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Mackenzie Asia Team

China's energy transformation



Summary

China has announced an ambitious energy policy to transform the country to net zero carbon emissions by 2060, a huge step forward in meeting global climate change goals.

China's initiative is critical for the world to achieve carbon emission reduction targets and to mitigate climate change. It also creates a number of unique investment opportunities in the Asia Pacific region.

Investment opportunities may include clean energy, electric vehicles (EVs), and certain key material sectors. Apart from solely investing in China, exciting prospects appear to exist across the Asia Pacific region and may provide better risk-adjusted investment returns.

China's ambitious energy policy & roadmap to 2060

Climate change has become an urgent global challenge. In recent decades, we have experienced a rise in temperatures, more frequent wildfire incidents, rising sea levels and extreme weather phenomena. Some island nations and their populations are facing the risk of complete ecological destruction.

The global community has started to take collective action to mitigate climate change. In 2016, 175 state parties signed the Paris Agreement, with the stated goal to limit temperature increases to 1.5 degrees Celsius above pre-industrial levels. One of the primary mechanisms is through a reduction in global CO₂ emissions.

China's real GDP grew 45-fold in the past 30 years, driving a massive increase in carbon emissions (Figure 1). China is now the largest carbon emitter and in absolute terms accounts for 28% of global emissions, followed by US (15%), Europe (10%), and India (7%) (Figure 2). China's engagement in cutting carbon emissions is imperative to achieving the Paris Agreement's targets set in 2016.



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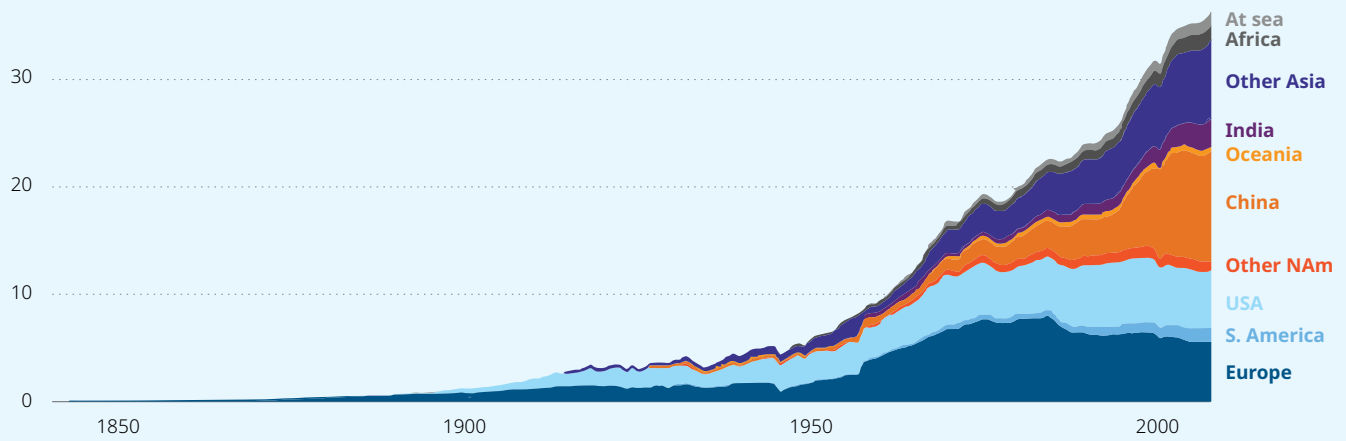


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Figure 1 | Annual carbon emissions, by region (in billions of tonnes of carbon dioxide, 1825-2019)

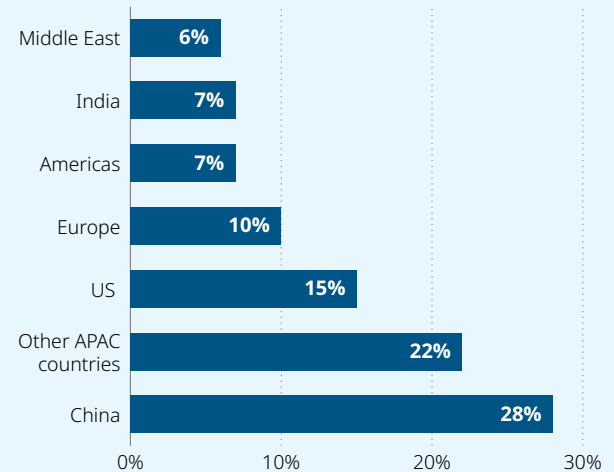


Source: Carbon Dioxide Information Analysis Center (CDIAC), Global Carbon Project (GCP)

