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EXECUTIVE SUMMARY

DECARBONISATION PATHWAYS AND HOW FINANCE CAN HELP TO ACCELERATE BUSINESS TO TRANSITION IN GUANGDONG-HONG KONG-MACAO GREATER BAY AREA

(PRE COPY EDITED VERSION)

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EXECUTIVE SUMMARY

HIGHLIGHTS

- The Guangdong-Hong Kong-Macau Greater Bay Area (the GBA) is expected to lead by example in advancing its carbon emission peaking and carbon neutrality as well as creating a regional benchmark for green and low-carbon development. This is achievable.

- Clean electricity will contribute to the largest emission reduction in the long-term for all energy consumption sectors—manufacturing industries, road transport and buildings. In the mid-term, energy efficiency improvement and cleaner energies in manufacturing and buildings, and mode shift in transport will be the key to decarbonisation.

- Our analysis estimated that the GBA needs appr. US$1.84 trillion to achieve carbon neutrality by 2060, which equals to around 1% of cumulative GDP during 2020- 2060. We also estimated that US$200-700 billion will be needed for road transport, and US$150-300 billion for building sector.

- We recommend financial practices to accelerate transition: establishing cross-regional agency coordination mechanism in the GBA; facilitating interoperability of transition finance taxonomies and information disclosure standards in Mainland China and Hong Kong as well as internationally; encouraging financial institutes and enterprises to set net-zero targets; facilitating development of regional carbon markets; developing transition-related financial toolbox to scale-up financing; and developing sector-specific financial solutions for key sectors.

About this report

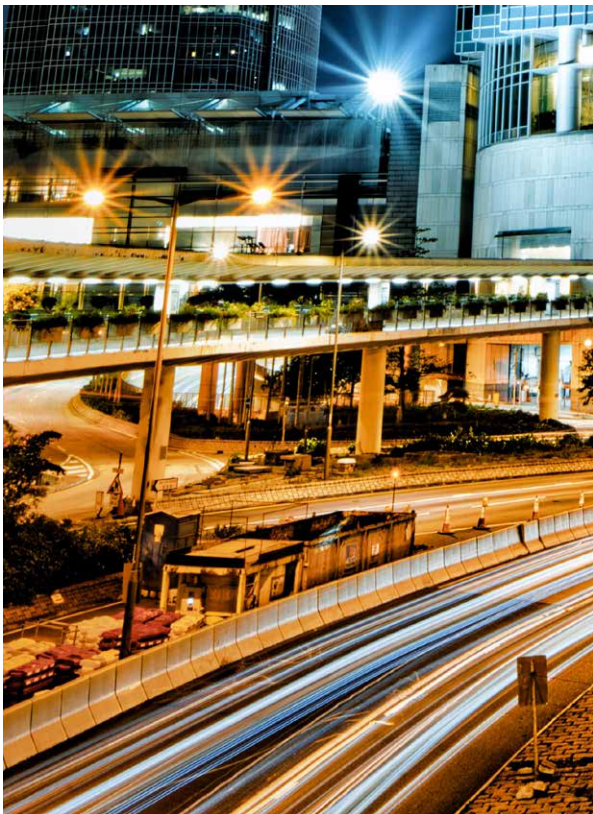
The need for actions is urgent. Greenhouse gas (GHG) emissions rose over the past decade, reaching 59 gigatonnes of CO_2 equivalent ($GtCO_2e$) in 2019 — roughly 12% higher than emissions in 2010 (IPCC 2022). The Intergovernmental Panel on Climate Change (IPCC) released its synthesis report in 2023, warning that "rapid and deep" systemic changes are needed to limit global warming to the Paris Agreement's 1.5-degree Celsius goal, and GHG emissions need to peak at the latest before 2025 and then reach net zero CO_2 emissions in the early 2050s (IPCC 2023). As the world's largest CO_2 emitters since 2005 (Climate Watch 2022) contributing 28% of the world's CO_2 emissions, China is critical to carbon emissions reduction.

The GBA is expected to lead by example in advancing its carbon emission peaking and carbon neutrality earlier than the national "30-60" goals – China's national goal of carbon emissions peaking by 2030 and carbon neutrality by 2060, as well as create a regional benchmark for green and low-carbon development.

This report aims to connect decarbonisation solutions with necessary finance required to accelerate the net-zero transition in the GBA. It firstly applied a top-down approach to predict macro pathways for the whole GBA, then applied bottom-up approach to analyse specific decarbonisation pathways and solutions for key energy consuming sectors--manufacturing industries, road transport, and buildings, to highlight actions most needed to achieve the 30-60 goal, and more ambitious goals to peak emissions and achieve carbon neutrality earlier. Based on the above decarbonization pathways, this report estimated how much investment will be needed and how to solve the challenges faced to ensure finance to help accelerate businesses to transition.

Overall and sectoral transition pathways

The GBA is one of the engines driving China's economic progress and leading in socioeconomic and green development in China. Can the GBA lead in advancing its carbon emission peaking and carbon neutrality earlier than the national "30-60" goals? This study estimates the GBA's carbon emissions from 2020 to 2060 using a top-down approach based on projected GDP and carbon intensity, and sets up three scenarios: Current Policy Scenario, "30-60" Scenario and "25-50" Scenario.



Our analysis shows that ambitious actions are needed for GBA's earlier carbon emission peaking and carbon neutrality. The Current Policy Scenario answers the question that whether and when will the carbon emissions peak and carbon neutrality goal being achieved, if no stronger measures are taken. The "30-60" Scenario and "25-50" Scenario pre-determine the peaking year and carbon neutrality year as assumptions, and the analysis answers the question of how fast the emissions will need to be reduced to be consistent with the national "30-60" goal, and how much more sharply it needs to cut emissions to peak emissions by 2025 and achieve carbon neutrality around 2050.

- As there are no new national or subnational targets on carbon intensity for the 14th FYP, under the Current Policy Scenario, we assume that the rate of each city's carbon intensity reduction for every five-year period in the future retains what was in the 13th FYP. Result shows that the GBA will reach its peak emissions in 2030, and a remaining 355 million tonnes of CO_2 emissions will need to be offset in 2060 (Figure ES-1), which is barely possible.

