THE CHINA GUYS

WHITEPAPER SERIES

CHINA'S ECONOMIC HUBS OF 2035: THE PEARL RIVER DELTA

THE MEGALOPOLIS DRIVING CHINA'S GROWTH INTO THE MID-21ST CENTURY

A COLLABORATION BETWEEN

THE CHINA GUYS POLICYBOT

Acknowledgements

China's Economic Hubs of 2035: The Pearl River Delta

The Megalopolis Driving China's Growth Into the Mid-21st Century

Authors

Derek Chuah, Erik Stahle, Ava Jamerson, Nathan Handwerker, Steve Hopkins, Fabian Engeln, Jianyin Roachell

Editors

Alicia Hinds, Melanie Snyder, Jenny Wheeler

Data Sourcing

Policybot

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The China Guys

As a team of dedicated China watchers working to bridge the information gap between the East and the West, we constantly seek to understand the future of the Middle Kingdom. That's why, in this series, we sought to look at the pacesetters on track to define China's future economy. We are excited to kick this series off with the Pearl River Delta, a powerhouse economic zone that has played a pivotal role in the modern rise of China.

TCG is a diverse group of professionals with deep in-country experience that allows us to cut through the noise and connect the dots behind Beijing's activity. Our collaboration with Policybot on this report allowed us to achieve the unique analysis and foretelling insights contained within this whitepaper.

We look forward to expanding upon this series in the future.

Nathan Handwerker, Co-Founder & Chief Research Officer

POLICYBOT

Policybot offers custom and open-source software solutions, as well as big data training modules to political scientists, business leaders, and global scholars. We are a group of civic technologists advocating for global public-policy transparency and socially responsible diplomacy.

What makes the Policybot and TCG research collaboration unique is our automated information retrieval and data science approaches that help bring out insightful trends and latest updates for decision-makers and investors. Our text-mining approach, coupled with expert economic analysts from TCG, can give our audience the right context and background to our data-driven policy analysis and ultimately shed light on critical industrial insights. We build models to read thousands of policies to extract key themes and topics, so that you don't have to. All the policy data used in this paper were acquired responsibly from city-level policy announcement boards and publicly available sources. For policy data on other economic zones, please contact team@policybot.io.

Jianyin Roachell, Chief Data Scientist
Fabian Engeln, Information Retrieval, Data Scientist

Executive Summary

The Pearl River Delta ("PRD"), a ginormous metropolitan area nestled along the Southern coast of China, has played a pivotal role in the rise of modern China. From the cultural heritage of Foshan to the buzzing tech hub of Shenzhen, the PRD is immensely influential to the China we know today.

While the Pearl River Delta's rise has been awe-inspiring, it's far from complete. The region commonly underscores investment, business, and innovation trends and is on pace to continue growing dramatically into the foreseeable future. Now, with a strong pursuit towards poverty alleviation, urbanization, and centrally planned strategic growth in the Mainland, the PRD has found itself commanding an increasingly prominent position in China's policies which are set to spur inbound investment and business in the region.

This paper will explore the historical rise of the PRD, discuss the policy frameworks structuring the region's growth, and breakdown the incentives for its future development. Following which, it will identify provincial- and city-level goals by which policymakers seek to push the PRD forward to new heights. Through analyzing keyword mentioning frequencies amongst city-level data, the report will present the industries behind current and future growth trends among each city in the PRD.

EXECUTIVE FINDINGS

1. Across all tiers of Guangdong's cities - 1st tier, 2nd tier, 3rd tier cities - the primary focus has been industries related to energy, green development, and smart manufacturing;
2. PRD key industrial & market development mechanisms mentioned in policy documents for the last 20 years have been mainly price setting, toll/taxes, and standards setting regulations, contrary to the traditional thinking of heavy subsidy-based government intervention on local economic development;
3. In regulating and guiding the development of energy and green industries, policy instruments like pricing, standards setting, licensing, and subsidies are the major modes of government intervention;
4. In guiding the smart manufacturing industry, policy instruments mainly consist of toll, taxes, refund, as well as subsidies.

By the end, our readers should walk away with an understanding of why the Pearl River Delta is uniquely positioned as one of China's key economic hubs as far out as 2035 and beyond.

China's Economic Hubs of 2035: The Pearl River Delta

February 2021

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Introduction

The Pearl River Delta (PRD) is a cluster of cities that surrounds the Pearl River estuary, which is the region of land where the Pearl River flows into the South China Sea. The river delta is formed by three major rivers, the Xi Jiang, Bei Jiang, and Dong Jiang (west, north, and east respectively). One of the most densely urbanized regions in the world, it is the wealthiest region in South China and one of the wealthiest across all of China. It is considered a megalopolis, defined as a group of adjacent metropolitan areas, but is also part of a series of larger megalopolises running along the southern coast of China.

The term "Pearl River Delta" is often interchangeably used with the "Hong Kong-Macau-Greater Bay Area," or GBA. Geographically, both terms are the same, referring to the nine prefectures and two special administrative regions, Hong Kong, and Macau, which all lie along the Pearl River estuary. Policy-wise, there is a slight differentiation. The Pearl River Delta Initiative refers to the policy known as "The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)"[i]. The GBA refers to the "Outline Development Plan for the Guangdong-Hong Kong-Macau Greater Bay Area (2020-2035)"[ii] policy. Both guiding policies oversee the development of the same geographic region; however, the current GBA policy places stronger political emphasis on incorporating Hong Kong and Macau into growth on the mainland.

Source: Alpina[iii]

The PRD is broken up into three primary regions, namely Guangdong, Hong Kong, and Macau. The province of Guangdong itself is split into nine prefectures: Guangzhou, Shenzhen, Zhuhai, Foshan, Dongguan, Zhongshan, Jiangmen, Huizhou, and Zhaoqing. According to the World Bank Group, the Pearl River Delta region is the largest urban area in the world by size and population. With a current combined population of over 70 million people, the region has a larger population than the United Kingdom at 66 million.

Figure 1

Population of Pearl River Delta Cities Compared with Western Cities

Source: Visual Capitalist[iv]

While the PRD as a whole has one of the largest populations in the world, it is important to recognize that each of the individual cities in the collective have a population comparable to other modern-day cities in different parts of the world. For example, the two cities of Guangzhou and Shenzhen have populations of approximately 13 million people each[v], the highest of the region, and are comparable to metropolises like Chicago and Los Angeles.

PRD City Composition

Along with a general increase in economic activity, each city within the region is also expected to bring a specific benefit[vi] to the entire PRD.

Hong Kong

Through stock market connects, dual listings, and special bond offerings, Hong Kong is anticipated to play a key role in funding. Hong Kong is expected to leverage its deep financial capabilities to foster cross-border investment into innovation and development in the region. Additionally, Hong Kong's geographic location, which connects inland cities with the ocean, makes it a crucial infrastructure point. Infrastructural linkages like bridges and roads will receive prioritization from policymakers.

Macau

Macau is already famous as a major international entertainment hub. As a part of broader plans for the GBA, Macau will partner with Zhuhai to boost tourism levels in the area. With the recent opening of the Hong Kong-Zhuhai-Macau Bridge, visitor arrivals to Macau grew to 39.4 million in 2019[vii], a 10% year-on-year increase from 2018's 35.8 million.

