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

Policy levers to accelerate the transition

Chapter Snapshot: Future fuels

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

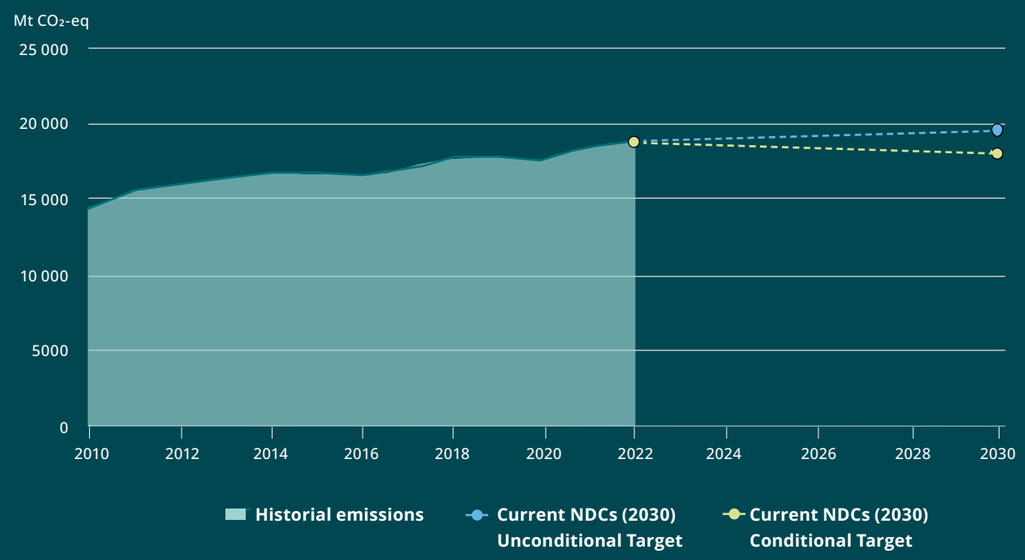
Asia Pacific's Ambition

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.

Future Fuels

Future fuels are critical to the next wave of decarbonisation

Meeting climate targets means shifting away from fossil fuel dependence.

For industrial heating, heavy transport such as aviation and shipping, and certain power generation needs, the opportunity for electrification is limited and new low- and zero-carbon fuels are needed (collectively referred to as ‘future fuels’ in this paper).

Power generation and industrial processes generate 68% of global energy related CO2 emissions today while transport contributes a further 23% (see Figure 2). Electrification and renewables can reduce emissions from electricity generation, some industrial processes and light road transport. But other sectors, such as heavy industry, aviation and maritime shipping, require fuels with higher energy density or specific properties – and this is where future fuels are critical to the net-zero transition.

Clean hydrogen, synthetic fuels, and biofuels are the primary low-carbon fuel options, but each face technical, economic, and infrastructure hurdles. With current production limited and costly – and future demand projected to rise – the race to scale up is accelerating. Yet high costs constrain demand, and without a clear path to profitability, attracting investment remains a challenge.

Future fuels include clean hydrogen, synthetic fuels and biofuels:

