



中国一带一路倡议瑞典执行小组

The Belt and Road Institute in Sweden

China's Green Transition:

Putting people's development and livelihood first!

Hussein Askary*

The Belt and Road Institute in Sweden

January 12, 2022

As in many other aspects of political economy and governance, China's definitions, visions, and actions differ significantly from those promoted by Western political leaders and think tanks. Dealing with the climate issues follows the same pattern. While China, like most Western countries, does admit that there is a climate change caused by emissions by human society, its dealing with the effects of that climate change and how to move forward without jeopardizing the livelihood of its people differs in many aspects from the Western policies.

In the West, we tend to deal with these matters "negatively", i.e., through such actions as "shut down coal plants", "end use of fossil fuels", "change the lifestyle", "ending the industrial revolution", etc. without really measuring the effects of such moves on society, and without having the real alternatives in place to sustain a good living standard for the people. Here in Europe, we take a decision to reach "zero CO2 emissions by 2030" but only then attempt to figure out how to do it and live with this decision. This is practically the essence of the "Green New Deal" which has become the main slogan in the United States and the European Union. For example, Germany has decided to simultaneously close both coal and nuclear power plants. At the same time, its leaders are faced with the consequences of the dangerous fantasy that the unreliable solar and wind power could replace these two powerful sources of energy and the at the same time sustain an industrial economy in Germany.

In China, its leadership is devising a realistic vision and plan of action that will both reduce its emissions but at the same time sustain its progress as an industrial nation with a

moderately prosperous people. China does this “positively” by embracing scientific and technological progress with a continuation of the industrialization process, not rolling it back.

This article will review two major official papers and several speeches by China’s President Xi Jinping in recent conferences on the matter.

No climate action without development!

In his speech titled “Acting in Solidarity for a Shared Future”, President Xi stated the following at the 16th G20 Leaders' Summit hosted by Italy on October 30, 2021:

“Sustainable Development is facing unprecedented challenges. In this context, we must take a people-centered approach and make global development more equitable, effective and inclusive, so that no country will be left behind.

“The G20 should prioritize development in macro policy coordination, ensure sound implementation of the Action Plan on the 2030 Agenda for Sustainable Development, move forward with the Initiative on Supporting Industrialization in Africa and Least Developed Countries.

“Infrastructure development plays an important role in propelling economic growth. China has made unremitting efforts in this regard through Belt and Road cooperation and other initiatives. China is prepared to work with all sides to uphold the principle of extensive consultation, joint contribution and shared benefits, stay committed to the vision of open, green and clean cooperation, and pursue the goal of high-standard, people-centered and sustainable development, so as to deliver more fruitful outcomes from high-quality Belt and Road cooperation.”

So, instead of the usual panic-button alarmistic statements by leaders and celebrities of the West about the coming collapse of the planet, President Xi is presenting proposals that prioritize the development of the human community, which in turn is the most effective actor to mitigate environmental and climatic problems. Rather than putting humans in a rivalry position with nature as if they are parasites, people with the modern instruments of science and technology are capable of living in harmony with nature and dealing with effects of natural disasters and other climate issues in an effective way. Poor people are in a much disadvantageous position to deal with such problems.

In his Keynote speech at the APEC CEO Summit ([Full Text: Keynote speech by Chinese President Xi Jinping at APEC CEO Summit - Global Times](#)) on November 11, 2021, President Xi emphasized this point. “In the Asia-Pacific, over 100 million people still live in abject poverty. Some economies are still plagued by inadequate infrastructure development, education and health care, and they are weak in food security and energy supply,” He said. Xi stressed that *“Without development, it will be impossible to pool the economic strength*

necessary for achieving green transition. Neglecting people's livelihood means loss of social support for pursuing green transition."

Concerning the very definition of "sustainable development" (which we discuss below), President Xi said: "We need to gain an accurate understanding of what sustainable development means, put the people first, and strike a balance between economic growth, ensuring people's well-being, and energy conservation and emissions reduction. This will enable us to catalyze green transition in the course of economic development and achieve greater development through green transition."

Here lies the biggest difference between China's "new development philosophy" and the Western one. Here in the West, we have become somehow indoctrinated in recent decades to believe that this is a contradiction in terms, that more industrialization leads to more environmental and social problems, not the opposite. We have also been indoctrinated in recent decades that more humans on the planet, especially poor ones, means more problems. The view of a human being has been transformed from a resource into a burden.

In his speech at the 76th Session of the United Nations General Assembly on September 2021 ([Full text of Xi's statement at the General Debate of the 76th Session of the United Nations General Assembly - Xinhua \(news.cn\)](#)), President Xi proposed a Global Development Initiative in steering global development toward a new stage **of balanced, coordinated and inclusive growth** in face of the severe shocks of COVID-19.

The only matters of importance for the Western media in covering this speech were President Xi's announcement that China will stop the construction of new coal-powered plants outside China, and that China will achieve carbon neutrality by 2060 while continuing to peak it until 2030. However, left unnoticed is his call for staying committed to development as a priority.

"The world needs to increase input in development, advance on a priority basis cooperation on poverty alleviation, food security, COVID-19 response and vaccines, development financing, climate change and green development, industrialization, digital economy and connectivity, among other areas, and accelerate implementation of the UN 2030 Agenda for Sustainable Development," he said.

CHINA'S CLIMATE ACTION

We will divide this review into two sections:

A. The Objectives, Principles, and Guidelines;

B. Plan of Action.

Each of the two is based on an official paper.

A. THE OBJECTIVES, PRINCIPLES, AND GUIDELINES

One month after President Xi's address to the UNGA and one week before the Glasgow COP26 Climate Summit, China's Department of Resource Conservation and Environmental Protection issued a white paper on Oct.24, 2021, and published on the website of the National Development and Reform Commission (NDRC) ([【Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy】 -National Development and Reform Commission \(NDRC\) People's Republic of China](#)) titled "Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy". The length of the title is an indicator of the complexity of the matter. The paper states in the introduction:

"We need to ground our work in the new stage of development, apply the new development philosophy, and foster a new pattern of development. Through the application of systematic thinking, we will strike a balance between development and emissions reduction, between overall and local imperatives, and between short-term and longer-term considerations. Endeavors to peak carbon dioxide emissions and achieve carbon neutrality must be incorporated into the overall economic and social development framework. In this way, we aim to effect a comprehensive green transformation in respect of economic and social development, with a special focus on the development of green and low-carbon energy, with a view to expediting the development of industrial structures, production modes, living patterns, and spatial zones that will conserve resources and protect the environment."

