



Asian Insights SparX

Environmental, Social and Governance

Refer to important disclosures at the end of this report

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17 Jun 2022

Aligning taxonomies is key to energy transition

- Annual global green investment has to triple in the next few years to achieve net zero emissions by 2050
- Higher transparency and efforts to clarify criteria will grow green finance market further
- [CNOOC](#), [Sinopec](#), [PT Indo Tambangraya](#), [Adaro](#), [ENN](#) and [Towngas Smart Energy](#) will see faster progress towards decarbonisation

More green investment is needed in Asia. Global investments in energy transition reached a new record at US\$755bn in 2021, up 26.9% from 2020, according to Bloomberg NEF. Energy and transportation accounted for >80% of total investment. But global investments must triple between 2022 and 2025 to achieve global net zero emissions by 2050. China's "1+N" policy framework will require green investment of Rmb140tn (US\$21tn) by 2060 while Indonesia targets investments of US\$100bn by 2050.

Aligning taxonomies to boost Asia's green finance market.

Despite the heated debate over the inclusion of gas nuclear projects in the EU Taxonomy, China and ASEAN have made significant progress in formulating their taxonomies (or interpretation of green projects) and enhancing disclosures. With the gap against international practices narrowing, we believe cross border green capital flow will increase between the EU and Asia.

Leaders in energy transition. We have identified CNOOC (883 HK), Sinopec (386 HK), PT Indo Tambangraya (ITMG IJ) and Adaro (ADRO IJ) as leaders given their robust capex and progress in green investments. Chinese gas companies ENN (2688 HK) and Towngas Smart Energy (1083 HK) have a commendable presence in integrated/new energy.

HSI: 21,308.21

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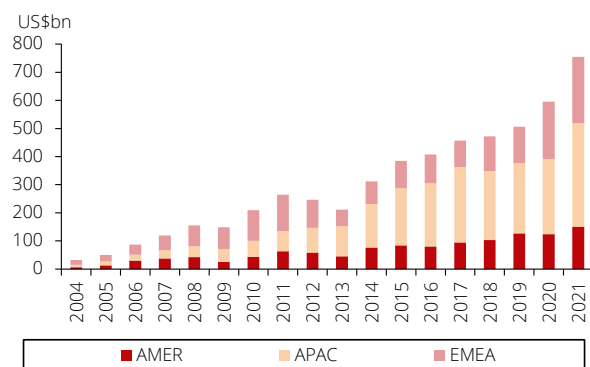
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Global investment in energy transition by region



Source: BloombergNEF, DBS Bank



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The DBS Asian Insights SparX report is a deep dive look into thematic angles impacting the longer term investment thesis for a sector, country or the region. We view this as an ongoing conversation rather than a one off treatise on the topic, and invite feedback from our readers, and in particular welcome follow on questions worthy of closer examination.

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Note: Prices used as of 15 Jun 2022

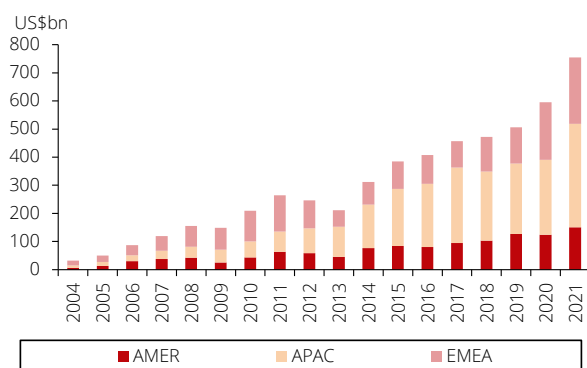
Investment for green transition

Record high investments in low-carbon energy transition.

With wildfires, heat waves and flooding growing in frequency and intensity, climate change-related weather events caused more than US\$630bn in economic damage globally between 2016 and 2018, according to data from Munich Re. There is increasing attention being placed on climate change from regulators, governments, and investors.

Global investments as we transition to a low-carbon energy system are hitting record highs each year. BloombergNEF data showed that global investment in low-carbon energy transition amounted to US\$755bn in 2021, up from US\$595bn in 2020. In particular, the Asia Pacific region recorded the highest y-o-y growth in investments at 38% to US\$368bn (see below).

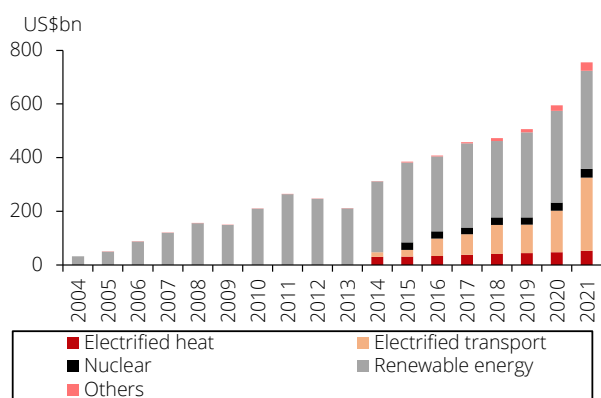
Global investment in energy transition by region



Source: BloombergNEF, DBS Bank

While renewable energy still has the largest share in total investments (48.5% in 2021), the increase in investment in electrified transport was also substantial, from 26% of total investments in 2020 to 36.2% in 2021 (see below).

Global investment in energy transition by sector



Source: BloombergNEF, DBS Bank

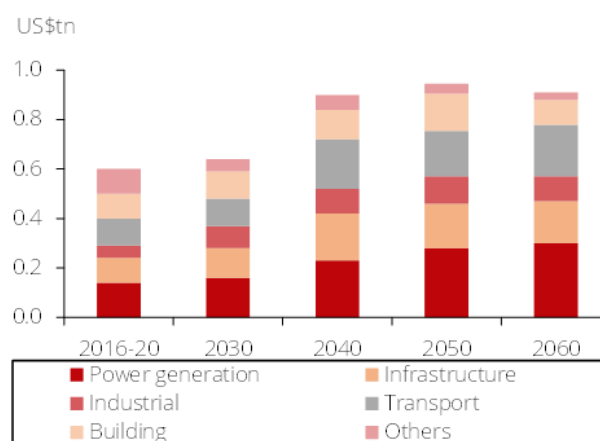
More is needed. To be on track for global net zero by 2050, according to Bloomberg's New Energy Outlook, investments must triple in the next few years to reach US\$2,063bn between 2022 and 2025, about three times the amount in 2021. In this report, we will study how China, Indonesia and Singapore seek to achieve their net zero targets in the coming few years.