Guangzhou

Guangzhou, the provincial capital of Guangdong, is anticipated to become an important transportation hub, supporting the flow of labor talent, tourism, and logistics. Guangzhou has a central location in the PRD, making it extremely important that transport networks in the city keep up with demand for travel and shipping, connecting cities from the Northern tip of Guangdong all the way down to Hong Kong. There are plans to increase the length of railways around the city to 2000 kilometers by 2035 and for this enhanced rail infrastructure to carry 396.8 million passengers a year. With these additions to the rail system, getting around the PRD will become much easier in the next decade.

Shenzhen

As one of the largest tech hubs in southern China and the world, Shenzhen is currently home to some of China's largest technology firms. On a global scale, these firms' investment into research and development is one of the world's highest[viii], with 2018 investment surpassing

US$14.9 billion, or about 4% of the city's GDP. In comparison, this figure was only matched by two other countries in the world, South Korea, and Israel, both of which invested 4.2% of their GDP into research in 2016.

Dongguan

Finally, Dongguan has plans to develop as a hub for the manufacturing industry. Currently, it has a five-pillar focus for manufacturing - electronic information, electrical machinery, textiles, food processing and paper production - that generated industrial output with a total value of US$34 billion in 2017. Through heavy investments into smart manufacturing and robotics technologies, Dongguan aims to develop itself into a globally competitive center for high-value manufacturing.

With ongoing US-China trade frictions and the rise of nationalism and protectionism around the world, there has never been a more crucial time for the development of the Pearl River Delta. With its ability to rapidly adapt and the sheer size of its market, the PRD will help China transition into a new global climate. First, it will help foster innovation and propel economic growth across the region through high-tech centers like Hong Kong and Shenzhen. It also will function as a key engine for domestic growth, which is especially important as exports' contribution to overall GDP growth continues to decline. Finally, the PRD's economy will support the country's plans to further open up its economy to outside trade and investment through initiatives like the Belt Road Initiative.

Historical Background

In 1979, Deng Xiaoping and the Chinese government created four Special Economic Zones (SEZ) with the goals of attracting foreign investment and encouraging private enterprise. Two of these SEZs were the cities of Shenzhen and Zhuhai, which had their designations changed in an effort to support the overflow of businesses from Hong Kong. Combined with easy access to the sea, abundant land, and a cheap labor pool, the two regions saw their GDP grow more than 10x in the subsequent two decades alongside inbound foreign investment, leading to population growth that rivaled metropolitan cities around the world.

Later, in 1988, Guangdong province was designated as a "comprehensive economic reform area," granting further market reform autonomy to the region. This movement gave rise to the Shenzhen stock exchange, land-lease liberalizations, and the privatization of housing. In 2008, China announced plans[ix] to combine Guangzhou, Shenzhen, Dongguan, Zhaoqing, Foshan, Huizhou, Jiangmen, Zhongshan, and Zhuhai into a single megalopolis. This was formalized in the passing of the policy known as "The Outline of the Plan for the Reform and Development of the Pearl River Delta (2008-2020)," which has led the integrated development of the region for the past 12 years.

The PRD's economic autonomy granted by the central government and policy focus has allowed this region to comparatively flourish since 1979, and the government's plans do not stop there. With the "Outline Development Plan for the Guangdong-Hong Kong-Macau Greater Bay Area (2020-2035)" now in place, the PRD is well on track of maintaining its place as a key economic hub of China as far out as 2035.

The Policy Framework

The State Council of the People's Republic of China first put out the "Outline Development Plan for the Guangdong-Hong Kong-Macau Greater Bay Area" (Outline Development Plan) on February 18, 2019. The Plan covers the period up to 2022 in the immediate term, extending to 2035 in the long term. Key strategies include spatial development building on the four core cities of Hong Kong, Macau, Guangzhou, and Shenzhen as engines for regional development and leveraging the core cities' comparative advantages to strengthen development of nearby regions.

Policy measures for developing an international innovation and technology hub are paired with the spatial development, expediting infrastructural connectivity, building a globally competitive modern industrial system, taking forward ecological conservation, developing a higher quality of living, working, and travelling, strengthening cooperation, and jointly participating in the Belt and Road Initiative. In addition, the Outline Development Plan supports enhancing Hong Kong's status as an international finance, transportation, and trade center, making great efforts to develop the innovation and technology industries, and establishing Hong Kong as the center for international legal and dispute resolution services in the Asia-Pacific region, and much more.

The main targets for the Outline Development Plan have two key dates, 2022 and 2035. The first phase of the plan aims to substantially increase the overall strength of the GBA through deepened cooperation among Guangdong, Hong Kong and Macau and enhanced internal driving forces for development. In addition, China's objective for the region is to form a framework for an international first-class bay area and world-class city cluster that is vibrant and highly innovative with an optimized industrial structure. Then, by 2035, the GBA would like to achieve a vibrant economic ecosystem underpinned by innovation, increased productivity, highly interconnected markets, wealthier citizens with further cultural development and exchange, and lastly, a protected ecological environment. Together, these elements will build a world-class bay area that is ideal for living, working, and travelling, and additionally sets the region up to be a key international economic hub worthy of investment.

GBA Development

As this region is extremely diverse in terms of development level, it requires a highly comprehensive plan. As seen in the GBA development priorities, the core of the plan is to deepen regional integration, develop an international innovation and technology hub, build a modern industrial system, and develop a quality working and living sphere. Across these four pillars, the overarching themes of investment and development lie within two areas: infrastructural and industry investment. Should these two areas advance successfully, it is likely that the GBA will achieve its key goals in both 2022 and 2035.

Figure 2

Source: Deloitte China[x]

Successful Investments in the GBA

The development of the Greater Bay Area will span across many different industries and is set to greatly alter both the physical and economic landscape of the region. There are a few cities that have already benefited from the extra attention, but none more so than Shenzhen.

Famously declared a special economic zone as a part of China's economic reform and opening phase, Shenzhen is reaching its 40th year anniversary of its special status. In that period, its GDP has grown over 10,000x[xi], becoming the third largest city in China by economic scale. This rapid growth has been enabled through policies that encourage innovation, entrepreneurship, and technology. For example, Shenzhen has recently completed construction of more than 46,000 5G base stations[xii], making it the first city in the world to have a stand-alone 5G network. These base stations are set to power the city's 20 projects demonstrating 5G applications. The projects are worth a combined US$231 million and cover medical technology, industrial internet, and transportation, among other areas.

As for investment initiatives, another success story is the cross-border wealth management scheme involving Hong Kong and Macau. The Wealth Management Connect will allow residents of the two offshore centers and those in nine cities in the mainland to buy financial products in each other's markets, leading to enhanced market connectivity over time. Other initiatives include a new futures exchange and plans to pilot cross-border private equity investments in the area.

These are just some examples of what concentrated policy and monetary support can achieve in the Greater Bay Area and provide a better picture of how this region is set to develop. As exhibited in the Shenzhen case, many of these investments are focused on the crossroads between infrastructure and high tech, enabling the future of the prioritized industries for the region. Quickly developing cities in the GBA like Foshan, Zhuhai, Dongguan, and Zhongshan provide a further glimpse into where the plan's priorities lie.

