零碳中国

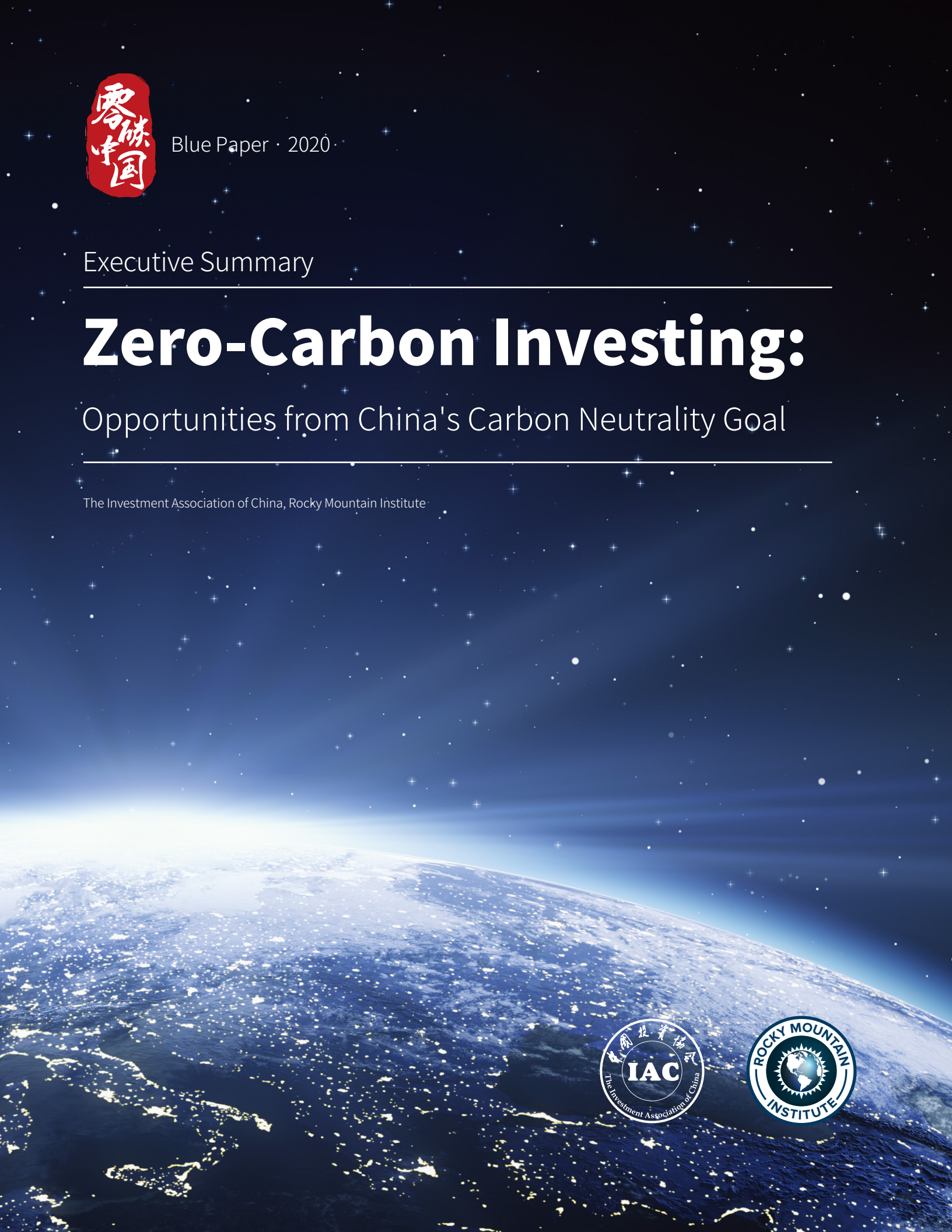
Blue Paper · 2020

Executive Summary

Zero-Carbon Investing:

Opportunities from China's Carbon Neutrality Goal

The Investment Association of China, Rocky Mountain Institute



IN SUPPORT OF THE ZERO-CARBON INITIATIVE

"The '2030 carbon peaking' and '2060 carbon neutrality' goals define the timetable and roadmap for China's green and low-carbon development, which will provide broad space for the development of new, low-carbon technologies, industries and forms of business. It will create a large number of climate-friendly investment opportunities and support the sustainable development of financial and investment institutions."

– Gao Li, director, Department of Climate Change, Ministry of Ecology and Environment

"The implementation of the 'Zero-carbon China' initiative should convene a group of enterprises who are committed to zero-carbon industry. The Association should identify and support such enterprises."

– Dinghuan Shi, former deputy secretary, Ministry of Science and Technology & former counselor of the State Council

"Strong policies and large investments will be needed to achieve the mid-century objective. The priority now is to ensure that actions in the 2020s and in particular in the 14th Five-Year Plan, achieve rapid progress towards the twin goals."

– Lord Adair Turner, chair, Energy Transitions Commission

"Based on the 'carbon peaking' and 'carbon neutrality' goals, the 'Zero-carbon China' initiative should focus on representative pilot projects and promote low-carbon transition in energy, building, transport, and industry sectors. "

– Yaowei Sun, president, the Energy Investment Professional Committee of the Investment Association of China

"The key to achieve carbon neutrality is to advance the energy transition. Energy transition requires not only consensus, but also joint actions."

