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Accelerating Net-Zero: Critical Opportunities in Asia Pacific's Climate Policy

Policy levers to accelerate the transition

Chapter Snapshot: Critical minerals

Foreword: The Defining Decade For Asia Pacific's Climate Ambition

The next decade will define Asia Pacific's climate transition. Asia Pacific has the most to gain from reaching net-zero, and the most to lose from this not happening fast enough.

The region has the natural resources, technology, human and financial capital needed to provide leadership and effect change, but governments, businesses and society at large must act decisively and accelerate the next wave of decarbonisation.

This paper represents a chapter in the complete report 'Accelerating Net-Zero: Critical Opportunities in Asia Pacific's Climate Policy'. The complete paper details the four pillars and related policy considerations Deloitte recognises as critical to meet the rising decarbonisation needs for our region in the next decade. To access the full report or the other chapter snapshots, see here.

Achieving net-zero ambitions has the potential to grow the Asia Pacific economy by almost US$50 trillion by 2070 but at the same time requires us to scale up emerging technologies, build new industries and unlock US$80 – US$90 trillion in investment by 2050[1].

Government policy will make or break this transition.

Clear direction can facilitate investment through the design of regulatory environments that remove barriers and encourage private capital. In many cases, success will depend on coordinating complex industry and infrastructure shifts – modernising electricity grids to meet growing demand for renewable energy, scaling up charging and future fuel distribution to decarbonise both industry and transport – and supporting difficult industry and workforce transitions. Technologies needed for the transition remain comparatively immature, creating commercial uncertainty with capital not sure where to look, or which technology to back. Most critically, governments must create viable markets and visible demand signals, while also supporting early-stage innovation.

While each nation faces different circumstances, three common imperatives stand out:

- Accelerate, commercialise, and scale up emerging clean energy technologies
- Mobilise private capital for large-scale net-zero investment
- Close the price gaps between low-carbon and conventional options.

Solar and wind are now the lowest cost sources of electricity, so the economics of the transition are already working in its favour. **This paper focuses on the next wave of decarbonisation: future fuels, critical minerals, batteries, and industrial transformation.** These are the building blocks of the future economy.

This next wave of transition will be harder than the last. With increasing interdependence for energy, resources, and technology, governments across Asia Pacific need to balance national interests with greater regional integration. Shared standards, trade, and investment agreements can grow new markets and accelerate change. Facing structural shifts, governments must balance competition with collaboration to secure shared prosperity.

This is our moment to act, and we must accelerate.

Will Symons

Asia Pacific Sustainability Leader

Aloysius Teh

Asia Pacific Public Policy Leader

Introduction
Pathways to net-zero require policy ambition

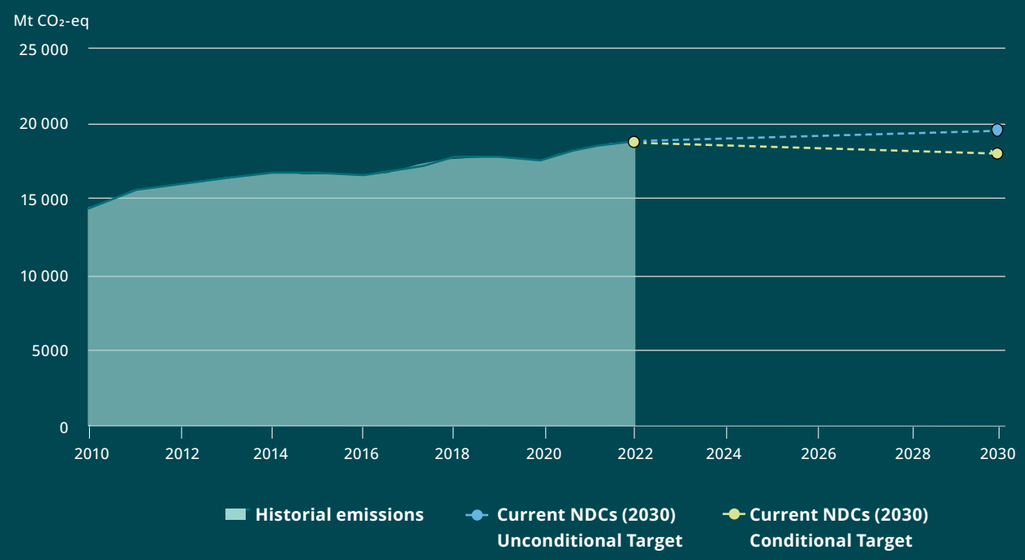
Asia Pacific's Ambition

Economies across Asia Pacific have set ambitious emissions reduction targets through Nationally Determined Contributions (NDCs) under the Paris Agreement and are embedding targets into laws, aligning policy, and mobilising resources to close the gap.

They have launched transition roadmaps and rallied investment. From China's dominance in decarbonisation technologies to Australia's clean energy export potential, the region is positioning itself as a global climate leader.

Yet the Intergovernmental Panel on Climate Change (IPCC) data is clear, and emissions in Asia Pacific, which account for nearly 60% of the global total, continue to rise (see Figure 1). While momentum for change is growing, we are not on track to keep warming within a 1.5°C limit.