Foshan

In order to further develop the Greater Bay Area, Foshan will accelerate the interconnectedness with other cities in the bay area. In particular, the city plans to foster the assimilation of Guangzhou-Foshan city, and enable its vision of "one-hour living circle" – a concept used to describe the transport connectivity of the Guangdong province.

To achieve this, there are two key infrastructure projects in place – the Pearl River Delta Shinkansen Airport (New Guangzhou Airport) and the Foshan high-speed rail. The Shinkansen Airport is one of the key airports in Guangdong province, and is expected to begin operations in 2022, with future routes covering Foshan, Guangzhou, Jiangmen, Zhongshan, Zhaoqing, and other areas. In addition, the connecting of the Guangzhou-Zhanjiang high-speed railway, Shenzhen-South high-speed railway and Zhaosun South Intercity to the airport will allow a connection of all city clusters within the Greater Bay Area and achieve a one-hour traffic connection between Baiyun Airport and Shenzhen Airport.

However, this development is not only on the infrastructural side. The Foshan Hi-tech Zone has become a main driver for the city's technological innovation and industrial upgrading. The Zone achieved a regional GDP of US$22.8 billion in 2018[xiii], an increase of 7.5% over the previous year. Due to this development, the Foshan Hi-tech Zone has become dominated by

a mix of real and private sector companies, across several manufacturing subsectors. Some of the main areas include automobile and parts manufacturing, smart living, and biomedicine, with newer sectors including robots, drones, 3D printing, and smart home appliances. From this strong manufacturing base, Foshan has gathered 96 Fortune 500 investment companies, 76 companies listed on the National Equities Exchange and Quotation (NEEQ), and 1,512 high-tech companies.

Zhuhai

The recent construction of the Hong Kong-Zhuhai-Macau Bridge has brought about a great opportunity for Zhuhai to develop its service industry, particularly in tourism, trade, and exhibition. The city is expected to accommodate 75 million and 90 million tourists in 2025 and 2030 respectively[xiv], with tourism revenue predicted to be US$11.7 billion and US$16 billion, respectively. Unfortunately, one of the recent investments came at the wrong time of September 2019, right around the emergence of the coronavirus pandemic.

At that time, Zhuhai's city government announced a tender for a 226,000sqm plot of land to the north of Zhuhai port to be auctioned off on October 18. The starting price of the plot was at US$793 million. Though the results of this auction have not been reported, this move indicates that the Zhuhai government expects a high level of investment in tourism, leisure, and exhibition from both foreign and domestic companies. Of course, these industries have been heavily impacted by the coronavirus, but as China reopened, there has been notable interest in travelling to Zhuhai. Search volume of the keyword "Zhuhai'' on the Ctrip app surged 92.46 percent[xv] since July after the National Immigration Administration announced on August 11 that it would gradually resume processing tourist endorsements for individual or group tours from the Chinese mainland to Macau.

Outside of tourism, much is being done to develop advanced industry in Zhuhai while increasing Zhuhai's ties to Macau. As of now, there are 4,111 businesses funded by Macau investors in Zhuhai with total investment worth US$28 billion[xvi], and 943 businesses from Zhuhai are engaged in multiple industries in Macau. Looking forward, on October 21, Zhuhai and Macau signed another batch of agreements for 20 cooperative projects worth more than US$2.8 billion at the Macau-Zhuhai Entrepreneur Summit 2019. They cover areas such as creative-cultural tourism, finance, cross-border commerce and trade, and healthcare.

As the Chinese economy recovers from a difficult first half of the year, investment is picking up yet again. Zhuhai Gree Group will closely cooperate with Xiaomi Corp and China CITIC Bank in matters of industrial funding and investment, financial services, project cooperation, and resource sharing under a strategic agreement signed on September 3. Gree will take part in the investment and management of the US$1.8 billion Xiaomi Industrial Fund. The fund seeks high-quality suppliers for Xiaomi to further establish its position in the market and introduce top-caliber companies that meet the needs of Zhuhai's development strategies into the coastal city by investing in construction of smart manufacturing industry clusters, per the agreements.

Dongguan

Dongguan has long been known as a manufacturing hub in Southern China, and as China's economy has grown, so has the reputation as Dongguan, becoming widely known as the "factory of the world." However, as wages are rising and Dongguan's comparative advantage as a manufacturing center is diminishing, the government is keen to bolster innovative industries in Dongguan.

To do this, Dongguan is raising funds from both foreign and domestic sources. In 2019, the city introduced 2,062 new domestic and foreign-funded projects in the first six months, with a total contracted investment of US$15.7 billion. Much of this investment is being funneled into the prioritized industries for both the local and regional priorities. At the recent Global Advanced Manufacturing Investment Conference in Dongguan on September 8, 2020, 39 projects worth US$27.7 billion were signed on site. In total, 216 major projects have been agreed in Dongguan recently, involving a total investment of US$439 billion.

In another strategic industry for the region – logistics, the global furniture giant Ikea announced it would invest US$146.3 million to build a headquarters in Dongguan with construction to begin in September 2020 and operations scheduled to launch in August 2022. It said the headquarters will cover about 20 of its stores in China and Southeast Asia, driving local purchases of US$1.5 billion annually.

Zhongshan

Zhongshan has been named as the "hub of the GBA," and therefore extra emphasis will be placed on the construction of transportation infrastructure. Zhongshan aims to become the comprehensive transportation hub west of the GBA and enhance its connectivity with other cities in the area by accelerating the construction of infrastructure such as railways, highways, and ports.

The keynote infrastructure project at the center of it all is the Shenzhen-Zhongshan (Shenzhong) Link, a sea-crossing link between Shenzhen and Zhongshan cities. Shenzhong Link is a 24km-long sea-crossing link between Shenzhen and Zhongshan cities in Guangdong province, China. The US$6.38 billion link will feature a tunnel, which upon completion will be one of the biggest and widest immersed tunnels in the world. The foundation for the project was laid in May 2017 while the construction is expected to be completed in 2024. The link will improve mobility in the southern part of the country, with the capacity to carry up to 90,000 cars a day and reduce the travel time between the two cities from 120 minutes to 20 minutes. In addition to the Shenzhong link, the city will invest US$21.9 billion within the next 5 years to improve its transportation system, including high-speed rail, intercity railway, expressway, water transport, and city terminals.

Apart from transportation, as of late 2019 Zhongshan is home to three industrial clusters worth US$14.6 billion each – equipment manufacturing, electronic information and home

appliances. Looking to the future, Zhongshan will focus on expanding these three clusters to be valued at US$29.3 billion (CN¥200 billion), US$43.9 billion (CN¥300 billion), and US$73.2 billion (CN¥500 billion), respectively. In addition, a fourth cluster for healthcare and medicine will round out Zhongshang's industrial clusters, with a target value of US$14.6 billion (CN¥100 billion) for healthcare and medicine. Despite a slow 2019 and an even worse 2020, the region is still expected to be on target for its goals.