– Xingqiu Zeng, former chief geologist, Sinochem Group

"To achieve carbon neutrality, we need to start with pilots and gradually expand the scope. We need to gain experience and explore the standards and roadmaps."

– Junfeng Li, the first director of the National Center for Climate Change Strategy and International Cooperation

"We should move forward with the implementation to electrify as much as possible of the economy which requires cleaning up the power sector, dramatically increasing efficiency, and further reducing the emissions in the harder-to-abate sectors."

– Jules Kortenhorst, CEO, Rocky Mountain Institute

FOREWORD

On September 22, 2020, President Xi Jinping announced at the 75th Session of the United Nations General Assembly that China will strive to become carbon neutral by 2060. Carbon neutrality means achieving net zero carbon dioxide (CO_2) emissions by removing (often through carbon offsets) the same level of emissions that are emitted, or simply eliminating CO_2 emissions altogether. A more ambitious goal than carbon neutrality is to achieve zero carbon emissions, but a national goal of carbon neutrality would already imply that most players within the economic system achieve zero carbon.

Therefore, under the guidance of the Department of Climate Change of the Ministry of Ecology and Environmental Protection, the Investment Association of China (IAC) has taken the lead in launching the "Zero-carbon China" Initiative. This initiative aims to explore the action pathway of green development for China to support carbon neutrality by 2060.

The announcement of China's carbon neutrality establishes a direction for realizing a "Zero-carbon China" and will greatly support the drive toward ecological civilization and green, sustainable, and high-quality development. It will also be a strong driving force for revolution in the energy sector. In addition, the carbon neutrality goal will activate the market and encourage more long-term value investors to focus on zero-carbon development and invest in zero-carbon assets, projects, and technologies.

This report is co-authored by the Energy Investment Committee of the Investment Association of China (IAC) and Rocky Mountain Institute (RMI). It identifies seven key investment areas for China's zero-carbon transition, namely, resource recycling, energy efficiency, demand-side electrification, zero-carbon power generation, energy storage, hydrogen, and digitalization. It analyzes the trends and market sizes while envisioning a development pathway for these clean tech solutions. Further, policy and investment recommendations are provided for each area according to their development stages and roles in the zero-carbon economy.

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ZERO CARBON: THE NEW TARGET FOR INVESTING IN LONG-TERM VALUE

Zero carbon is turning from a global political consensus to national policy goals. This global political consensus was established in 2015, when the Paris Agreement set out the vision of limiting global temperature rise to 2°C or even 1.5°C by the end of the century. The Paris Agreement further establishes the specific goal that global carbon emissions should achieve "net zero" in the second half of this century.

Driven by the Paris Agreement goal, countries have made great efforts in carbon emission reductions, including proposing new and updating previous quantitative carbon reduction targets and striving to align with the long-term global goal of zero carbon. These zero-carbon emission targets are becoming the core action to address climate change for more and more countries. In China, President Xi Jinping's recent "carbon peaking" and "carbon neutrality" announcement also signals that China will play a greater role in global carbon emissions reductions.

Zero-carbon industries, represented by clean energy, are now at a tipping point of accelerating development. History has shown that when a new disruptive technology reaches a market share of around 3%, the industry begins to shift from incumbent industries to new solutions. According to relevant statistics from Bloomberg New Energy Finance (BNEF) and the International Energy Agency (IEA), global annual sales of electric vehicles already accounted for 2.6%[1] of total passenger car sales in 2019 and will likely exceed 3% in 2020. Photovoltaics (PV) accounted for 2.7% of total global power generation, and wind power for close to 5%,[2][3] as early as 2018. At the same time, a growing number of investors are recognizing the growing risk of stranded assets in the fossil fuel sector, reassessing portfolio priorities, and accelerating their exits from fossil fuel-related sectors.

The newly announced carbon neutrality target is driving "zero carbon" as the new direction for long-term value investing in China. The Chinese government has been reinforcing its climate actions over the past few decades, including both proposing low-carbon development and announcing carbon neutrality targets. That created a favorable policy environment for zero carbon to become a new target for long-term value investments. This is in accordance with the trends that investors are increasingly focused on long-term investments, leapfrogging over short-term uncertainties around technology and business maturity, and looking for new investment targets over the long term.

[1] IEA, Global EV Outlook 2020

[2] Data calculated from IEA statistics of power generation of 2017 and 2018.

[3] BNEF, Power Transition Trends 2020

Exhibit 1
Vision of zero-carbon China in 2050

A ¥15 TRILLION MARKET IN 2050 AND A ¥70 TRILLION INFRASTRUCTURE INVESTMENT

Achieving the carbon neutrality goal requires an energy system transition from both the supply and demand sides. Meanwhile, higher-quality economic development can be supported by lower levels of energy use and cleaner energy. Under the zero-carbon scenario by the Energy Transitions Commission and Rocky Mountain Institute, China's total final energy consumption in 2050 would be around 2.2 billion tce (tonne of coal equivalent), 27% lower than the 2016 level. Total primary energy demand would fall from 4.5 billion tce today to 2.5 billion tce in 2050, and fossil fuel demand would fall by more than 90%, with renewables becoming the dominant energy source.