- Under the "30-60 Scenario", to be consistent with the national 30-60 goals, carbon emissions in the GBA need to peak by 2030, carbon intensity reduction same with the Current Policy Scenario can enable this. Peak emission value is 480 million tonnes of CO_2. But more ambitious actions need to start from 2030 to enable a sharply emission decline to achieve carbon neutrality by 2060. If carbon neutrality means 90% emission reduction and 10% offset by forest sink and negative emissions technologies such as CCUS, as many other countries set their targets, an emission cap goal will be needed since 2030 and annual emission reduction during 2030-2060 need be around 7.5%.

- Under the "25-50 Scenario", if carbon intensity can be reduced by 24% in the 14th FYP, the GBA can peak its emissions by 2025. Peak emission value will be 467 million tonnes of CO_2. This requires much stricter policies and measures because the target is higher than what was achieved in the 13th FYP in Guangdong -- 22.35% carbon intensity reduction, and the room for emission reduction from some measures such as energy efficiency is getting smaller and harder. Annual emission reduction rate during 2025-2050 should be around 16% if we want to achieve carbon neutrality around 2050. This scenario is consistent with the

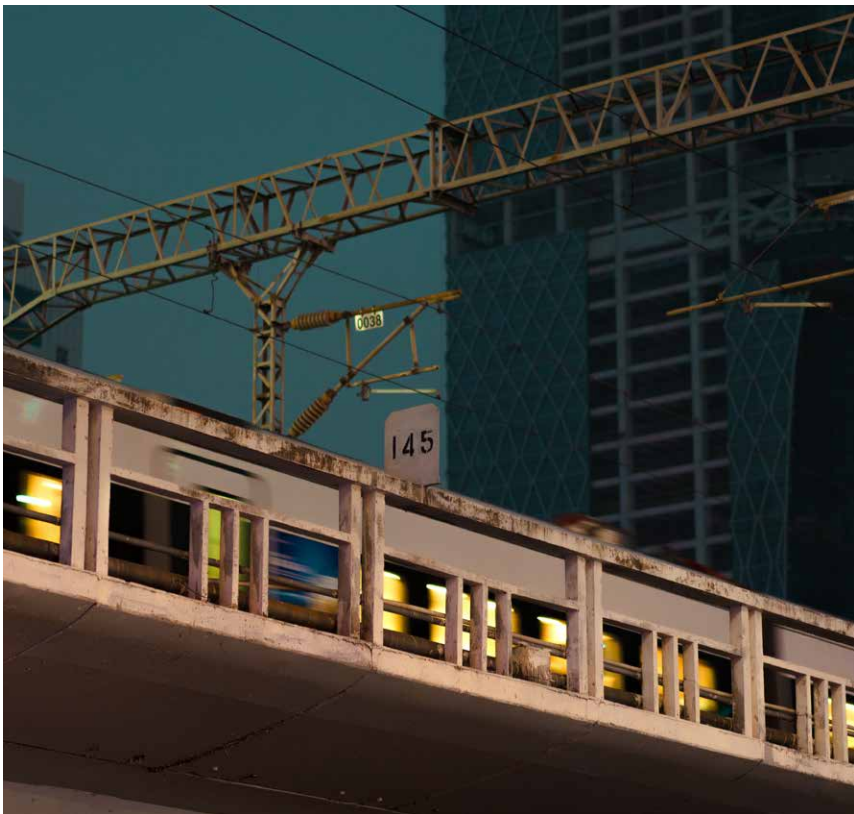
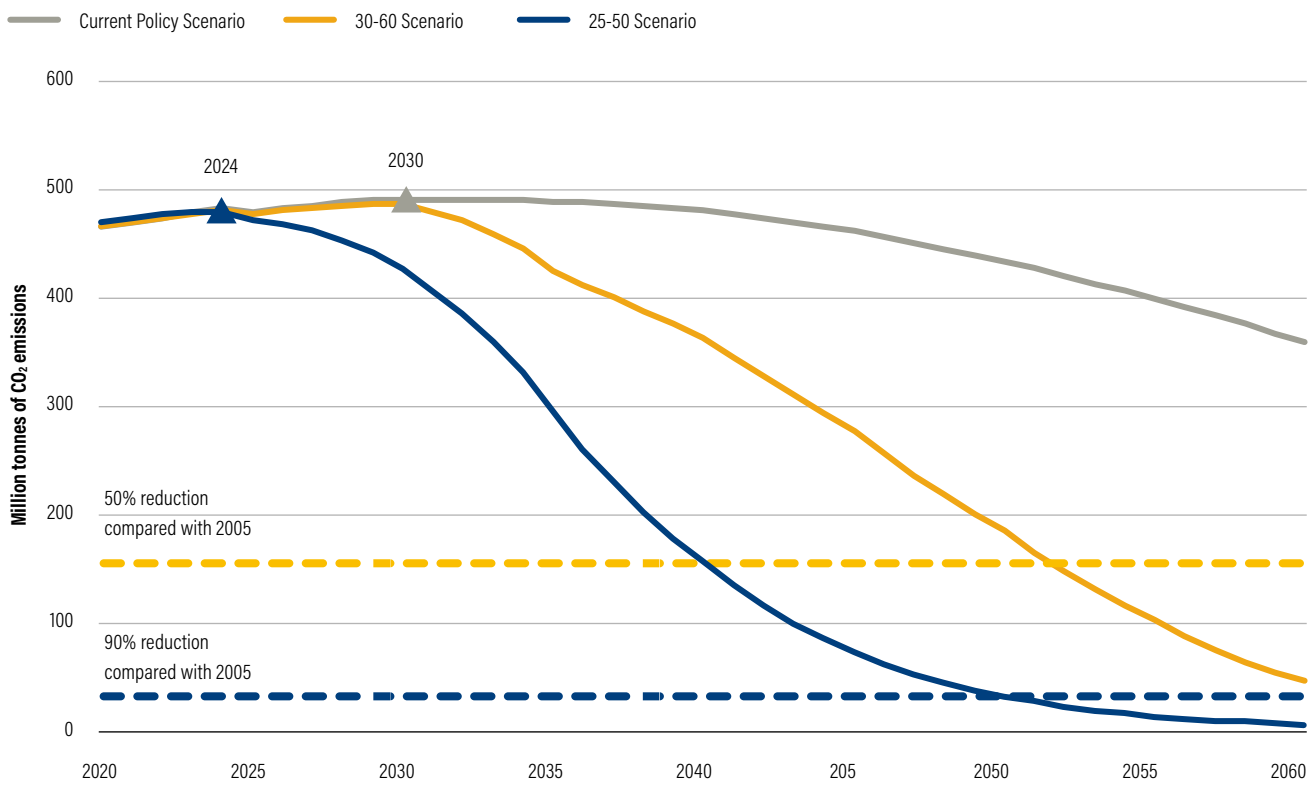


Figure ES-1 | **Scenario analysis of carbon emissions in the GBA toward 2060**



Source: Project team

newest IPCC report advice to ensure the Paris Agreement 1.5-degree Celsius goal.