So, while the commitment is to "low-carbon" (not the unrealistic zero-carbon) development, it is a high-quality development that takes into consideration the economic and social needs of society with t an "eco-civilization" that is committed to industrialization and advanced science and technology.

It is also important to note here that China will be "peaking" carbon dioxide emissions, which means that it will not stop building coal-fired power plants and the use of other fossil fuels until 2030. After that, these plants will continue to exist and most probably be upgraded until 2060, when "neutrality" is scheduled to be achieved. Even neutrality here means a balance between emissions and mitigation, not simply ending all emissions. Increasing the forest cover and using it as a "carbon sink", is just one such tool of neutrality.

The objective

The objective of this policy of green transition is defined as follows:

By 2025, China will have created an initial framework for a green, low-carbon and circular economy and greatly improved the energy efficiency of key industries. Energy consumption per unit of GDP will be lowered by 13.5% from the 2020 level; CO2 emissions per unit of GDP will be lowered by 18% from the 2020 level; the share of non-fossil energy consumption will have reached around 20%; the forest coverage rate will have reached 24.1%, and the forest stock volume will have risen to 18 billion cubic meters. All the above will lay a solid foundation for carbon dioxide peaking and carbon neutrality.

By 2030, China will see significant accomplishments with energy efficiency in key energy-consuming industries reaching advanced international levels. Energy consumption per unit of GDP will have declined significantly; CO2 emissions per unit of GDP will have dropped by more than 65% compared with the 2005 level; the share of non-fossil energy consumption will have reached around 25%, with the total installed capacity of wind power and solar power reaching over 1200 gigawatts; the forest coverage rate will have reached about 25%, and the forest stock volume will have reached 19 billion cubic meters. CO2 emissions will reach peak and stabilization and then decline.

By 2060, China will have fully established a green, low-carbon and circular economy and a clean, low-carbon, safe and efficient energy system. Energy efficiency will be at the advanced international level, and the share of non-fossil energy consumption will be over 80%. China will be carbon neutral, and it will have achieved fruitful results in ecological civilization and reached a new level of harmony between humanity and nature.

To summarize, there are three elements of this policy: 1. new energy sources, 2. Increasing the energy efficiency of all industrial processes, and 3. Increasing the green cover and forestation.

While the official papers emphasize the increase in solar and wind power (which sounds like music to Western ears) as the new source of energy, in reality, it is nuclear power (first fission and later fusion) which will be the cutting edge of this transition in reality.

THE PRINCIPLES: Energy security and development is the bottom line.

Some of the most important principles in the guidelines of the green transition policy are as follows:

- **Guarding against risks:** A very important guiding principle is that this process should never risk the nation's security. The document states: "The efforts to reduce pollution and carbon emissions must be balanced with the need to ensure the security of energy, industrial chains, supply chains, and food, as well as normal daily life," it stated, adding that "we need to respond appropriately to any economic, financial, and social risks that may arise during the green and low-carbon transformation to prevent any excessive response and ensure carbon emissions are reduced in a safe and secure way."
- **Nation-wide planning:** Taking a whole-of-nation approach, with centralized design,

but policies will be implemented on a categorized basis in light of local circumstance in order to encourage local authorities to act on their own initiative and take the lead in peaking carbon dioxide emissions. So, there are no blanket decisions that apply to everyone everywhere without regard to the local conditions. For example, the increase of the taxes on car fuel in Sweden across the board, created economic difficulties for families and corporations in the very sparsely populated rural areas who depend entirely on private vehicles in their daily life. In the large cities, there are public transport possibilities that can replace the use of cars.

- **Prioritizing conservation.** Conservation here does not mean cancelling or shutting down high-emission production but make all technologies as energy-efficient as possible. “We will continue to reduce energy and resource consumption and carbon emissions per unit of output,” the document states.
- **Balancing the strength of the government and the market:** The usual Chinese top-down mobilization of all resources will play a key role here, including giving room for the “market” to act. “We will deepen reform in energy and related fields, give full play to the role of market mechanisms, and create effective incentive and restraint mechanisms,” it emphasizes.
- **Coordinating efforts on the domestic and international fronts:** China will prioritize its own “national context” even when it promotes international cooperation in climate matters. “In the international response to climate change, we need to be prepared to both stand our ground and engage in cooperation, continue to increase China’s influence and voice on the world stage, and resolutely safeguard our development rights and interests,” the policy states.

Thus, China will not tow the line of whatever ideas, visions, and commitments that are pushed from the West or international community. Every step will be filtered through the lens of the national interest.

THE GUIDELINES

Since China aims at becoming and remaining the leading industrial nation on the planet, the most important guidelines in the green transition policy are related to 1. Industrial restructuring to ensure energy efficiency in energy-intensive industries, 2. Energy production sector efficiency, 3. Development of clean and low-carbon transport sector, 4. Green rural and urban development, 5. Improving the carbon sink capacity of the ecosystems, 6. Increase research and development of low-carbon technologies, 7. Promoting green opening-up especially through the Belt and Road Initiative, and 8. Actively developing green finance.

1. Energy efficiency in energy-intensive industries: The policy intends to create plans for industries and fields including energy, steel, non-ferrous metals, petrochemicals, building materials, transportation, and construction. Authorities will be “looking back” to

inspect steel and coal facilities that have cut overcapacity to consolidate achievements in this area. The policy will also accelerate innovation in low-carbon industrial processes and the digital transformation of the industrial sector. In fields such as goods distribution and information services, green transformations will be accelerated, and low-carbon development will be enhanced in the service sector. Capacity substitutions will be strictly implemented at equal or reduced levels for new entries and expansion of energy-intensive and high-emission projects in areas such as steel, cement, flat glass, and electrolytic aluminum. Production capacity control policies will be introduced for coal-fired power, petrochemical, and coal-based chemical industries. Oil refinery operations not listed in national industrial plans will be prohibited from engaging in new construction, reconstruction, or expansion, and unlisted ethylene, paraxylene, and coal-to-olefins projects will be banned from engaging in new construction.