Addressing the United Nations General Assembly in September 2020, China's President, Xi Jinping, stated that China's CO₂ emissions would peak by 2030, and the country would reach carbon neutrality by 2060 (Figure 3). It was the first time the world's largest emitter of carbon dioxide had pledged to end its net positive contribution to CO₂ emissions whilst maintaining an aggressive growth target.

China's determination to reach carbon neutrality by 2060 matches its strategic goal of maximizing energy self-sufficiency. China is a net importer of coal, oil and natural gas, and is therefore highly incentivized to increase non-fossil fuel power generation capacity (via solar, wind, hydro and nuclear), in order to increase the nation's energy security. Coal and oil's share of energy mix is planned to decrease from 76% in 2020 to only 15% in 2060 while non-fossil fuel share will increase significantly from 16% in 2020 to 70% in 2060 (estimated) (Figure 4). It is an aggressive target as China still aims to double its real GDP by 2035 (vs. 2020 level). With China's large population and economic size, this dramatic energy mix transformation creates numerous exciting investment opportunities.

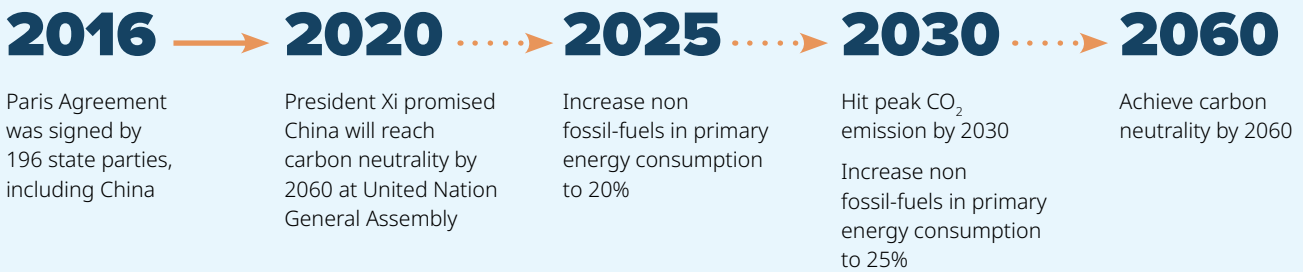
Figure 2 | China accounts for 28% of global CO₂ emissions