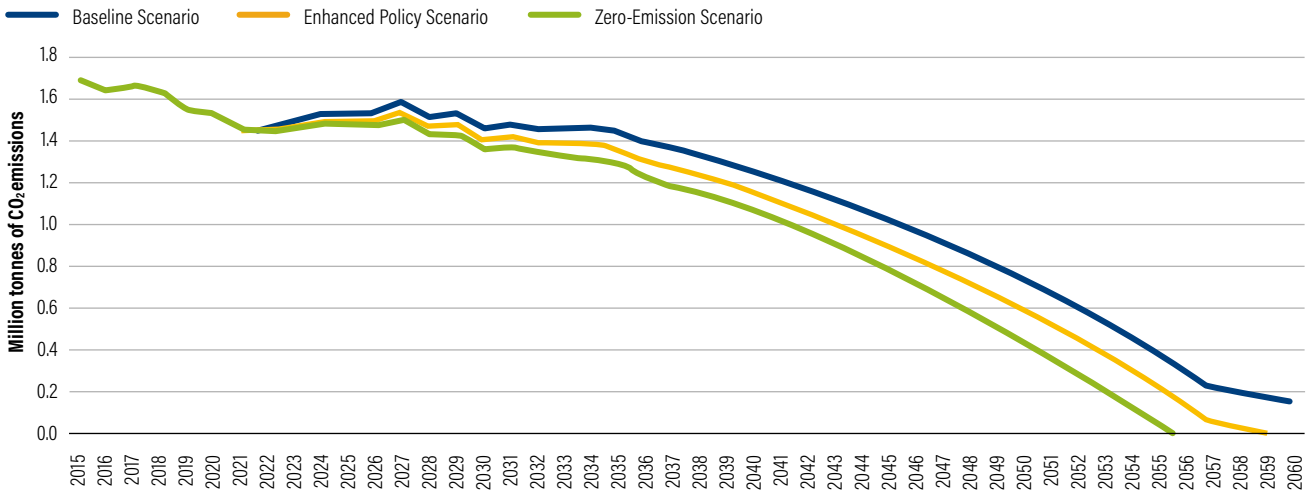
How can the "30-60 Scenario" pathway or even the "25-50 Scenario" pathway be achieved? The GBA's energy-related carbon emissions come mainly from three key sectors: manufacturing industry, building operations and road transport accounted for 32%, 31% and 20% of the emissions respectively in 2020. This study provides in-depth analysis for the three sectors. Bottom-up approach was applied to model different scenarios for each sector. Because the peak year and carbon neutrality year vary in different sectors, the name of Enhanced Policy Scenario and Zero-Emission Scenario are used in sectoral analysis to correspond to the "30-60 Scenario" and "25-50 Scenario" in the overall GBA analysis.

Manufacturing industries

Manufacturing industry in the GBA is estimated to peak carbon emissions during the 15th FYP (2025-2030) and is expected to achieve carbon neutrality around 2055-2060. "New Major Projects" would lead to increase in carbon emissions in the Pearl River Delta during the 2020-2030. But different interventions in energy intensity (energy consumption per unit of industrial value added), phasing down fossil fuels use, energy conservation technologies, and the decarbonised power and heating systems will result in emissions reductions. Emission peak values are 154.2 million tonnes for the Baseline Scenario, 150 million tonnes for the Enhanced Policy Scenario, and 147.2 million tonnes for the Zero-Emission Scenario. However, the Baseline Scenario will not achieve carbon neutrality by 2060 with a residual 16 million tonnes of emission, the manufacturing industrial sector in the GBA is expected to achieve carbon neutrality during 2055-2060 under the Enhanced Policy and Zero-Emission scenarios (Figure ES-2).

The largest emission reduction potential lies in the

Figure ES-2 | **Scenario analysis for industrial carbon emissions**



Source: Project team

following areas:

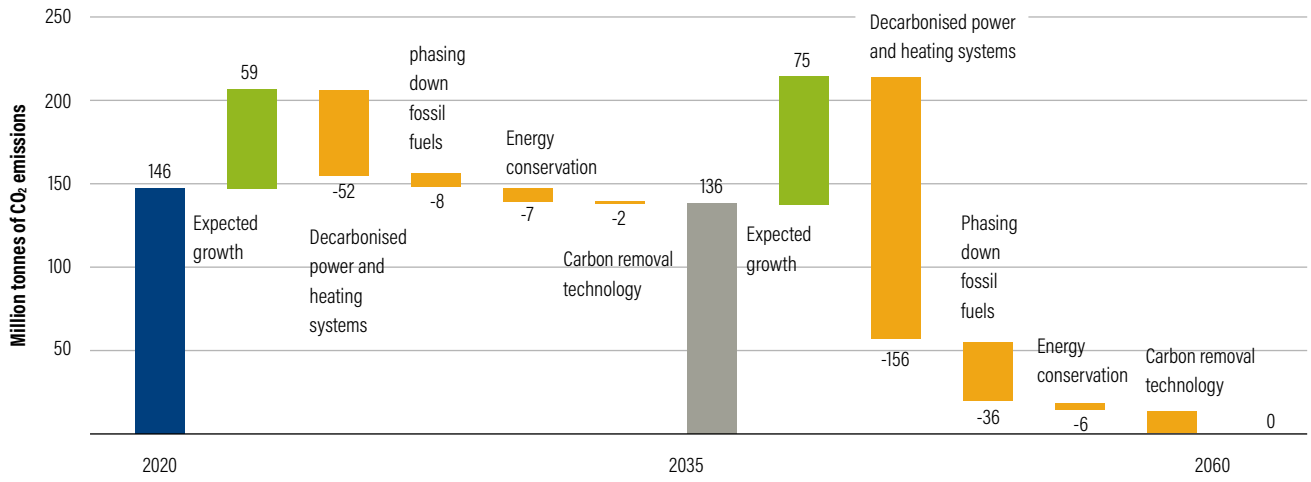
- **The most important contribution to carbon neutrality comes from decarbonised power generation and heating systems.** Decarbonised power and heating systems accounts for 74% of the total emission reduction potential from now to 2060. Phasing down fossil fuels in production accounts for 16%, energy conservation accounts for 5%, and carbon removal technologies accounts 5% (Figure ES-3). Decarbonised power and heating generation can be achieved by leveraging advancements in low-carbon electricity from grid and switching to renewable energy to generate on-site electricity and heating. Decarbonised heating systems are also important to manufacturing process and the electrification of thermal processes should be one of the solutions to decarbonised heating systems and provide an opportunity to leverage decarbonised electricity sources.

