeting 3 million tonnes of clean hydrogen and ammonia production by 2030. These policy frameworks demonstrate a coordinated approach to industrial decarbonisation, combining regulatory measures, market mechanisms, and technological innovation to achieve substantial emissions reductions while maintaining economic competitiveness.

Appendix 1 describes the various policy and institutional interventions being taken in three large Asian countries (India, China, Japan), it is important that most industrialising Asian countries embark on formulating and implementing green industrial policies. Lessons learnt that can be applied throughout Asia and the Pacific is to adapt policy instruments to incentivise early adopters of low-carbon solutions, reduce investment risks (reducing cost of capital) unique to these solutions, penalise carbon-intensive activities, and create markets for green products. Asian governments need to play a more active role in guiding industrial markets by introducing new policy instruments to hasten industrial development led economic growth towards green growth by creating policy rents in green sectors and withdrawing policy rents from carbon intensive sectors.

Recommended actions

RECOMMENDATION 1

Accelerate the scale and urgency of low carbon transition and green growth

- Provide subsidy/incentives for accelerating development of green technologies—alternative materials, fuel switch and energy efficiency—accelerate deployment of clean technologies.

RECOMMENDATION 2

Implement explicit internalisation of environmental costs

- Cap and Trade in carbon markets to green credit lines with subvention and risk sharing financial instruments and providing risk subsidy to financial sector for lending to greening industries. Also consider taxes on "polluter pays" principle.

RECOMMENDATION 3

Address information, coordination, credit market failures

- Increase market transparency, mandate disclosure of emissions (scope 1/2/3), reduce uncertainty through off take guarantees or take or pay contracts such as Green Steel and GH2. Public investments in RE, Storage and Smart Grids etc. Use public credit guarantees.

RECOMMENDATION 4

Increase social awareness and develop a new social contract

- Build social consensus on national Green transformation and responsible consumption, e.g. LIFE program in India. Change unsustainable consumption such as ban on single use plastics and rethink economic growth with sustainability safeguards.

6. Ensuring sufficient and quality water supply in the Asia-Pacific

Water is a fundamental resource for economic development, environmental sustainability, and human well-being. Ensuring sufficient and high-quality water supply is crucial for agriculture, industry, and domestic use, as well as for the transition toward renewable energy. As the Asia-Pacific region faces increasing water scarcity and declining water quality due to climate change, industrial pollution, and inefficient water management, it is essential to adopt both regional and localised strategies that promote sustainable water use across all sectors.

Water scarcity

Water scarcity poses a significant challenge to agriculture, industry, and green energy expansion. In 2022, nearly half of the global population experienced severe water scarcity for at least part of the year, with one-quarter facing extremely high water stress.⁵⁸ The Asia-Pacific region, home to over half the world's population, is particularly vulnerable due to rapid urbanisation, agricultural intensification, and climate variability. The demand for water-intensive renewable energy technologies, such as

hydropower and green hydrogen production, exacerbates stress on already overdrawn water basins.⁵⁹ In India, for example, water consumption for energy production is expected to rise from 15 billion cubic meters (bcm) in 2025 to 130 bcm by 2050, making up about 9 per cent of total water demand.⁶⁰

In agriculture, unsustainable groundwater extraction has led to aquifer depletion, particularly in water-stressed regions. Solar-powered irrigation pumps, while reducing reliance on fossil fuels, enable continuous groundwater extraction, potentially worsening water depletion. Without regulatory oversight, widespread adoption of these pumps could lead to unsustainable water use, undermining long-term water security.⁶¹

Water quality degradation

Beyond scarcity, water quality degradation threatens agriculture, industry, and renewable energy projects. Contaminants such as heavy metals, industrial effluents, and agricultural runoff can render water unusable for irrigation, drinking, and hydropower operations. Hydropower reservoirs, for example, suffer from sedimentation and nutrient accumulation, reducing efficiency and increasing maintenance costs.

Furthermore, the increasing reuse of treated wastewater for industrial and energy purposes must be carefully managed to avoid emerging contaminants, including pharmaceuticals and microplastics. If unchecked, these pollutants could disrupt aquatic ecosystems and affect the reliability of water supplies needed for various sectors.