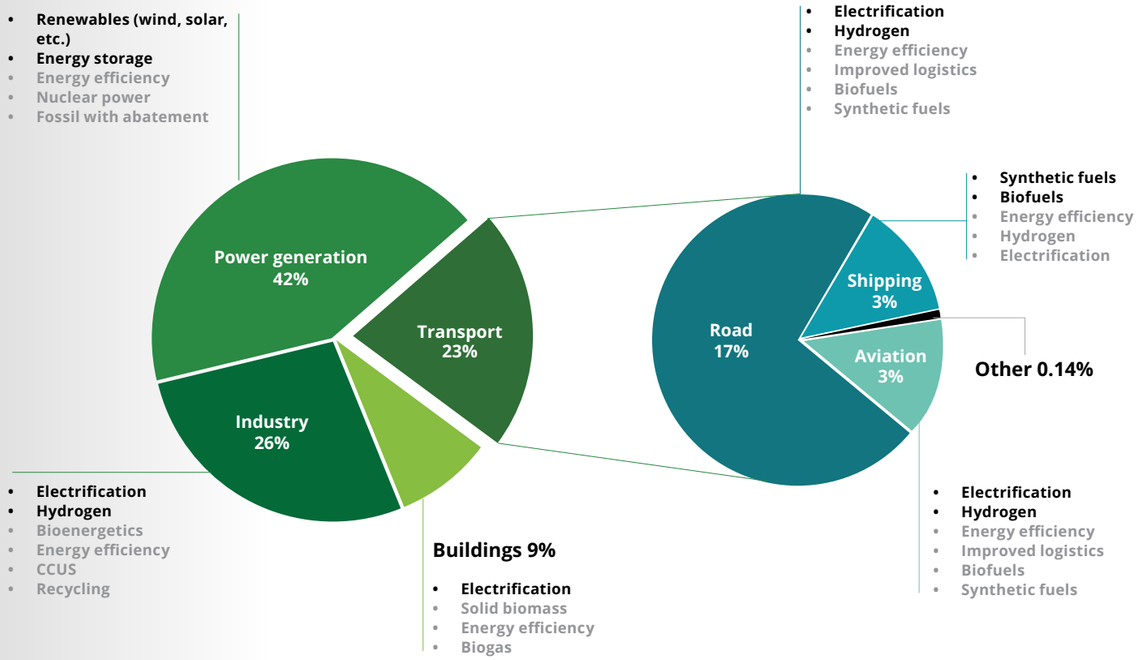
Clean hydrogen is produced by processes with significantly lower emissions than hydrogen produced through traditional approaches – primarily through water electrolysis powered by renewable (‘green hydrogen’) or nuclear (‘pink’) sources, or by capturing and storing carbon emissions from traditional hydrogen production (‘blue’).

For a full explanation of the different methods (and ‘colours’) of hydrogen production, please see 'Green hydrogen: Energizing the path to net zero' by Deloitte.'

Synthetic fuels, such as kerosene, methanol, and ammonia, are created by further processing hydrogen feedstocks.

Biofuels convert organic matter, such as crops or agricultural waste, into fuels through chemical, thermal or biological methods.

Figure 2: Global CO_2 emissions from energy combustion and the available decarbonisation strategies for each addressable through future fuels technology

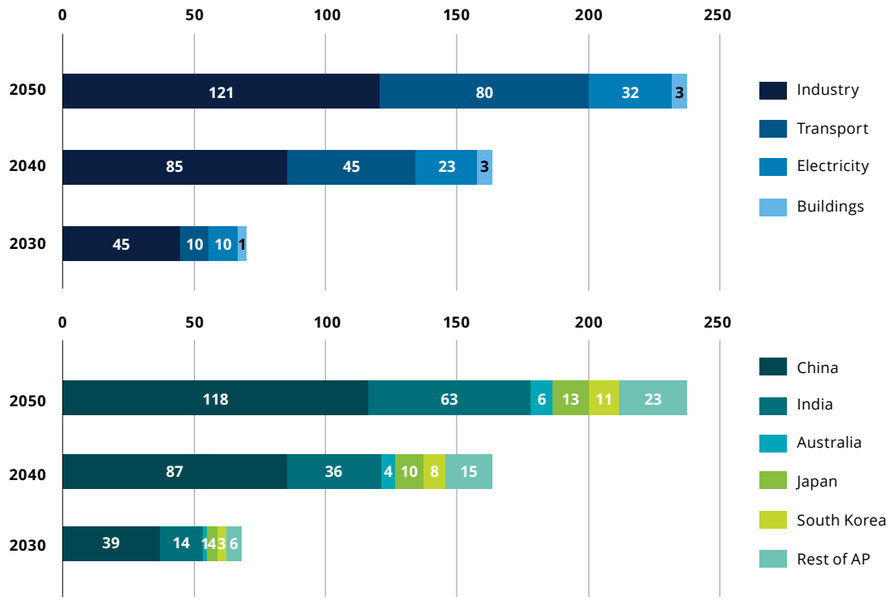


Source: Deloitte analysis based on Deloitte,[3] IEA[9] and Our World in Data[10]

Asia Pacific, with its concentration of heavy industry and rapidly growing air and shipping traffic, faces significant pressure to adopt future fuels. Production, however, remains minimal with biofuels accounting for less than 4% of energy consumption in the transport sector[5], less than 1% hydrogen consumed annually in the region is green[6], and the use of sustainable aviation fuel (SAF) and low-carbon maritime fuels barely registering.