Source: Wind

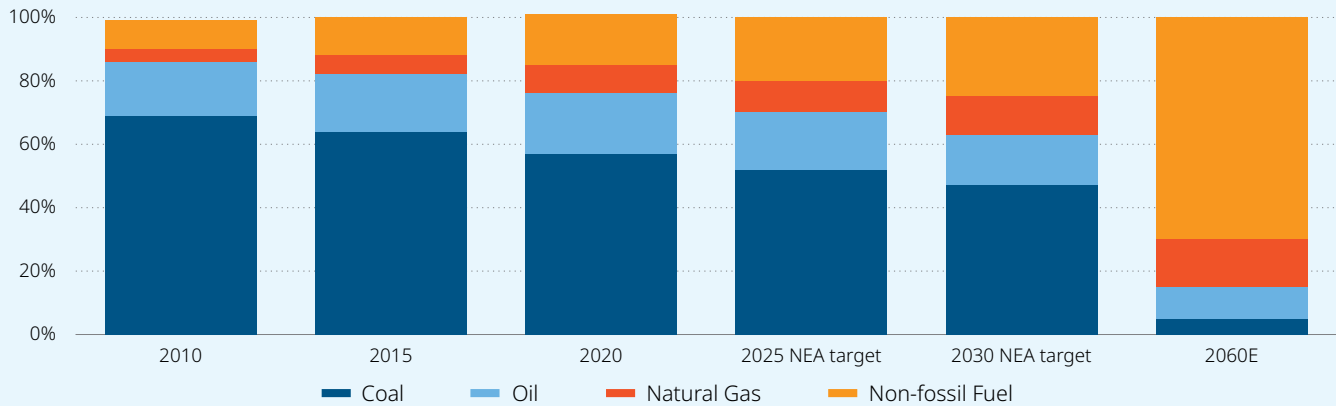


Figure 3 | China's commitment to CO₂ emissions



Source: National Energy Administration

Figure 4 | Primary energy mix in China



Source: National Bureau of Statistics (NBS), National Energy Administration (NEA), Tsinghua University (for 2060 forecast)

On a cautionary note, China has a history of overinvestment when driven by initiatives set by the central government and backed by the state-owned banks. For example, the steel, cement, and solar panel industries have experienced dramatic boom/bust cycles over the last decade caused by overinvestment. The Chinese government executed a huge economic stimulus package after the Global Financial Crisis of 2008. This led to a nationwide infrastructure investment boom and Chinese companies responded with substantial capacity build-up, aided by cheap financing.

That cycle ultimately ended with oversupply, a collapse in prices and many companies suffering huge financial losses or bankruptcy.

However, another risk investors need to remain vigilant about is unexpected changes in standards and regulations in China. There have been numerous instances of the Chinese government disadvantaging foreign players in order to create domestic national champions.



Opportunities in Asia Pacific

Across Asia Pacific, there are many sectors and companies which will benefit from this policy change. In some cases, companies outside of China have more competitive advantages than those within China and may act with greater financial discipline. There are leading Asian semiconductor, chemical and automotive companies which may operate with greater focus on financial returns, higher levels of corporate governance and with more shareholder-friendly management teams. In other cases, the winners may be Chinese companies which enjoy home advantage and an ability to achieve greater scale. Overall, we believe a pan-Asian investment approach should allow investors to enjoy higher risk-adjusted returns.

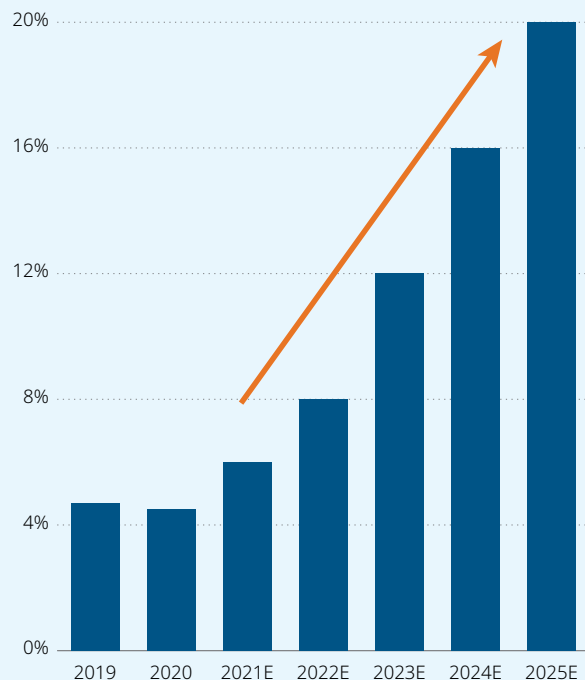
Among a wide range of investment opportunities, this whitepaper highlights the following key sectors.

1 Electric vehicles

The transportation and auto industry accounts for 10% of total CO₂ emissions in China. Over the past 15 years, China increased annual auto sales from 6 million to 20 million units. Despite auto companies' continuous fuel efficiency improvements, rising auto penetration has added substantially to CO₂ emissions. With the economy expected to grow at more than 5% per annum over the next five years, auto sales in China will continue to increase.

China surprised the world when it announced that it will stop selling pure internal combustion engine (ICE) vehicles by 2035 and will only allow sales of hybrid vehicles (HV) and battery electric vehicles (BEV). HVs consist of both an engine and a battery and use the battery's power to substantially improve fuel efficiency versus a standalone ICE. We will therefore witness a substantial increase from the current 5% EV penetration.