Figure 1: Asia Pacific emissions continue to rise
Asia Pacific historical and implied greenhouse gas emissions from energy by NDCs (mid-point projection)



Source: International Energy Agency Climate Pledges Explorer

The current state of play: growing risk of stalemate

Most transition plans rely on a mix of proven solutions and emerging technologies. With rising electricity demand, energy security concerns, hard-to-abate sectors, and challenging investment demands, there is a growing risk of delay or stalemate.

This paper focuses on four critical pillars: **future fuels, critical minerals, batteries, and industrial transformation.** Each pillar must scale up now, reducing emissions or enabling other transition levers, to drive meaningful decarbonisation by 2030 and beyond.

Some areas of transition are accelerating. Renewable energy is scaling as solar photovoltaic (PV) and wind become the least expensive generation sources in almost all markets. Electric vehicle sales (EV) are growing across the region, making up 48% of new car sales in China[2].

Renewables now account for almost 30% of the region's energy generating capacity and are growing faster than fossil fuels. Despite this success, the region's power mix remains reliant on fossil fuels, which still generate 67% of electricity. As energy demand surges and energy security concerns rise, fossil-based generation – and associated emissions – continue to rise.

To meet net-zero commitments decarbonisation must also begin delivering material emissions reductions beyond power generation.

The global energy transition will succeed or fail on Asia Pacific's efforts

The region accounts for 60% of the world's population, nearly 40% of global GDP and around 60% of carbon emissions[3]. Its scale and trajectory of change is pivotal. How Asia Pacific responds will shape the world's net-zero outcome.

The opportunity is historic, and the risks are significant. Asia Pacific can lead a zero-carbon industrial revolution as transformative as its recent decades of economic growth.

Deloitte's Turning Point analysis shows decarbonising the region could unlock a 7.5% increase in GDP by 2070 – equivalent to a US$9 trillion gain, or US$47 trillion in net present value[3]. That's more than the combined economies of Australia, India, and Japan today.

The economic risks of failing to act are stark. If action is not taken, Asia Pacific's GDP will shrink by 5.5% or by US$3.4 trillion annually by 2050. By 2070, losses could reach 12% of GDP – US$16 trillion per year – or US$96 trillion in net present value.

What comes next is more difficult and requires deep changes in industrial policy, energy systems and technology adoption.

The challenges are complex:

- **Future fuels** are essential for decarbonising transport, heavy industry, and power, but remain costly and in limited supply.
- **Critical minerals** are rising in demand, but supply is geographically concentrated and growth faces environmental constraints.
- **Battery production** must scale up rapidly to meet EV demand and support renewable grids, but faces resource bottlenecks and margin pressures.
- **Industrial transformation** – core to economic growth – must shift away from emissions intensive processes and fuels, but lacks viable, commercially scalable alternatives.

Net-zero is unattainable without policy intervention

The scale, pace and complexity of change is unprecedented. Asia Pacific's current NDCs target a reduction of nearly half a billion mega-tonnes of CO_2-equivalent emissions by 2030, or 3% of total emissions. Reaching net-zero implies cutting emissions by 2.6% per year. And every year of delay requires steeper cuts in future years to meet net-zero by 2050 and decreases the likelihood that we will avoid dangerous climate change.

Across Asia Pacific, the impact and implication vary nation to nation. Developed economies, with greater historic emissions, must make deeper cuts to offset rising emissions from developing countries, as their economies grow.

The logic of transition is conceptually simple: Electrify wherever possible, decarbonise the electricity supply, and tackle residual emissions through efficiency, behaviour change and new technology.

With progress on decarbonised electrification accelerating, focus needs to expand to emissions sources which cannot be electrified. These transitions are more difficult. Heavy transport and industrial production face many entrenched barriers and, while technologies exist in areas like low-temperature industrial heat, many sectors still lack viable, scalable decarbonisation pathways. This is where targeted, creative policy becomes essential.

It is estimated that achieving global net-zero will require between US$150-200 trillion in investment by 2050[4]. Asia Pacific alone will need US$79 - 89 trillion. In 2023, investment in low-carbon technologies across the region hit a record US$840 billion. But this must nearly triple to around US$2.3 trillion per year by 2030 and increase further thereafter.

Capital investment is needed to scale up generation and grid infrastructure, replace transport fleets, transform industrial processes, and build resilient supply chains. And the financing challenge is significant. Many projects are not economically viable under current market conditions. Investors need returns on their investments, and consumers need affordable options.

This is where policy becomes critical – to set direction, offer public funding support, and reduce risks to make transition projects bankable. Targeted policy needs to address bottlenecks in each pillar to unlock private capital and accelerate change.

Five key actions for policy makers stand out:

1. **Accelerate policy and regulation**
   Provide clear, stable frameworks that signal a long-term direction and commitment to industry and reduce risk for investors.

2. **Establish sector strategies and institutions**
   Develop targeted roadmaps that clarify what to build, when and where – and assign institutional responsibility for delivery.