Yet change is anticipated. Focusing specifically on hydrogen, Deloitte forecasts demand will grow to 66 Mt by 2030 and to 236 Mt by 2050 (see Figure 3)[7]. Almost all demand growth is expected to come from clean hydrogen sources. By mid-century, future fuels could meet 77% of aviation fuel needs and 83% for maritime transport[8].

Figure 3: Asia Pacific hydrogen demand by sector and country (in MtH2)



Source: Deloitte analysis adapted from Deloitte's 2023 report 'Green Hydrogen: Energising the path to net zero'. Forecasts are estimated and based on the anticipated projected demand should sufficient action be taken to meet required commitments alongside the ambition to limit warming to 1.5 degrees by 2050.

For Asia Pacific, the value isn't just in decarbonisation – it's the creation of a major new industry.

Deloitte estimates the hydrogen market could grow to US$632 billion annually in Asia Pacific (53% of the global total)[9]. Rich natural resources and renewable energy capacity position the region as both a leading source, and key market for, future fuels. Australia stands out as a primary exporter of clean hydrogen products, while China and India are expected to scale up production for their domestic markets. Meanwhile, Japan and South Korea are set to become major future fuel importers, driving industry and grid decarbonisation. And while earlier in development, with growing aviation and shipping markets – and strong renewable energy and feedstock resources – Asia Pacific can also be a major player in future transport fuels.

Advancing the future fuels industry

Most major economies have hydrogen strategies in place and are beginning to tackle aviation and maritime fuels. Meeting demand, however, requires substantial investment. Developing the region's hydrogen value chain alone needs investments of US$130 billion annually over the next 25 years[9], with further investment in other future fuels[10]. This means not just investing in production facilities, but renewable energy, transport, infrastructure, and even new vessels and engines. By comparison, fossil-fuels industries attracted US$1.1 trillion investment in 2024[11].

Today, clean hydrogen comprises less than 1% of total global hydrogen production, and just 10% of this fraction is green hydrogen[12].

Development is scaling fast: as of May 2024, 1,572 clean hydrogen projects representing US$680 billion investment by 2030 have been announced. Yet, actual investment commitments remain modest, with only 434 projects (representing 4.6 Mt) passing final investment decisions (FID), and only one third of these in Asia Pacific.

In aviation, the story is similar. SAF production reached just 0.2% of global fuel use in 2023, primarily from US and European facilities. Despite this, momentum is building, with 85 producers announcing 130 SAF projects across 30 countries[13].

Less than 1% of global shipping fuel is estimated to come from future fuels, with ships capable of taking these inputs a key constraint. As of July 2024, just 297 of the global fleet of 109,000 were operating with future fuels[14].

Early movers face major hurdles, including limited domestic supply chains and distribution infrastructure, and – most critically – uncertain demand for costly new fuels.

High future fuel costs are holding back the transition

Direct price comparisons are difficult. Energy prices are volatile, end-uses differ, and regional costs vary, but most future fuels typically cost three to ten times more than conventional fuels. The gap is widest for the synthetic fuels that are essential to decarbonise aviation and shipping.

While innovation, scale and efficiency gains will reduce costs, future fuels are likely to remain more expensive than fossil fuels in the medium and longer term. This is driven by renewable energy inputs, new infrastructure requirements, and entrenched fossil fuel subsidies (see chapter 5).

This is the core challenge policymakers face – new technology, market structures, and demand signals are necessary. But without addressing the price gap, progress will be slower and more expensive.

High production costs, price volatility, poor transparency, and limited low-carbon premiums for downstream products lower returns and create financial risk – complicating project investment.