On the demand side, **resource recycling**, **energy efficiency improvement**, and **large-scale electrification** for the building, transportation and industrial sectors, as well as cleaner energy carriers such as hydrogen, would reshape energy use patterns and even the economy as a whole. In the industrial sector, increased reuse of key materials such as steel and plastics and improved energy efficiency in production would significantly reduce energy demand. Meanwhile, electric heating, hydrogen, bioenergy, and carbon capture and storage offer the potential to decarbonize feedstocks and production processes in heavy industry.

In transportation, the electrification rate would reach 74% in 2050. Surface transport (road and rail) could be fully electrified, and hydrogen, synfuels, biofuels, etc. would also contribute to the decarbonization of aviation and shipping. The building sector would be 75% powered by electricity with the application of more energy-efficient equipment. Heat pumps and improved insulation would be more widely used for a zero-carbon heating and cooling system. Also, industrial waste heat and biomass, which can be transported over long distances, would play a role.

On the supply side, 67% of China's final energy demand would come from electricity in 2050 with a doubling of installed electric capacity versus current levels. The majority of this would come from **zero-carbon power sources**. Solar and wind would reach a capacity 22 times larger than that in 2016, at 70% of total capacity. Accordingly, battery **energy storage** would grow from 189 megawatts in 2016 to 510 gigawatts in 2050, with an average annual growth rate of 26%. **Hydrogen** would account for 12% of China's final energy demand, with hydrogen production increasing from 25 million tonnes per year today to 81 million tonnes per year in 2050. And at the system level, **digitalization** would greatly

improve the overall efficiency of the energy system.

The zero-carbon energy transition on both the demand and supply sides will create a huge investment opportunity in China. In our view, there are seven primary areas that will be crucial for China's decarbonization progress and therefore are the most promising, with each representing huge potential. These are resource recycling, energy efficiency, demand side electrification, zero-carbon power generation, energy storage, hydrogen, and digitalization. By 2050, these seven sectors could have a market size of nearly ¥15 trillion and contribute more than 80% of the emissions reductions that China needs to achieve between 2020 and 2050. In addition, China's zero-carbon transition could create more than 30 million new jobs in emerging sectors such as zero-carbon electricity, resource recycling, and hydrogen alone.

At the same time, around ¥70 trillion of infrastructure investment could be triggered directly or indirectly over the next 30 years. This includes large-scale installations of solar PV and wind power, a growing capacity of cross-regional electricity transmission lines, construction of tens of millions of 5G base stations, and infrastructure for the internet of things. In the transportation sector, it would include the accelerated deployment of EV charging stations and hydrogen refueling stations as well as the large-scale expansion of high-speed rail and intercity railways.

According to the Energy Research Institute of the National Development and Reform Commission, carbon neutrality goal would bring ¥100 trillion of investment needs in the next 30 years only for China's energy-related infrastructure.

TECHNOLOGY BREAKTHROUGHS ARE NEEDED

Energy-related markets are mostly dominated by natural monopolies and energy transitions are therefore driven by technology breakthroughs followed by a process of market maturity. The seven investment fields listed above include nearly twenty technologies. Technological innovation usually will go through five phases during its lifecycle of development towards market maturity: "Technology Trigger," "Inflated Expectations," "Trough of Disillusionment," "Slope of Enlightenment," and "Plateau of Productivity."

Through the lifecycle, core technological strengths are developed, applications are expanded, supporting services are established, and finally the innovation can be adopted by the mainstream. These zero-carbon technologies are currently at different phases in terms of market expectations and industrial maturity and therefore face different challenges and opportunities, which requires different policy and market enablers to become more investible.

Exhibit 2

Seven investment areas of China's zero-carbon transition could bring enormous market and economic value