The policy will accelerate the development of strategic emerging industries in areas such as next-generation information technology, biotechnology, new energy, new materials, high-end equipment, new energy vehicles, environmental protection, aerospace, and marine equipment. It will establish a green manufacturing system and embed the internet, big data, artificial intelligence, 5G, and other emerging technologies into green and low-carbon industries.

When it comes to trade with the West, this policy might give one advantage to China and one disadvantage to the U.S. and Europe. The latter two use “climate certification” as a protectionist measure against Chinese and other parties’ products. But gradually, China may beat them at their own game as Chinese products can quickly become fully “climate certified” due to more intensive Chinese investments in new machinery and low-carbon technologies. On the other hand, Western products that have certain components that are not fully certified will be left out in the cold due to the EU’s and US’s own rules.

2. Energy production sector efficiency: Adhering to a conservation-first energy development strategy, the government will strictly control energy consumption and CO₂ emission intensity, appropriately control total energy consumption, and establish a system to control the total volume of CO₂ emissions. It intends to ensure proper linkages among the spatial distribution of industries, structure adjustment, energy conservation audit, dual-controls over energy intensity and total energy consumption, so that regions in danger of missing energy intensity reduction targets will face delay or restriction of project approvals and introduce energy substitutions at equal or reduced levels.

What can be derived from this complicated scheme is that the total amount of energy produced must account for less CO₂ emissions, which can only be accomplished by more efficient production means of the same amount of energy produced. On the other hand, the correlation between the intensity of low-carbon energy produced this way and the amount consumed in industrial activity must also change in a way that ensures the same productivity with less energy input. This can only be achieved by introducing new

technologies in the industrial processes that ensure higher “energy-flux density” a physical and technical concept that was incorporated into economics by American economist Lyndon LaRouche. It means that the area of work this power is supplied to must decrease so that more work is accomplished with the same or less power supplied. An example is using a laser beam to cut metals rather than mechanical tools. The capital investment in the new technology must increase though.

Strict control over fossil fuel consumption seems to be another feature of this policy. Coal consumption will be reduced at an accelerated pace and will strictly limit the increase in coal consumption over the 14th Five-Year Plan period and phase it down in the 15th Five-Year Plan period, when petroleum consumption will reach its peak plateau. Coal-fired power will be developed in coordination with power supplies and peak shaving capacities to strictly control coal-fired power generation projects. Upgrades and power flexibility retrofitting projects should be accelerated for existing coal power generators. The burning of bulk coal will be gradually phased out before the introduction of a complete ban. Scaled development of unconventional oil and gas resources such as shale gas, coal bed gas, and tight oil and gas will pick up pace. Here again, risk management must be enhanced to ensure a stable and safe energy supply and a smooth transition.

Developing non-fossil fuels will be enhanced, and initiatives will be promoted to substitute renewable energy for fossil fuels, vigorously develop wind, solar, biomass, marine, and geothermal energy sources among others, and continuously increase the share of non-fossil energy in total energy consumption. Importantly, development of hydro power and nuclear power in “a safe and orderly manner” will be enhanced and appropriate steps will be taken to develop biomass energy. The development of a complete hydrogen energy chain covering production, storage, transmission, and use will be encouraged. Boost the capacity of the power grid to uptake and accommodate a high proportion of renewable energy will be a priority. However, the government must reckon with the fact that the latter will become an expensive investment in exchange for a low-energy-density source.

3. Development of clean and low-carbon transport sector: The Chinese policy will accelerate the effort to put in place an integrated multi-dimensional transportation system and will vigorously develop multimodal transportation and raise the proportion of rail and water transportation to achieve a sustained reduction in energy consumption. The organization of passenger transportation is to be improved, and passenger transportation enterprises should be guided toward larger-scale and more intensive operations. Green logistics will be developed more rapidly, and transportation resources should be integrated to ensure higher efficiency.

Encouraging the use of energy-conserving and low-carbon transportation vehicles more rapidly, and promote intelligent transportation, move forward with the electrification of railways, push forward construction of hydrogen refueling stations. There is need for

forward planning to move faster to build a convenient, efficient network of battery charging and swapping facilities. The policy also recommends raising energy efficiency standards for fossil fuel vehicles and vessels, improve the energy efficiency labeling system for transportation vehicles and equipment, and move faster to eliminate old, energy-intensive, and high-emission vehicles and vessels.

Encouraging low-carbon means of transportation, such as accelerating the development of urban rail transit, bus lanes, bus rapid transit, and other forms of large-capacity public transportation and strengthen the development of bike lanes, pedestrian walkways, and other facilities for slow urban transportation systems.

4. green and low-carbon rural and urban development is to be applied to every link of urban and rural planning, development, and management. The government will promote the development of city clusters, develop urban ecological corridors and ventilation channels, and promote afforestation in urban areas. The gross floor area for buildings in urban areas will be set at a reasonable level, and strict limits will be enforced on public buildings with high energy consumption. Green building practices are to be applied throughout the construction process, improve the management system for the demolition of buildings, and avoid demolition and construction on a large scale.

Promoting energy-conserving and low-carbon buildings are among the priorities to raise energy conservation standards for new buildings and accelerate the large-scale development of ultra-low energy, near-zero energy, and low-carbon buildings. The policy recommends the advancement of energy conservation retrofits of urban buildings and municipal infrastructure and ensure buildings consume less energy and emit less carbon. The policy emphasized the gradual introduction of energy consumption caps as well as energy efficiency assessment and labeling for buildings, in addition to conducting low-carbon development assessments in the construction industry.

Comprehensively promoting green and low-carbon building materials and promoting the recycling of building materials is encouraged. This will be also reflected in the development of green housing in rural areas.

Moving faster to improve the energy consumption structure of buildings is also recommended. The use of renewable energy in buildings will be promoted, and the conversion to electric and low-carbon energy in buildings should be accelerated. “We will launch rooftop photovoltaic initiatives and greatly increase the electrification rate for heating in buildings, domestic water heating, and cooking” the document indicates. The guidelines demand moving more rapidly to advance combined heat and power (CHP) central heating in cities and towns in northern China and to promote the large-scale application of residual heat from industrial processes in heating systems, while taking active and prudent

steps to promote heating produced through nuclear waste heat recovery. They also promote advancing clean and low-carbon forms of heating such as heat pumps, gas, biomass energy and geothermal energy in accordance with local conditions.