Water is a linchpin in the Asia-Pacific's sustainable development, essential for agriculture, industry, and renewable energy. Yet, its scarcity and declining quality pose significant risks. Addressing these challenges requires both a regional and localised approach, including technological improvements in water-efficient energy production, sector-wide water conservation, and economic incentives through pricing and markets. By integrating these solutions, Asia-Pacific countries can ensure a resilient and sustainable water supply, supporting both the green transition and broader environmental stability.⁶²

Recommended actions

RECOMMENDATION 1

Enhance water efficiency across sectors

To address water scarcity, water-efficient technologies and management strategies must be integrated across agriculture, industry, and energy production:

- Agriculture: Promoting water-saving techniques such as drip irrigation, mulching, and cultivation of drought-resistant crops can reduce agricultural water demand.
- Industry: Circular water use in manufacturing, including wastewater recycling and industrial symbiosis, can cut down freshwater withdrawals.
- Urban Water Systems: Reducing conveyance losses, implementing smart water metering, and promoting treated wastewater reuse for non-potable applications (e.g., irrigation, construction) can optimise urban water use.

- Renewable Energy: Improving thermal power cooling, adopting dry and hybrid systems, robotic solar cleaning, and prioritising water recycling in green hydrogen production reduce water use. Similarly, green hydrogen production should prioritise water recycling and desalination in regions experiencing high water stress.⁶³

RECOMMENDATION 2

Integrate sustainable water management practices

Integrated water resource management is essential to balance competing demands across different sectors.⁶⁴ Key strategies include:

- Implementing watershed restoration projects to maintain water quality and regulate flow.
- Strengthening regulations to prevent industrial and agricultural water pollution.
- Expanding nature-based solutions such as wetland restoration and reforestation to enhance water filtration and storage.

RECOMMENDATION 3

Implement water pricing and market-based approaches

Governments should implement pricing mechanisms and tradable water rights to drive efficiency and ensure availability across sectors like agriculture and energy.⁶⁵ Formal water markets, supported by robust data governance, can enhance fair allocation and sustainable withdrawal limits. Digital tracking systems should be established to monitor groundwater use, while citizen science initiatives, as demonstrated in Lebanon and India, can complement government efforts by improving local data collection and supporting informed water management decisions.

Conclusion

The Asia-Pacific region faces critical environmental challenges, including climate change, biodiversity loss, and resource depletion, while driving global economic growth. To address these issues, a comprehensive Asia-Pacific Green Development Agenda is needed. This agenda should harness the region's strengths, such as biodiversity, technological innovation, and renewable energy, while tackling poverty, inequality, and unsustainable resource use. A strong regional voice is needed to navigate shifting global dynamics, balancing mineral production with environmental concerns. Key actions include integrating carbon pricing mechanisms, incorporating traditional ecological knowledge, and accelerating decarbonisation in hard-to-abate sectors like steel and cement. Through these efforts, the Asia-Pacific region can drive sustainable growth, fostering both environmental resilience and economic inclusivity.