- **Phasing down fossil fuels use is the second large contributor to emission reduction, it can be achieved by substituting low-and no-carbon fuel and feedstocks to reduce emissions for industrial processes.** Technical improvements can lower emissions, including upgrading furnaces to phase down coal and consume waste heat. Coal used in ceramic

kilns, papermaking, and textile boilers can be replaced with natural gas in the short and medium term. Innovation in hydrogen production can also reduce the use of fossil fuels (such as coal-based hydrogen production). Hydrogen energy can be produced from industrial by-product hydrogen from propane dehydrogenation, from electrolysis of water via off-peak power and clean energy. Coal-related carbon emissions can be effectively reduced in the cement, steel, and chemical industries over the long term. By 2060, low-emission fuels, including biodiesel, green hydrogen and methane produced from hydrogen, could replace approximately 50%-60% of oil consumption in the petrochemical & chemicals industries.

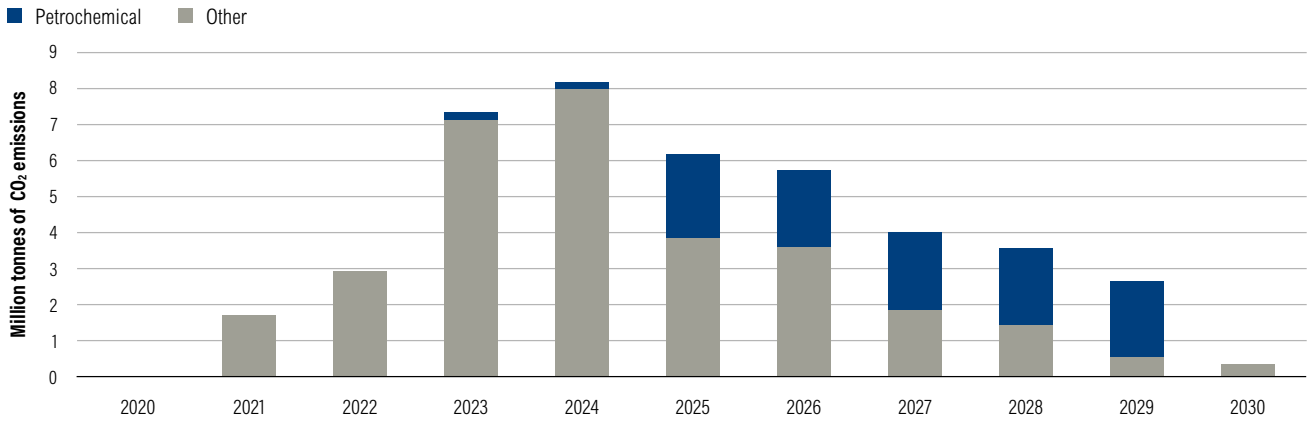
- **The petrochemical industry is a key sector for emissions peaking.** The petrochemical industry consumed 18% of the total energy use in Guangdong in 2020 and is the No.1 sector for energy use (Guangdong Statistic Bureau, 2021). There are 5 large petrol chemical bases in Guangdong and 2 are in the GBA—Guangzhou and Huizhou. Huizhou ExxonMobil Huizhou Ethylene Phase I Project will be completed and put into operation

Figure ES-3 | **Contribution of Decarbonisation Pathways in industries in the GBA**



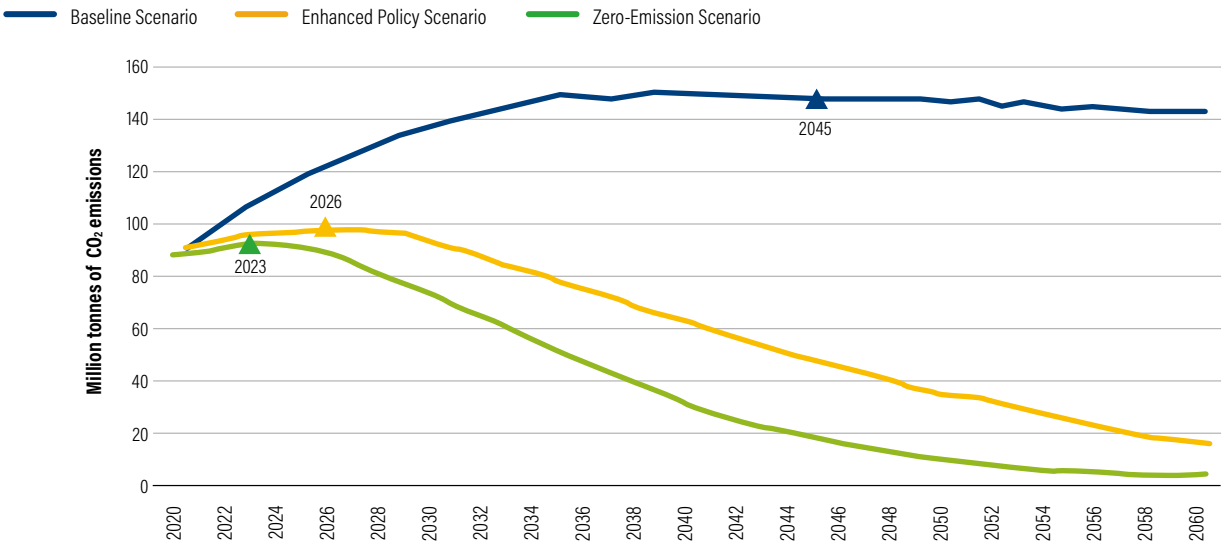
Source: Project team

Figure ES-4 | **Manufacturing industries carbon emissions increase from the "New Major Projects" during 2020-2030**



Source: Project team

Figure ES-5 | **Road transport carbon emissions projections in the GBA under different scenarios**



Source: Project team

around 2025, there will be a large increase in emission increase then (Figure ES-4).