Incentives matter, but the key issue is cost allocation and determining who pays. Policy must decide where costs fall between producers, consumers, and government. Fossil fuels will remain cheaper unless climate impact, air quality and other externalities are priced in. Carbon pricing, whether through tax, trading, or direct levies, won't solve everything, but it can go a long way towards closing the cost gap and funding early-stage scale up.

Key issues for policymakers

1) Set the policy roadmap and sequencing

Future fuel strategies need to be developed into national and sector-level roadmaps, policy action and funding. What's needed now is clear, coordinated policy and regulation that aligns fuel pathways, infrastructure and incentives across supply and demand, and across borders. This will give industry and investors the confidence to make long-term commitments.

Policymakers must also make pragmatic choices based on fuel readiness and cost. For example, blue hydrogen can accelerate early market and infrastructure development due to its lower cost, while production of clean hydrogen scales. Similarly, biofuels and methanol will likely play a more important role in the near-term decarbonisation of aviation and shipping before synthetic kerosene and ammonia become viable.

Given the significant investments required for transition fuels, policymakers must evaluate options to ensure that they do not lock-in technologies that are not viable in the long-term due to their higher carbon intensity.

Australia's hydrogen strategy: turning vision into investment

Australia is leveraging its strong resources base and proximity to growing Asian demand to become a global hydrogen leader. The 2024 National Hydrogen Strategy aims to build a substantial clean hydrogen industry and unlock over AUD$50 billion in private sector investment and create up to 16,000 new jobs by 2030[15].

With an AUD$225 billion project pipeline, Australia is now focused on delivery and key initiatives include:

- **Hydrogen Production Tax Incentive:** AUD$7 billion over 10 years to close the production cost gap.
- **Hydrogen Headstart:** AUD$4 billion to support large-scale clean hydrogen projects.
- **Regional hydrogen hubs:** co-investment in shared infrastructure across seven locations.
- **Project funding** from the Clean Energy Finance Corporation and National Reconstruction Fund.
- **Research and development (R&D) and innovation:** led by ARENA[16], alongside regulatory reform at state and federal levels.

In 2024, ARENA awarded AUD$814 million to the Murchison Green Hydrogen Project. The project will generate 3.7GW of renewable power for hydrogen and ammonia production, backed by federal and state support to streamline planning and approvals.

While momentum is building, the question remains whether the extensive policy support will be enough to break through the technical and financial challenges for this industry to reach scale.

2) Address technology readiness

Many of the technologies behind future fuels are in early development (see Figure 4). Challenges extend beyond production to fuel certification, infrastructure and downstream use. These issues increase the risk of project delay, cost overruns and underperformance – impacting investment decisions and cost.

Governments must help close the gap. Targeted support through R&D funding, tax incentives, venture capital and concessional finance can reduce risk for first movers and accelerate commercialisation.

Figure 4: Future fuel technology readiness, not including biofuels

Category	Sub-Category	Main Solutions	Technology Readiness Level (TRL)*	Comment
Fuel production	Synthetic fuel production	Synthetic kerosene production	6	Produced by Fischer-Tropsch synthesis (using H_2 and CO_2)
		Methanol production	7	Produced using H_2 and CO_2
		Ammonia production	8	Produced by Haber-Bosch (using H_2 and Nitrogen)
Feedstock	H_2 production	Electrolysis	9	Green hydrogen - electrolysis using renewable energy
	CO_2 capture	Solid direct air capture	7	Direct air capture based on solid adsorbents (at low temperature)
		Liquid direct air capture	6	Direct air capture using aqueous solutionn (at high temperature)
		Sustainable biogenic CO_2	11	Sustainable CO_2 from point capture (concentrated sources)
Engine technology	Aviation	Electric aircraft	5	Battery or Hybrid electric plane
		Hydrogen-fueled	6-7	Fuel cell or direct hydrogen combustion
		Kerosene-fueled aircraft	11	Commercial engines
	Maritime	Hydrogen-fueled ship	4-5	Combustion engines fuelled with hydrogen
		Ammonia-fueled ship	6	Combustion engines fuelled with ammonia
		Methanol-fueled ship	9	Combustion engines fuelled with liquid methanol
		Biogas-fueled ship	9-10	Combustion engines fuelled with liquified biogas
		Electric ship	9	On-board battery electric ships