5. Improving the carbon sink capacity of the ecosystems: One of the important aspects of achieving “CO2 emissions neutrality” is using the ecosystem as a natural factor in absorbing and reducing the CO2 in the atmosphere. The guidelines propose to strengthen the planning and use regulation of territorial space, in addition strictly enforcing ecological conservation red lines and control the appropriation of ecological space. “**First**, there is need to stabilize the carbon sequestration function of existing forests, grasslands, wetlands, seas, soils, permafrost, and karst areas”, it states. The guidelines intend to ensure full enforcement of land-use rules, enhance evaluations of economical and intensive land use, and promote the application of land-saving techniques and modes of development.

Second, Increasing the carbon sink capacity of ecosystems by implement major projects for protecting and restoring ecosystems and coordinating the protection and restoration of mountains, rivers, forests, farmlands, lakes, grasslands, and sandy lands. A very important part of this is promoting further large-scale afforestation and consolidate the achievements made in returning marginal farmlands to forests and grasslands. The policy is to implement projects to make targeted improvements to forest quality and continue to increase forest area and stock volume, strengthen grassland ecological protection and restoration as well as wetland protection. It states that there is need to promote protection and restoration of marine ecosystems in a holistic way and improve the carbon sequestration capacity of mangroves, seagrass beds, and salt marshes. The policy makers state that they will launch initiatives to improve the quality of cultivated land, carry out a conservation project for China’s chernozem soils, and increase the carbon sink capacity of ecological agriculture.

China is already a world leader in fighting desertification and greening the deserts. A NASA study ([Human Activity in China and India Dominates the Greening of Earth | NASA](#)) published in 2019 covering the previous twenty years, showed that China had contributed more than 12% to making the whole planet greener. “China’s outsized contribution to the global greening trend comes in large part (42%) from programs to conserve and expand forests,” the study indicates. This trend is not only going to continue, but poised to accelerate in the coming decades according these guidelines.

6. Increase research and development of low-carbon technologies: The guidelines suggest that the government is planning to formulate an action plan to ensure science and technology better support the endeavor to peak carbon dioxide emissions and achieve carbon neutrality and develop a technological roadmap to carbon neutrality. It will continue with the open competition mechanism to select the best candidates to lead research on

low-carbon, zero-carbon and carbon-negative technologies and on new materials, technologies, and equipment for energy storage. It emphasizes the need to strengthen research on basic theories and methods concerning the cause and impact of climate change as well as on carbon sinks in ecosystems.

The guidelines call for achieving breakthroughs in cutting-edge low-carbon technologies such as high-efficiency solar batteries, hydrogen production from renewable energy sources, controlled nuclear fusion, and zero-carbon industrial process reengineering. To achieve this, there is need to develop key national laboratories, national technological innovation centers, and major scientific and technological innovation platforms for the research and development of energy-saving, carbon-reducing, and new-energy technologies and products. It calls for developing a talent pool for the task of peaking carbon dioxide emissions and achieving carbon neutrality and encourage universities and colleges to establish disciplines and majors relevant to peak carbon dioxide emissions and achieve carbon neutrality.

Speeding up the research, development and dissemination of advanced and applicable technologies to develop smart grid technologies that can support the smooth, large-scale integration of wind and solar power into the grid is needed. This also includes more research and industrial application of advanced energy storage technologies such as electrochemistry and compressed air energy storage. Other research that is recommended is in the large-scale application of key technologies for hydrogen production, storage, and application.

7. Promoting green opening-up through the Green Belt and Road Initiative:

The guidelines call for the acceleration of the development of a green trade system with outside world. The paper argues that as China continues to improve the composition of trade, “we need to make great efforts to promote the trading of green products that are high-quality, high value-added, and technologically advanced.” The paper declares that export policies will be improved to exercise strict regulation over exports of energy-intensive and high-emission products. “We will expand imports of green and low-carbon products, environmental services, and services for energy conservation and environmental protection”, it adds.

To Promote the development of green Belt and Road China will accelerate a green transformation in Belt and Road investment and cooperation practices and support the development and use of clean energy in participant countries. “We will strive to promote South-South cooperation to help other developing countries better address climate change” it states, adding that China will deepen exchanges and cooperation with other countries on environment-friendly technology, equipment, services and infrastructure construction,

actively encourage China's new-energy and other green and low-carbon technologies and products to go global, and make green development a defining feature in the joint pursuit of the Belt and Road Initiative."

To Strengthen international exchanges and cooperation, China will take an active part in international talks on climate change. As a developing country, China adheres to the principles of common but differentiated responsibilities, respective capabilities, and fairness and safeguards its development rights and interests. This is an emphasis on the priority of China's economic development rights. However, it states: "We will follow the United Nations Framework Convention on Climate Change and its Paris Agreement and issue China's Mid-Century Long-Term Low Greenhouse Gas Emission Development Strategy". But it also points out that China will actively participate in formulating international rules and standards and promote the establishment of "*a fair and rational system*" for global climate governance based on mutually beneficial cooperation.

The paper deals with several other guidelines for China's green transition policy and recommendations concerning laws and regulations to be established and followed, and also on green financing and trading. These matters, while are important, need a closer look by experts to determine how they will contribute to this transition process.

B. THE ACTION PLAN

"Energy security and economic development as the bottom line"

A few days after the publishing above-mentioned paper on the principles and guidelines of the green transition, The Department of Conservation and Environmental Protection issued a second paper outlining the action plan of China's green transition. The "Action Plan for Carbon Dioxide Peaking before 2030" was published on October 27th, 2021 on the website of the National Development and Reform Commission website [【ACTION PLAN FOR CARBON DIOXIDE PEAKING BEFORE 2030】 -National Development and Reform Commission \(NDRC\) People's Republic of China](#)

The guiding principles are reiterated as described above in the guidelines. While the government is given the full play in defining and implementing the policies outlined, the market has also the full play in working out innovative technological breakthroughs to achieve the goals defined.

One important paragraph reveals a fundamental difference in the thinking of the Chinese planners and Western ones. The Action Plan states in the very introduction the following:

"Based on China's energy resource conditions of rich in coal but poor in oil and gas, we must insist construction before destruction, stabilize energy stock and expand energy increment.