Road transport

Stricter policies could allow the GBA's road transport sector to achieve peak emissions by 2026 or even earlier. Carbon emissions from road transport in the GBA was 91.5 million tonnes in 2020. Private cars, light-duty vehicles and heavy-duty vehicles are the main sources of carbon emissions. Under the Enhanced Policy Scenario, road transport carbon emissions in the GBA would rise 31% above 2020 levels, peak around 2026, then fall to 20 million tonnes of CO_2 – 80% below the 2020 level – by 2060. In the Zero-Emission Scenario, road transport carbon emissions in the GBA would peak in 2023 and reach a near 100% reduction by 2060 (Figure ES-5). Carbon neutrality for road transport by 2060 is possible, but it requires greater determination and earlier actions, including more ambitious new-energy vehicles (NEVs) promotion, fuel economy improvement, mode shift, reduced annual kilometres travelled, and clean electricity and green hydrogen.

The largest emission reduction potential lies in the following areas:

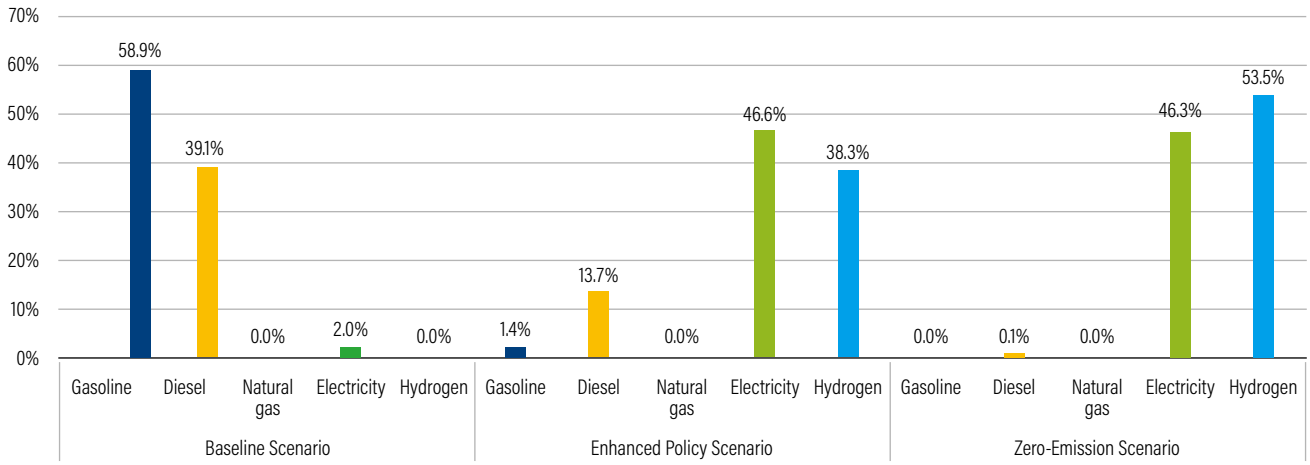
- **Outside of Guangzhou and Shenzhen (which is ahead of other cities in road transport decarbonisation) more aggressive emission reduction measures have a dramatic impact on emissions.** We found that stricter measures would dramatically lower emissions peak in non- Guangzhou and Shenzhen cities in the Pearl River Delta and allow them to peak three years earlier than they otherwise would. This is because Guangzhou and Shenzhen have already taken stricter policies such as the NEVs promotion.

- **Gasoline and diesel will still be the main energy sources for a long time, but electricity and hydrogen will eventually become the main energy supply.** Under both the Enhanced Policy Scenario and Zero-Emission Scenario, the proportion of gasoline and diesel consumed drops rapidly after it peaks. However, until 2050 and 2041 respectively under the two scenarios, the consumption of electricity and hydrogen can surpass gasoline and diesel and become the main energy supply (Figure ES-6). This implies that intervention on internal combustion engine vehicles such as improving fuel economy, shifting away to public transport, etc, will still have significant impact, and meanwhile it is necessary to upgrade the GBA's road transport

infrastructure in the future, especially in Guangzhou and Shenzhen, where the development of NEVs is fast.

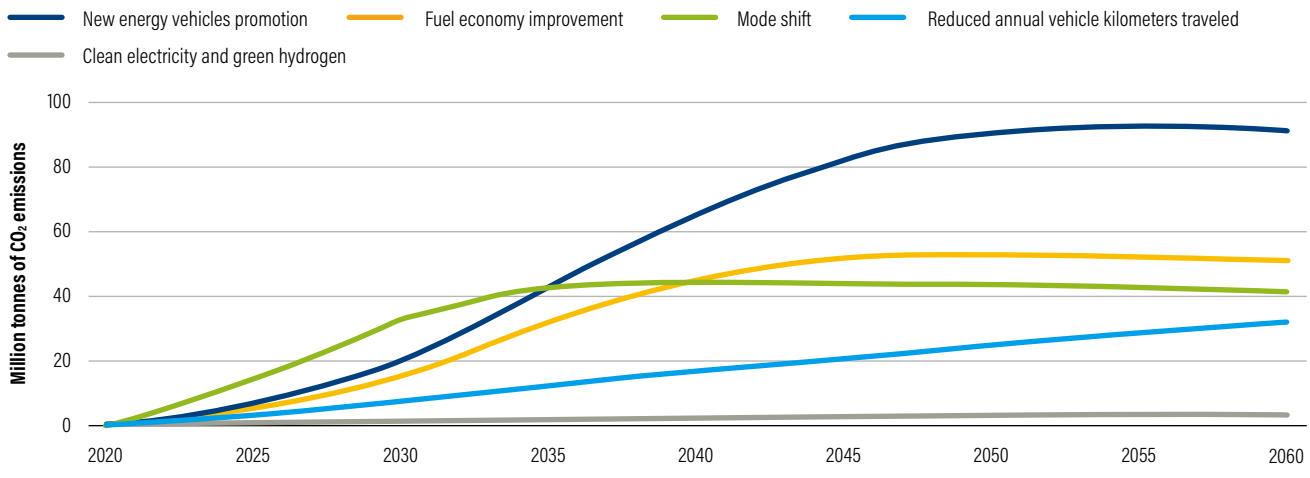
- **Among all policies and measures, promotion of NEVs together with upstream clean electricity and green hydrogen will contribute to the largest emission reduction potential in the long-term. In the mid-term, mode shift will be the largest contributor for decarbonisation.** To compare the contributions of all measures, we analysed emissions reduction potential from five measures when any one of the measures is implemented alone. In the long run, a high proportion of NEVs has the greatest potential to reduce emissions, and its effect increases over time. Shifting passenger transport from private vehicles to public transit services and shifting road transport to railway and ships, would have larger emission reductions

Figure ES-6 | **Road transport carbon emissions projections in the GBA under different scenarios and proportion of different energies**



Source: Project team

Figure ES-7 | **Estimate of Emission Reduction Potential of single measures under the Zero-Emission Scenario compared with the Baseline Scenario**



Source: Project team

than NEVs promotion and fuel economy improvement before 2030 (Figure ES-7). This would require major investments in railway construction; more aggressive policies to expand public transit services and shift freight transportation from highways to railways and waterways; and multi-modal transport, as well as green mobility in the Greater Bay Area.