3. **Develop new markets**
   Support research, innovation and early-stage investment – but most importantly, build the market infrastructure that allows industry to scale up.

4. **Remove barriers to growth**
   Address financing gaps, infrastructure bottlenecks and execution risks that are slowing progress.

5. **Foster regional cooperation**
   Collaborate across borders to pool demand, share technology, and attract capital at the scale necessary for net-zero transition.

Across the following chapters these five themes return again and again in offering a roadmap for governments, policy makers, business leaders and regulators across the region to meet their NDCs and accelerate decarbonisation.

Critical Minerals

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Critical minerals underpin the net-zero transition

Critical minerals underpin the net-zero transition.

Demand is accelerating across renewable energy, grid infrastructure, EVs, batteries, and future fuels, making access to raw materials both a strategic enabler and a supply risk.

Production is highly concentrated with two or three countries controlling most of the mining and processing for most critical mineral supply chains – and China dominates in nearly every category. With rising demand, trade tensions and the essential role of critical minerals in clean energy technologies – securing supply has become a strategic imperative.

Figure 5: Critical mineral needs for clean energy technology

	Copper	Cobalt	Nickel	Lithium	Rare Earth Elements (REEs)	Chromium	Zinc	Platinum Group Metals (PGMs)	Aluminium
Solar PV	●	●	●	●	●	●	●	●	●
Wind	●	●	●	●	●	●	●	●	●
Hydro	●	●	●	●	●	●	●	●	●
Concentrated solar power (CSP)	●	●	●	●	●	●	●	●	●
Bioenergy	●	●	●	●	●	●	●	●	●
Geothermal	●	●	●	●	●	●	●	●	●
Nuclear	●	●	●	●	●	●	●	●	●
Electricity networks	●	●	●	●	●	●	●	●	●
EVs and battery storage	●	●	●	●	●	●	●	●	●
Hydrogen	●	●	●	●	●	●	●	●	●

Importance	High	Moderate	Low
	●	●	●

Source: International Energy Agency (IEA)

What are critical minerals?

These minerals including copper, nickel, cobalt, lithium, graphite, and rare earth elements are essential for the manufacturing of batteries, magnets, turbines, electrolysers, motors, and solar panels that drive clean energy technologies. In addition, massive volumes of copper and aluminium are needed to meet the world's electrification demand.

Many countries have their own definitions of critical minerals with minor differences in which elements are included. What is common however, is that critical minerals are vital for decarbonisation, advanced industry, and increasingly, national security.

Demand for critical minerals risks outstripping supply

The scale of the global net-zero transition is unprecedented and cannot happen without a reliable supply of critical minerals.

As an example, the EV fleet in Asia Pacific is projected to reach 671 million vehicles by 2050 – each requiring, on average, 53kg of copper, 40kg of nickel, 13kg of cobalt and 9kg of lithium. Over the same period, the region's power grid will double in size, expanding by 53 million kilometres[21].

According to the International Energy Agency (IEA), critical mineral demand could double by 2030 based on the announced NDC pledges or more than triple under the Net-Zero scenario – then continue rising to 2050[22]. Demand patterns vary by material: copper could increase 154%, nickel by 226%, and lithium by almost 9-fold by 2050, with nearly all growth coming from clean technologies (Figure 6).

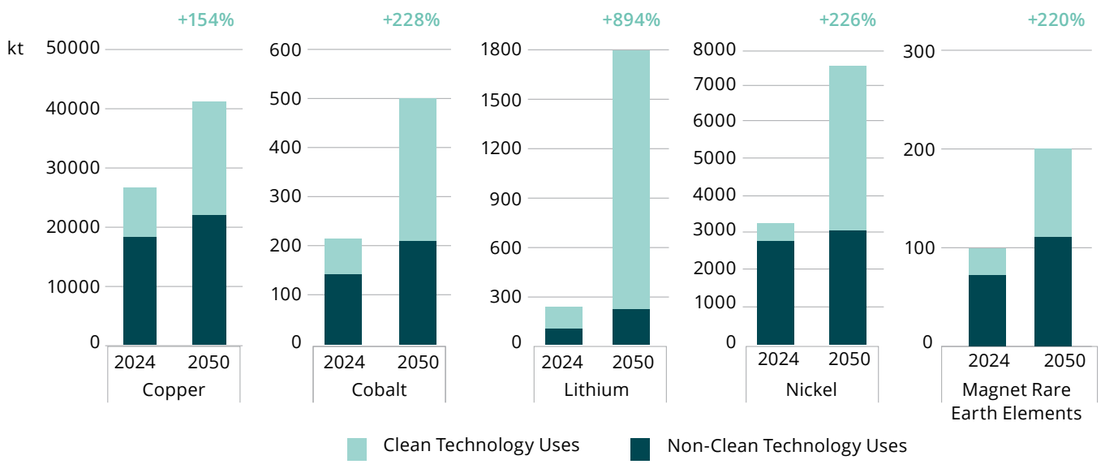
To meet this rising demand new sources are required. However, building new capacity, including refining and processing, and supply chains is not straight forward.