We must keep national energy security and economic development as the bottom line, strive for time to realize the gradual replacement of new energy, and promote the smooth transition of energy low-carbon transformation.”

So, before shutting down coal power plants and other fossil fuels, a functioning alternative must be in place. It stresses once again that development and the livelihood of the Chinese people come first. “We will take concrete steps to safeguard China's energy security, food security, and the security of industrial and supply chains and to keep ordinary citizens living and working as normal.”

While many interesting actions with regards to the guidelines expressed above are in this paper. We will focus on a few tangible aspects, in which the report has clarity on the actions and tasks ahead. Many of these are also useful to know for experts, scientists and businesses dealing with energy production and utilization technologies in Europe and in the West generally in order to open up channels of cooperation.

1. Coal substitution:

It is very important to have a clear view of the policies and actions that the Chinese leadership are taking in this respect, because their views in this matter are different from those of our own leaders and experts. China is not in any way abandoning coal-fired power production soon, because that would be tantamount to committing economic suicide. Therefore, the steps that are being taken are carefully measured not on the basis of public opinion but on national security and national interest. It is also a rational and calculated vision.

The paper states: “We will pick up the pace in cutting coal consumption, strictly and rationally limit the increase in coal consumption over the 14th Five-Year Plan period (2021-2025) and phase it down in the 15th Five-Year Plan period (2026-2030). Severe restrictions will be placed on new coal power projects, and newly constructed units will meet the most advanced international standards for coal consumption.”

Thus, there will be no “phasing out” and new power plants will be built with new technologies. Only outdated coal power capacity will be phased out in an orderly manner. Furthermore, the policy is intending to “accelerate energy-saving upgrades and flexibility retrofits on units that remain in service, actively advance retrofits in coal-fueled heating facilities, and push forward coal’s transition into a power source that is for ensuring basic needs and serves as a system regulating source.”

As for new energy sources, in trans-regional transmission of power generated by new energy resources, China “will strictly control the scale of supplementary coal power and ensure in principle that no less than 50% of electricity transmitted via newly constructed lines is generated from renewable resources” the paper states.

When it comes to other actions regarding coal, the paper states: “We will vigorously promote the clean utilization of coal. We will rationally designate zones where burning of bulk coal is prohibited, promote efforts to replace bulk coal and make coal cleaner in an active and orderly manner through multiple measures, and gradually reduce and eventually prohibit burning of bulk coal.” A timeline for this specific action is not given though.

2. New energy sources:

Solar and wind: “New and clean” energy in the Western media and increasingly among experts refers to solar and wind power only. However, in China other sources, like hydropower and nuclear power are among the top “clean energy” mix components. While the official paper starts with promoting solar and wind power as a priority, hydropower and nuclear power are considered an important part of the future energy mix. “We will spur large-scale, high-quality development of wind and solar power generation across the board, continue to promote both concentrated and distributed systems, and accelerate the construction of wind and solar farms,” the paper states. It stresses that China will speed up innovative upgrading and specialized application of innovations in smart photovoltaic industry, creatively develop the “solar +” model, and promote a diversified layout in photovoltaic power generation.” “Solar+” refers to an emerging approach to distributing and using photovoltaic solar power using energy storage and controllable devices for small scale customer-based use.

Emphasizing both onshore and offshore power generation systems, China will promote rapid and coordinated development of wind power, improve industrial chains for offshore wind power, and encourage the construction of offshore wind bases. “By 2030, total installed generation capacity of wind and solar power will reach above 1200 gigawatts” the paper declares.

Hydropower: China is planning to upgrade its hydropower bases. New projects include those on the upper Jinsha River, the upper Lancang River, the middle section of the Yalong River, and the upper Yellow River, pushing the development of hydro power on the lower Yarlung Zangpo River, and promoting the green development of small hydro power plants.

“Approximately 40 gigawatts of additional hydro power capacity will be installed during both the 14th and 15th Five-Year Plan periods, respectively, while a renewable energy system based largely on hydro power will be generally established in southwestern China” it states.

Nuclear power: “We will set a reasonable layout and timetable for the construction of nuclear power stations, and maintain a steady pace of construction”, the paper announces.

It emphasizes that China will “develop nuclear power in an orderly manner under the premise of ensuring safety and maintain a steady pace of construction.”

The paper does not mention the number of plants that are planned to be constructed, but estimates are that China will have 150 nuclear reactors in operation by 2030. What the paper states clearly is that China “will push forward demonstration projects for advanced reactor types including high-temperature gas-cooled reactors, fast reactors, small modular reactors, and offshore floating reactors, and conduct demonstrations on the comprehensive utilization of nuclear energy.” On December 20, Global Times reported ([World’s first nuclear power plant using 4th generation high-temperature gas reactor officially enters operation in E China’s Shandong - Global Times](#)) the world’s first 4th-generation pebble-bed gas-cooled reactor entered operation in China’s Shandong Province. This is a very advanced type of inherently safe type of fission reactors where the high temperature residual heat has many applications for chemical, mining, energy and recycling industries.

The paper further states: “We will step up efforts to make nuclear power more standardized and independently driven, move faster to make breakthroughs in key technologies and equipment, and foster industry clusters for the manufacturing of high-end nuclear power equipment.” This will clearly make China a leading builder of nuclear fission reactors in the world.

Concerning fusion power, the paper indicates that China “will step up R&D in advanced nuclear energy technology, particularly cutting edge and disruptive technologies such as controlled nuclear fusion.” It also stresses that China will continue to “take an active part in major international scientific projects such as the International Thermonuclear Experimental Reactor Project.”

On December 21, 2021 the world woke up to a new world record in China’s experimental advanced superconducting tokamak (EAST) fusion energy reactor dubbed as the 'artificial sun'. It set a new by running for 1,056 seconds at high plasma temperature of 120 million degrees Celsius. This is many times the temperature on the surface of the Sun itself. The main challenge is of course to sustain such an incredible reaction at extreme temperatures continuously and maintain it as a continued process. But given the unparalleled rate of investment China is making further breakthroughs towards such a goal are not to be expected before 2050.

3. oil and gas consumption

It was made amply clear in this article that China will reduce but not stop utilization of fossil fuels for the reasons clarified above. However, the Plan of Action states: “We will keep oil consumption within a reasonable range, gradually adjust the scale of gasoline consumption, vigorously promote alternatives like advanced liquid biofuels and sustainable aviation fuel in substitution for traditional fuel oils and make end-user fueled by oil more efficient.”