Figure 5 | China's electric vehicle penetration



Source: China Association of Automobile Manufacturers, JP Morgan Estimates

This transformation will have profound global ramifications. China boasts the world's largest automotive market. Auto companies will have to lower costs and improve EV quality to attract customers. Therefore, China's policy will become an important catalyst to accelerate a global migration toward EV usage (Figure 5).

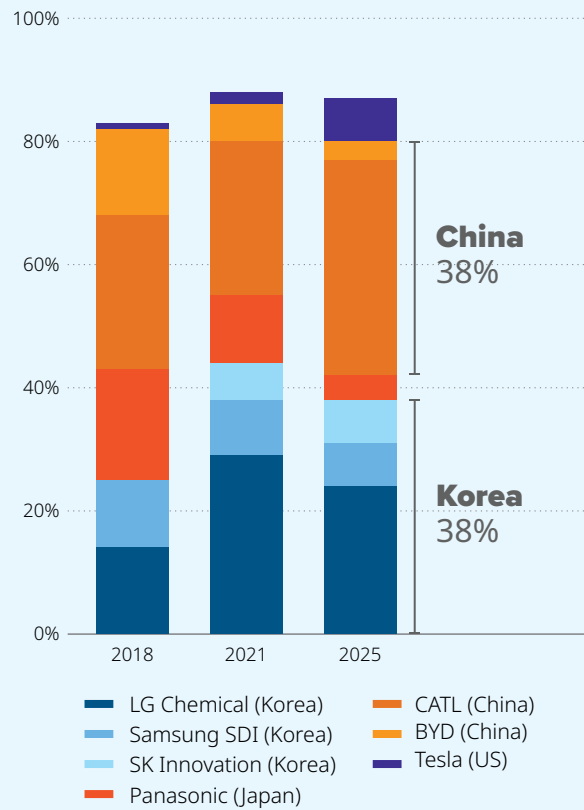
The battery is the most critical component for EV. Only battery companies with advanced technology and global production networks can supply to auto manufacturers around the world. This EV revolution, accelerated by China’s policy, will allow future global leaders to emerge.

China is home to one of the largest and most advanced automotive battery companies in the world. The Chinese government previously provided generous subsidies to allow new battery companies to emerge. In the last several years, these subsidies were reduced substantially, and many nascent battery companies did not survive. However, those that did thrive now provide high-quality batteries to serve the domestic market and global brands in Japan and Europe.

Within the global EV battery market, Korea also stands out as having advanced technology and scale. Korean makers have 44% global market share, or 70% market share outside of the China market (Figure 6). There is a high safety bar for electric vehicle batteries and only a handful of companies can supply on a global scale. Scale is key to drive down fixed costs, and lower costs drive up EV penetration, creating a virtuous cycle.

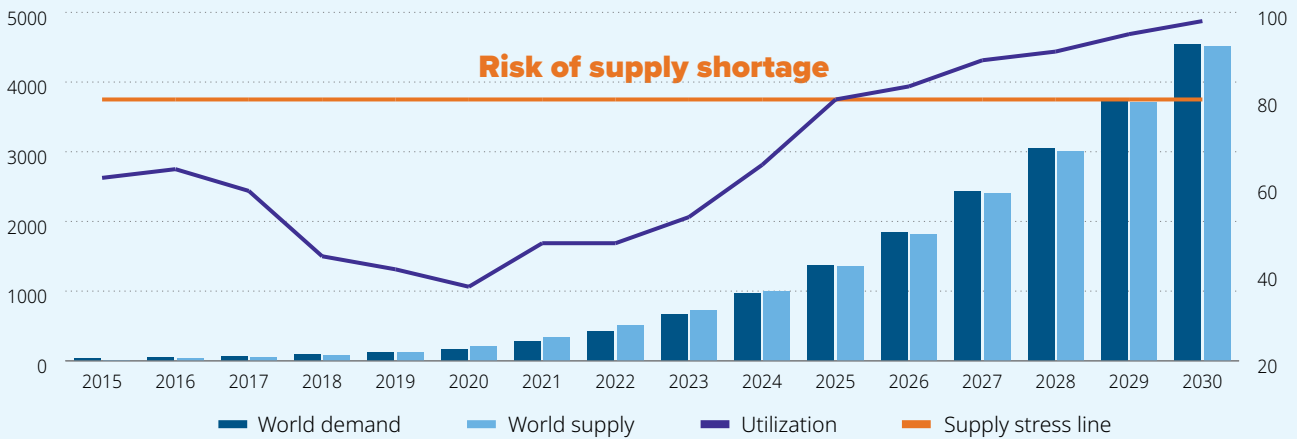
Within the next few years, the price of an EV can be lowered to that of ICE vehicles. At that point, it will become rational for consumers to buy an environmentally friendly EV, and the EV market will experience rapid market share growth. The world may experience a supply shortage of batteries, and those Chinese and Korean companies with the largest manufacturing capacity will likely dominate (Figure 7).