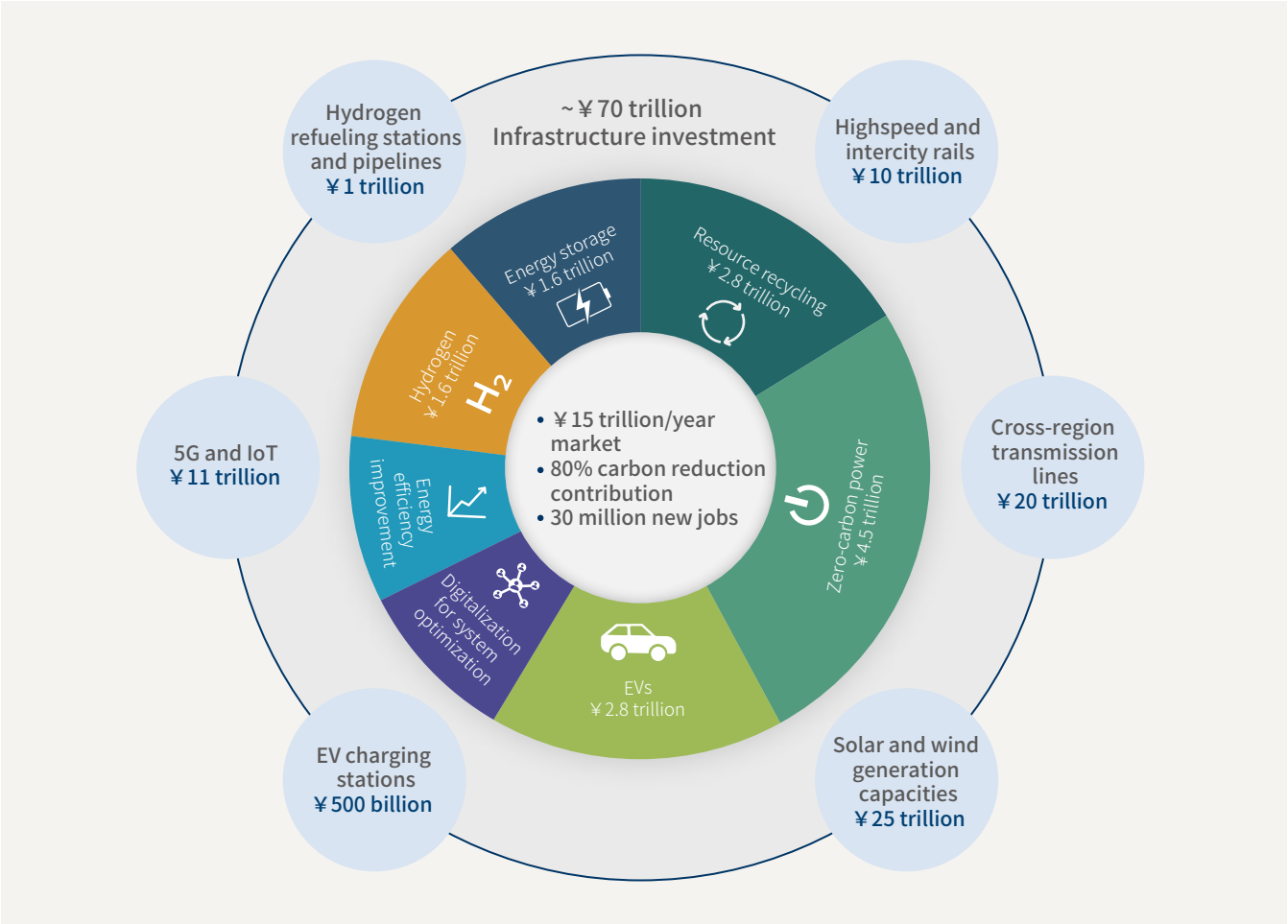
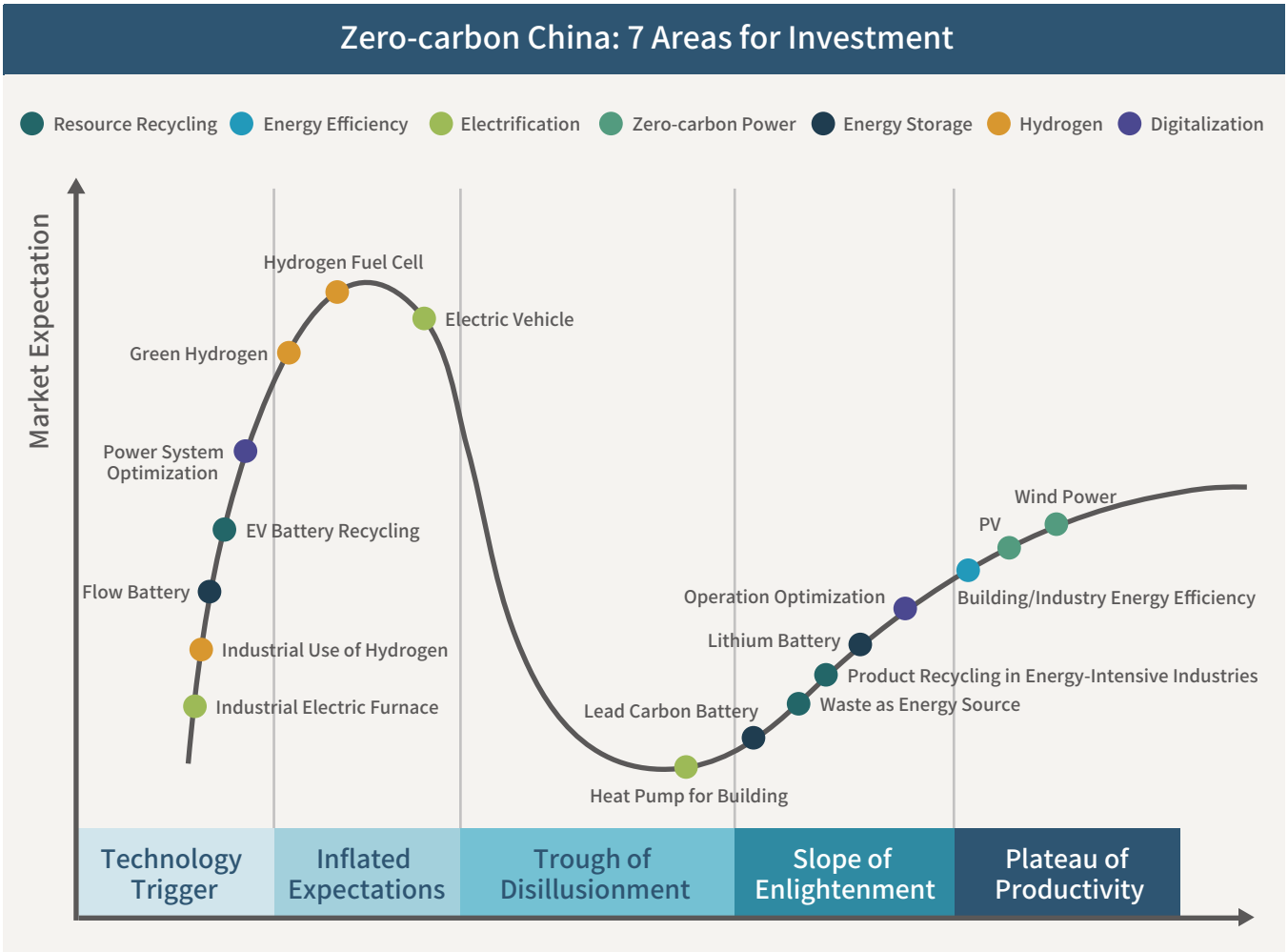