Mining projects are capital intensive, slow to develop and often rely on complex trade agreements and foreign investments. Prices are volatile and opaque, and in some mineral markets, low-cost suppliers with weak environmental and labour standards are leading to the curtailment of production elsewhere.

Governments and policy need to bridge the gap between demand and reliable, affordable and diversified supply.

The value of the global critical minerals market reached US$320 billion in 2022, with mining capex for nonferrous metals rising 30% to US$40 billion, and exploration spend up 20% to US$6 billion[23]. But investment remains far below what is needed. Meeting net-zero demand would require US$360 - US$450 billion in cumulative investment by 2050 and current forecasts fall short by at least US$140 billion. Furthermore, supply gaps across a range of minerals are forecast from 10% for cobalt to as much as 35% for lithium.

Figure 6: Demand growth for select critical minerals, net-zero scenario



Source: International Energy Agency (IEA)

How to address the challenge of ready access to critical minerals

Ready access to affordable raw materials is essential to scale up clean energy technology. Governments must align their transition strategies to a reliable supply chain – clarifying where and how they will obtain the necessary critical minerals.

In Asia Pacific, three broad economic groupings are emerging. Resource-rich markets, like Indonesia, Vietnam, Malaysia, and Australia, are seeking to grow exports and move up the extraction and processing value chain.

Import-dependent economies, like Japan and South Korea, are focused on long-term supply security. And China, which dominates mineral processing and clean energy technology manufacturing, aims to retain market access while assuring trading partners it will remain a dependable supplier.

Two core tensions between growth and security are shaping policymaking:

Cost vs resilience

Governments face pressure to keep material costs low while also securing supply. But building resilient supply chains – through domestic development, diversification of trade partners, or stockpiling – comes at a cost premium. Governments need to bridge this gap.

Growth vs responsibility

Sourcing low-cost supplies or expanding local extraction and processing carry environmental and social risks. Many developed countries are reluctant to onshore resource-intensive industries, yet offshoring raises its own challenges. Relying on others to shoulder environmental burdens is no longer an option – and neither is limiting the development of value-add industries in partner countries. Policymakers must share value creation without shifting harm.

The mining and processing industry is mature, but project viability hinges more on price and demand certainty, and less on access to capital. Governments can act to de-risk supply chain development through incentives or underwriting demand and offtake agreements to reduce investment risk.

Increased collaboration across Asia Pacific offers a way forward. The diversity of resource needs and concentration of supply necessitate interdependence. Governments must build stronger trade and investment partnerships to support the growth of this broader industry.

Key issues for policymakers

1) Build stable trade partnerships

Mining depends on stable, long-term trade relationships – but these need to go beyond commodity transactions. Future focused partnerships must include investment, joint-ventures, and technology transfer that supports upstream mining and development of processing industries.

These efforts are no longer just bilateral. Initiatives like the Minerals Security Partnership (MSP) (see box) bring together like-minded nations to align strategy and pool resources. Effective execution often relies on coordinating institutions, such as the Japan Organisation for Metals and Energy Security (JOGMEC), that can bridge public policy and private sector investment (see box).

Minerals Security Partnership

The Minerals Security Partnership (MSP) is a US-led initiative focused on building diversified supply chains for critical minerals and reducing overreliance on any single economy. It brings together governments including Australia, Canada, Japan, South Korea, the UK, and European Union to coordinate private investment across the mineral value chain.

The MSP facilitates collaboration among regulators and financiers to accelerate minerals projects. Its Finance Network aligns government funding, funding agencies and private capital to expand investment in critical minerals projects. The MSP Forum connects its members with mineral producing nations to support resource development.

As of September 2024, the MSP had supported 32 projects globally[24], including:

- Electra Battery Materials: North America's first cobalt sulphate refinery, backed by US$20 million under the US Defense Production Act and $3m from Natural Resources Canada, sourcing cobalt from the Democratic Republic of Congo.
- Mingomba Copper Project: A US$2 billion joint investment by US KoBold Metals and Zambia's ZCCM-IG, is significantly expanding Zambia's copper production and export.

Implementing the Australia/Japan minerals partnership

The Japan Organisation for Metals and Energy Security (JOGMEC) is the coordinating agency for Japan's strategy to secure minerals for its advanced manufacturing and clean energy technology sectors. It plays a key role in trade agreements, manages Japan's critical mineral stockpile, and is instrumental in efforts to diversify chains.

A cornerstone of its strategy is the relationship with Australia. In 2011, JOGMEC and Sojitz Corporation co-founded the Japan Australia Rare Earths (JARE) joint venture, investing AUD$250 million in Lynas Rare Earths to secure long-term supply and bolster the company's future[25]. The partnership expanded in 2022, with an additional AUD$200 million investment, securing access to up to 65% of Lynas's heavy rare earth output.

This also aligns with Australia's ambition of increasing domestic mineral processing, and the Australian Federal Government backed Lynas's expansion with an AUD$1 billion loan to Iluka Resources to develop the country's first integrated rare earth refinery.

