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Rising to the Energy Challenge in Asia

A review of policy trends on energy transition technologies across the region

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The energy challenge in Asia – to meet massive energy demand growth, while drastically reducing greenhouse gas emissions in line with targets under the Paris Agreement – is the eye of the needle for the world's climate challenge.[1] For regardless of decarbonization efforts in the U.S., Europe, or elsewhere, the world will not reach net zero without Asia playing its part. Energy transition technologies - including Carbon Capture and Storage (CCS), low carbon hydrogen, and biofuels - have a unique role to play in reducing emissions from hard-to-abate industries, some of which are intrinsic to energy access and affordability, as well as economic growth. Though interest and support for energy transition technologies in Asia is growing, developing viable pathways for the technologies' value chains is a complex Rubik's-cube with intersecting technical, commercial, and policy challenges. In the absence of widespread climate policies to provide a strong carbon price incentive, and with 2030 climate commitments coming into view, clear and practical policy support is urgently needed to drive clean energy investment and solutions that can help forge an accelerated decarbonization pathway.

The evolving energy landscape in Asia

Energy demand in southeast Asia has grown by more than 80 percent since 2000, and with a trajectory of continued economic and population growth, is set to triple by 2050. [2, 3] Many countries in Asia – including China, Indonesia, and Singapore – are yet to reach peak emissions. To date, this rising energy demand has been met by increasing fossil fuel usage, which makes up some 80 percent of the energy mix, including heavily polluting coal-fired power plants, and a legacy of fossil-fuel subsidies.[4] The emission intensity of Asian economies is currently 41 percent higher than the rest of the world.[5]

At the same time, as one of the world's most climate-sensitive regions, nearly all countries in Asia have commitments in place to reduce emissions and achieve net zero or carbon neutrality under the Paris Agreement, mostly by mid-century (China and Indonesia by 2060).[6] Over three-quarters of Asia's emissions are covered by net zero targets enshrined in official Long-Term Strategies under the Paris Agreement.[7] Promisingly, some of the region's biggest economies, such as China, Japan, Indonesia, Singapore, Thailand, and Vietnam, have committed to significant 2030 GHG reduction targets.[8]

Progressing towards these targets will require a range of decarbonization options and pathways. There is appetite in Asia to switch from coal to gas, and governments have increased the role of renewable power in national energy development plans.[9, 10] Other decarbonization pathways include improvements in energy efficiency, electrification of industrial processes, and changes in land management and agriculture. Yet these efforts on their own will not be sufficient.

Energy transition technologies - including CCS, low carbon hydrogen, and biofuels - have a unique role to play in addressing emissions from hard-to-abate industries in Asia. [11] Industries such as cement, steel, aviation, maritime shipping, and long-haul trucking are significant carbon emitters but face practical difficulties in incorporating renewable energy sources into their operations. Or, if not using renewables for decarbonization, they would require CCS retrofits, access to low-carbon fuels produced from captured CO_2 and hydrogen, or access to carbon offsets achieved via engineered carbon removals.

From a Just Transition perspective, developing countries in the region believe they have the right to benefit from their natural resources, just as industrialized countries have done to date, strengthening the case for CCS and potentially achieving low-cost CO_2 storage by repurposing existing oil and gas infrastructure. Meanwhile, countries at the forefront of considering hydrogen derivative imports such as Japan, South Korea, and Singapore see the value of a more diversified energy mix, with an over-reliance on imported gas and renewables an energy security concern.

Policy support is needed to drive investment in energy transition technologies ahead of 2030 targets

Realizing the promise of lower carbon technologies requires innovation and investment across the value chain for these to be commercially viable. In the U.S. and Europe, coherent climate and decarbonization policies, alongside dedicated legislation and incentives, are working together to drive the current surge in low carbon technology projects. The absence of an overarching regulatory body has slowed this process in Asia. Though nascent Emissions Trading Systems (ETS) and carbon pricing is in place in some countries, there is unlikely to be a sufficiently high carbon price to create a strong enough market signal for CCS and hydrogen market development before 2030.[12, 13] With 2030 targets in view, many governments are taking steps to provide policy clarity and the support needed to help drive top-down market development and win-win solutions.

We observe the following current policy trends:

Policy trend 1: CCS and hydrogen are increasingly part of national decarbonization strategies – clear and practical regulations are now needed to support project development

The role of CCS and hydrogen are increasingly recognized as potential solutions in national decarbonization strategies across the globe. There is momentum in some countries in Asia – in particular, Australia, Indonesia, and Malaysia – towards developing regulatory frameworks for CCS. Hydrogen is part of the strategic thinking of countries across the region, but sector-specific targets and more detailed regulations are largely yet to be developed.