Exhibit 3:
Industry development stages of seven investment areas for China's zero-carbon transition



- **Area 1: Resource Recycling—The Force for Demand Reduction**

The carbon emission reduction and market potential of resource recycling is mainly concentrated in three areas: product recycling in energy-intensive industries (steel, cement, aluminum and plastics), waste as an energy source (straws, forestry waste, domestic waste and animal manure), and recycling of EV batteries for energy storage. The next 5 to 10 years could see a boom in market expansion and investment in resource recycling. Among the three key areas, product recycling in energy-intensive industries and waste as energy source are in the "Slope of Enlightenment" stage, and the current priority for investors is to focus on the breakthroughs in technology and business

models and explore solutions that can be rapidly scaled.

As for product recycling in energy-intensive industries, we recommend investors pay attention to the waste import and export policy that could affect scrap prices. Also, local demonstration projects with recycling rate targets could bring early market opportunities. In terms of technology, we recommend investors focus on solutions that can tackle downcycling problems and ensure recycled products' features are as good as those of primary products. Integration of upstream and downstream value chains including players like product companies, recycling companies, waste treatment companies, etc. from the business model perspective is also worth attention.

For waste as energy source, in the short term, the scattered sources of waste biomass resources add to difficulties to realize a scale effect. However, in the long term, the trend toward large-scale agriculture with intensification of production could significantly improve resource recycling efficiency. The recycling of retired EV batteries for energy storage is still in its infancy, and the focus is on technical improvement in battery structure design and the establishment of industry standards.

- Area 2: Energy Efficiency—The First Fuel to Meet Demand

Energy efficiency, mainly the energy service industry, has been developing for a while with strong policy support and the market is relatively mature. During the transition from a strongly policy-driven to market-oriented industry, it is necessary to identify new driving forces for development. Currently, most of the energy service companies in China are small and medium companies, and a lack of industry consolidation and capability for in-depth retrofits are challenges. For the industrial sector, the main potential of energy efficiency improvement comes from waste heat and pressure utilization, general equipment efficiency improvements, optimization of processes, and creating a system based on digital technologies.

Energy efficiency improvements in buildings are currently in a booming phase of development while still at a relatively early stage. The energy consumption per unit area of public buildings is relatively higher than that of residential buildings and there is a lot of potential for energy saving in the future, especially in building envelope and heating-cooling system upgrades. Finally, the application and rapid penetration of new information technology such as digitalization and artificial intelligence will tap the energy-saving potential of the traditional building industry at a further level.

- **Area 3: Electrification—A Blue Ocean for High-quality Energy Applications**

Electrification will be applied in buildings, transportation and industry. Heating is the key for building electrification, and air-source heat pumps are the central technology for electrifying heating. They are in the phase of "Trough of Disillusionment." Right now, air-source heat pump products for buildings have been reaching gradual maturity, standardization, and healthy market competition.

In the future, with increasing heating demands in southern China, governments will need to step up and launch building heating energy-saving standards. Meanwhile, investors can focus on the development of premium communities and villas. The key strategy is to launch premium heat pump products with comfort and dual functions in heating and cooling. For heating demand in rural northern China, we recommend that governments sustain existing subsidies and support the development of installation and other services. That would help reduce costs for end-users and provide feedbacks on the evolution of heating pump technology.

For electrification of the transportation sector, growing the penetration of electric passenger vehicles is a key area of focus. To achieve that, on the one hand, it is necessary to further overcome mileage and charging anxiety through advancing battery technology and developing new charging facilities. On the other hand, it is important to build EVs' competitive advantage versus gasoline vehicles by creating additional benefits for consumers. That can include network-connected vehicles, self-driving cars, and user-friendly experiences, which would make EVs a carrier for trendy technologies.