2) Shorten the development cycle

New mines take an average of 15 years to reach commercial production[26], leaving projects vulnerable to changes in policy, demand and prices. A key lever to accelerate critical minerals production is to streamline the permitting process and ease regulatory hurdles. This doesn't mean compromising environmental or community standards, but rather creating integrated systems that enable faster, well-informed decisions.

Canada is aiming for a five-year permitting target for critical mineral development through inter-agency alignment. By focusing on designated development zones, new projects can share or develop infrastructure more expeditiously. In developing countries, strengthening regulatory frameworks, building institutional capacity and other practical measures, like conducting targeted geological surveys, can boost investor confidence and accelerate progress.

3) Establish market infrastructure

Markets for low-volume, specialised minerals remain immature compared to bulk commodities. Limited scale reduces price transparency and increases volatility. While organisations like the IEA and London Metals Exchange are working to improve market data, policymakers have an important role to play. Long-term offtake agreements and production incentives can stabilise prices and provide certainty to miners and investors. Strategic stockpiles – such as those in Japan, South Korea, and recently announced by Australia – not only secure supply but can also buffer against price shocks, particularly when co-ordinated internationally[27].

A further priority is strengthening Environmental, Social and Governance (ESG) standards standards and mineral traceability. The EU's Carbon Border Adjustment Mechanism (CBAM), battery passports and local content rules are pushing markets towards greater transparency and differentiation by the source of input materials. These efforts highlight the tension: sourcing responsibly versus sourcing cheaply. Aligning standards is key to balancing both.

4) Align economic and environmental development

For resource-rich countries, building value-added capability is central to their economic development. Malaysia's New Industrial Master Plan[28] targets developing downstream processing of critical minerals – particularly rare earth elements and advanced materials manufacturing aligned to its growing solar PV sector. Policy support includes regulatory reform, R&D funding and financial incentives, which have attracted investments from companies like Lynas Rare Earths – now operating the largest, rare earth processing facility outside of China.

Indonesia, the world's top nickel producer, has restricted its raw material exports to promote domestic refining and establish an end-to-end EV and battery supply chain (see Chapter 3: Batteries). Australia's critical minerals strategy and Future Made in Australia Plan aim to increase domestic refining and processing by supporting local and foreign investment, and secure international trade partnerships across the value chain.

A key question is where to build or invest in the different stages of mineral development. High-cost countries have often offshored resource-intensive extraction and processing while retaining high-value refining and manufacturing. But this model is under pressure. ESG expectations, emission targets, and new processing technologies are pushing countries to co-locate extraction, renewables, and processing to create cleaner and more integrated supply chains.

5) Integrate supply chains

Access to minerals and economic development goals are also driving deeper supply chain integration. Technology companies are securing supply through direct partnerships and investment in upstream facilities. BHP has signed long-term nickel supply deals with Tesla, Ford and Prime Planet Energy Solutions (a Toyota and Panasonic JV) for its Nickel West operations[29].

Tesla has also built its own lithium refining facility in Texas, using US sourced lithium[30].

For resource-rich countries, these partnerships play a role in developing domestic refining and processing industries – and not just for accessing finance, but technology and know-how as well. And when structured around long-term relationships and supply, these deals can create significant mutual benefit – such as the global expansion of South Korea's POSCO (see box).

POSCO's global minerals expansion

A longstanding player in South Korea-Australia resource cooperation, POSCO acquired a stake in Pilbara Minerals in 2018, securing long-term lithium offtake.

Together, the companies have developed downstream lithium processing facilities, making POSCO one of the few lithium chemical producers for batteries outside China[31].

These investments have been supported by Australia's federal and state governments, as well as low-cost financing from state-sponsored Korea Eximbank and Korea Development Bank. POSCO's global approach involves investment and development of raw materials and processing, such as its MSP-backed stake in Black Rock Mining's Mahenge graphite project in Tanzania[32]. In Vietnam, it has announced a US$1.2 billion investment program, including rare earths processing[33].

6) Increase circularity

Recycling is one of the most promising ways to strengthen critical mineral supply chains. With high recovery potential for many materials, the IEA estimates that recycling alone could meet 10-20% of mineral demand by 2030[34]. As available ore quality declines and processing new materials becomes more energy-intensive, the case for recycling grows stronger.

However, recovery rates remain low, and processes are often costly and labour-intensive. Despite this, recycling is essential for reducing waste and emissions, and for improving security of supply. The EU's Critical Raw Materials Act targets 25% of critical mineral demand to be met through recycling by 2030. South Korea plans to increase its recycling rate from 2% to 20%. These plans are typically supported by local content requirements and incentives, and in the EU, by take-back and circularity requirements.

Momentum is growing across the full spectrum of minerals – from established recycling of nickel and aluminium to newer efforts like battery recycling and e-waste recovery. Policy support for R&D, recycling targets and facilities, and product design standards will be key to accelerating circularity at scale. While new business models that could significantly increase efficiency, such as shared ownership, or leasing equipment or components, will likely require regulatory support and sponsorship.