China: "1+N" policy framework

Key framework. With two major carbon emission targets (i.e., reaching peak carbon by 2030 and carbon neutrality in 2060), China has a "1+N" policy framework where "1" refers to the major document, titled 'Opinion on the Full Implementation of the New Development Philosophy in Carbon Dioxide Peaking and Carbon Neutrality (关于完整准确全面贯彻新发展理念做好碳达峰碳中和工作的意见)' and "N" refers to various documents to be released to govern the development of high-carbon industries. The first "N" document released was the Action Plan for Reaching Carbon Dioxide Peak Before 2030 (2030年前碳达峰行动方案).

Under these two key documents, China has various targets to achieve, such as (i) carbon emissions in GDP to decline 18% by 2025 from the level in 2020, and 65% from 2005 by 2030, (ii) non-fossil fuel energy consumption to be around 25% of the total by 2030, and (iii) total installations of wind and solar power to reach 1,200GW by 2030, etc.

Cumulative green investments required in China



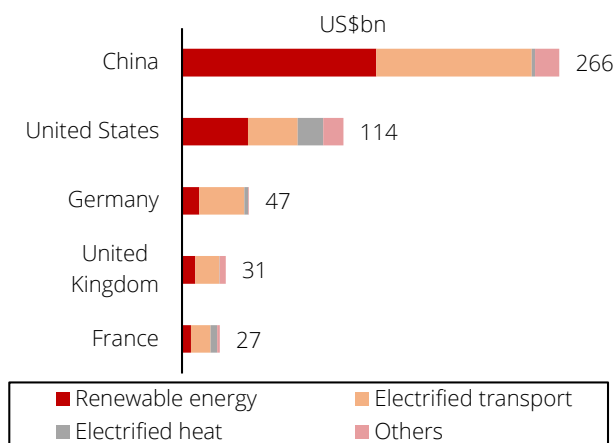
Source: International Energy Agency, DBS Bank

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According to a study made by Tsinghua University in October 2020, **China's decarbonisation efforts will require investment of around Rmb140tn by 2060**. Annual investment is estimated to account for around 2% of GDP. According to the report, titled Carbon Neutrality Roadmap of China Energy System by the International Energy Agency, 25-35% of green investment will be spent on power generation. The percentage will be even higher at 45-55% if spending on power infrastructure is included. Most of the investment will be made after 2030. Apart from investment in infrastructure, there would be significant spending on technologies relating to bioenergy, hydrogen, carbon capture, utilisation, and storage (CCUS), etc. As these technologies mature, application and deployment will be broadened.

Data from Bloomberg NEF shows that **China topped in investment in energy transition in 2021 (US\$266bn)**, followed by the US (US\$114bn) and Germany (US\$47bn) (see below). Most of the investment made in China was spent in renewable energy and transport sectors.

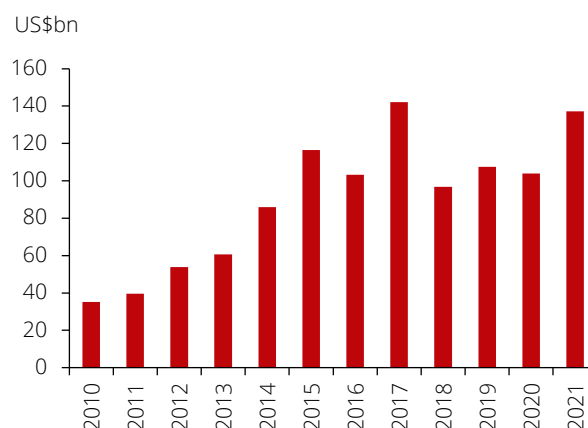
China has the highest investment for energy transition in 2021



Source: Bloomberg NEF, DBS Bank

While China government's policy to increase the adoption of renewable energy has been supportive, the financial pressure on the government from climbing subsidies has indirectly resulted in volatility in investment on renewable energy. Nevertheless, with all renewable projects to be at grid parity, i.e., nil subsidies, investment is expected to be on an uptrend going forward.

Historical investment in renewable energy in China

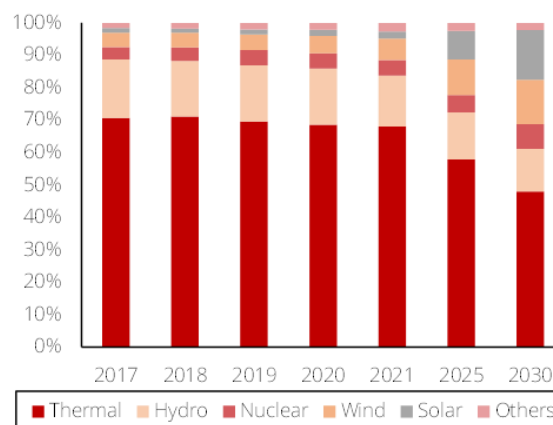


Source: Bloomberg NEF, DBS Bank

Rising contribution of green electricity to total electricity generation. Investments in solar and wind energy over the past few years have resulted in an increase in power generation from around 390bn kWh in 2017 to 750bn kWh in 2021, and contribution has risen from 5.9% of total electricity generation to 8.8% in 2021. We expect electricity generation from solar and wind power to increase further to around 13% in 2025 and 20% in 2030. Coupled with hydropower and nuclear power, green electricity percentage is expected to increase from 28% of total electricity generation in 2017 to around >40% in 2030.

To achieve these targets, the required amount of investment is estimated to be at least Rmb10tn within this decade. We believe more investment will be required along the value chain, i.e. upgrade of grid networks and existing coal-fired power plants, power storage and other auxiliary facilities.

Rising percentage of green electricity in China



Source: CEIC, DBS Bank

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Indonesia: Going green while leveraging on the commodities price uptrend

Increasing focus on green transition despite Indonesia being a key beneficiary of strong commodity prices.

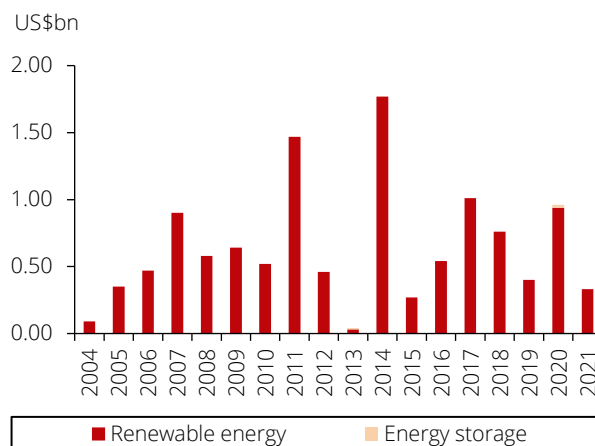
Despite commodities (e.g., thermal coal) being Indonesia's key export backbone for so many years – with China ready to absorb any additional coal volumes from Indonesia given its strong demand for coal – Indonesia is ready to focus on its energy transition initiatives and carbon emission reduction challenges. Initiatives such as incentives for coal gasification/downstream investments, progressive royalties, carbon tax and Indonesia's ambitious targets in renewable energy investment has sparked various discussions on life after coal.