Appendix 1

India 	China 	Japan 
<ul style="list-style-type: none"> • National Green Hydrogen Mission (2023) [66]: The Government of India announced the NGHM in 2023 to incentivise green hydrogen production and exports. The mission targets the production and supply of 5 million tonnes per annum (Mtpa) of green hydrogen to fulfil domestic demand by 2030, potentially reaching 10 Mtpa to also fulfil export demand. The mission foresees the investment of over USD 90 billion, 67 creation over 6 lakh jobs, and abatement of 50 Mtpa of CO₂ emissions. The mission will be implemented in two phases. Phase I (2022–23 to 2025–26) focuses on creating demand and increasing domestic electrolyser manufacturing capacity. Phase II (2026–27 to 2029–30) aims to make green hydrogen cost-competitive and expand its use in various sectors. The bulk of the total financial outlay of USD 2.3 billion will be for the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme (USD 2 billion) which will support indigenous electrolyser manufacturing and incentivise green hydrogen production. The mission also provides USD 170 million for pilot projects, USD 46 million for R&D, and USD 45 million towards other mission components. • Indian carbon market (2022, 2024): The government passed the <i>Energy Conservation (Amendment) Act, 2022</i>⁶⁸ into legislation, under the Ministry of Power, allowing it to develop a domestic carbon credits trading scheme (CCTS) and to authorise the issuance of carbon credit certificates. In 2024, the Bureau of Energy Efficiency adopted the <i>Detailed Procedure for Compliance Mechanism under CCTS</i>.⁶⁹ These regulations provide a framework for the CCTS that includes a compliance mechanism for energy-intensive industries and an offset mechanism to incentivise voluntary actions for greenhouse gas reduction. • Steel decarbonisation roadmap (2024) and green steel taxonomy (2024): The Ministry of Steel released a comprehensive report <i>Greening the Steel Sector in India: Roadmap and Action Plan</i>.⁷⁰ The report supports the decarbonisation of the Indian steel industry through energy efficiency, renewable energy, process transition, steel recycling, green hydrogen, biochar and CCUS. This includes increasing energy efficiency technologies, renewable energy, and steel recycling in the short term. In the medium term, the strategy envisions increased hydrogen and carbon capture technologies. The plan also addresses financing mechanisms for decarbonisation, skilled workforce development and governance mechanisms. 	<ul style="list-style-type: none"> • 14th Five Year Plan (2021) and Action Plan for Energy Saving and Carbon Reduction (2024): The 14th FYP (2021 to 2025) set targets for reducing the energy consumption per unit of GDP by 13.5 per cent by 2025 compared to 2020 levels. The State Council of China later released an action plan for energy efficiency improvements and CO₂ emissions reduction to accelerate the country's decarbonisation efforts and meet the targets set by the 14th FYP.⁷⁵ The plan targeted the reduction of energy consumption and CO₂ emissions per unit of GDP by 2.5 and 3.9 per cent respectively in 2024 alone. The plan targets increasing the share of non-fossil fuel consumption to 18.9 per cent in 2024 and 20 per cent in 2025, thereby abating 130 MtCO₂ annually in 2024 and 2025. The action plan includes strict controls on coal consumption, optimization of oil and gas use, increased non-fossil energy consumption, and energy savings and carbon emission reductions in industries such as steel, petrochemicals, non-ferrous metals, etc. • Steel sector plans: The plan targets increasing electric arc furnace steel output to 15 per cent of the total crude steel output by 2025 (currently <10 per cent), increase scrap utilisation and curb the expansion of BF-BOF capacity to maintain profitability.⁷⁶ • Cement sector plans: China seeks to control the clinker production capacity at 1.8 billion tonnes per annum by 2025 and increase gypsum waste recycling. The country is mandating 30 per cent of cement-making capacity to meet pre-set energy efficiency benchmark targets by 2025.⁷⁷ • Petrochemical sector plans: China is implementing strict new policies focusing on controlling production capacity, improving energy efficiency, and reducing carbon emissions in key sectors like oil refining, ethylene, and synthetic ammonia. By 2025, the country aims to control crude oil processing capacity at 1 billion tonnes per annum. From 2024 to 2025, the industry will abate 110 MtCO₂ by energy conservation, technology overhaul and reducing coal consumption by 40 Mtpa. Plants that do not meet the energy efficiency benchmark targets by 2025 will be shut down.⁷⁸ • Non-ferrous metals sector plans: By 2025, the country aims to increase recycled metal supply to over 24 per cent, boost direct aluminium alloying to over 90 per cent, and implement strict energy efficiency and environmental standards for new projects in electrolytic aluminium, alumina, polysilicon, and lithium battery sectors. The policy targets savings of approximately 5 Mtpa of coal and a reduction of around 13 MtCO₂ 	<ul style="list-style-type: none"> • Green Transformation (GX) League (2022): The Japanese government, through the Ministry of Economy, Trade and Industry (METI), formed the Green Transformation (GX) league, which is a forum for major companies, government agencies and academic institutions to work towards Japan's 2050 net-zero emissions target. The forum is meant to leverage economic and developmental opportunities of the Japanese economy's energy transition.⁸³ The GX strategy of the government has specific sectoral targets and plans for hydrogen and ammonia, iron and steel, chemicals, cement, pulp and paper, etc.⁸⁴ • Some recent policy developments resulting from the GX League working group deliberations are given below. • GX Acceleration Declaration Framework (2024): Launched in December 2024, this framework encourages companies to proactively engage in creating a market for green transformation (GX). As per the framework, the nearly 700 companies that are part of the league will support several Japanese industries to produce low-carbon products through investments and technological support. The Japanese government will work towards demand creation for these low-carbon goods by providing short- to medium-term support for the consumption of these higher-priced goods. In the early phases, the framework will target products and services currently supported by the government, such as green steel, green chemicals, hydrogen and SAF. The scope of support will be subsequently expanded as required to cover a wider range of products.⁸⁵ • GX-ETS (2023) and ETS-linked climate bonds (2024): The GX League emission trading system (GX-ETS) is Japan's domestic carbon market that launched in 2023. Companies in the GX League voluntarily participate in this ETS till 2026, with a 46 per cent GHG reduction target versus 2013 emission levels of each firm (based on Japan's NDC). Beyond 2026, the system will gradually transition to become mandatory.⁸⁶ Post 2028, the government will also introduce a carbon surcharge system targeting fossil fuel importers.⁸⁷ • The Japanese government began issuing climate bonds from February 2024, aiming to issue bonds worth USD 120 billion by 2024 to raise public and private investments supporting the energy transition. From 2033, emission allowances will be auctioned to the power sector to repay these bonds, thus being the world's first ETS-linked climate bonds.⁸⁸