7) Identify alternative materials and supply

With no easy fixes to the underlying supply and demand risks, attention is shifting to alternatives. This includes two key strategies: advancing materials science to improve materials efficiency or developing substitutes and expanding the scope of exploration to identify new reserves.

Governments play a vital role in supporting both strategies: funding research, facilitating early-stage development, and ensuring regulatory clarity. However, caution is needed in more controversial areas, such as deep-sea mining, where environmental impacts remain uncertain.

Achieving critical mineral security in Asia Pacific

Critical mineral security is often framed as a national interest issue, but with increasingly interconnected supply chains, regional cooperation is essential.

There are several actions for policymakers to consider.

Coordinate regional policy

Addressing supply concentration requires an integrated strategy. Policymakers can align incentives, cooperate on infrastructure programs, and codesign development plans across the full value chain, from exploration to processing and trade.

Build regional markets

Beyond bilateral trade agreements, governments need to support growth of tradeable markets. This includes improving transparency around production, pricing, and supply – and establishing consistent ESG and emissions standards.

Support resource-driven development

Asia Pacific's resource-rich economies can drive regional prosperity by co-locating extraction, processing, and renewable energy – shifting trade from raw commodities to processed materials. A coordinated approach can boost local development while increasing the region's economic and climate resilience.

Balancing mineral security and affordability

At the heart of the challenge is balancing low-cost access to the critical minerals essential for competitive and affordable clean energy industries, with the need for secure, resilient supply chains.

Developing new supply and strengthening domestic capacity is expensive and can come with environmental costs. Governments need to play an active role in de-risking projects and creating the conditions to attract investment.

In parallel, they need to lead open public dialogue about the trade-offs of resource development to ensure long-term social licence. There is a high cost, but a necessary one to build confidence and momentum in the net-zero transition.

Policy Approaches

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Government policy is crucial for achieving net-zero emissions

Without government intervention, the transition will stall

Accelerating the next wave of net-zero transition in Asia Pacific requires around $2.3 trillion in annual investment by 2030 – more than triple today's US$840 billion.

Governments cannot close this gap alone. They must act as catalysts, creating the conditions to crowd in industry participation and private capital.

The role of policymakers

Meeting emerging 2035 NDC targets requires deep and systemic transitions. Growth in renewable energy has shown what's possible when technology cost curves and the right policy mix align. That success must now be replicated across harder-to-abate sectors.

To scale the next wave of net-zero transition, policymakers must focus on four priorities:

1. **Targets:** Set clear and credible targets backed by robust policy frameworks, industry roadmaps and the incentives needed to achieve them.
2. **Innovation:** Fund R&D and early-stage innovation to de-risk emerging technologies.
3. **Investment:** Provide upfront investment support and targeted policy for high-cost projects.
4. **Carbon pricing:** Phase out fossil fuels subsidies and implement carbon pricing.

Policy is the critical accelerator. But strategies must reflect local context.

Access to renewable energy, mineral resources, the industrial base, and capital vary widely across Asia Pacific. So too does institutional capacity to design and orchestrate change. Developing economies in the region will require support from developed partners to close investment gaps, build capacity, and drive economic growth. (see box).

Catalysing investment into developing economies

Emerging and developing economies require 70-75% of global decarbonisation investment[77]. Yet weaker financial markets and higher country risk make capital scarcer and more expensive. It is in the global interest to support these transitions. While development finance plays an important role, real progress depends on partnerships that de-risk private investment.

Just Energy Transition Partnerships (JETP) offer a model for aligning transition plans, public funding and private investment. Both Indonesia and Vietnam launched JETP agreements in 2022 – Indonesia securing US$20 billion and Vietnam US$15 billion in pledges to decarbonise power systems and accelerate the shift from coal[78].

These plans combine ambitious targets, regulatory reform, long-term infrastructure roadmaps. Progress, however, has been mixed. The US withdrawal of funding created gaps, but other partners have moved to fill them. As of May 2025, US$1.1 billion has been committed to projects in Indonesia and US$700 million in Vietnam, spanning renewables and electrification[79]. While investment has been slower than expected, momentum is building as the project pipelines mature.

The next stages of transition will be expensive and politically challenging. Decarbonising fuels, transport, and industry risk rising prices, economic and social disruption – all of which can threaten public support. The most economically efficient way to decarbonise our economies at least cost is generally accepted to be carbon pricing (see box).

Getting it right is a major opportunity. Asia Pacific's net-zero transition could add US$47 trillion to the region's economy by 2070[80]. Effective policy can increase the pace of change – and reduce the cost. Deloitte estimates that policy interventions can de-risk the low-carbon finance premium and reduce global investment costs by US$2 trillion annually – saving US$50 trillion by 2050[81].

Carbon Pricing

At the heart of the economic challenge of net-zero transitions is the absence of meaningful carbon pricing. Without it, governments must pick winners and subsidise low-carbon technologies – an approach that is expensive and unsustainable. Carbon pricing can correct market distortions, enabling more efficient solutions to emerge and improve the effectiveness of other policy actions whilst reducing risks to taxpayers.