Furthermore, it indicates: “We will speed up the large-scale exploitation of unconventional

oil and gas resources including shale gas, coal bed gas, and tight oil and gas. We will steer natural gas consumption in an orderly manner by optimizing the structure of use with priority given to meeting public needs.”

4. New Electric power grids: As the share of new power sources increase in the national energy mix, new and integrated systems of transmission will be necessary. “We will make vigorous efforts to enhance the overall adjustable capacity of our electric power system, expedite the construction of flexible power sources, incorporate enterprise-affiliated power plants, the load of traditional energy intensive industries, interruptible industrial and commercial load, electric vehicle charging grids, and virtual power plants into regulation of the power system, build resilient smart electrical grids, and make grids more secure and reliable”, the paper states. It adds that the plan is to “actively develop the “new energy + energy storage” model, promote coordination of power source-grid-load-storage, use multiple energy sources to supplement each other, and support the deployment of appropriate energy storage systems for distributed new energy sources.” This is a massive undertaking which will require enormous investments.

5. A new industrial campaign: energy efficiency across the board

What China is embarking on is no less than a new industrial leap forward, because it will require an almost complete overhaul of the existing system of energy production, transmission and consumption in all sectors in the world’s largest industrial economy.

The planned energy conservation across all sectors of the Chinese economy is not simply reducing energy consumption, but increasing the efficiency of the supply and utilization. This means that new machinery, technologies, and building materials will be introduced to most sectors of the economy. “We will implement energy conservation and carbon reduction projects in urban areas, carrying out energy-saving upgrades on building, transportation, lighting, and heating infrastructure, promoting the trial application of advanced green construction technologies, and advancing overall improvement of energy efficiency in urban areas,” the plan insists. It adds that China “will implement energy conservation and carbon reduction projects in industrial parks, promoting systematic optimization of energy systems and cascading use of energy with a focus on industrial parks where energy-intensive, high-emissions projects are concentrated, so as to foster a group of energy-saving, low-carbon industrial parks that meet advanced international standards.”

These measures will be implemented in all energy-intensive sectors such as electric power, steel, non-ferrous metals, building materials, petrochemicals, and chemicals. The paper goes further to explain the types of equipment that will be replaced “with a focus on equipment including electrical machinery, draught fans, pumps, compressors, transformers, heat exchangers, and industrial boilers.” It will also establish efficiency-

oriented incentives, popularize advanced high efficiency products and equipment, and move faster to retire outdated, low efficiency equipment.

This is probably equivalent to removing the whole engine of a car and replacing it with a new one. But the car in this case is the world's largest industrial economy. We can only leave to the imagination how much such an endeavor will require in terms of investments, technology, power and innovations. If we add to that the digitalization of the whole system, this will leave the realm of ordinary imagination.

The industrial sectors that will undergo this transition:

The steel industry: The plan “will deepen supply-side structural reform in the steel industry, rigorously execute production capacity replacement, strictly prohibit additional production capacity, push for the optimization of existing capacity, and retire outdated capacity.” It will promote mergers and reorganization of steel enterprises across regions and ownership types, so as to make the industry more concentrated. Furthermore it “will optimize the layout of productive forces, and continue to push down steel production capacity with a particular focus on the Beijing-Tianjin-Hebei region and surrounding areas.” Concerning energy supply to the steel industry, measures like the substitution of clean energy, vigorously promoting demonstrations of non-blast furnace technology, improving recycling and reuse of steel scrap, and advancing the use of electric furnaces which can be totally charged with steel scrap.

The same measures will apply to the production of non-ferrous metals such as copper, aluminum, zinc, lead, nickel, titanium, etc.

Building materials: “We will strengthen oversight on production capacity replacement, move faster to eliminate low efficiency production capacity, strictly prohibit new cement clinker and flat glass production capacity, and guide the building materials industry in transitioning to become lighter, more intensive, and more product-oriented” the plan instructs. More specifically it “will promote making staggered production of cement a regular practice, and reasonably reduce the operating time of cement clinker equipment and utilize renewable energy like wind and solar according to local conditions, and gradually increase the proportion of electricity and natural gas in energy consumption.”

Recycling and encouraging building material enterprises to use coal fly ash, industrial waste residue, and mine tailings as raw materials or for mixing cement. “We will speed up efforts to certify green building materials and spread their use, and accelerate the R&D and application of low-carbon gel material products like new binding materials, low-carbon concrete, and wood and bamboo building materials,” the paper further elaborates.

Petrochemicals industry: China intends to optimize the scale and layout of production capacity but will also increase efforts to retire outdated capacity, and address problems arising from structural overcapacity through effective measures. “We will set strict

thresholds on projects, appropriately arrange the timing of construction, strictly control additional production capacity in oil refining and traditional coal-based chemicals industry and pursue development of a modern coal-based chemical industry in a steady and orderly manner. What “coal-based chemicals” refers to is the use of coal as a feedstock to produce hydrocarbon compounds like olefin, also called alkene, compound made up of hydrogen and carbon. China is investing heavily in Coal-to-Olefins (CTO) and the use of coal to produce chemicals. Already in 2014, according to HIS Chemicals ([IHS-China-Coal-Chemical-Prospectus_223213110913044932.pdf \(ihsmarkit.com\)](https://www.ihsmarkit.com/insights/publications/223213110913044932.pdf)) “eight CTO and four merchant methanol to olefins (MTO) plants are in commercial production, with total ethylene-plus-propylene capacity of 6.1 million metric tons and another nine projects with total capacity of 5.4 million metric tons are currently under construction and many additional projects are under evaluation or in the detailed planning stage. It also reports that in addition to CTO, “a number of Coal-based-Monoethyleneglycol (CTMEG) projects were also developed.”

The plans also include guiding petrochemical enterprises in “shifting their energy use model, encouraging the substitution of sources like electricity and natural gas to coal. Furthermore, it plans to integrate the different sector and direct them to “coordinated development between the petrochemical industry and other industries including coal mining, metallurgy, building materials, and chemical fibers, and bolster efficient utilization of refinery byproducts such as dry gas and liquefied petroleum gas.”

energy-saving upgrades and promotion of cascading use of energy as well as circular use of materials will be encouraged. By 2025, the paper indicates “domestic capacity for primary refining of crude oil will be kept below 1 billion metric tons, and the utilization rate of production capacity for main products will rise to 80% or more.”