Figure 6 | Global battery market share



Source: UBS

Figure 7 | EV battery supply/demand



Source: UBS

The automobile is becoming more like a personal computer. Each new model has more safety features, greater energy efficiency and wider passenger entertainment offerings; these structural trends are very evident in EVs. Autonomous driving and advanced driver-assistance systems (ADAS) require advanced camera sensors and control systems. More functions in a car are built on software rather than mechanical hardware. They can be updated with wireless communication overnight like the operating system on a smartphone. It will become commonplace to have multiple displays and noise cancellation technology to provide a better cabin experience, all of which drives higher demand for semiconductors (Figure 8).

Power efficiency is one of the most important factors in EVs and it requires specific semiconductors and more electronic devices. Amplifying the weak electric current from a battery to power an electric motor sufficient to drive a car requires a special semiconductor chip. Other specialized semiconductor chips can reduce power consumption and increase driving range.

Korea, Taiwan and Japan account for almost 60% of worldwide semiconductor manufacturing (Figure 9). Korea and Taiwan have some of the most advanced computer chip manufacturers, and they continue to increase capacity and develop most advanced chips. Japan has many specialized semiconductor companies whose products contribute to energy savings.



Figure 8 | Growth trend of automotive semiconductor market (billion USD)

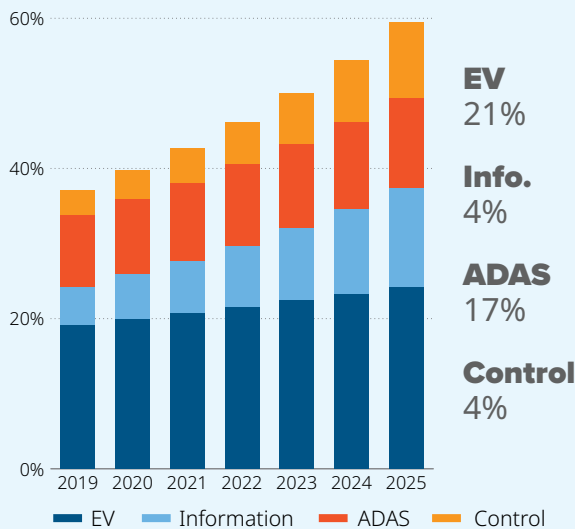
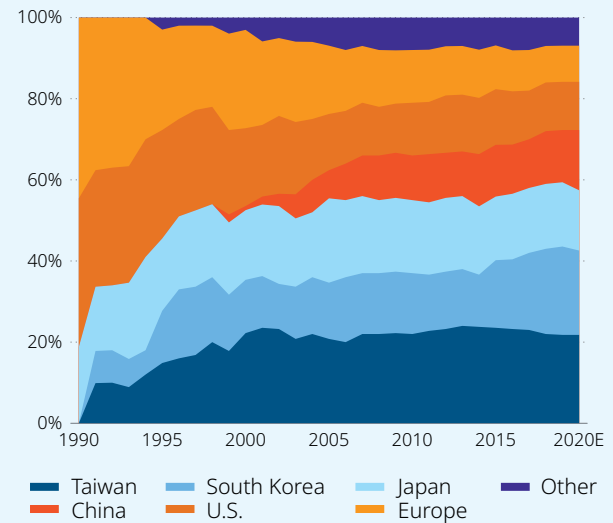