Fossil fuels currently benefit from US$7 trillion annually in implicit and explicit subsidies – around 7% of global GDP[82]. These include climate and health externalities, tax breaks, and direct subsidies.

Yet as of 2024, only seven Asia Pacific countries have carbon taxes or emissions trading schemes in place. And carbon prices remain well below the IPCC's recommended US$170 - US$290 per ton CO_2 by 2030 to meet the 1.5oC pathway[83]. Coverage is limited, with trading schemes excluding key sectors and only 24% of global emissions priced[84].

Under Article 6 of the Paris Agreement, international carbon markets are beginning to take shape – but progress is slow. In the meantime, Asia Pacific economies must expand carbon pricing to accelerate transitions. Concerns over carbon pricing persist, driven by fears of rising costs, industry impacts and public perception. Yet emissions intensity is becoming an important measure of competitiveness – one best tackled through international cooperation.

Carbon pricing can level the playing field for clean energy technologies – it can also generate up to US$4 trillion in public revenues to reinvest in transition[85].

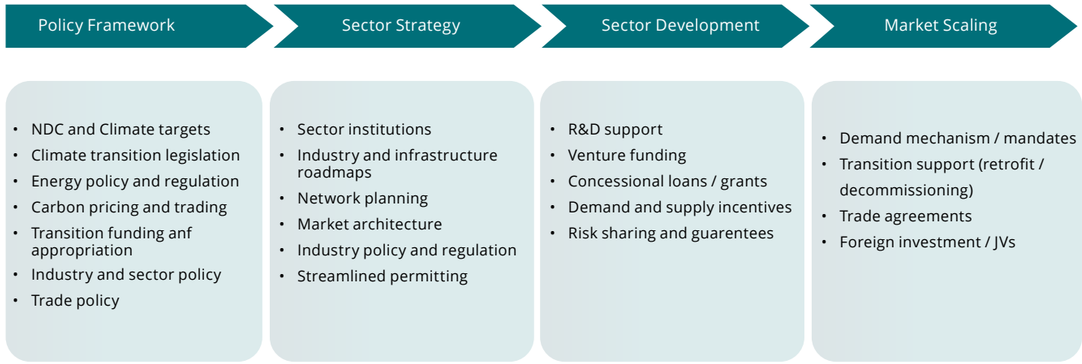
Policy making must set direction and mobilise industry and capital

Policy making must set direction and mobilise industry and capital. Delivering system-wide change in energy and industry requires a coordinated policy mix and effective execution.

This means strengthening government capacity to design, implement, and iterate policy. And there is no one-size-fits-all solution. While each pillar of the transition faces specific challenges, policymakers must also tailor interventions to their context– using the right levers at the right time.

A lifecycle approach – targeted by sector and maturity – can create policy certainty and drive faster, more effective transition outcomes (see Figure 11).

Figure 11: Transition lifecycle policy approach



Source: Deloitte

1) Establish vision, targets, and policy framework

To drive least cost decarbonisation, governments must set clear, long-term targets – anchoring NDC commitments in legislation and backing them with credible roadmaps and transparent reporting. Industry and investors need confidence in stable policy settings to commit to large-scale, long horizon investments.

A credible framework includes enabling policies: sector strategies, funding mechanisms, carbon pricing, international cooperation, and investment in infrastructure and skills. Where possible, this should be underpinned by cross-party political support to build lasting confidence and reduce sovereign risk.

2) Empower independent agencies to set sector strategies and infrastructure plans

Delivering system-level transitions requires sector-specific policy, regulation, and infrastructure planning. Governments should empower independent institutions to lead this work in close collaboration with industry.

These institutions can develop regulation, set industry standards and coordinate infrastructure planning. As system operators, they can manage critical market mechanisms, such as procurement auctions, planning consents and funding disbursement (see box on the next page: Accelerating progress through focused agencies).

Accelerating progress through focused agencies

Accelerating progress through focused agencies

Net-zero transitions are cross-cutting, requiring coordinated execution beyond traditional policymaking. Independent agencies with technical expertise can accelerate policy execution, operate outside the sphere of political influence and build industry confidence.

The Australian Renewable Energy Agency (ARENA) drives technology deployment across solar, hydrogen, battery storage, transport, and low-emissions metals. It supports research, innovation and project commercialisation through grants, co-funding, and knowledge sharing. ARENA has backed 735 projects with AUD$2.6 billion, leveraging AUD$12.6 billion in total investment. Flagship initiatives include large-scale solar and battery projects, and the Murchison Green Hydrogen project[86].

The UK's National Energy System Operator (NESO), launched in 2024, oversees both systems operations and long-term planning for a net-zero grid. As a central authority, it can adapt rules quickly and manage key mechanisms like the Capacity Market and renewable energy procurement auctions - facilitating investment in 39 GW of generation projects[87]. NESO has already delivered reforms to clear grid-connection backlogs, published the future network plan and delivered the UK's first zero-coal winter.

3) Support research and innovation

Accelerating transitions requires innovation to scale - strong R&D and commercialisation capability is essential.