For coal, Indonesia has imposed higher royalties on higher coal prices to cap the upside for coal miners while collecting export revenues from coal for newly approved IUPK¹ licenses. The royalties have also incentivised coal miners to consider gasified coal, or other alternatives such as Independent Power Plant (IPP) investments. Meanwhile, coal-fired power plants are now offered to participate in early retirement schemes, where the IPP is entitled to receive the remaining future cashflows in the concession period according to the power purchase agreement. This enables coal miners to consider using the additional capital/funds to invest in renewable energy projects.

Targeted green investment of US\$100bn by 2050.

Indonesia's Investment Coordinating Board has targeted US\$100bn in green investments to meet Indonesia's Sustainability Development Goals and climate change action. According to data from BloombergNEF, less than US\$5bn of investments was made in energy transition in Indonesia in the past five years.

Investment in energy transition in Indonesia



Source: Bloomberg NEF, DBS Bank

Indonesia's roadmap to net zero emissions and investment potential

2021: Presidential Regulation (Perpres) on New Renewable Energy (NRE), Presidential Regulation on Retirement Coal, co-firing PLTU, CCT, Conversion of diesel-fueled power plants (PLTD) to gas & NRE

2022: Renewable Energy Act, electric stove 2 million RT/y

2024: Interconnection, smart grid & smart meter

2025: NRE 23% dominated by solar power plants (PLTS)

- Electrification ratio 100%
- Electricity 1,217 kWh/capita

2031: Retirement of subcritical coal plants phase 1, COD of interconnection between islands

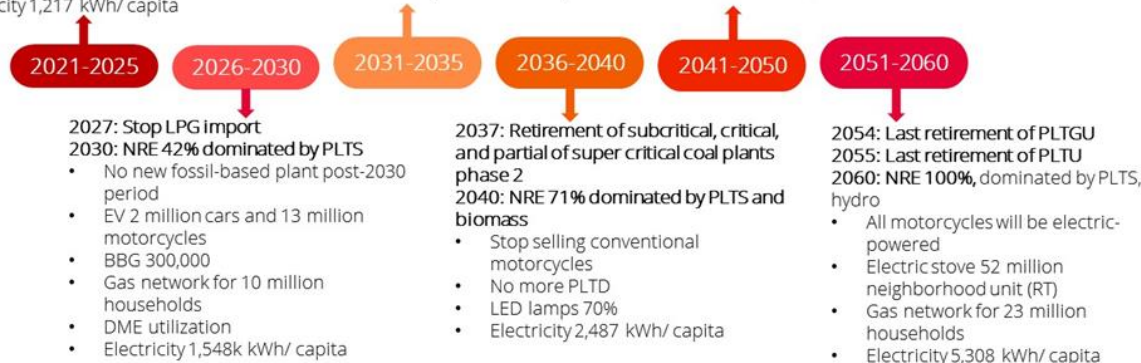
2035: NRE 57% dominated by PLTS, hydro, geothermal

- Electricity 2,085 kWh/capita

2045: First PLTN to start COD

2050: NRE 87% dominated by Biomass and PLTS

- Stop selling conventional cars
- Electricity 4,299 kWh/capita



Source: Bloomberg Finance LP., MEMR, DBS Bank

¹ Special mining business permit aka IUPK

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Driving forces behind Indonesia's green energy transition. In the case of Indonesia, green energy investing is interlinked with the country's energy mix agenda, decarbonization goals, and the improvement of its national trade surplus. Indonesia produces, consumes, and exports coal. Simultaneously, Indonesia also imports more than half of its domestic energy consumption in the form of fuel, liquefied petroleum gas (LPG) and liquefied natural gas (LNG). Through green energy investments, Indonesia is able to improve both its trade surplus and energy mix.

Indonesia has ample unutilized renewable energy potential

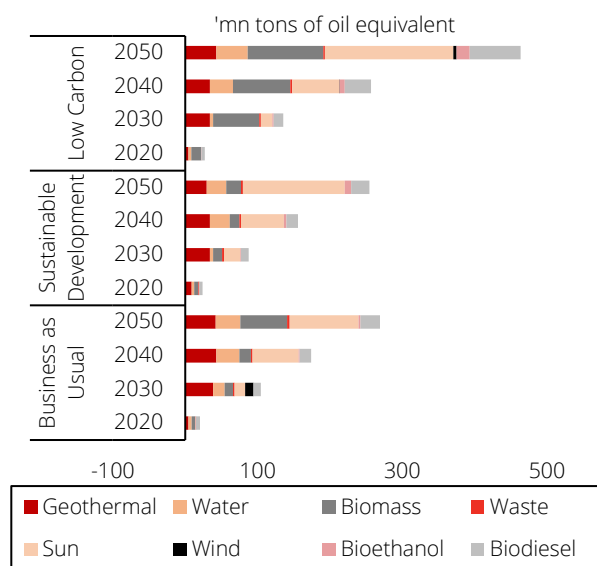


Source: Coordinating Ministry of Maritime and Investment Affairs Republic of Indonesia, DBS Bank

Improving energy mix. The green investment initiatives are in line with Indonesia's long-term plan to increase the mix of gas and renewable energy to 22% and 23% respectively in 2025, before further increasing to 24% and 31% in 2050, from 2021's contribution of 19% and 11%. Meanwhile, the Indonesian government has also targeted renewable capacity to reach 437.4 GW by 2050 vs. current installed capacity of 10.5 GW.

Coal gasification projects initiatives. Another key initiative is to expand coal gasification projects in Indonesia, which will help to reduce Indonesia's LPG imports. Currently, Indonesia consumes 8m tonnes of LPG annually, of which 6m tonnes is imported due the lack of natural gas availability and LPG refining facilities in Indonesia.

Solar panel will also contribute a significant portion to Indonesia's renewable energy initiatives



Source: Bloomberg Finance L.P., MEMR, DBS Bank

Solar energy initiatives. Another key green investment project is Indonesia's ambitious large scale household solar panel energy scheme. However, despite rich solar resources in Indonesia, the grand scheme is unavailable to take off due to several key considerations such as PT. Perusahaan Listrik Negara (State Owned Electricity Company, PLN)'s revenue losses, and IPP power plant take or pay agreements.