Australia, Indonesia, and Malaysia are three countries positioning themselves to provide regional storage hubs for carbon imports. All three are at different stages of developing regulatory regimes to support this. In Australia, high-level policy drivers for CCS include 2023 reforms to Australia's Safeguard Mechanism, which targets a decline in baseline emissions of 4.9 percent per year to 2030, as well as Australia's Strategic Energy Policy (Powering Australia Plan), which explicitly acknowledges a role for CCS and mandates that the development of all new oil and gas reservoirs be net zero, effectively requiring the use of CCS.[14], [15] All necessary regulations are in place to enable CCS projects (licensing, access to pore space, long term liability etc.) and some 16 CCS projects are already in development.[16]

Indonesia has also developed dedicated CCS regulations. Its 2023 framework is based on its upstream oil and gas regulation and encompasses technical and legal requirements for safe and secure CO_2 storage, alongside business and economic aspects (e.g., how the commercial business case for CCS activities might be developed).[17] Malaysia has also indicated an interest in providing regional CO_2 storage. Malaysia's national oil-company and lead on CCS, Petronas, took foreign direct investment on Kasawari, the country's first CCS project off the coast of Sarawak in November 2022, with the first injection planned for 2026. CCS projects are currently regulated using existing national legislation. However, the government has recently acknowledged the need for dedicated regulation.

Six countries - Australia, India, Japan, China, South Korea, and Singapore - have national hydrogen strategies in place and a further 11 are developing their own. Australia is currently revising its original 2019 National Hydrogen Strategy, which is expected to focus on domestic use cases to support its continued drive to be a global exporter of green hydrogen. In May 2023, the South Australian Government announced a proposal for 'world first' hydrogen and renewable energy legislation, which would streamline regulatory processes throughout the lifespan of renewable energy and hydrogen production projects.[18]

Other frontrunners in Asia's hydrogen market – Japan, South Korea, and India – have recently updated their hydrogen strategies with more ambitious targets and some stronger elements of policy support. Japan released a revised Hydrogen Basic Strategy in June 2023 setting out a 'pathway' to low-carbon hydrogen (i.e., 3.4 kg of CO_2 emissions or less for 1 kg of hydrogen produced) and a 10 percent target for Japanese companies' share of the global electrolyser market.[19] South Korea's revised strategy aims for green hydrogen to comprise 7.1 percent of the country's energy mix by 2036.[20] A major focus of South Korea's roadmap is hydrogen for mobility applications, with the goal of producing 30,000 hydrogen-powered commercial vehicles by 2030. India's 'National Green Hydrogen Mission' issued in January sets an ambitious target of producing at least 5 million metric tonnes (MMT) of green hydrogen annually by 2030, with the potential to reach 10 MMT per annum to supply 10 percent of the global export market for green hydrogen.[21]

Policy trend 2: Governments are cautiously putting financial incentives and revenue mechanisms in place – but more targeted and substantial incentives are still needed

The US Inflation Reduction Act's $370 billion package of subsidies for clean energy developers, including a generous $3 per kilogram subsidy for green hydrogen production over 10 years, and a tax credit to incentivize the use of CCS technologies, has spurred governments in Asia to update their strategies and strengthen incentives.[22]

The Japanese government is spearheading incentives for hydrogen development. In its revised strategy, Japan committed to spend $20.3 billion over the next 15 years to subsidize cleaner hydrogen production.[23] There are two subsidy schemes expected to commence this year: first, a supply-side Contract for Difference (CfD) subsidy providing support for the price gap between the sourcing of low carbon hydrogen and its derivatives as compared to conventional fuels; and, second, an industrial development support subsidy scheme, providing subsidies for the development of specific industrial areas (or 'clusters') that have the capacity to accommodate large-scale hydrogen/ammonia projects.[24] The dual subsidy approach seeks to stimulate both demand and supply side needs, avoiding a historical 'chicken-and-egg dilemma'.

Other governments cautiously putting financial incentives in place include Singapore which recently announced a Future Energy Fund of an initial $3.7 billion to spur its transition to cleaner fuels, acknowledging that this cannot be achieved by the private sector alone. Australia's latest budget details a Hydrogen Production Tax Incentive providing US $1.33 per kilogram of renewable hydrogen produced between 2027-2040, for up to ten years per project.[25, 26] The budget also adds to the $1.3 billion Hydrogen Headstart program, which provides a production credit to renewable hydrogen projects over 10 years to help bridge the commercial gap between the cost of producing renewable hydrogen and the market price.[26] India is providing US $2 billion in funding support for hydrogen under its National Green Hydrogen Mission and is planning to release a CCS policy later this year with targeted incentives. [27, 28] The country is also working on a framework for carbon credit exports, linking green hydrogen production in India in exchange for investment and purchase deals with countries such as Japan.