Governments can support early-stage R&D, sponsor innovation hubs, and build foundational research capability. Beyond grants and tax incentives, policy can drive innovation by convening partnerships, setting challenges, and creating the enabling environment.

Early-stage commercialisation often faces funding gaps. With a higher risk appetite, governments can act as venture partners – catalysing private investment through co-funding, offtake agreements, production incentives, and regulatory sandboxes. This can de-risk innovation and accelerate market formation where private capital is hesitant.

Given the high risk inherent with early-stage innovation and commercialisation, and the urgency of the net-zero transition, innovation support is not optional – it is essential.

4) Unlock investment to scale up net-zero solutions

The underlying need across the net-zero transition pillars in this paper is unlocking investment. Policy uncertainty, technology risk, and challenging economics continue to drive up the risk premium for low-emissions finance.

While there are many financial risks and financing mechanisms to consider, (see figure 12) policymakers should focus on five broad considerations:

Direct investment support

Use public finance tools (e.g. equity, concessional debt, risk-sharing) to lower capital costs and attract investors.

Establish and structure markets

Set standards and certification that create transparency and support trade. Sponsor markets through competitive tenders or auctions for low-emissions commodities to catalyse demand and price discovery.

Stimulate demand

Drive early adoption through mandates, incentives, and infrastructure investment to overcome price, technical and behavioural barriers.

Bridge the price gap

Where low-emissions options are more expensive, targeted production or tax incentives can buy time for cost curves to fall. Incentives alone are unlikely to resolve residual cost differences without addressing fossil fuel subsidies

Motivate industry

Support industry-led initiatives and embed climate disclosures, to increase transparency, focus and accelerate private sector action.

The policy imperative

The right policy mix depends on a clear view of national starting points and transition goals. At the core is a singular challenge: rapidly scaling finance for system-wide energy and technology shifts. Governments must act as catalysts – mobilising capital, reducing risk, and enabling market formation.

The next wave of technologies will not scale without support. This demands bold policy – accepting high costs, complexity, and political risk. Without it net-zero targets will remain out of reach.

For Asia Pacific, regional cooperation is growing in importance. Governments must align supply chains, market standards, capital flows and infrastructure. Strategic partnerships are needed to balance economic efficiency with national security and development goals. These are hard choices, but the scale of opportunity and the cost of inaction, demand decisive leadership.

Figure 12: Policy levers

	Policy Tools	How does it work?	Impacts
Policy frameworks	Climate and energy strategy	Provides market transparency and regulatory clarity	Sets clear direction, reduces political risk
	Carbon pricing	Put a price on carbon emissions	Reduce price gap between green / fossil fuel alternatives
	Remove fossil fuel subsidies	Stop implicit/explicit support for fossil fuels	Make fossil alternatives more expensive by internalising costs
	Infrastructure planning (grid, industry, CCUS)	Provide market clarity and timelines	Reduces policy and technical risk, accelerates project readiness
	Streamline planning	Accelerate project timelines	Reduces cost and technical risk, accelerates project readiness
	Trade policy / Investment policy	Improve access to overseas markets	Access additional demand, access additional sources of capital
Market architecture	Market creation (e.g. auctions, domestic financial market)	Facilitate access to tradeable markets	Reduces revenue risk, sets pricing signals
	Industry standards (definitions, product and end-use)	Set common industry and product standards	Reduces technical risk
	Climate and sustainability reporting	Increases industry transparency	Reduces financing costs and enables more efficient and aligned capital allocation
Technology and infrastructure	R&D support (e.g. funding, innovation hubs)	Accelerates technology learning	Reduces investment and financing costs
	Venture funding	Accelerates technology commercialization	Reduces investment and financing costs
	Infrastructure investment (e.g. grid, distribution and trade, CCUS)	Provides market clarity, accelerates access to required infrastructure	Reduces technical risk, stimulates demand, reduces investment and financing costs
Market incentives	Offtake contracts (PPA, CfD, FIT etc.)	Guarantee demand / price for producers	Reduces revenue risk, sets pricing signals
	Production incentives (tax-incentives, production incentive, green premium)	Increase revenue for producers	Reduce price gap between green / fossil fuel alternatives
	Demand incentives (rebates, mandates, procurement)	Stimulates demand and reduces purchasing barriers	Reduces revenue risk, increases demand
Finance support	Risk sharing and guarantees	Protect investors against losses	Reduce risk of default and cost of capital
	Public private partnerships	Mobile private capital for public infrastructure	Shares risk and cost of investment
	Green bonds	Targeted end-use bonds	Increased transparency, lower borrowing costs
	Concessional finance / grants	Co-finance in transition projects	Reduce investment and financing costs
	Equity and debt structures	Co-invest in transition projects with greater risk exposure	Reduce investment and financing costs
Implementation support	Industrial strategy	Develop industry ecosystem and skills	Reduces implementation barriers and technical risk
	Support training / job transition	Develop human capital for green transition	Reduce economic impact on society, reduces implementation barriers and technical risk
	Transition support	Fund retrofitting/ decommissioning and compensation for stranded assets	Reduce economic impact on industry

Source: Deloitte

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