Buildings

Building sector in the GBA is projected to peak its carbon emissions in 2025 at the earliest and achieve carbon neutrality by 2058. Under the Enhanced Policy Scenario, carbon emissions from buildings in the GBA will reach its peak in 2030 at 180 million tonnes of CO_2. Under the Zero-Emission Scenario, the GBA building sector emissions will peak at a lower level of 144 million tonnes by 2025 and will fall to less than 10 million tonnes by 2058 (Figure ES-8).

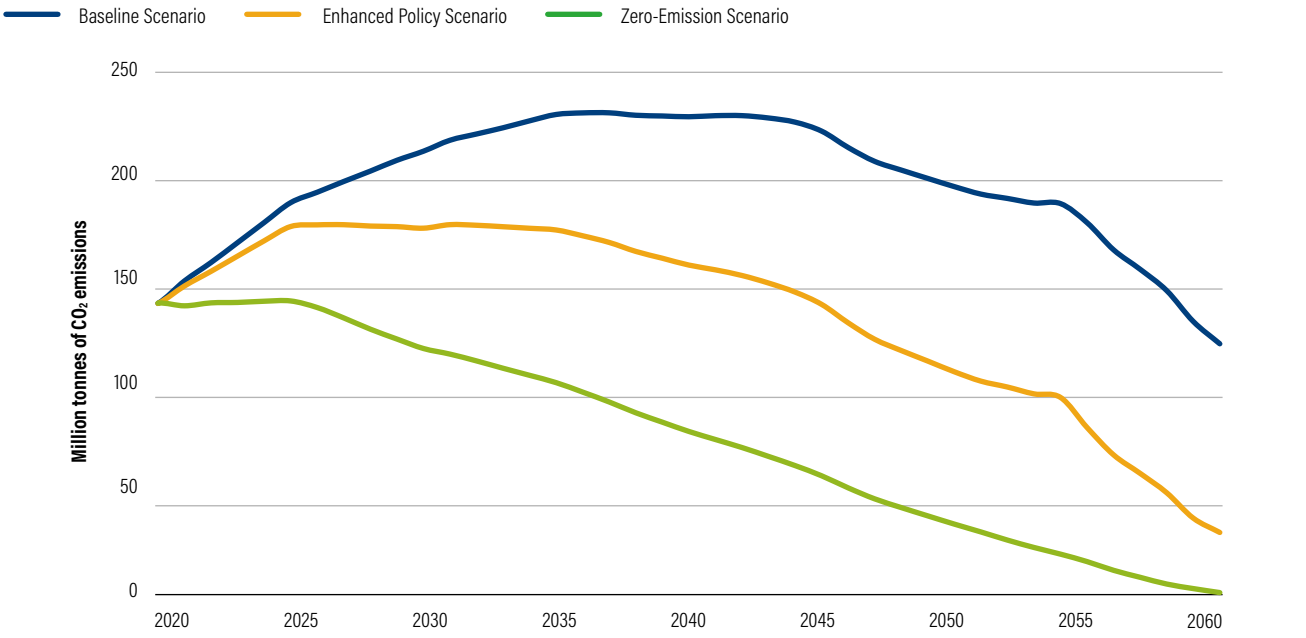
The largest emission reduction potential lies in the following areas:

- **Both the stock and future increment of building emissions are mainly in public and commercial buildings.** Public and commercial buildings take up 60% of emissions. Residential building area per capita in the GBA rivals EU and Japan, but public and commercial building area per capita is smaller and likely to grow. The GBA's residential area per capita was 35.7 m2 in 2020, which is very close to 36 m2 for Europe and Japan. The GBA's public and commercial buildings area per capita is only 13 m2, lower than 14-16 m2 for Europe and Japan, and is expected to catch up in the near future. These indicates that larger emission reduction potential lies in public and commercial buildings.

- **The three largest emitting cities, Guangzhou, Shenzhen and Hong Kong, account for 60% of total emissions in buildings.** Building sector emissions across the GBA are varied. Usually, the higher the proportion of service industry, the greater the proportion of building emissions. Building emissions in Guangzhou and Shenzhen surpassed Hong Kong between 2017 and 2018.

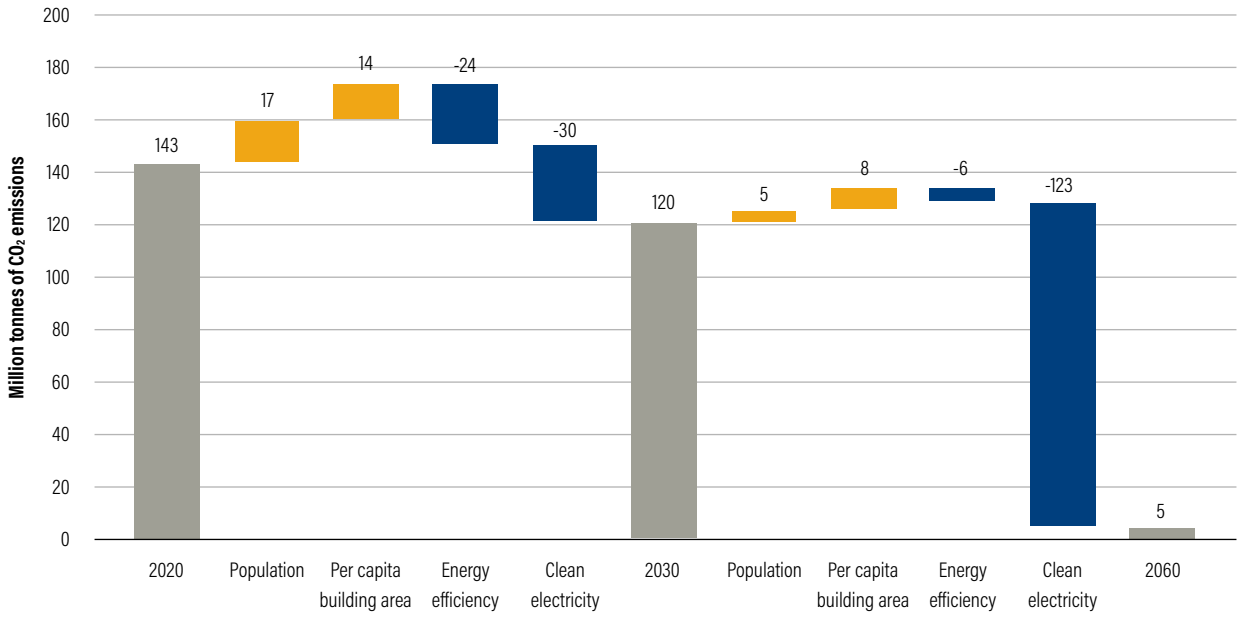
- **Energy efficiency is important to decarbonise building sector in the near future while decarbonized electricity contributes the largest potential in**