The PRD's Modern Relevance

The Pearl River Delta Development Plan coincides with two broader initiatives currently at the forefront of Beijing's mind. First is spreading affluence and easing the burden of urbanization across megalopolises such as the Yangtze River Delta Economic Belt and the Beijing-Bohai-Tianjin Corridor. These economic zones share similar growing pains with the Pearl River Delta due to China's rapid urbanization, and as such, are prime candidates to serve as focal points of campaigns to spread development.

Second is the declining influence of "The Pearl of the Orient," Hong Kong. Upon Hong Kong's re-accession to China, it has maintained a status as an autonomous zone, giving it special political and economic privileges. Over time, Beijing has slowly spread the wealth of the city across the PRD, minimizing Hong Kong's influence and thus giving Beijing more leeway to diminish Hong Kong's political leverage.

Urbanization

Growing Pains

Beginning with the "Opening Up and Reform" campaign of Deng Xiaoping in the late 1970's, China's economic reform policies have driven an increased demand for labor in urban regions, spurring a large influx of rural laborers into cities. While only 17.9% of China's population[xvii] in 1978 was urban, nearly 60%[xviii] of the population called the city their home in 2019. Notably, nearly 10% of urban residents alone are clustered in Beijing, Shanghai, Guangzhou, and Shenzhen, four economic hubs that have blossomed alongside the rise of contemporary China.

Although urbanization facilitates growth in national incomes, increased productivity, and economic output, the rapid rate at which these hubs have grown has led to issues of overcrowding, unequal access to resources, and uneven development. Additionally, the cities that form the largest megalopolises in China tend to experience these issues on a greater scale.

Overcrowding

At the forefront of these issues is overcrowding. Beijing and Shanghai, China's two most populous cities with a respective 21.54 and 24.24 million residents[xix], are notorious for what is known as "big city disease," which refers to overpopulation byproducts such as congestion, pollution, traffic, poor waste management, etc. Yet, it is not just the total population that

drives these issues, but instead population density. Beijing, Tianjin, Shanghai, and Shenzhen, four key hubs that sit amongst China's megalopolis initiatives, are among the world's most densely populated urban areas[xx]. Shenzhen in particular ranks fifth and has about 6,000 residents per square kilometer on average.

Unequal Access to Resources

Such overcrowding has produced fierce competition for resources amongst locals, leading to often unequal access to healthcare, transportation, education, work, and housing. Many of these issues stem from China's archaic *hukou* system, which oversees people's access to public services within certain regions. A *hukou*, similar in its physical form to a passport, is registered to your place of birth and oftentimes can be difficult to change. Consequently, many people in China find themselves living and working in urban places where they are not registered to utilize public services. The Economist estimates[xxi] that as of 2018, there were nearly 250 million people living in urban regions while holding a rural *hukou,* signifying the system's inability to manage the rapidly increasing population density over time. Although China has phased-in updates to the system over time, *hukou* management has yet to catch up to China's rapid urbanization. In Beijing, for example, non-Beijing *hukou* holders must produce five proofs of residency in order to attend a primary school[xxii]. Many families are often unable to produce these documents, leading to numerous unregistered schools erected by migrants across the outskirts of Beijing, which the local government has cracked down on in recent years.

The Result

While these megacities face individual problems of overcrowding and competition for resources, they still experience the overarching benefit of rapid productivity and economic growth. Large cities benefit from economies of scale (free flow of information), specialized supply chains, and access to vast labor pools, all of which comprise the concept known as "agglomeration." Scholars estimate that doubling of labor density in a city can lead to increased wages and productivity between 2-5%[xxiii]. Population growth over time has led to tremendous economic and affluence gains for cities like Beijing, Tianjin, Shanghai, Guangzhou, and Shenzhen.

Urbanization is also a direct consequence of increasing inequality in China. Particularly, as these megacities experience the economic benefits of increased productivity of vast labor pools, China's countryside and lower-tier cities have drastically lagged behind their counterparts, leading to increasingly lopsided development. China's lower-tier cities and rural towns are notorious for underfunded education, poor healthcare, failing infrastructure, and overall lack of job opportunities. As of 2019, China's Gini coefficient[xxiv], which measures wealth inequality from 0 (perfect equality) to 100 (perfect inequality), registered at .465, vastly higher than the developed world and even higher than other emerging markets like India and Vietnam.

Spreading the Wealth

Urbanization began trickling in during the Deng Xiaoping era, but has quickly turned into a great wave, and has induced a myriad of growing pains. To address these, coordinated development has become a key goal under the Xi Jinping administration, earning itself a prominent place among the 13th Five Year Plan[xxv] of China. While the government has utilized numerous measures such as forced migrant evictions and special economic zones (SEZs) to spread the population out, the party places a particularly strong emphasis on megalopolis coordination, such as that of the PRD, to mitigate problems of inequality.

For example, both Beijing and Shanghai had instituted population limits in 2017. These caps of 23 and 25 million alongside the stagnation in Shanghai's and Beijing's population in the last few years represent Beijing's push to spread populations across wider regions. Beijing in particular has cracked down on illegal migrant housing, and in 2017[xxvi], the government forced evictions upon tens of thousands of migrant workers. While many argue that the concept of "big city disease" is not factual, China has decided to continue on with forced relocations, nonetheless.

In a similar effort, the government has attempted to lure out mega-city dwellers using special zones and new, flashy cities. In April 2017, for example, China announced the development of the Xiong'an New Area, a new urban zone just a short drive southwest from Beijing. The goal was simple: build a major urban hub of innovation to attract labor talent and resources out from Beijing. It has been planned that, as part of the execution, that many of Beijing's non-political resources including banking services, business headquarters, hospitals, and universities will be relocated to the area. The new area may cost the country up to 4 trillion yuan[xxvii] over the next decade or two, a worthy investment should Xiong'an be able to live up to the government's dream of a high-tech, sustainable city. Most importantly, the city acts as a key link amongst the Beijing-Bohai-Tianjin corridor and will be the recipient of crucial transport links between the regions. Even within the short three years since its announcement, the Xiong'an New Area has already increased its population from 745,000 to 1.2 million residents.

While these efforts have played some role in redistributing people, they have lacked the ability to leave a lasting impact on facilitating more even development across larger regions. To achieve this, Beijing has placed vast amounts of faith and resources behind initiatives like the Pearl River Delta. The mission statement of the "Pearl River Delta Zone Reform and Development Plan 2008-2020" emphasizes the need to use megacities like Shenzhen, Guangzhou, and Hong Kong to serve as focal points that complement and give overflow development to nearby villages and cities.

Hong Kong

Beyond measures of population distribution and even development, there are additional political strategic goals that lie behind the PRD initiative. Hong Kong, a key component of China's economic modernization, has been rife with political turbulence since the Hong Kong democracy supporters took to the streets in the 2014 umbrella movement[xxviii]. In the following years, the movement gained significant traction, and mass protests became commonplace between 2019-2020 as the government attempted to place a new extradition bill over the city. In 2020, Beijing imposed the present Hong Kong national security law to bring the city under its reins. While this move appears to be dramatically sudden, in reality, the government may have been targeting the city for enhanced security control for years through the Pearl River Delta scheme, mitigating Hong Kong's relative economic contributions.