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Singapore: Five key pillars in the green plan

A green national agenda. Singapore made an international commitment to hit peak carbon dioxide emissions at 65m tonnes by 2030, halve emissions to 33m tonnes by 2050, and achieve net zero emissions as soon as viable in the second half of the century. The Singapore government has set out a clear roadmap to invest for a greener future. Singapore Green Plan 2030 charts ambitious and concrete targets to advance Singapore's national agenda on sustainable development. The five key pillars under the Green Plan comprise: 1) City in Nature; 2) Sustainable Living; 3) Energy Reset; 4) Green Economy; 5) Resilient Future.

Bulk of investment is expected to be ploughed onto the Energy Reset strategy. By 2030, Singapore plans to increase solar energy deployment by five-fold to at least 2 gigawatt-peak (GWp), to meet around 3% of 2030 projected electricity demand and generate enough electricity to power more than 350,000 households a year (1.5 GWp by 2025, to meet around 2% of 2025 projected electricity demand and generate enough electricity to power more than 260,000 households a year). There are also plans to deploy 200 MW of energy storage systems beyond 2025, to power more than 16,000 households a day. It targets to have a diversified electricity supply with clean electricity imports.

On the cleaner energy vehicle front, all new car and taxi registrations must be cleaner-energy models from 2030. To facilitate the adoption of electric vehicles (EVs), the government targets to install 60,000 charging points nationwide by 2030, including 40,000 in public carparks and 20,000 in private premises.

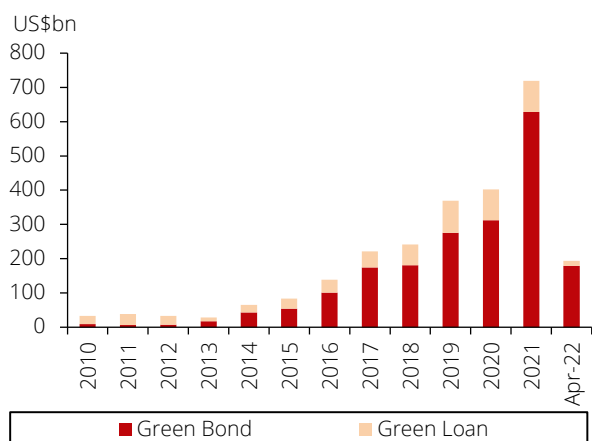
Raising carbon tax to accelerate decarbonisation initiatives. Singapore is committed to achieve net zero emissions by or around mid-century. The government plans to raise carbon tax rate to S\$25 per tonne (t) from 2024, a significant jump from S\$5/t currently. This will be followed by an increase to S\$45/t in 2026 and 2027 and potentially S\$50-80/t by 2030, a 5-fold increase from its original plan to raise carbon tax to S\$10-15/t.

Based on Energy Market Authority (EMA), Singapore's power plants emitted approximately 0.408 kg CO₂/kW in 2020. Assuming 12GW capacity, carbon tax collectable could be S\$700-2,250m per annum (from ~S\$140m currently) assuming tax rate of S\$25-80/t. Part of the carbon tax could then be channelled to green investments, in our view.

Growing the green finance market

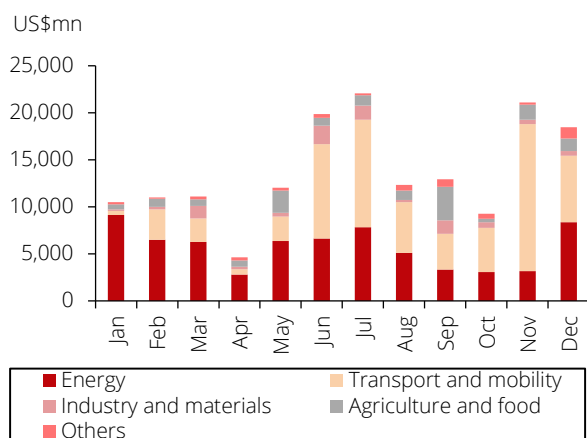
Green financing to play a more pivotal role in the green agenda. While public finance will continue to play a key role in pushing green investment, a substantial part of financing will have to come from the private sector. In fact, green finance is considered a key element to tackle not just the problem of climate change but also biodiversity loss as it provides incentives to shift investments towards green projects. Data from BloombergNEF showed that corporate finance deals raised US\$165bn for all climate-tech sectors in 2021. The energy sector raised the largest amount (41.5% of the total), closely followed by the transport and mobility sector (40.8%).

Robust growth in global green finance market



Source: Bloomberg NEF, DBS Bank

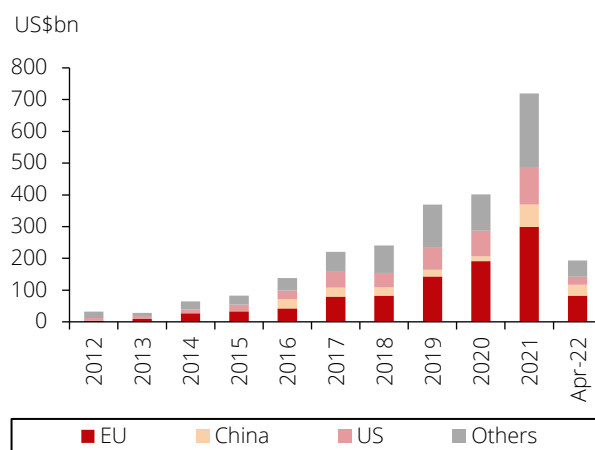
Global climate-tech fund raising dominated by transport and energy sectors (2021)



Source: Bloomberg NEF, DBS Bank

The global green financing market has grown over 20 times in the past decade. Green financing, including green bonds and loans, jumped from US\$32.4bn in 2012 to US\$719.8bn in 2021, according to BloombergNEF. Green bonds accounted for over 75% of total green finance globally during this period. In 2021, over 40% of green finance came from the EU but growth of **China's green finance market was the strongest at over three times**.

Substantial growth in China's green finance market



Source: Bloomberg NEF, DBS Bank

Challenges in green financing

Notwithstanding the jump, green finance only accounted for around 4% of the total finance market in 2021 (around 0.1% in 2012). There is no doubt in the huge growth potential of green financing, but the proceeds of green finance are increasingly used for general-purpose, or even carbon-intensive activities, defeating the purpose of green finance. In extreme cases, some firms have even exaggerated or falsified their environmental commitments in order to gain access to green capital. These **greenwashing activities have deterred green capital from flowing into carbon reduction projects**, resulting in an ineffective allocation of green capital and slower progress of decarbonisation.