<ul style="list-style-type: none"> • The government also announced the definition of green steel to adopted in India (i.e., the green steel taxonomy) in 2024,⁷¹ becoming the first country in the world to do so.⁷² As per the adopted taxonomy, any steel producer whose emission intensity is lower than the fixed threshold value of 2.2 tCO₂/tonne of finished steel (tfs) will be eligible for a green rating. The threshold value will be reviewed once every three years. The taxonomy defines a three-tier rating system for steel: • Five-star, green-rated steel: emission intensity <1.6 tCO₂/tfs • Four-star, green-rated steel: emission intensity of 1.6–2.0 tCO₂/tfs • Three-star, green-rated steel: emission intensity of 2.0–2.2 tCO₂/tfs • Production-linked incentive schemes: Two major production-linked incentive (PLI) schemes were rolled out by the government. • The Ministry of New and Renewable Energy is implementing a PLI scheme for domestic manufacturing of high-efficiency solar PV modules with an outlay of USD 2.8 billion.⁷³ Under tranche I of this scheme (2021), the Indian Renewable Energy Development Agency (IREDA) awarded bids to three manufacturers for setting up 8.7 GW of high-efficiency PV manufacturing capacity with a PLI of USD 522 million. Under tranche II (2022), the Solar Energy Corporation of India (SECI) issued letters of award to 11 bidders for setting up 39.6 GW of manufacturing capacity with a PLI outlay of USD 2.3 billion. • The Ministry of Heavy Industries has a PLI scheme⁷⁴ under the National Programme on Advanced Cell Chemistry (ACC) Battery Storage. The scheme, worth USD 2.1 billion, will support both domestic and foreign companies in setting up 50 GWh of new-generation (+5 GWh of niche technology) ACC battery manufacturing facilities over period of five years. The scheme emphasises domestic value addition (DVA), requiring the beneficiaries to have an initial DVA of 25 per cent and increase it to 60 per cent by the fifth year while also making the mandatory investment of USD 26 million/GWh for the committed capacity within 2 years. The scheme is supporting 3 beneficiary firms that are setting up a total capacity of 30 GWh. 	<p>between 2024 and 2025 and promotes advanced technologies and increased renewable energy use in the non-ferrous metal industry.⁷⁹</p> <ul style="list-style-type: none"> • Carbon market expansion (2024): The Ministry of Ecology and Environment of the Government of China announced in 2024 that the country's emissions trading scheme (ETS) will be expanded from covering only the power sector to cover steel, aluminium, and cement by the end of 2024. This expansion raised the share of total national CO₂ emissions covered by the market from 40 per cent to 60 per cent. Companies from these sectors will receive free allowances for their CO₂ emissions between 2024 and 2026, with no cap on total allowances, to enable them to familiarise with the system and generate data. From 2027 onwards, these allowances will be tightened⁸⁰ China's ETS is based on emissions per unit of output; if total output continues to increase, the effect of the ETS may be limited.⁸¹ • Standardised and mandatory ESG disclosures (2024): The Ministry of Finance notified the <i>Basic Standards for Corporate Sustainability Disclosure</i> as part of China's larger efforts to mandate ESG disclosures from its companies. China's major stock exchanges mandated ESG disclosures by major companies by 2026⁸² Full implementation of the disclosure standards is expected by 2030. 	<ul style="list-style-type: none"> • Long-term CCS roadmap (2023): In 2023, METI announced Japan's long-term carbon capture and storage (CCS) roadmap. The roadmap aims for commercial CCS activities starting 2030, creating 120–140 MtCO₂ of annual storage by 2050 onshore, near-shore and offshore. The CCS <i>Business Act</i> passed by the Japanese Parliament provide a legal framework for CCS businesses. • Hydrogen and ammonia strategy (2023): Under the GX, Japan is developing technologies for clean hydrogen and ammonia production and supply chains. According to the GX strategy, the country is targeting 3 Mtpa of hydrogen and ammonia production by 2030, and 20 million tonnes of hydrogen and 30 million tonnes of ammonia by 2050. The plan also foresees the creation of large, resilient supply chain within and outside Japan to enable the transition.⁸⁹ • Green steel strategy (2023): The GX strategy aims to reduce CO₂ emissions from steelmaking by 30 per cent compared to 2013 levels by 2030. The country also aims to produce and supply over 10 million tonnes of green steel by 2030. The strategy aims to invest in developing and commercialise large electric arc furnaces to transition from coal-based blast furnaces by 2030. The industry will also expand the use of hydrogen in steel production, including blending hydrogen in blast furnaces and developing direct-reduction technologies using hydrogen.⁹⁰
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ABOUT THE AUTHORS