Source: Deloitte analysis based on International Energy Agency (IEA) Technology Readiness Database[63]

**The International Energy Agency (IEA) utilises a Technology Readiness Level (TRL) scale to assess the maturity of energy technologies. This scale, ranging from 1 to 11, helps evaluate a technology's development stage and its readiness for practical application.*

3) Manage demand for renewable electricity

Future fuel production is energy intensive and relies on access to low-cost renewable energy. Electricity accounts for up to half the cost of green hydrogen.

From a transition perspective – direct electrification is more efficient than converting electricity into future fuels – policymakers must weigh up where renewable capacity delivers he greatest emissions reduction impact.

For economies with abundant, low-cost renewable electricity supply, future fuel production is viable. Other nations may need to prioritise domestic electrification and rely on importing low-carbon fuels to meet demand. Reliable access to zero-carbon energy is a critical decision point for project viability.

4) Build market infrastructure

Inconsistent standards and weak price signals are two significant barriers for future fuel markets. Definitions of future fuels vary by producer and country. Policymakers must set consistent standards that support ease of doing business and trade whilst ensuring certainty about fuel emissions intensity.

Price discovery is equally problematic. Conventional energy prices are distorted by subsidies, and there are no established low-carbon fuel premiums.

Governments can bridge the price gap through pricing support – such as production incentives in India or Australia, or auctions in the UK and Japan.

Some governments go further and act as market-makers. Germany's H2Global, acts as a market intermediary (see box). South Korea has pioneered auctions that can set a benchmark price, which included a 2024 round to secure 6,500GWh of long-term hydrogen supply for power generation[16].

Forging cross-border trade

H2Global is a cornerstone of Germany's strategy for energy independence and industrial decarbonisation. It bridges the cost gap between clean hydrogen producers and buyers. Through its intermediary, Hintco, it contracts long-term supply through competitive tenders and then resells to buyers via short-term auctions. The government covers the price difference, de-risking trade.

H2Global is supporting global hydrogen supply chains. In 2024, Germany and Australia deepened co-operation through an Energy and Climate Partnership. Cooperation covers R&D support and technology transfer and underpins trade between the two nations. The agreement included a joint €400m H2 Global-linked fund to support Australian hydrogen exports to Germany and Europe[17].

5) Stimulate new fuel demand

Without early buyers, projects struggle to secure financing. The absence of tradable markets and demand signals slows development, even where the long-term trend is clear.

Governments are helping to close this gap through mandates and quotas, shifting the cost burden to industry. Examples include the EU's ReFuelEU regulation which mandates 1.2% of aviation fuel be from sustainable sources by 2030, or India extending biofuel blending targets to aviation. However, without pricing support, the impact of mandates on end-consumer costs needs to be carefully managed.

The private sector is also stepping in. Large buyers are using bilateral offtake agreements – often in response to mandates or supported by incentives – to create demand, invest in supply and de-risk production. In aviation and shipping, these are being coordinated by the International Air Transport Association (IATA) and the International Maritime Organisation (IMO).

6) Coordinate industry infrastructure

Fuel supply chains need investment in distribution and infrastructure. While some fuels, like synthetic kerosene and biofuels, can use existing systems, others require purpose-built assets. Hydrogen, for example, needs dedicated pipelines, terminals and storage facilities due to its volatility and low density.

The policy challenge is aligning infrastructure with production. The EU's hydrogen plan regulates fuel transport and streamlines permitting, supported by national initiatives and investment to build distribution networks (see box). Fuel hubs offer a solution by co-locating R&D, production and demand to accelerate deployment. This is particularly important for air and port infrastructure.

The EU's hydrogen development policy: a potential case study for the region

The EU's comprehensive mix of regulatory, financial and industrial policy aims to build a clean hydrogen economy as a core part of its net-zero goal. Key regulatory measures include the Hydrogen and Decarbonised Gas package, Renewable Energy Directive III, Fit for 55 package, and Net-Zero Industry Act. These set binding targets, govern hydrogen infrastructure, define clean hydrogen and future fuels, and integrate these into energy and industry supply chains.