6. Transportation vehicles and equipment: the paper gives a detailed report on the use of clean-energy and low-carbon transport sector.

“We will expand the application of new and clean energy in transportation, such as electricity, hydrogen power, natural gas, and advanced liquid biofuels,” it emphasizes. While vigorously promoting new-energy vehicles, it will gradually reduce the proportion of cars that run on traditional oil-based fuels in new car sales and car ownership. It will also promote the replacement of public service vehicles with electric vehicles and the use of heavy cargo trucks fueled by electricity, hydrogen fuel, and liquefied natural gas.

The railway system will become more electricity based. Old ships will be upgrade, and ships fueled by electric power and liquefied natural gas will be developed. “We will work to make airport operations based increasingly on electric power and smart technology, and develop new-energy aircraft”, the paper says.

By 2030, according to the action plan, the share of incremental vehicles fueled by new and clean energy will reach around 40%, carbon emission intensity of commercial vehicles measured on the basis of converted turnover will be cut by about 9.5% compared

with 2020, and comprehensive energy consumption of the national railways per unit of converted turnover will be cut by 10% compared with 2020. “We will strive to reach a peak in petroleum consumption for land transportation before 2030,” it adds.

“We will develop public transport service systems that are fast, convenient, comfortable, and linked efficiently, and actively encourage people to choose green and low-carbon means of transportation”, the policy promises. More specifically, during the 14th Five-year Plan period, the volume of rail-ship container transportation will increase above 15% annually. By 2030, no less than 70% of travel will be conducted through environmentally friendly means in cities with permanent populations of one million or more.

The action plan will also boost construction of infrastructure such as charging piles, supporting power grids, and natural gas and hydrogen fueling stations through an orderly approach to improve public transport infrastructure in urban areas. By 2030, all ground vehicles and equipment at civil airports will strive to be powered by electricity, the plan stipulates.

7. Waste management and recycling of materials:

Becoming the country with the largest industrial capacity in the world and the largest population (1.4 billion people) that are enjoying an improving living standard, it would be unthinkable that large scale recycling processes are not in place. The amount of waste such a society can produce is gargantuan. The plan of action is divided into two sections, recycling of industrial waste and recycling of household waste.

Industrial waste recycling: The plan of action suggests that China will “will support the large-scale utilization of waste in a manner that maximizes proportion and value with a focus on bulk solid wastes including coal gangue, coal fly ash, tailings, associated minerals, smelting slag, byproduct gypsum, construction refuse, and crop straw, and encourage the use of such waste as a substitute for raw non-metallic minerals and gravel.” In addition, it will speed up efforts to carry out demonstration projects for the comprehensive utilization of bulk solid waste. By 2025, the amount of bulk solid waste recycled annually will reach around 4 billion metric tons, rising to about 4.5 billion by 2030.

The paper states that by 2025, “the total amount of nine major reusable resources including steel scrap, cooper, aluminum, lead, zinc, waste paper, plastic, rubber, and glass recycled will top 450 million metric tons,” and will be reaching 510 million by 2030.

Reducing and recycling household waste: The plan of action states that the country will move steadily ahead with the sorting of household waste, and work faster to establish collection, transportation, and disposal systems for household waste covering all of society, thereby ensuring that all household waste can be discarded, collected, transported, and

disposed of in a well-sorted manner. “We will intensify efforts to control plastic pollution throughout the entire process from production to recycling, and take action against excessive packaging, so as to reduce the amount of household waste from this source.” The plan suggests. The plan will also promote incineration of household waste, bring down the proportion of waste disposed in landfills, and develop recycling technology that is tailored to the peculiarities of kitchen waste in China. The recycling of sewage will also be advanced. An important milestone is that by 2025, a basic sorting system for urban household waste will be established, with the reclamation rate up to about 60%. “By 2030, the sorting system for urban household waste will cover all cities, and the reclamation rate will rise to 65%” the plan of action states.

8. Advancing green and low-carbon technology innovation

Improving innovation mechanisms and systems: A separate action plan will be formulated to ensure that science and technology support and guide China’s achievement of peaking carbon dioxide emissions and achieving carbon neutrality, according to the paper. “Major R&D and demonstration projects for key technologies related to the achievement of peaking carbon dioxide emissions and achieving carbon neutrality will be set up in national key R&D programs, making use of open competition mechanisms to select the best candidates to lead the projects, and intensifying core technology research for reaching low carbon, zero carbon, and carbon negative,” it foresees.

One aspect of this policy is that achievements in green and low-carbon technological innovation will be included in the performance assessments of institutions of universities, scientific and research institutes, and state-owned enterprises. “We will boost the principal role of enterprises in innovation, support their participation in major national green and low-carbon science and technology projects, and encourage the sharing of facilities, data, and other resources,” the paper stresses.

Furthermore, a national green technology trade center will be set up to accelerate the commercialization of innovations. The intellectual property rights protection for green and low-carbon technologies and products will be strengthened, and the testing, evaluation, and certification systems for them will be improved.

Enhancing innovation capability and personnel training: China is planning to set up Key national laboratories, and national technology innovation centers related to the realization of peaking carbon dioxide emissions and achieving carbon neutrality. “Relevant major national science and technology infrastructure will be planned in advance, and enterprises, universities, and research institutes will be guided in a joint effort to build national green and low-carbon industrial innovation centers,” the plan says.

Concerning training programs, the paper states: “We will develop new approaches in personnel training, encourage institutions of universities to accelerate discipline development and talent training in new energy, energy storage, hydrogen energy,

carbon emissions mitigation, carbon sinks, and the carbon emission trading, and establish a group of future institutes of technology, modern industrial institutes, and demonstration energy institutes focusing on green and low-carbon technologies.”

There is also the aspect of the integration of education and industry, with plans encouraging school-enterprise cooperation in educating students, launching an alliance for industry-education integration on the realization of peaking carbon dioxide emissions and achieving carbon neutrality, and setting up a number of national innovation platforms for industry-education integration on energy storage technology.