Finally, for industrial electrification, the key is electrifying process heating. Essential technologies include microwave heating, infrared heating, and arc heating. These are in the phase of "Technology Trigger." Future development depends on the government's requirement of production process upgrades and high-tech industry development.

- **Area 4: Zero-carbon Power—The Cornerstone of a Zero-carbon Energy System**

Today, zero-carbon power generation technology, which is on track to take the majority share of the future installation portfolio, has become increasingly mature and already formed a complete value chain. Reliance on subsidies has been greatly reduced, gradually transitioning to the market, and wind and solar have become competitive with thermal power. The economics of different power generation technologies is the deciding factor for their potential market size. As wind and solar are becoming the cheapest power sources, it reveals a

market trend that wind and solar are dominating new installations with a small amount of new capacity from other technologies in the future.

Driven by the cost of wind and solar, the price of power is likely to continue to decline, resulting in pressure on all other types of generation and their corresponding supply chains to further advance cost reduction. Two main priorities of this industry include: 1) reducing technology costs via innovation and continuous investment and upgrade of the supply chain; and 2) lowering non-technical costs, such as land costs and grid connection costs, through business model innovations.

Wind and solar industries have entered the "Plateau of Productivity" stage and will gradually form a virtuous circle of development. Growing investment in the wind and solar industries will harvest more rapid technology cost reductions and reinforce competitive advantages, providing a positive feedback. Providing clear policy guidance, such as establishing long-term installation targets, improving power market efficiency, upgrading grid infrastructure, and aligning renewable energy project development with grid planning, could help accelerate the phase-out of fossil fuels and achieve the transformation of the zero-carbon power system more quickly.

- **Area 5: Energy Storage—Guardian of High-penetration Renewable Energy Systems**

Energy storage technologies include physical energy storage and chemical energy storage. Of all technologies, electrochemical/battery energy storage represents the mainstream due to its high power density and high specific energy. Due to various applications on the power supply side, on the demand side, and as a part of power transmission and distribution services, China's electrochemical energy storage presents a state where mainstream technologies lead and multiple technologies co-exist. On the whole, the three most promising energy storage technologies in the industry are lithium-ion, lead-carbon, and flow batteries. Li-ion and lead-carbon batteries are in the "Slope of Enlightenment" stage, while flow batteries are in the budding stage of "Technology Trigger."

Lithium batteries have benefited from the scale-up of EVs which brings significant cost advantages and likely pushes lithium batteries up to the mainstream of the energy storage market. We recommend that investors focus on potential solutions for future cost reduction and performance enhancement, with the breakthrough lying in upgrading electrode materials and electrolyte optimization.

Lead-carbon batteries are an upgraded form of lead-acid batteries, which have locked some market share with a first-mover advantage and will continue

to play an important role in the energy storage market in the short term. Their future breakthrough lies in domestic production of the core technology. But in the long term, the rapid cost reduction of lithium batteries may pose a great threat. Currently, the market of lead carbon batteries is mainly in specific scenarios such as 5G base stations.

Flow batteries are most suitable for large-scale energy storage applications, but need to quickly optimize their technology before a market outbreak brought by a high-penetration renewables power system. On the one hand, this requires policy support for demonstration projects; on the other hand, reduced material costs and higher energy density are two keys for a further technical breakthrough.

On the whole, under the goal of carbon neutrality, the future development of energy storage will to a greater extent fit in with specific application scenarios. Also, the economics, safety and battery recyclability are three core elements. To promote the energy storage industry in China, government policy should focus on solving the problem of lagged-behind industry plannings. Another problem is the unclear price mechanisms which lead to difficulties in measuring energy storage project benefits. The government should also adopt certain preferential policies to support the early market.

- Area 6: Hydrogen—A Vital Solution towards Carbon Neutrality Goal

Green hydrogen is a key solution to zero-carbon China. Overall green hydrogen development is in the early growth period and requires the simultaneous build-up of both market demand and hydrogen supply. Hydrogen use in transportation has taken the lead to enter the "Inflated Expectations" phase. The fuel cell industry has received policy support from 20+ cities/provinces/national departments and becomes an investment hotspot. But it is necessary to overcome system durability problems and to improve the level of domestic production to avoid low-quality expansion. Another important step to build this industry is to cultivate downstream hydrogen storage and transportation systems.

The application of green hydrogen in heavy industries, such as steel and chemicals, is still at the "Technology Trigger" phase and is gradually attracting mainstream attention. With many demonstration projects around the world and in China in progress, a huge market for green hydrogen as an energy carrier is coming into shape. However, the industry needs to address challenges including competitive pressures due to the thin profit margin of commodities and stranded assets risks.

Driven by the hydrogen demand from fuel cell

vehicles, green hydrogen production technology such as water electrolysis is also rapidly developing. The key technological issues are cheaper materials for membrane electrode assembly in the polymer electrolyte membrane (PEM) electrolysis and a need for breakthroughs in solid oxide electrolysis (SOE), anion exchange membrane (AEM) electrolysis, and other technology types. Also, scale effects of production and lower electricity costs will be essential to narrow the cost gap with gray hydrogen.