Another major challenge faced by the green finance market is **the lack of standardisation and loose regulations on disclosure of environmental, social and governance (ESG) data**. The quality of disclosed ESG data also varies. These have made comparison and evaluation of ESG performance difficult, leading to inaccurate risk assessment by investors and banks. In particular, the

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interpretations of “green projects” or “sustainable business activities” differ amongst jurisdictions. This has created a lot of confusion, holding back firms’ ability to quantify and convey their sustainability performance effectively to investors and regulators, hence limiting their access to capital.

Better alignment across jurisdictions needed

Several initiatives have been made to resolve the above issues, for example the introduction of G20 Sustainable Finance Roadmap (Roadmap) by G20 Sustainable Finance Working Group. The Roadmap lists out key priorities for G20 members and other international organisations to **help scale up private and public sustainable finance to aid the implementation of the Paris Agreement and 2030 Agenda for Sustainable Development.**

Another example is the formation of the International Platform on Sustainable Finance (IPSF), which is a global effort to ensure greater consistency between the different frameworks and tools of the capital markets among the 18 members. These members represent 55% of greenhouse gas emissions, 50% of the world population and 55% of global GDP. While respecting national and regional contexts, **IPSF aims to promote integrated markets for environmentally sustainable finance** and members are encouraged to go further to align their initiatives and approaches.

In addition, the International Sustainability Standards Board (ISSB) was endorsed by the Roadmap as a **comprehensive global baseline of sustainability-related disclosure standards.** This will help investors and other capital market participants make informed decisions with better information regarding companies’ sustainability-related risks and opportunities. The first set of international consistent reporting standards on climate information will be issued by ISSB by the end of 2022. This standard is expected to be incorporated into domestic regulations of many key countries.

Enhanced collaboration between the EU and China

The EU is the leader in combating and adapting climate change with various comprehensive and stringent legislative measures, regarded as “gold standards” for green investing. Under the EU’s Sustainable Finance Action Plan, EU taxonomy² was established to reorient capital

flows towards green projects while the Sustainable Finance Disclosure Regulation and the Non-Financial Reporting Directive were created to enhance transparency and disclosure by corporates, investors, insurers, and banks.

In February 2022, **the European Commission adopted the Complementary Climate Delegated Act (CCDA), listing specific gas and nuclear activities under certain conditions as “environmentally sustainable”** for the purposes of the EU Taxonomy Regulation. Although specific conditions have been set in CCDA, such controversial change in taxonomy has brought about many criticisms from some EU members, non-governmental organisations (NGOs), and environmental activists. It also has significant implications on investment decisions by investors and corporates, the formulation of other related standards (such as EU Green Bond Standard) as well as taxonomies in other countries. The divergent views arise as **energy security is one of the key considerations for EU members when formulating their taxonomy policy.** Germany, Belgium, and Spain are committed to phasing out nuclear power plants after the Fukushima nuclear disaster in 2011 while France relies heavily on nuclear power for its energy needs. Putting a temporary green label to gas projects will help some countries, such as Poland, Slovakia, and Hungary, in energy transition. Objections from at least 20 out of 27 EU member states and the majority of the European Parliament are required to reject such a change. In early June 2022, the European Parliament’s environment and economy committees voted against it. The vote did not have a direct impact but it can be a good indicator of the outcome when all members of European Parliament place their vote on the CCDA in early July.

In China, the People’s Bank of China (PBoC) issued guidelines defining criteria and categories for green bond projects in 2015, setting out the official requirements for green projects and a taxonomy in the form of a Green Bonds Endorsed Project Catalogue. **The Catalogue was revised in April 2021 with the removal of some carbon-intensive activities related to clean coal, coal-fired power, coal mining and oil and gas exploration equipment,** bringing more harmonisation to international practice. In addition, Common Ground Taxonomy (CGT), an in-depth comparison between the EU and China, was released in November 2021. Although CGT does not have any legal implications in either the EU or China, it is expected to **enhance collaboration with the EU in the green finance market, accelerating crossed border green capital flows between two regions.** In fact, two green bonds aligned

² Under EU taxonomy, an activity must contribute to at least one of six environmental objectives and do no significant harm to any of the other objectives, while respecting basic human rights and labour standards. Six environmental objectives are 1) climate change mitigation; 2) climate change adaptation; 3) sustainable use of protection of water and marine

resources; 4) transition to a circular economy, waste prevention and recycling; 5) pollution prevention and control; and 6) protection of healthy ecosystems.

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with CGT have been issued by China Construction Bank and Industrial Bank in the past few months. The CGT has also set an example for further improvement in the comparability and interoperability of global sustainable finance standards. Other regions, such as Sri Lanka and Hong Kong, are considering to use CGT as the building block to develop their domestic taxonomy. Going forward, the coverage of CGT will be broadened from climate mitigation to other sustainability issues, such as building, manufacturing, environmental, biodiversity, and circulation of economy activities. Comparison will also be extended to more countries. This will further enhance comparability, consistency, and interoperability of global sustainable finance standards.

The China government has also been active in enhancing climate and environmental disclosures by financial institutions as well as corporates since 2008, though the results are not apparent. However, **the latest revision of the regulation, Measures for the Disclosure of Environmental Information by Enterprises (企业环境信息披露管理办法), is showing good progress to enhance disclosures.** For example, the disclosure requirement is more focused on heavy polluting companies and those companies with a track record in violation of environmental laws. In addition, disclosure of data on environmental management, carbon emissions and breaches of environmental law is now mandatory. Furthermore, disclosed data will be shown on a dedicated platform set up by local environmental authorities, which will make supervision and comparison of corporate environmental performance easier and more effective.

Singapore is the biggest green finance market in ASEAN

ASEAN Taxonomy³ for Sustainable Finance was also released in November 2021. Version 1 will initially focus on climate change before moving on to other sustainability aspects. Key sectors include agriculture, electricity generation and manufacturing that are critical to the four environmental objectives. Due to the diverse economic and financial systems among ASEAN member states, **the ASEAN Taxonomy is structured into two tiers, i.e., a Foundation Framework and Plus Standards, allowing multiple options for member states to scale up according to their domestic economic and regulatory development.**

Singapore is one of the leading players in ASEAN in terms of sustainability development. Generous government initiatives include Singapore government's S\$1bn projected expenditure to help businesses become more energy and carbon efficient, and Monetary Authority of Singapore's (MAS) Green Investment Programme to invest up to US\$2bn in public market investment strategies that have a strong green focus.