Figure 9 | Share of global semiconductor manufacturing capacity



2 Clean energy

China's energy mix must undergo a drastic shift away from coal-fired power generation towards renewables and nuclear in order to achieve carbon neutrality by 2060. Energy consumption sourced by coal and oil will drop by over 95% between 2020 to 2060. Clean energy will contribute over 70% of China's energy consumption by 2060 (from 2020's 16%). This translates to solar/wind capacity rising by ~14x/7x from 2020's level by 2060. China has enough natural resources to support such a program, but it must re-invent the power system in the long term. With solar and wind making up almost 60% of the power market by 2060, policy makers will need to make aggressive investments in these areas. While it takes time to build out renewables across China, natural gas (50%+ cleaner than burning coal) remains an important transition

energy solution for China, as it will be challenging to decommission coal-fired power plants in the short-term while achieving necessary economic growth.

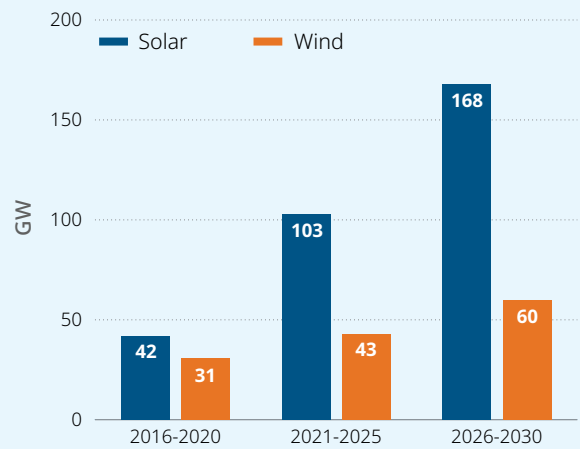
Solar and wind farm operators look to be obvious investment targets. However, potential subsidy cuts for existing solar and wind farms need to be closely monitored as project returns can be adversely impacted. That's why we need to be selective about investing in upstream component suppliers or downstream farm operators.

Solar is the most cost-effective renewable energy solution in China by far. China itself accounts for approximately 40% of the world's new solar installations. The global solar installation boom (most developed countries also

declared carbon neutrality target) provides high order visibility for Chinese solar supply chain companies as they control more than 80% of global effective solar capacity. For example, Chinese companies control 97% of global solar glass capacity. It is impossible to complete a solar module without solar glass. Newcomers would find it hard to compete with Chinese peers as Chinese companies developed a comprehensive solar supply chain locally in the past 20 years with superior cost advantages and efficiency (Figure 11).

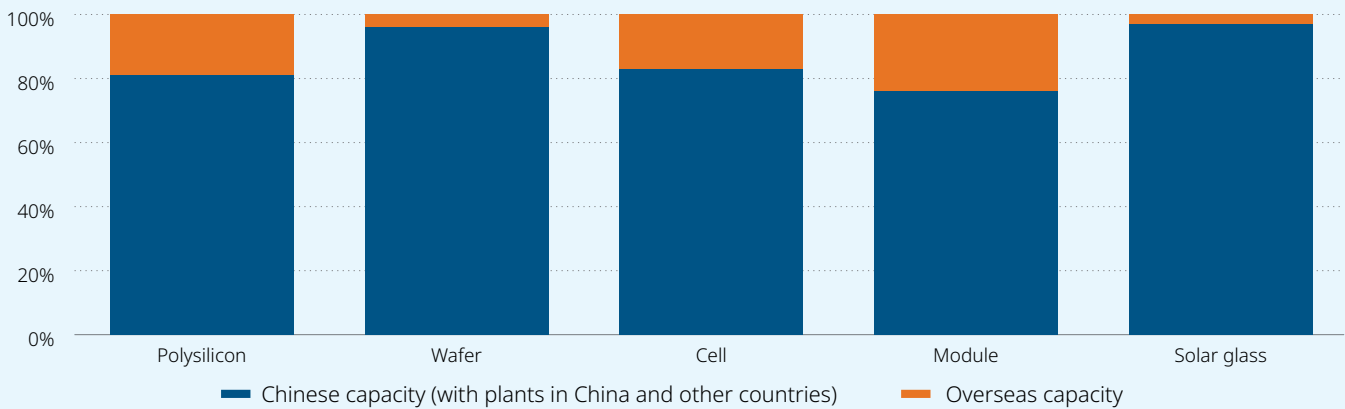
Apart from solar, China also has rich wind power resources to support its drastic shift to renewables (Figure 10). Dispatch of electricity generated by wind is always a challenge for the power grid given wind's lower reliability, meaning the amount of renewable power generated at any given time is somewhat unpredictable. Wind power density is higher in the west and north parts of China, far from most of the large urban centers with higher power needs. It highlights the hurdle of building ultra-high voltage (UHV) lines and energy storage systems, which requires large amounts of copper, which we will elaborate upon in the next section.