The Pearl of the Orient, No Longer

After the British handover of Hong Kong to China in 1997, the Pearl of the Orient became the de facto launching point for foreign businesses that sought access to the vast Chinese market, but also valued the familiar business culture, transparent legal system, and favorable trade environment of the former British colony.

FDI soared as multinationals from across the globe scrambled to set up their Asian headquarters in the city. Between 2003-15, inbound investment totals skyrocketed by 875%, which then drove consistent growth and earned the city significant standing in domestic and foreign policy decisions. After its accession and up until the early 2010's, Hong Kong was the largest contributor to national GDP growth, consistently exceeding China's modern megalopolises.

Bringing Hong Kong into the Fold

To reduce economic reliance on the city, Beijing began regionalizing Hong Kong's economy into the greater Pearl River Delta as early as 2008, which cannibalized many of Hong Kong's unique advantages. As China began to transition from a production economy to a consumer economy, Beijing's priorities shifted towards developing a more domestic-driven economic framework. By attracting vast sums of FDI through Hong Kong, bringing it into the mainland through enhanced intra-regional trade and investment, then trapping it within its borders via strict capital controls, China was able to direct huge inflows of liquidity towards first and second tiered cities. Ultimately, China's cities quickly became megalopolises that eclipsed Hong Kong in GDP size and growth rate. With FDI now distributed among large Mainland cities, shifting national priorities, and comparatively lagging growth, Hong Kong's influence in China's future has taken a serious hit.

A Policy Rebranding

The largest difference between the 2008-2020 Pearl River Delta Reform and Development Outline and the 2020 New GBA Plan is that Hong Kong has shifted from being considered an additional land area to partner with the region, to being a part of development of the Greater Bay region. This rebranding of policy suggests a shift in the prioritization of Hong Kong in the Greater Bay Area, and therefore decreases the overall importance of Hong Kong in the region.

This continued regionalization of the Hong Kong economy into the now Greater Bay Area will likely harm the future development of the city. At the very least, citizens of Hong Kong are cautious about how these plans will impact[xxix] many of the freedoms that have made Hong Kong such a unique city for much of its history. In fact, nearly 60% of residents of the area believe that further integration into the Greater Bay Area plan will bring more harm than good for Hong Kong.

The reduced importance of Hong Kong in the overall New GBA Plan could still stand to be beneficial for the city and its residents. The plan overall seeks to create economic prosperity for the region, the greatest risk now lies in how smoothly the city of Hong Kong can be integrated into the Greater Bay Area.

Policy Priorities of the PRD

The Pearl River Delta covers a broad and diverse region, among which there are highly advanced cities like Shenzhen and Guangzhou, as well as smaller, developing cities like Jiangmen and Zhaoqing. As such, local governments have taken a tailored approach to implementing the nationally syndicated Pearl River Delta development plan. While Shenzhen may be in the market for an expanded electric vehicle industry, a developing city like Jiangmen would be geared more towards prioritizing the development of critical infrastructure, like telecommunications towers, rail transport, etc.

In the following section, we will break down the various policy priorities for each major city of the Pearl River Delta, identifying industries ripe for investment and growth. For this section, The China Guys partnered with Policybot, a software analytics firm serving political scientists and economists. Using Policybot's proprietary and open-source technology, we scraped publicly available primary policies related to the PRD initiative from each relevant local government's National Development Reform Commission (NDRC) site. The NDRC is the major driver behind growth initiatives like the PRD and oversees the development of a national framework, as well as implementation at the local level.

Defining Regulatory Policy Instruments

Industrial policy has always been at the fulcrum of China's political economy and economic planning. A new strand of industrial policy, mixed with market steering instruments (including pricing, standards setting, and subsidies), is arguably the derivative of China's industrial success. During this transition from industrial guidance to market rule setting, the optimal balance of government regulatory instruments and market forces at play is now being tested in economic zones all across China. This seductive dialectical contradiction of China's socialist market economy is what makes China's economic development so interesting.

While assessing the driving factors behind each region's implementation plan, we sought to answer the following research questions:

1. **How has the level of policy support/policy instruments towards the region changed in the past 10 years in comparison to other heavily supported regions (e.g., Yangtze River Delta/Beijing Tianjin Bohai Corridor)?**

2. **Which will be the key industries driving economic growth in each of these regions (e.g., greentech, fintech, infrastructure, manufacturing)?**

The Pearl River Delta: Implementation

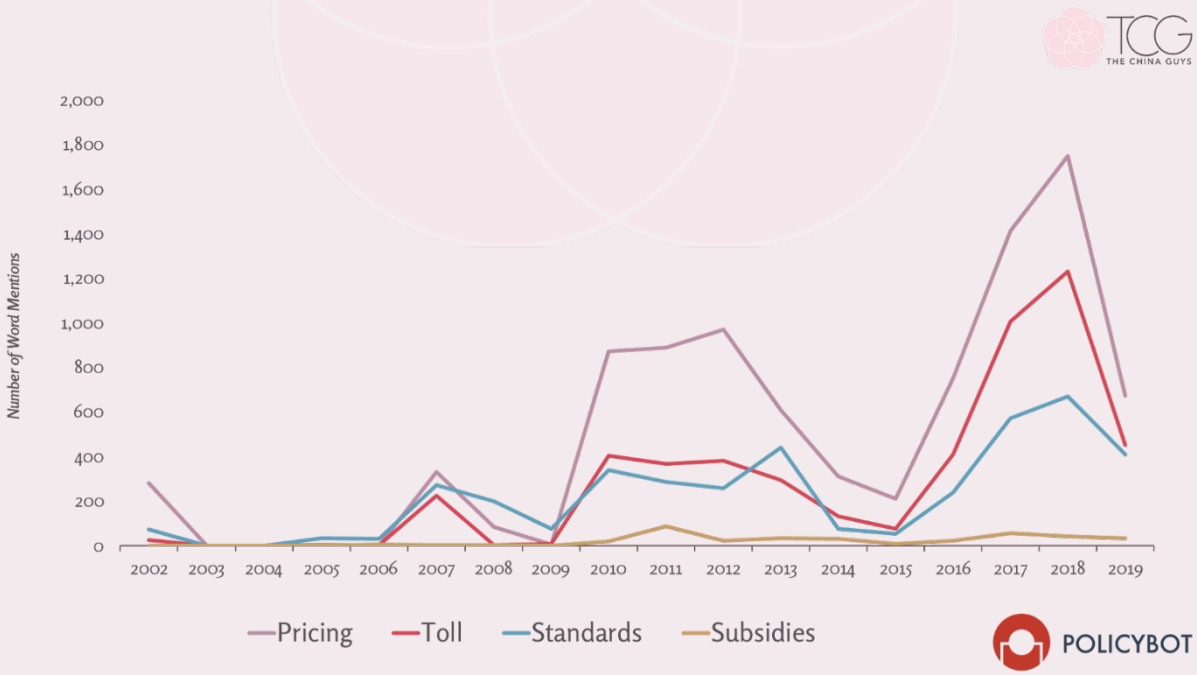
Provincial Level

The PRD initiative is three-pronged: national, provincial, and local. To properly execute the overarching framework behind the development campaign, these three levels must coordinate properly on building an implementation plan. Considering that the PRD includes cities from Guangdong, the Southeastern province has played a crucial role in developing a guiding framework for local level implementation and has acted as a key driver behind carrying out national-level goals.