In 2020, MAS released a set of three Guidelines on Environmental Risk Management (guidelines) for the asset management, banking, and insurance sectors. It then launched the Singapore Green Finance Centre and the Green and Sustainability-Linked Loan Grant Scheme (GSLS) which aim to provide grants to cover expenses incurred in engaging independent sustainability assessments, developing green and sustainability framework and targets, and obtaining reviews for green and sustainable loans. In 2021, the **Green Finance Industry Taskforce convened by MAS was launched to accelerate green financing in Singapore through improving disclosures and fostering green solutions.**

Today, **Singapore is the biggest green finance market in ASEAN, accounting for almost half of all sustainable loans and bonds issued in the region.** Over S\$8bn of green, social and sustainability bonds have been issued in Singapore since 2017 to develop new energy projects, improve buildings' energy efficiency and finance social enterprises.

³ Under the ASEAN Taxonomy, four environmental objectives include 1) climate change mitigation; 2) climate change adaptation; 3) protection of healthy ecosystem and diversity; and 4) promotion of resource resilience

and transition to circular economy. Two essential criteria are do no significant harm and remedial measures to transition.

Environmental, Social and Governance

Key strategies of Singapore's Green Finance Action Plan

Strengthen Financial Sector Resilience

- Guidelines on Environmental Risk Management

Develop Markets & Solutions

- Green and Sustainable Bond and Loan Grant
- US\$2bn MAS Green Investment Programme

Harness Technology

- Green Fintech and innovative solutions

Build Knowledge & Capabilities

- Asia-Focused Climate Research and Training (through Singapore Green Finance Centre)
- Sustainable Finance Verification, Review and Rating Services

Source: MAS, DBS Bank

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Decarbonisation progress of energy players in China and Indonesia

Based on latest Bloomberg NEF data as of Mar 2022, BNEF has outlined various leaders and laggards based on cumulative low-carbon investments (as a share of total capital expenditure) of various global oil and gas companies.

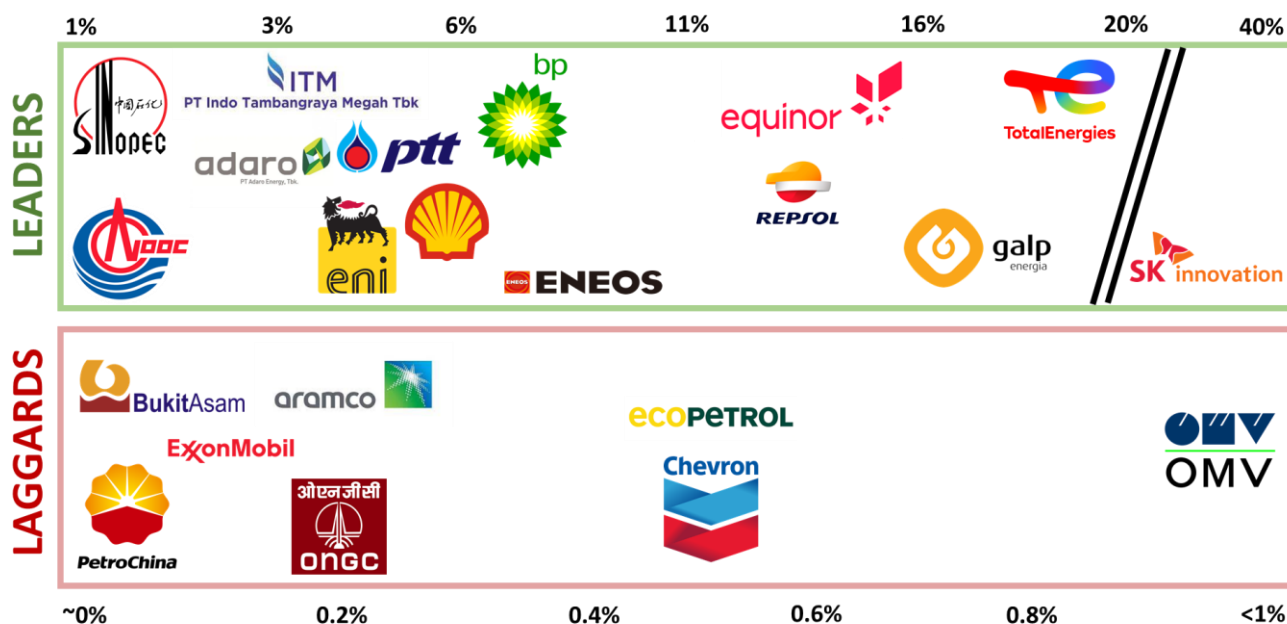
Leaders in green investment. Within our coverage of Chinese and Indonesian players, we note that CNOOC (883 HK), China Petroleum & Chem (Sinopec; 386 HK), PT Indo Tambangraya (ITMG IJ) and Adaro (ADRO IJ) are identified as leaders. ENN (2688 HK) and Towngas Smart Energy (1083 HK) are not included in the chart below but we note that both already have a commendable presence in integrated/new energy.

Laggards in green investment. Separately, we note that Petrochina (857 HK) and PT Bukit Asam (PTBA IJ) are identified as laggards. Whilst Petrochina has set up various long-term goals and initiatives aimed at its green and low-carbon transition path, Petrochina is less transparent in terms of its progress, shorter term goals as well as available capex earmarked for its green investments. Separately, the lack of historical green investment capex over the past few years has positioned PTBA as a laggard. Though, we note that going forward PTBA has set aside c. US\$52mn (out of total capex of c. US\$111mn in 2022 and 2023), which is close to 50% of its capex for its green investments.

In the later pages, we will study the energy transition progress of the Chinese and Indonesian companies within our coverage.

Leaders & laggards in green investment

Low-carbon investment as a share of capital expenditure, cumulative between 2015 – 2021



Source: Bloomberg NEF, DBS Bank

Note: Low-carbon technologies included in this calculation are: biofuels, CCUS, advanced materials and circular economy, hydrogen, digital technologies, energy storage, advanced transport and mobility solutions, wind, solar, decentralized and frontier power generation, and other renewables. Please also note that the calculation only includes 'completed deals'. If a project is announced but has yet to secure/confirm financing, Bloomberg does not include the project into the investment number for the year. The data also includes VC/PE investments in those technologies.