Malaysia was the first country in the region to offer specific CCS incentives in its 2023 Budget in the form of tax allowances for CCS capex spending. Malaysia also offers CCS providers a so-called Investment Tax Allowance (ITA) of 100 percent for 10 years and full import duty and sales tax exemptions on necessary equipment from 2023 to 2027.[29, 30] In Australia, CCS projects can earn Australian Carbon Credit Units (ACCUs) if they meet the Clean Energy Regulatory eligibility criteria (including, for example, that the project follows an approved method for estimating emissions reductions); however, Australia's abolition of a carbon price some years ago means there is still a lack of incentive for domestic emitters.[31]

Policy trend 3: International cooperation on energy transition technologies is growing, including early-stage work on cross-border agreements vital for establishing their value chains

For CCS, Asia's geography lends itself to the export of captured CO2 from highly emitting countries with little storage space such as Japan, South Korea, and Singapore, to countries with abundant storage capacity such as Australia, Indonesia, and Malaysia, that are already positioning to provide regional storage hubs. For hydrogen, the region has both production and consumption potential. Many countries are selecting international partners and establishing initial agreements that could lead to more formalized treaties.

Policy progress can be seen in Indonesia's announcement at the start of 2024 that it will allow CCS operators to set aside 30 percent of their storage capacity for imported CO2, with the government to collect royalties from storage fees charged by the CCS operators.[32] Indonesia has since signed an agreement with Singapore to work towards a legally binding

bilateral agreement on the cross-border transport and storage of CO2 to the country and is reportedly in similar discussions with others.[33]

The Singaporean government recently announced that it has selected an S-Hub consortium (Shell and ExxonMobil) to plan and study the feasibility of developing a first of its kind, cross-border CCS project from Singapore.[34] The S-Hub project is the first CCS project to be considered by the government and will focus on the capture and aggregation of CO2 for transport out of Singapore, with a planned start date of 2030. The regulatory process will be developed in parallel with Singapore CCS Hub engagements.

Malaysia has established bilateral agreements with key importing countries both on CCS (including with Japan and South Korea) and low-carbon hydrogen value chains, in line with its recently launched Hydrogen Economy and Technology Roadmap.[35] For example, Singapore gas supplier City Energy and Gentari last year signed a feasibility study for a hydrogen pipeline between Malaysia and Singapore to be operational as early as 2027.[36]