Despite establishing the first wave of PRD SEZs more than four decades ago, the initiative has gained significant steam within the past few years. Since the 2008 announcement of the 2008-2020 PRD guiding policy, there have been thousands of mentions of the Pearl River Delta in provincial level policies. In 2017, for example, Guangdong's NDRC passed nearly 1,750 policies related to the setting of pricing standards, 1,250 policies regarding taxes and fees, and 500 policies on standard setting for industries.

Figure 3

Guangdong's Key Market Regulation Mechanisms 2002-2019 (June)



Alongside the implementation of the 2020-2035 Hong Kong-Macau-Greater Bay Area development plan, the frequency of PRD mentions should continue to accelerate. The name change is largely superficial and considered to be a "rebranding" of the same framework. As such, the Pearl River Delta Economic Zone will continue to play a crucial role in provincial and national level development goals.

Policy Emphasis by Tier

The Pearl River Delta Economic Zone is comprised of member cities from each level of China's city tier system. The tier system is a hierarchical method of classifying cities based upon measurements of population, infrastructure, average incomes, and business opportunities. Tier 1, the highest tier, points to China's historical economic powerhouses like Beijing and Shanghai, while tier 3, the lowest tier, includes cities that have struggled to achieve economic development akin to their larger counterparts.

Due to the different levels of development across tiers, the policy priorities of each city among the Pearl River Delta vary to a large degree. While the PRD advocates for joint goals such as enhancing cooperation with ASEAN, engaging with Hong Kong, and elevating economic openness across the region, the main goal of economic development requires a tailored approach in each city. Because Shenzhen already boasts some of the world's best infrastructure, further development would require investment in high-tech industries such as AI, cloud computing, etc. that require highly skilled workers. Zhaoqing, on the other hand, is a tier three city and needs to prioritize base development including infrastructure, manufacturing, and education. The following section analyzes city-level policy approaches through the lens of Policybot's proprietary technology to understand which industries may see the quickest growth alongside the prioritization of the Pearl River Delta plan.

Tier 1 and New Tier 1 Cities

At the top of China's economic food chain are the tier 1 cities, half of which are claimed by the Pearl River Delta. Shenzhen and Guangzhou are among China's most economically developed cities, boasting massive populations and acting as global leaders in cutting-edge industries. Traditional tier 1 cities, which include the two above as well as Shanghai and Beijing, have spearheaded China's rise since the opening up and reform of the 1980s, and serve as focal points for the spread of economic development.

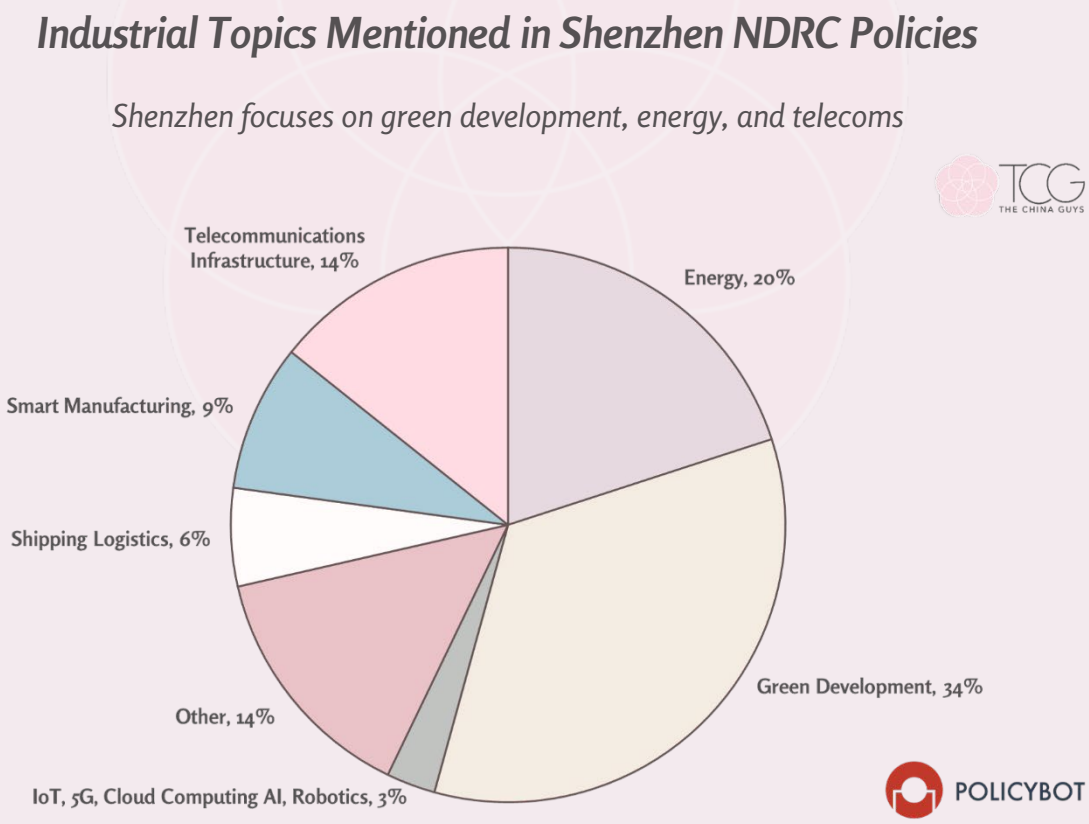
In addition to the traditional tier 1 cities, new ones are emerging as well. In 2019, financial news portal, Yicai.com, released an updated ranking of China's first-tier cities which included Dongguan, a smaller industrial city that sits East of Guangzhou and North of Shenzhen. Although new tier 1 cities still lag behind the economic prowess of traditional tier 1 cities, they are considered highly developed in terms of infrastructure, education, healthcare, and technology.

Shenzhen

Shenzhen is one of the fastest growing local economies within China and has contributed greatly to the overall rise of China. Among the tier 1 cities, Shenzhen is particularly regarded as a key technology hub, earning the moniker "The Silicon Valley of China." The city claims some of China's biggest technology giants such as Huawei, Tencent, and DJI, while also boasting the highest national GDP per capita at US$29,498.