Boosting application-oriented basic research: “We will launch a group of major national projects for forward-looking, strategically important cutting-edge technologies with a view to making breakthroughs in low-carbon, zero-carbon, and carbon-negative technological equipment R&D,” the plan of action paper indicates. The focus is on green and smart development and the clean, low-carbon utilization of fossil energy, large-scale utilization of renewable energy, new types of power system, energy conservation, hydrogen energy, energy storage, power batteries, and carbon dioxide capture, utilization, and storage.

Regarding future technologies, such as fusion power the paper declares: “We will deepen application-oriented basic research and step up R&D in advanced nuclear energy technology, particularly cutting edge and disruptive technologies such as controlled nuclear fusion.”

Accelerating the R&D and application of advanced technologies: In accordance with the plans, China will intensify innovation on technologies particularly related to the safe, stable operation and control of major complex power grids, large wind farms, high-efficiency photovoltaic panels, heavy-duty liquefied natural gas engines, large capacity energy storage, low-cost hydrogen production from renewable energy sources, and low-cost carbon dioxide capture, utilization, and storage. It will also accelerate R&D in basic materials such as carbon fiber, aerogel, and special steel.

“We will broaden the application of advanced, mature green and low-carbon technologies and carry out related demonstrations, carry out demonstration projects for whole-process, integrated, and large-scale carbon dioxide capture, utilization, and storage as well as demonstrations for the application of molten salt storage for heat supply and power generation,” the paper state. R&D into hydrogen energy technology and its demonstrations applications will also be accelerated, and its large-scale application will be trialed in industry, transportation, and construction.

9. International Cooperation along the Belt and Road

The Belt and Road Initiative will play central in China’s international green cooperation. The Action Plan reiterates the same points outlined in the previous paper on the guidelines of

the green transition such as actively participating in the climate cooperation globally and utilizing the Green Belt and Road Initiative to promote green transition and development globally.

Making the Belt and Road Initiative a green initiative: “We will follow the principle of extensive consultation, joint contribution and shared benefits, uphold openness, green development, and integrity in advancing the Belt and Road Initiative (BRI), and strengthen cooperation with other participants on green infrastructure, green energy, and green finance,” the plan of action reiterates. It promises to “make overseas projects more environmentally sustainable, develop a BRI energy partnership characterized by green development and inclusiveness, and expand the export of new energy technology and products.”

In practical terms, it states that China “will bring into full play the role of cooperation platforms such as the BRI International Green Development Coalition, advocate the Green Investment Principles, advance the implementation of the Belt and Road South-South Cooperation Initiative on Climate Change and the Belt and Road Science, Technology, and Innovation Cooperation Action Plan.”

Interestingly, it delivers additional information that is useful for investors, innovators, companies, and scientific institutions in the West. It states the following in this regard: “We will boost the import and export of energy-saving and environmental protection products and services. In expanding green technology cooperation, we will promote research cooperation and technological exchanges relating to renewable energy, energy storage, hydrogen power, carbon dioxide capture, utilization and storage, and take an active part in major international scientific projects such as the International Thermonuclear Experimental Reactor Project. We will intensify green finance cooperation across the world, actively participate in carbon pricing and global macro policy coordination on green finance standards, and work with all parties concerned to move forward with the transformation toward a green and low-carbon growth model.”

11. The governance of the green transition in China

This comprehensive green transition requires, according to the authors of the action plan, enormous policy support and coordination in developing a unified and standardized carbon emissions measuring and counting system, improving laws, regulations, and standards, optimizing economic policies, and establishing sound market mechanisms.

The Action Plan states that the process will be a centralized process to ensure its implementation across all sectors of the economy and the society. “The CPC Central Committee will strengthen its centralized, unified leadership over the efforts to peak carbon dioxide emissions and carbon neutrality,” it emphasizes. A “Leading Group” will be created to make overall plans and systematic steps “and take a holistic approach to major

issues and major policies.” The paper says that the members of the Leading Group “will make solid efforts in line with the decisions and plans of the CPC Central Committee and the State Council and relevant requirements defined by the Leading Group.” The office of the Leading Group “will strengthen planning and coordination, examine and coordinate work in all regions and key areas and industries on a regular basis, and scientifically put forward the timetable and road map for carbon dioxide peaking step by step so as to ensure the thorough and effective implementation of all targets and tasks.”

As in other matter, if the CPC Central Committee is in charge of a national endeavor, it is usually guaranteed to be implemented.

The marching orders are clear: “Being fully aware of the importance, urgency, and complexity of initiatives related to carbon dioxide peaking and carbon neutrality, all regions and departments must take on responsibilities, work toward the goals and major tasks defined in this plan and in line with the *Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy*, focus on the key targets and important tasks, and ensure all policies and measures are implemented effectively. The performance of all these tasks will be subject to central and provincial environmental inspections. In light of state plans, all relevant departments, people’s organizations, and social groups should make full use of their strengths to promote green and low-carbon development.”

Meritocracy in action

Finally, the well-known Chinese governance notion of meritocracy seems to come into full display in this process too. The Action Plan paper concludes in the following way:

“We will implement a system for controlling both carbon intensity and total carbon emissions, taking the former as the priority. We will coordinate the management, allocation, and assessment of energy consumption and carbon emissions targets, and gradually develop a sound and comprehensive evaluation mechanism for peaking carbon dioxide emissions and achieving carbon neutrality. We will make better use of evaluation results, rewarding outstanding regions, organizations, and individuals for their contributions to achieving peak carbon dioxide emissions while holding accountable those regions and departments which fail to accomplish targets and tasks with circular criticisms and admonishment in accordance with laws and regulations. Governments of provinces, autonomous regions and municipalities directly under the central government will evaluate the performance of major peaking carbon dioxide emissions targets on an annual basis, and report promptly to the Leading Group on the ongoing progress and major issues.”

CONCLUSION

What we have reviewed here is a matter that should be of great interest for any one who is curious about what the Chinese leaders and experts define as China's "Green Transition". As we clarify in the introduction to this review, it is important to realize that China is coming from a different political, historical, economic, social, and even philosophical direction than that we here in the West do. Therefore, it is very important to see this matter in light of China's recent history and development process.

We are not attempting to evaluate this green transition policy here but present it in a shorter and more graspable manner.

* Hussein Askary is Communication and Information Section Manager and board member of the Belt and Road Institute in Sweden.

www.brixsweden.org

Email: info@brixsweden.org , Hussein.askary@brixsweden.org