China: Oil & Gas companies' pivot to new energy

One of the objectives of China's 14th Five Year Plan (14FYP) is that the nation formulates an action plan on how to reach peak CO₂ emissions as soon as possible before 2030. Chinese oil companies are mandated to stick to the targets outlined by the 14FYP, and **all oil companies under our coverage have outlined their own initiatives on reducing carbon emissions, predominantly through pivoting towards new energy.**

CNOOC (883 HK) seeks to achieve peak CO₂ emissions before 2030 and carbon neutrality before 2060, through various initiatives such as clean energy development, energy-saving and emission reduction projects and efficient energy utilization. The renewable drive through the installation of offshore windfarms appears to be the key initiative on CNOOC's decarbonisation footprint. CNOOC's first offshore windfarm commenced operations at the end of 2020. CNOOC aims to grow its renewable capacity to 5-10GW by 2025 from installed offshore windfarm capacity of c. 1.5GW as of end Aug 2021.

Going forward, CNOOC aims to invest 5-10% of its capex into its new energy business, with a focus on offshore windfarms. Though CNOOC's management has shared that there are some challenges in developing its new energy business, due to the lack of feasible wind assets for acquisition. Whilst CNOOC's offshore wind business is still in its early stages, CNOOC has reiterated its commitment towards its renewable capacity goal of 5-10GW in offshore wind assets by 2025 through continued research and evaluation of its offshore wind business.

China Petroleum & Chem (Sinopec; 386 HK) aims to achieve its net zero goals ahead of national targets. Various initiatives include (1) developing new energy business, with a focus on hydrogen energy as the core, (2) developing low-carbon energy sources (e.g., natural gas) and increasing the proportion of natural gas in Sinopec's energy production, (3) expanding into new infrastructure and services e.g., hydrogen refuelling stations, (4) promoting large-scale development of bio-diesel and bio-jet fuel and wind/solar power projects, (5) installing supply capacity of new energy to reach the equivalent of 10 million tonnes of standard coal by 2025, (6) continuing to research and promote CCUS technologies, and more.

Hydrogen energy would be the key focus for Sinopec's new energy development, with Sinopec targeting to be

China's top hydrogen supplier as shared by management. Currently, Sinopec's hydrogen production capacity is c. 3.5 million metric tonnes/year, accounting for 14% of China's hydrogen output – of which most is used for its chemicals unit.

Sinopec has disclosed that its capital investment budget for 2022 is the highest in history in 2022 at RMB198bn (US\$31.1bn), up 18% from a year ago, beating the previous record of c. RMB182bn in 2013. Sinopec's 2022 capex will focus on upstream exploitation, which includes both crude oil and natural gas fields. Other than that, there is generally a lack of disclosure related on the amount of capital expenditure earmarked for its green investment.

PetroChina (857 HK) has set up a green and low-carbon transition path via a three-stage plan i.e., "Clean Substitution, Strategic Succession and Green Transition", starting in 2021. Through this, Petrochina aims to achieve peak carbon emissions by 2025 and "near-zero" emissions around 2050 through various initiatives such as development and utilisation of new energy (includes hydrogen, wind, solar, geothermal energy), development of integrated natural gas power and new energy power generation projects, mass implementation of CCUS and carbon sequestration projects and more.

Whilst Petrochina has set up its long-term goals and initiatives aimed at its green and low-carbon transition path, similar to Sinopec, there is generally a lack of disclosure related on the amount of capital expenditure earmarked for its green investment. Nevertheless, Petrochina has expressed its commitment in meeting the government's policy goals and is increasingly focusing on natural gas production.

Between the three oil companies within our coverage, **CNOOC** has the greatest transparency on capex earmarked for its green transition. **Sinopec** has been accelerating its green energy initiatives, albeit there is a lack of guidance on its green investment capex. Lastly, in our view, we observe that **Petrochina** has been the least transparent, in terms of its shorter-term goals as well as capex earmarked for its green investments, relative to CNOOC and Sinopec. On a positive note, we observe that all three Chinese oil players have shown commendable improvement in their ESG goals and initiatives over the past two years.

Environmental, Social and Governance

Natural gas plays a vital role in China's decarbonisation plan where the percentage of natural gas in the energy mix will increase from 8% in 2020 to >15% in 2030. Energy demand shifting from coal to gas will sustain gas consumption growth in the high single digit to low-teens per annum in the coming 10 years. However, the long-term growth prospects will be limited due to its fossil fuel characteristics with carbon emissions. As such, **all gas distributors under our coverage have plans for transformation with various new energy projects.**

The common strategy for gas distributors in the short term is diversification into Integrated energy (fuelled by gas, distributive solar power, biomass, or geothermal power). The National Energy Administration of China issued documents to encourage the installation of distributive solar power systems on 30-50% of rooftops of various types of buildings. In addition, after the launch of the first batch of pilot projects by the Jiangsu government for sale of electricity to third parties through a distributive network, more provinces, such as Shandong and Zhejiang, have also issued similar policies to encourage installation of distributive solar power systems. Thus, after self-consumption, any excess electricity can be sold to third parties, significantly reducing the operational risk for distributive solar operators and further stimulating demand.

Many gas distributors are also diversifying into value-added services, including sales of kitchen appliances, bath appliances, home safety insurance, energy efficiency management, etc.

ENN (2688 HK) has the highest exposure to integrated energy given its first mover advantage. With 150 operational integrated projects and 19,065m kWh of sales volume, integrated energy and value-added services (VAS) accounted for around 11% of total turnover in FY21. This percentage is expected to increase to around 15% in FY23.

Towngas Smart Energy (1083 HK) has also made relatively faster progress in new energy where it plans to install 1GW of distributive solar power systems in industrial parks in FY22, rising to total installations of 8GW in FY25. If this materialises, turnover from smart energy and VAS should account for around 12% of total turnover in FY23, from 4% in FY21.

China Gas' (384 HK) VAS segment is growing fast, and is expected to account for >10% of total turnover in the coming few years. In terms of decarbonisation, the company has initiated a digital platform to help to implement the carbon peak and carbon neutral

strategies of local governments. The platform will also help industrial users in carbon asset management and energy efficiency management. While we reckon the company is moving in the right direction in decarbonisation, the contribution from this new business line is uncertain for the time being.

Both **CR Gas (1193 HK)** and **Tian Lun Gas (1600 HK)** have >95% of turnover coming from gas-related businesses. Tian Lun Gas has already ironed out its strategic plan and teamed up with various partners to develop a low-carbon business which is expected to account for around 10% of total turnover by 2025. CR Gas is also expanding into various low-carbon businesses, including integrated energy, carbon trading, electricity charging stations, hydrogen refuelling stations, etc. But contribution remains insignificant at this juncture. Thus, the progress of decarbonisation of these companies is still slower than its peers.