Figure 10 | Average annual new solar and wind installations in China



Source: Wind, Census and Economic Information Center, Credit Suisse Estimates

Figure 11 | Solar supply chain's capacity market share



Source: Company data, BJX News



3 Materials

Over the last 200 years, the world has used coal and oil to generate power, facilitating urbanization and motorization. China's decision to reduce its reliance on fossil fuels has profound implications for raw materials.

Within materials there will emerge winners and losers under the global energy mix transformation. Obviously, the world will have less demand for coal and oil. On the other hand, a number of materials will see an increase in demand. Renewable energy, such as solar, tends to be less stable than a traditional coal power plant, and hence requires energy storage to smooth demand and production imbalances. The world will need more lithium, a key ingredient for batteries.

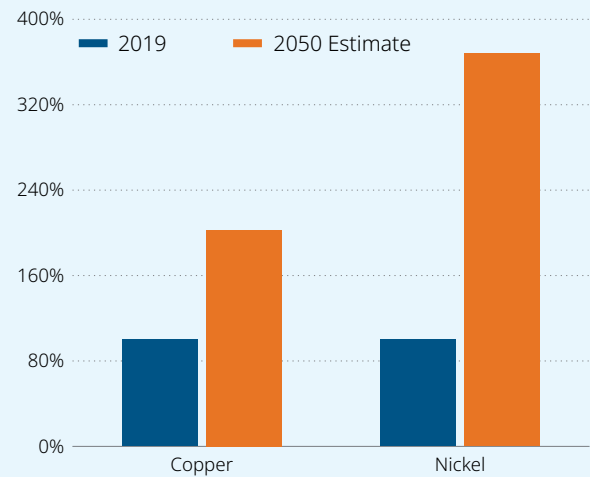
Copper has high electricity conductivity. Due to this feature and its availability, copper is widely used in electric wires. China will need to consume more copper for cables and wires when its non-fossil fuel energy mix increases. For example, a typical EV uses 80kg of copper, mainly for wiring in the motor, compared to just 20kg in an ICE vehicle. New grid networks to offtake solar and wind plants' electricity production will also drive demand for copper cabling across China.

Nickel is another commodity which will experience increase in demand. Nickel is one of the key ingredients in high-quality batteries. The more nickel a battery contains, the longer driving range it can achieve. Batteries require high-grade nickel, and supply is limited. We believe there are attractive copper and nickel mining companies in Australia, while Japanese companies excel in technology to smelt battery-grade nickel.

Conclusion

China's highly ambitious environmental policies will transform the world's second largest economy from the largest detractor in reaching global emission targets to one of the leading contributors. This transformation will disrupt many industries within China but create some large-scale, globally dominant companies. However,

Figure 12 | Potential demand growth for copper and nickel, if the world achieves net zero emission by 2050



Source: Glencore

Currently China accounts for approximately half of the global demand for both copper and nickel. If the world is to achieve net zero emissions by 2050, it will need to double copper supply and nearly quadruple nickel supply, according to some estimates (Figure 12). Australian and Japanese companies operating in these fields will likely enjoy increases in both volume and price.

some of the best investment opportunities may well lie outside the country itself. Investing in some of the leading Korean, Japanese, Australian or Taiwanese companies, closely aligned to China's needs to complete this profound transformation, may reduce China's country risk and improve risk-adjusted investment returns.



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