Financial support is provided through the European Hydrogen Bank, Innovation Fund, Important Projects of Common European Interest (IPCEI) and national schemes. These target production scale-up, cost-gap reduction and risk sharing for early stage projects. Infrastructure is supported through specific funds and mandates, including Hy2Infra for pipelines and storage. Certification frameworks are being developed to define clean future fuels and underpin cross-border trade.

Demand creation is driven by mandates and targets in industry and transport (e.g. ReFuelEU Aviation) and carbon pricing (through the EU Emissions Trading Scheme (ETS). However, delays in certification, slow permitting, high prices and offtake uncertainty continue to hold back final investment decisions. Despite strong policy architecture and rising investment, few projects have progressed. Demand-side policy implementation and infrastructure build-out remain critical gaps to address[18].

7) Align with global industry transitions

Aviation and maritime shipping are global industries with concentrated and mature supply chains. National roadmaps need to align across airlines and shipping firms, fuel suppliers, ports and global engine, ship and aircraft manufacturers.

For drop-in fuels like biofuels, mandates and subsidies must match realistic demand and supply forecasts. But transitions involving hydrogen, ammonia or methanol require new infrastructure, craft and engines. Policy must reflect the readiness of end-use technologies – underscored by Airbus's recent delay of hydrogen aircraft, citing slower market development[19].

Accelerating the future fuel industry across Asia Pacific

With a diverse mix of resource-rich producers and a growing need for alternative fuels across the region, there is opportunity for Asia Pacific nations to work together to accelerate the future fuel economy.

Coordinate policy frameworks

The region should agree on standards, definitions, and carbon pricing to enable certification, transparency, and ease of trade. Latin America offers a model where 14 nations developed a common certifications scheme for clean hydrogen, CertHiLac, to support regional integration[20]. Progress may also come through sectoral agreements, such as the IMO's recent global marine fuel standard and emissions pricing framework.

Supply chain and trade partnerships

Deepening trade relationships means aligning incentives, supporting cross-border investment and co-investing in trade infrastructure to enable long-term fuel flows.

Finance and technology transfer

Finance needs to flow into projects and partnerships. Development finance, joint ventures and technology transfer can accelerate local production, export readiness and regional transition to future fuels.

Bridging the future fuels cost gap

Future fuels offer two major benefits: they cut emissions from hard-to-abate sectors and create a new low-emissions industry than enhances energy security.

To reap these benefits, governments face the complex problem of closing the price gap with fossil fuels, and managing competing energy uses to maximise emissions reduction.

Policy Approaches

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].

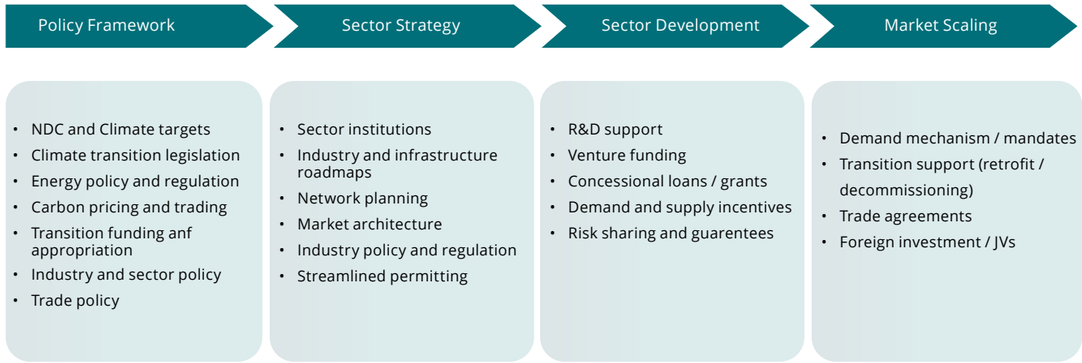
Policy making must set direction and mobilise industry and capital

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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