Using Policybot's database to query and analyze policy records from the City of Shenzhen's National Development and Reform Commission office, we are able to find correlations amongst policies referencing the PRD initiative and industry support based on keyword mentions. Among the 90 policy documents related to the PRD initiative, more than 30% of documents had key mentionings of green development, such as electric vehicles (EVs), wind energy, solar energy, etc. Among the renewables industry, Shenzhen is commonly known as a pacesetter within China for electric vehicles. The following diagram illustrates percent of key industrial topics mentioned from the local Shenzhen NDRC website:

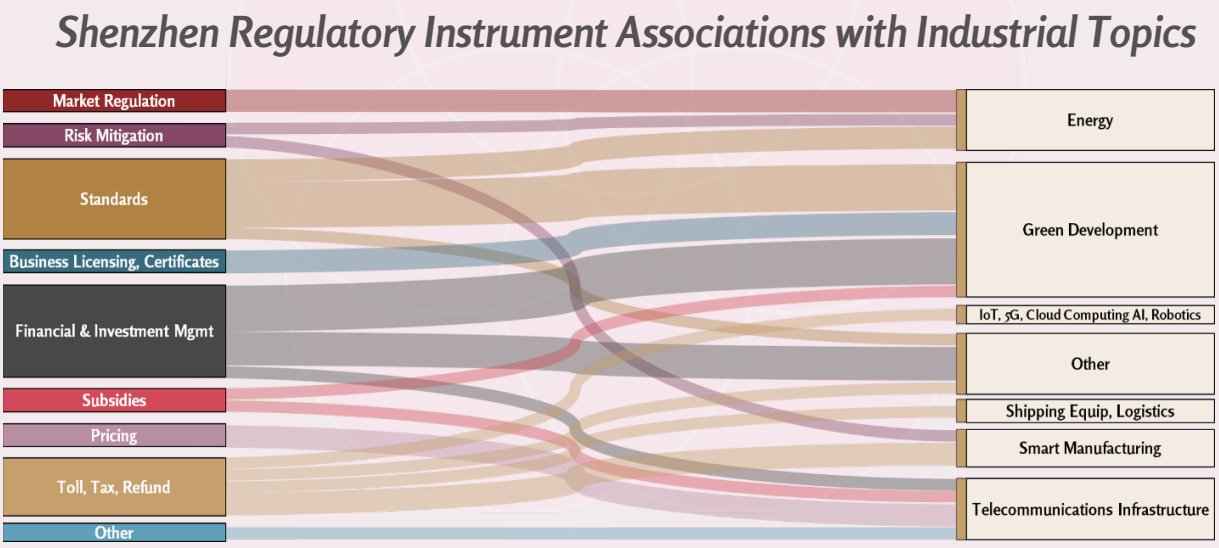
Figure 4



Between 2016 and 2019[xxx], Shenzhen's streets saw nearly 60,000 new electric trucks and vans that operated within the freight industry, in other words, more than 35% of the city's total truck freight capacity. Importantly, Shenzhen's rise in the EV market is unlikely to stop there: the city's policymakers stand firmly behind subsidies for EVs and charging infrastructure, as well as road restrictions for internal combustion engine vehicles. As a testament to the policy emphasis taking root, in June 2017, the city replaced its entire fleet of public buses with electric counterparts.

In second place for most mentioned keywords was energy, comprising 20% of the policy documents. Naturally, energy is an important subject to China and is intricately connected with green development. While China makes considerable leaps in the renewable energy space, renewable energy power generation capacity still lags behind the large energy demand of China's consumer base. Not to mention, the country is currently grappling with how to shift from using traditional sources of energy such as coal, to cleaner alternatives like wind and solar. As a result, the energy topic is a focal point in China's current policy to sustainable development and growth in the long-term.

Figure 5



Infrastructure, mainly telecommunications and shipping infrastructure, appeared in another 20% of policy documents. While one would expect Shenzhen not to place as large a focus on infrastructure development as it is currently one of the most infrastructurally advanced cities in Asia, Shenzhen plays a critical role in one of the PRD's key goals: "engaging in closer cooperation with Hong Kong." Geographically, Shenzhen sits directly above Hong Kong and offers key transport and telecommunications infrastructural links into the city. In 2018, construction was completed on the Guangzhou-Shenzhen-Hong Kong Railway, a bullet train route that dramatically reduced travel time amongst cities to 48 minutes from end-to-end.

Other infrastructural linkages such as waterways, airports, and ports, will also be introduced in years to come that align with the Hong Kong-Macau-Greater Bay Area development plan.

With the above three most referred to topics laid out/in mind/established, next is identifying how Shenzhen regulates and promotes its key corresponding industries by examining the National Development and Reform Commission (NDRC) and the various market instruments it intends to use. Beginning with green development, Shenzhen's local government is prioritizing the sustainable growth of the industry largely through financial support, standards, and business licenses.

As for the latter two, green development naturally lends itself to the placement of these instruments, particularly as it is a developing industry, but financial support has become a more pivotal factor. EVs nationwide have prospered under federal electric vehicle subsidies, greatly reducing the cost of otherwise expensive EVs for end consumers. However, the government seeks to gradually phase out its subsidy program to promote organic competition among China's thousands of EV startups, ideally leading to industry consolidation. Shenzhen is likely echoing this sentiment by prioritizing other methods of financial support to gradually replace subsidies, as Shenzhen claims more than 170 electric vehicle startups[xxxi] itself.

Getting Shenzhen off subsidies will not happen overnight. The government will likely hold onto smaller subsidies until the burgeoning industry has stronger footing. The city is also scaling back government assistance in other areas: in 2018 the city announced a timetable to reduce solar energy subsidies to zero.

Guangzhou

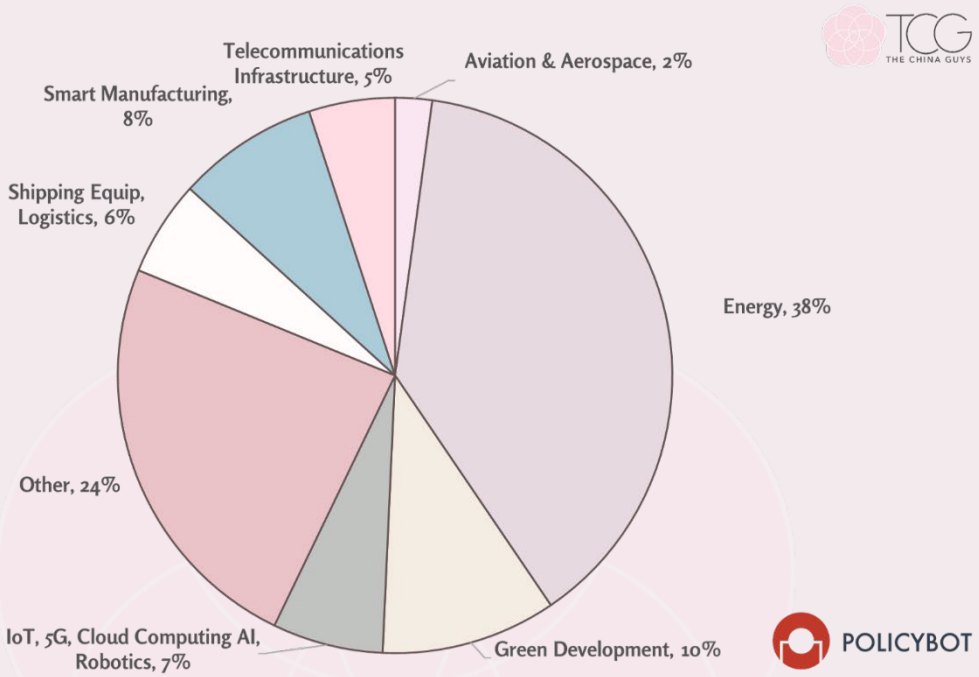
Guangzhou, a city of 13 million residents, is the third largest city in China by population. Albeit not as wealthy as its eastern neighbor Shenzhen, Guangzhou boasts a GDP per capita of nearly US$23,000[xxxii], the ninth highest in the nation.