Figure ES-8 | **Scenario Projections of Carbon Emissions in Building Sector**



Source: Project team

Figure ES-9 | **Contributions of Decarbonisation Pathways in the Building Sector under the Zero-Emission Scenario**



Source: Project team

emission reduction. In the Zero-Emission Scenario, between 2020 and 2030, improved energy efficiency and energy conservation will contribute 45% of emissions reductions and use of renewable energy in buildings and electricity generation will provide 55% in reductions. Between 2030 and 2060, use of renewable energy will contribute most emission reductions (96%) (Figure ES-9). Efficiency improvement measures should be emphasised ahead of the design and construction stages and can be a potent tool for restricting energy consumption and enabling emissions to peak earlier. Electricity drove most of emissions increase in buildings and accounts for 89% of emissions, indicating a high electrification rate of the GBA's building sector. The GBA can focus on shifting to low-emission fuel for electricity generation and use renewable energy for cooking, water heating and space cooling. Electricity, and especially high efficiency electric heat pumps, will become the primary source of energy use for space cooling. In addition to renewable energy now used to heat water in buildings, solar thermal technology can be used for cooking, and various forms of bioenergy can be tapped as well.

Funding needs to support the transition and key challenges on existing financial practices to accelerate the transition

Finance plays a pivotal role to help the GBA's key sectors achieve its decarbonisation goal. In order to realize the above suggested overall and sectoral decarbonisation pathways, this study estimated the investment needed.

Our analysis estimated that the GBA needs appr. US$1.84 trillion to achieve carbon neutrality by 2060, which equals to about 1% of cumulative GDP from now to 2060. We also estimated that US$200-700 billion will be needed for road transport, and US$ 150-300 billion for building sector. Of the estimated US$1.84 trillion financing required for GBA's decarbonisation by 2060, 55% would be needed in the energy-intensive industries, such as petrochemical, road transport and buildings. TableES-1 shows a breakdown of the investment needs.

Table ES-1 | **Estimates on the investment needed for the GBA**

PATHWAYS	INVESTMENT AREA	ESTIMATED AMOUNT UNDER ZERO-EMISSION SCENARIO (BILLION US$)
Road Transport		696
Increase EV and Fuel Cell Vehicles	Promotion of New Energy Vehicles	365
	Newly chargers and charge stations	34
	Newly hydrogen refilling stations	4
Mode shift	Road-transport to railway and water transport	300
Building Sector		314
Green Building	New green buildings	78
Energy efficiency improved	Ultra-low and near zero buildings	1
	Retrofitting existing buildings	209
Distributed renewable energy	Install solar thermal Install photovoltaic Install air-sourced heat pumps	26
Manufacturing and other energy-intensive industries		830
Total Investment needs		1,840

Source: Project team

The above investment estimates are not fully met. Part of them can be supported by green finance but the gap remains. Why is there a gap and what are the challenges faced to fill the gap?

This study summarizes five challenges of unlocking finance to accelerate businesses to decarbonisation given GBA's unique role in the "dual markets":

- **More cross-regional policy coordination needed:** Government coordination at all levels across the GBA needs to be strengthened. The governments of key cities such as Guangzhou, Shenzhen, Hong Kong and Macao, have not issued municipal-level planning guidelines that are drafted in tandem with each other. It is also not clear how the GBA will promote the coordinated cross-regional development of "financing decarbonisation", especially the emerging transition finance, which is important to support the carbon intensive industries and is an efficient supplementary to green finance.

Ambiguous definition for transition activities: Financing decarbonisation of carbon-intensive sectors will be essential to facilitate the transition of the real economy in the GBA. A clear definition of transition activities is needed, and this will allow a broader range of stakeholders to understand and appreciate financing carbon-intensive sectors. However, there is a lack of common taxonomy-based approaches to identify specific transition activities, sectoral decarbonisation targets and information disclosure standards in the key sectors that support net-zero transition and ensure an alignment approach across jurisdictions in the GBA. A great number of assets in these industries do not meet the requirement of the existing green finance taxonomy, thus cannot leverage green financial tools. Therefore, as a complement to green finance, China started launching some tools for financing decarbonisation including sustainability-linked bonds (SLBs), transition bonds and sustainability-linked

loans (SLLs) to support the transition entities and activities. However, there is risk of greenwashing due to an ambiguous definition of transition activities. PBoC is leading on transition finance taxonomy, beginning with carbon-intensive sectors like coal-fired power generation, steel, building materials and agriculture (J. Ma 2022). Some leading international financial institutions are exploring transition finance frameworks to qualify and label financing that accelerates transition activities. For instance, Standard Charted Bank (SCB) in 2021 released its transition finance framework, which is designed for asset-based financing and aligns with the IEA net zero energy 2050 scenario (NZE).

- **Insufficient scientific guidance for transition plans:** To transition to lower carbon emissions, enterprises will need unified standards, transition goals, and pathways. A large number of high-carbon enterprises in China have the will to transition. However, they typically lack sector specific guidance and expertise to set the transition goals, the ability to prepare transition plans and pathways, and the understanding of how to access the financial market with credible tools and products to support the transition.