The next ten years will be a crucial time for strategic investment in green hydrogen. It is key to establish the industry's core competitiveness in order to overcome possible market disillusionment. Policies should focus on core technology support, value chain cultivation, and infrastructure development, as well as R&D and pilot project support for industrial applications to promote strategic change for the industry.

For market development of fuel cells and electrolyzers, companies need to focus on the markets driven by policy support, and in the meanwhile, to try to expand niche markets where people are willing to pay for green hydrogen. For example, green hydrogen could achieve cost competitiveness with hydrogen from the steam methane reforming process where natural gas prices are high. Or some customers may favor green hydrogen for the sustainable lifestyle or cutting-edge technology.

- **Area 7: Digitalization—Accelerator for Energy System Optimization**

The application of digital technology in energy system optimization is mainly in the power sector. This includes power operation optimization with the objective to reduce cost and increase efficiency and power system optimization aiming to increase the percentage of renewable energy in the power system. Digital technology is already relatively mature in power operation optimization applications, such as energy asset performance management, smart asset planning, power generation optimization, and load management. On one hand, there are mature suppliers in the market that can provide corresponding services in terms of hardware and software as well as overall solutions. On the other hand, enterprises benefit directly from significant cost reductions which gives them a greater incentive to embrace these new digital application technologies.

The future of operations optimization will shift from a problem-solving approach to a preventative maintenance approach that unlocks the potential for deeper efficiency improvements and improves corporate competitiveness. Digital technology applied to system optimization scenarios such as virtual power plants, demand response, V2G, and distributed prosumer uses is currently in the "Inflated

Expectations" phase of the technology development curve, and the market is paying great attention to it.

Further development of system optimization requires effective policy support and a complete market environment. Also, it is necessary to establish an effective collaboration model among market players to ensure that all participants have reasonable returns to achieve large-scale application of these technologies. This includes allowing power users to provide excess power to load aggregators through their own energy storage and electric vehicles and load aggregators to gain profits from the overall regulation and control of decentralized power supplies. Additionally, communication technology companies must be able to profit from providing the underlying power control technology and big data analysis. Lastly, the growth of digitalized energy system will rely on the development of big data, cloud computing, artificial intelligence, internet of things, and other information and communication technologies.

STAGES OF DEVELOPMENT AND SYNERGIES AMONG FIELDS

To effectively invest in a future zero-carbon China, stakeholders must consider stages of industry development and synergies among various fields. In the early phases, the government plays a crucial role since related industries feature high capital investment, are hardware-based, are susceptible to lock-in effects, and have long pay-back periods. It will be necessary to design policies in a gradual and evolutionary way to guide the overall industry development, including supporting research and pilot projects, providing industrial strategic plans, and establishing industry standards. Markets are the key driver in later stages of industry development, which involve productivity improvement, product optimization, use-case expansion, and ancillary facilities and services back-up.

There are strong synergies among the seven investment areas. Zero-carbon power, green hydrogen, and energy storage form the foundations for a green energy system. Demand-side innovations in the industrial, transportation and building sectors will change patterns of energy use, driving the establishment of new value chains and generating new profit pools. Digital technologies could be integrated with almost all other sectors to help optimize energy planning, operation, and consumption.

Therefore, we recommend that policy and investment take a holistic view of the roles and synergies of different technologies in the zero-carbon ecosystem. Governments could support industrial synergy through macro tools such as energy planning, to achieve "1+1>2" effects.