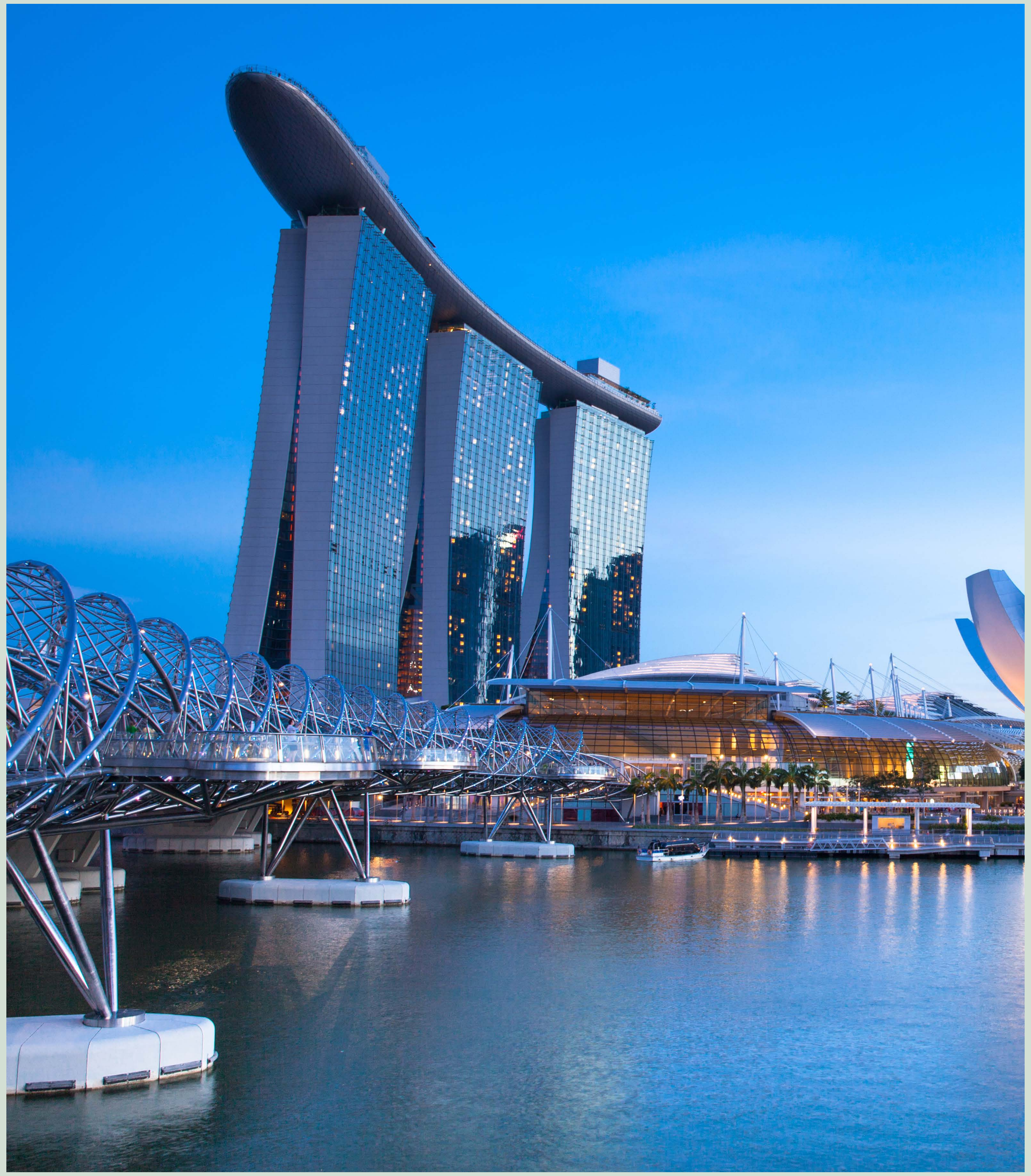
An initiative by the Asia Natural Gas Association (ANGEA) – a regional industry body of oil and gas players, many of whom have an interest in CCS - is also noteworthy. ANGEA is leading a two-year 'Cross Border Carbon Reduction Accreditation Study' to build understanding and consensus towards a regulatory and policy framework that would guide how C02 emission reductions are accredited and certified across the region. As part of the study, ANGEA will convene key stakeholders in government, industry and NGOs across Asia Pacific to understand possible methodologies and engage on issues such as which bodies are responsible for accreditation, what standards and accreditation will be used, how government will ratify carbon credits, how double-counting can be avoided, how certificates might be applied in different jurisdictions and, crucially for cross-border projects, which country would take credit under its Nationally Determined Contribution (NDC).[37]

A potential obstacle to cooperation on cross-border carbon transport is government or public opposition to importing or storing carbon from other countries, especially if carbon is perceived as a form of waste. There is work to be done at both national and local levels to understand the attitudes and concerns of different stakeholder groups towards energy transition technologies and proactively engage them to strengthen support.

Policy trend 4: Governments recognize the need for collaborative approaches – creating huge opportunity for industry to shape a supportive environment for project development

Collaboration is increasingly highlighted by government and business leaders alike as key to the success of low carbon technologies. The development of a multi-billion-dollar next generation energy system is a complex, multistakeholder challenge. Collaboration can help bring on new technologies, reduce counter-party risks, build efficiencies, lower costs and, importantly, contribute to constructive policy development to support project development. Similarly, developing shared infrastructure for CCS and hydrogen within Asian industrial clusters will require seamless collaboration between various emitters, project developers, infrastructure providers, local and national governments, and the finance sector to navigate the "chicken and egg" dilemma that has historically plagued such projects.

Though the geopolitics of the region can feature bilateral competition and mistrust, Asia is also very good at collaborating. There are many examples of collaborative initiatives between governments and industry (including national and international energy companies) to further clean energy ambitions, including a recent proliferation of feasibility studies. Deeper and more innovative collaborative efforts between government, civil society, and industry stakeholders along the value chain may hold the key to unlocking viable pathways for clean energy technologies to succeed.



Conclusion

Enery transition technologies – including CCS and low-carbon hydrogen - could play a critical role in helping Asia to achieve an accelerated decarbonization pathway. In the absence of a clear market signal for decarbonization in Asia, well-crafted policy support and incentives are needed for these technologies to attract investment, support project development (including by early-movers), and bring value chains to life. With many potential value chains reaching across borders, new bilateral agreements will be needed to govern these arrangements. Importantly, governments and policy-makers cannot achieve these changes in a vacuum – the experience and acumen of companies is vital in helping to shape this enabling environment, whether through direct engagement or more innovative and collaborative approaches that leverage the interests of a wider range of stakeholders. The promise of energy transition technologies in Asia calls for unique solutions drawing from the best of international and in-country knowledge, networks, and expertise.

Endnotes

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