- **Limited financial tools to accelerate transition:** A wide range of well-defined and well-understood financing tools are a prerequisite for financing the decarbonisation of high-carbon enterprises and their transition activities. The acceptance and liquidity of transition-related financial tools are also an indication of the maturity of the transition market. At present, while SLLs and SLBs are being adopted for setting clear GHG reduction targets during the financing terms. However, transition finance tools, bonds, and loans are still limited. Financial tools in the form of equity investment, insurance, and asset-backed securities are relatively undefined or non-existent.

- **Unaligned carbon market mechanisms:** Now, there are three carbon markets in the GBA, two pilot carbon markets in Chinese mainland and one voluntary carbon market in Hong Kong. Due to differences in the allocation of carbon allowances and the regulation of the carbon market, the allowances in these three markets cannot be traded or mutually recognised, making the carbon markets in the GBA fragmented from each other, which reduces the scale and liquidity of transactions and leads to the lack of comprehensive coverage of industries.

Six recommendations for finance to accelerate GBA's decarbonisation

In order to address the above challenges and fully exploit the supporting role of financing decarbonisation in the GBA, we propose the implementation of the following key measures.

1. Establish a cross-regional agency coordination mechanism for financing decarbonisation in the GBA. Given the fragmented nature of the finance market in the GBA, it is imperative to establish a cross-regional agency coordination mechanism for transition finance, which local policy maker and regulators should be the key committee members, aiming at accelerating sectoral transition in region. The coordination mechanism is to mobilise policy incentives and finance resources in support of transition activities and investment by drawing on the experiences of green finance development in the region. The core coordination agency could be established based on the existing GBA Green Finance Alliance (GFA).

2. Facilitate interoperability of Common Ground Taxonomy/transition finance taxonomies and information disclosure among Mainland China, international and/or Hong Kong standards. To reduce transaction costs, improve market transparency and avoid transition washing in the region, it is necessary to promote interoperability of the transition taxonomies that Mainland China currently being developed and international/HK standards whenever these taxonomies become available. And it is a requisite to raise consensus on mandatory information disclosure for transition activities among different regulators, promote

mandatory information disclosure such as Task Force on Climate-related Financial Disclosures (TCFD), and to facilitate market readiness for adopting international climate disclosure standards like the International Sustainability Standards Board (ISSB) in the region which will be served as a pioneer for the China nationwide.

3. Encourage GBA's financial institutions and enterprises to set up net-zero targets. Setting the net-zero target is key to support businesses, including the leading financial institutions and enterprises, to develop a credible technical roadmap and investment/financing plan for decarbonisation with independent assessment for this progress. The existing green finance associations in the region, like GBA-GFA, Hong Kong GFA, and Guangdong Green Finance Committee, can help to promote financial institutions and enterprises to set up net-zero targets, based on decarbonisation pathways from this study or other existing initiatives, such the Science Based Target Initiative (SBTi) and the Hong Kong Exchange's Practical Net-Zero Guide for Business. The net-zero targets should be ambitious to achieve net-zero well before 2060. Some international banks that have joined SBTi, like the Standard Chartered Bank, can showcases and play leading roles for target-setting, disclosure and engagement with corporate clients for their decarbonisation goals and pathways.

- **Debt:** Establish the GBA grant scheme to scale up the existing sustainability-linked and use-of-proceeds transition bonds in the identified sectors of manufacturing, building and transport. The scheme should adopt both policy supports in Chinese mainland (e.g., subsidy to bond issuance and discount interest on green credit) and Hong Kong Monetary Authority (HKMA) Green and Sustainable (GSF) Grant scheme. In addition, carbon-related products can be innovated to link with carbon assets, such as Chinese Emission Allowance (CEA), Chinese Certified Emission Reduction (CCER), and carbon credits recognized in the international market. The carbon-related products are embedded carbon assets into SLL structure and other carbon trading products, to support the energy-intensive enterprises to develop transition targets and technical roadmaps which follow the requirements of the Sustainability-linked Loan Principles issued by the Asia-Pacific Loan Market Association, and transition finance taxonomies.

- **Equity:** Explore setting up tax concession private equity fund to invest in the companies that are adopting new low-carbon technologies, upgrading high-carbon industries by using digital technologies, or incubating some innovative SMEs in the key sectors; and utilise potential revenue from carbon allowance auctions to establish the industrial low-carbon fund in collaboration with local governments for decarbonisation technology investment and projects in the GBA.

- **Insurance:** Innovate some insurance products, such as green building insurance, mandatory liability insurance for environmental pollution, carbon reduction loss insurance, carbon asset related insurance and the use of new low-carbon equipment insurance, to insurance energy performance during financing tenor.

5. Develop industries-specific financial solutions for the key sectors in the GBA:

- **Manufacturing:** For the key energy-intensive industries identified by the Chinese regulators, such as steel, petrochemicals, cement, ceramics, and papermaking, financial institutions can partner with Multinational Corporations (MNCs) in those sectors to scale up Sustainable Supply Chain Finance (SSCF) along the value chain. Leveraging SSCF can assign value to MNCs' supply chain sustainability and provide tangible incentives to suppliers and their buyers.

- **Building:** Leveraging tools for financing decarbonisation to scale-up green retrofitting via sustainability-linked loans , implement an effective Energy Performance Contracting (EPC) business model for green retrofitting, adopt a green insurance mechanism in the GBA to address term mismatch, expand recognition of international green building certifications for example, International Financial Corporate (IFC) Excellence in Design

for Greater Efficiencies (EDGE) Certificate to attract international funding, conduct operational assessment and disclosure of energy data.

- **Road Transport:** Through policy incentives for new energy-based freight fleet, electric and hydrogen fuel cell vehicles, to mobilize private capital into infrastructure construction for new energy vehicles such as charging piles and hydrogen refuelling stations in the region. Encourage local government to issue sustainable municipal bonds to invest in railways and leverage SLL and transition financing for shipping financing (beyond IMO and duel-fuelled vessels).

6. Facilitate the regional carbon market to accelerate GBA's transition. While the national carbon market is expected to expand the covered sectors and reboot the transaction of CCERs, it is an opportunity to connect with Chinese mainland CCER market, Hong Kong "Core Climate" and international voluntary carbon markets linking capitals with climate-related products worldwide. The existing Guangdong and Shenzhen carbon emission trading systems can also play more roles to accelerate the GBA's transition, by pioneering to expand the covered sectors that are not included in the national carbon market - ceramics, textiles, data centres, buildings and transport - into the scope of regional carbon markets. There is possibility of exploring the establishment of a GBA regional carbon market linking to the Hong Kong market to pilot some financial tools and derivatives.

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