Indonesia: Coal mining companies are evolving to prevent extinction

Amid the uncertainties over standard ESG guidelines, Indonesia coal mining companies now more aware of the position they are in today. High coal price benefits earnings performance, but long-term threats continue to haunt coal mining companies such as coal demand over the next decade, access to capital and shareholder interest.

Shareholders generally value companies with a diversification strategy beyond thermal coal mining business even with today's strong coal prices. We reckon that stocks such as PT Adaro Energy Tbk. (ADRO) and PT Harum Energy Tbk. (HRUM) (not rated) have outperformed peers due to their visible diversification progress in the last twelve months. ADRO announced an investment in green aluminium smelter project and HRUM revealed its investment in nickel mining projects.

Owned by private equity group Saratoga Investama (SRTG), **ADRO has been transforming itself into a diversified energy company from a conventional coal mining company.** Since ADRO is one of Saratoga's successful investments and considered to be a blue chip alpha, Saratoga has been proactive in transforming ADRO onto a growth path. The journey started in 2019 when Adaro established seven business pillars beyond thermal coal, which consisted of the power, energy, water treatment, logistics, property via Adaro Land, and strategic investments via Adaro Capital.

Environmental, Social and Governance

On the thermal coal business, ADRO's cost discipline has enabled it to maximize profitability. Mining services saw a switch from using Pamapersada to Buma (Delta Dunia Makmur, DOID IJ, not rated), which is more affordable than the previous contractor, but delivers largely similar results and efficiencies. We note that the **key initiatives undertaken are not only to cut costs but reduce ADRO's exposure to coal price volatility and declining demand in the future.**

ADRO diversified into the power business since decade ago however, progress was only made this year. Many power plant projects finally achieved financial close after power purchase agreement with PLN was sealed, and land clearing issues were settled. The power and utilities business will provide earnings stability, and decent cashflows.

ADRO has invested Rp358bn for a 4.7% stake in alumina producer Cita Mineral Investindo (CITA IJ, Not rated), and the green aluminium smelter expansion project in North Kalimantan. Both are part of its expansion and diversification into the aluminium processing business. ADRO has committed to spend US\$1bn on the aluminium segment over the next three years. **Both projects have good prospects as there is shortage of aluminium in Indonesia.**

Indonesia domestic aluminium demand expected to reach 2m tons by 2025, while Indonesia only has 500k tons per annum of production capacity. Given the strong demand for green aluminium in the future, we believe **ADRO's investment into a 500k tons per annum aluminium plant is strategic. The plant can provide domestic green aluminium supplies which is cheaper than imported aluminium.**

Adaro has also actively expanded its hard coking coal business with the successful IPO of Adaro Mineral (ADMR IJ, Not rated). Hard coking coal is used to produce steel and Adaro Mineral has plans to raise its production to 6m tons by 2023 from its current production volume of 1m tons.

Adaro's diversification should be positive. We note that Harum Energy's (HRUM IJ) share price has climbed by 10x post its investment in nickel mining companies. We think the successful diversification beyond thermal coal should be reflected on the EV/coal reserves valuation metrics. The higher the EV per ton of coal reserves reflects the higher value placed on divisions other than coal. In general, coal mining companies in terms of EV/coal reserves are trading at around US\$2-3 per ton vs. Harum Energy's US\$15 per ton. The long-term hidden liability in coal concessions such as carbon taxes, punishing royalties and land reclamation post mining operation have caused Adaro's share price to de-rate from 2008

(IPO)-2012's level of 15x PE to only 6x in 2021. However, Adaro's **positive progress in green and non-coal investments has led to ADRO's share price outperforming its peers in the last five years.**

Another example is **Bukit Asam (PTBA IJ), which is venturing into Dimethyl Ethylene (DME) business alongside Indonesia's grand plan to reduce energy import.** Indonesia imports 6m tons of LPG per annum to fulfil its domestic demand of 8m tons per annum. Indonesia's LPG import value is around US\$1.2bn per year despite being a producer of natural gas. DME has lower carbon emissions than coal and DME will replace the conventional LPG for household use. Most of the LPG used in households is for cooking and other home activities.

PTBA could get extra incentives by allocating 6m tons of its coal to the DME project. According to Indonesia Omnibus Law, coal downstream initiatives could be awarded with royalties discount up to zero percent, as this is helping Indonesia to reduce its carbon emissions and energy imports.

Although PTBA has underperformed ADRO in the last five years, share price has performed relatively well this year. Its exposure to domestic coal market, where coal price capped maximum at US\$70 per ton, also performed well after PTBA disclosed its US\$2.1bn investment commitment alongside Pertamina and Air Products in Sept 21, and held DME plant ground-breaking in South Sumatra.

HRUM has highest EV/reserves due to its high level of non-coal mining investments

Ticker	Companies	Market Cap (US\$m)	4Q21 balance sheet (US\$m)				Ann. production (m tons)	Reserves (m tons)	Reserves life (years)	EV/ton (US\$)	Notes
			Debt	Cash	Net debt	EV					
ADRO IJ	PT Adaro Energy	6,595	1,604	1,811	-207	6,387	53	1,449	27	4.4	Low-cost structure helps ADRO to maximize current high coal price. ADRO's earnings grow 290% in 2021 on higher production and stable costs
ITMG IJ	Indo Tambangraya Megah	2,410	52	691	-639	1,771	18	291	16	6.1	Thinnest coal reserves life among peers. ITMG's margins, ROE and decent dividends will benefit from its profit per ton of coal maximization strategy in 2022-2023
PTBA IJ	Perusahaan Batubara Bukit Asam	3,164	75	314	-239	2,925	30	3,180	106	0.9	With the railway transportation bottleneck, PTBA could not monetize its coal reserves optimally. PTBA's EV/ton could improve if DME project delivers positive earnings
INDY IJ	Indika Energy (Not Rated)	911	1,456	867	589	1,500	37	572	15	2.6	Exposed to less profitable low rank coal concession - it needs coal price index to be US\$980-90 per ton to sustain its operations. INDY is venturing to electric bike as diversification strategy in 2022 onward
HRUM IJ	Harum Energy (Not Rated)	2,273	100	149	-49	2,224	3	97	30.3125	22.9	Share price jumped due to its diversification plan to non-coal businesses. HRUM's EV/ton coal reserves stands at a 3x premium to its peers.

Source: Companies, DBS Bank

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BUY (>15% total return over the next 12 months for small caps, >10% for large caps)

HOLD (-10% to +15% total return over the next 12 months for small caps, -10% to +10% for large caps)

FULLY VALUED (negative total return, i.e., > -10% over the next 12 months)

SELL (negative total return of > -20% over the next 3 months, with identifiable share price catalysts within this time frame)

*Share price appreciation + dividends

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