Christoph Nedopil

Christoph Nedopil is the Director of the Griffith Asia Institute and a Professor of Economics. He is also a Visiting Faculty member at Singapore Management University (SMU) and Fathia International School of Finance (FISF), Fudan University. Christoph

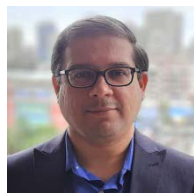
engages in research related to green and sustainable finance as well as development economics.



Dhruva Purkayastha

Dhruva Purkayastha is the Director for Growth and Institutional Advancement with Council on Energy, Environment and Water (CEEW), a leading public policy think tank, research and analysis non-profit institution in India. Dhruva is also a visiting faculty member at IIM

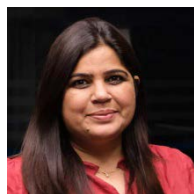
Calcutta for Climate Economics and Finance.



Hemant Mallya

Hemant Mallya leads the Industrial Sustainability at CEEW. Hemant's 20+ years of experience spans energy markets, energy efficiency, environment, and climate change. At CEEW, he leads the team on four broad areas—energy transition and industrial

decarbonisation; carbon management through carbon pricing and carbon capture utilisation and sequestration; ESG and circular economy; and innovation and R&D.



Kavita Vij

Kavita Vij is the Engagement Lead in the Growth and Institutional Advancement team at CEEW. Before joining the Council, Kavita served as the

Grants and Partnerships Manager at Climate Policy Initiative, where she was also responsible for funders, partners and

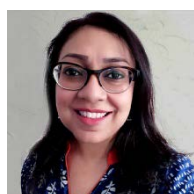
government relationship management, monitoring and evaluation and impact assessment of grant-funded projects.



Nitin Bassi

Nitin Bassi is a Senior Programme Lead for the Sustainable Water Team at CEEW. He has more than 19 years of experience undertaking research, consultancy, and training in water

resources. His work areas include river basin water accounting, agriculture water management, institutional and policy analysis in irrigation and water supply management, water quality analysis, climate-induced water risk assessment, and wetland management.



Shuva Raha

Shuva Raha leads CEEW's International Cooperation programme spanning four regions – Asia-Oceania, Africa-MENA, Europe, and the Americas and is a member of the CEO's Foresight team. She drives global governance-centric initiatives centred upon energy and

resource security, decarbonisation, sustainable finance, sustainable production and consumption, and climate resilience.

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Griffith Asia Institute (GAI) is an internationally leading partner for an inclusive, sustainable and prosperous Asia-Pacific. We build capacity and create positive impact through partnerships in sustainable economics and business, politics, international relations, security, and inclusive development.

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ABOUT THE COUNCIL ON ENERGY, ENVIRONMENT AND WATER (CEEW)

The Council on Energy, Environment and Water (CEEW) is a leading policy think tank based in New Delhi, India, with an office in Lucknow.

Founded in 2010, CEEW conducts research on energy, climate, and resource management, advising the Indian government and global stakeholders. Its work spans power sector reforms, industrial decarbonisation, sustainable mobility, climate adaptation, and more across 22 Indian states and beyond.

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ceew.in/



Griffith Asia Institute

Griffith University
Brisbane South (Nathan) Queensland 4111, Australia

Email: gai@griffith.edu.au

griffith.edu.au/asia-institute