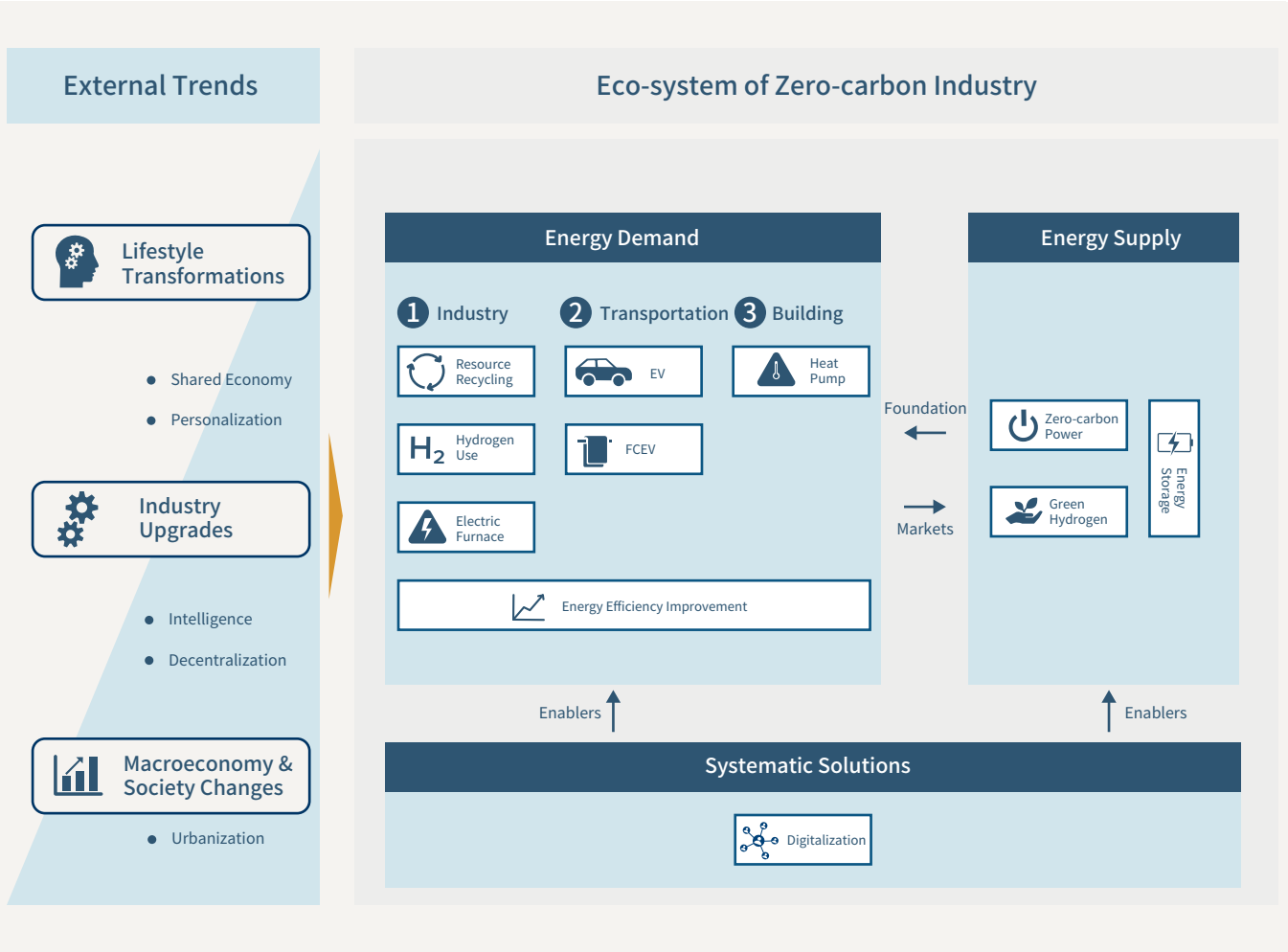
Investors and enterprises need to pay attention to synergies among sectors, as other sectors can serve as the foundation, potential markets, and systematic enablers for the development of each specific sector.

At the same time, we also recommend considering the opportunities created by other external trends in macro socio-economic changes, industry upgrades, and lifestyle transformations. They are adding new competitive advantages for the key technologies of China's zero-carbon transition.

Exhibit 4:
Characteristics of various development stages of zero-carbon industries

Phase	Technology Trigger	Inflated Expectations	Trough of Disillusionment	Slope of Enlightenment	Plateau of Productivity
Technology	• Industrial Electric Furnace • Industrial Use of Hydrogen • Flow Battery • EV Battery Recycling • Power System Optimization	• Green Hydrogen • Hydrogen Fuel Cell • Electric Vehicle Optimization	• Heat Pump for Building	• Lead Carbon Battery • Waste as Energy Source • Product Recycling in Energy-intensive Industries • Lithium Battery • Power System Operation Optimization	• Building/Industry Energy Efficiency • PV • Wind Power
Key Task	• Fundamental Tech • 1st Generation Product Development	• Core Tech • Infrastructure Planning	• Market Screening • 2nd Generation Product Development	• Cost Reduction • Segmented Product Development	• Market Expansion
Key Driver	Government: Research & Pilot Projects → Industry Policy → Industry Standards Market: Cost Reduction, Product Optimization, Market Expansion, Supporting Service				

Exhibit 5:
Synergies of China's zero-carbon industry development



Zero-carbon China will be the new direction of long-term value investment, thanks to the global trend of zero-carbon development and transition, as well as the Chinese government's increasingly clear strategic goal of zero carbon. Considering that zero-carbon China is still at an early stage of development, the government should introduce related policies and measures in the seven investment areas and continuously improve the investment environment. Investors should also strengthen their understanding of the zero-carbon investment sectors and expand their capability in order to be fully prepared for these new opportunities and reap the value returns.

AUTHORS

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The Investment Association of China (IAC)

The Investment Association of China (IAC) is a national social organization registered as a juridical association at the Ministry of Civil Affairs. It is an authoritative and comprehensive association in the field of investment and construction in China, governed by the National Development and Reform Commission. IAC consists of 16 investment committees with more than 1,000 large and medium-sized investment enterprises as members. This report was co-produced by the IAC's Energy Investment Committee, which is the lead committee of the "Zero-carbon China" initiative launched by the IAC in collaboration with more than 50 domestic and foreign organizations in 2020, with the goal of achieving "carbon neutrality" in contribution to the country's energy transition and green development.

Rocky Mountain Institute (RMI)

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; the San Francisco Bay Area; Washington, D.C.; and in Beijing, People's Republic of China.