Guangzhou's large and prosperous population has made energy security a prominent concern for the city's policymakers. For example, during a sweltering heat wave in 2018, the Guangzhou branch of China Southern Power Grid Co Ltd had a shortage of electricity capacity and was forced to limit power usage by industrial users.

Figure 6

Industrial Topics Mentioned in Guangzhou NDRC Policies

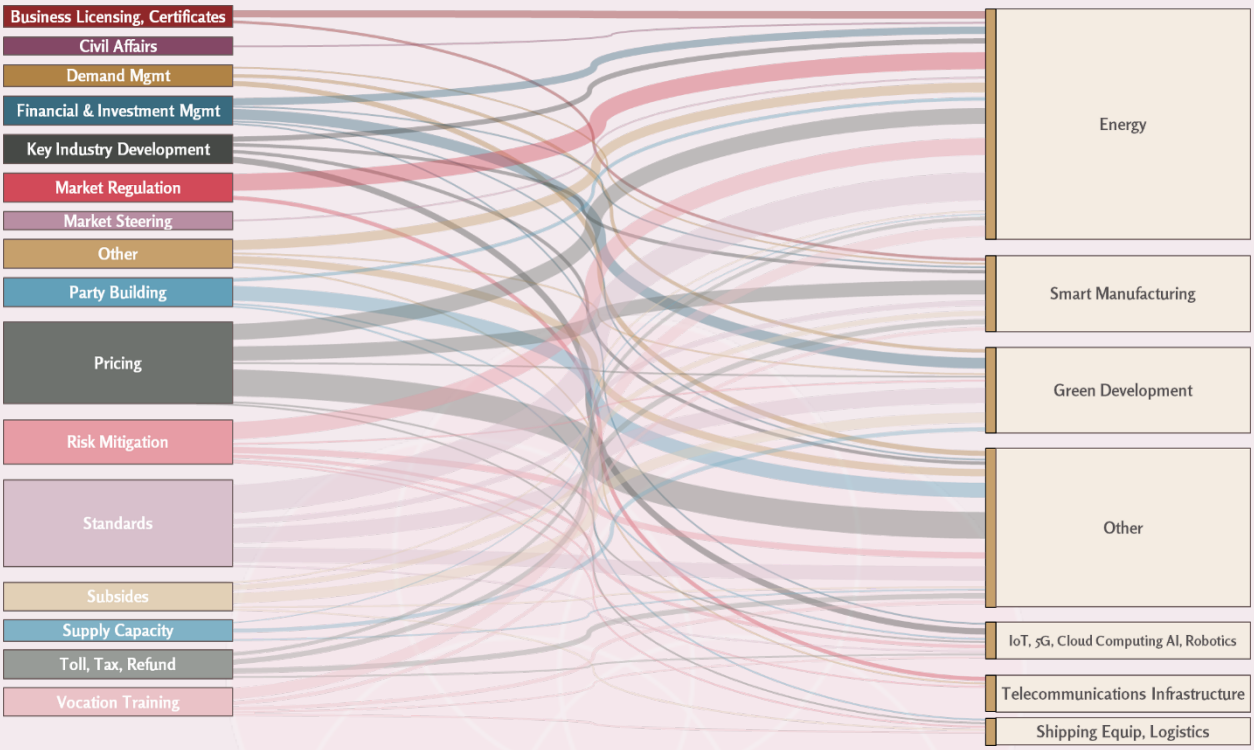
Guangzhou focuses on energy and green development



As such, energy comprises most PRD related industry mentionings amongst policy documents, coming in at 38%. Although the city is pushing to close coal fired electrical plants and has seen significant progress in this effort, Guangzhou is still heavily reliant on fossil fuels. Just in the past year of 2019, Guangzhou consumed nearly 5% of China's total fossil fuels.

Figure 7

Guangzhou Regulatory Instrument Associations with Industrial Topics



With data aggregated from the 2,069 policy documents published under Guangzhou city's municipal Development and Reform Commission related to the PRD, a large proportion of market instrument mentionings were also related to green development. Green energy is gaining a strong foothold in the Guangzhou market but remains a rather new industry, and as such requires official standards, tax regulations, vocational training, and other market instruments to be established through municipal policy.

In 2012, the city launched the "Pilot Low Carbon City Implementation Plan" to oversee the phasing out of high polluters and the entrance of green firms to fill their place[xxxiii]. Regulations put in place since then have included stricter emissions standards, licensing restrictions on high polluters, standards for green housing development, and more.

Dongguan

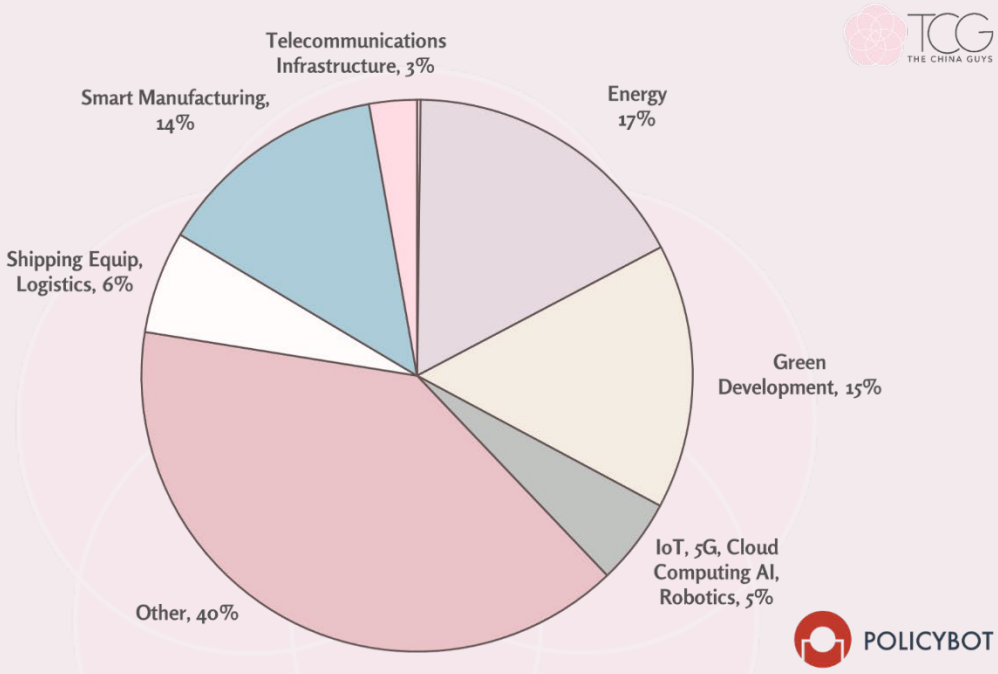
Dongguan, one of China's new tier 1 cities, sits among the Guangzhou-Shenzhen Technology Innovation Corridor, and has made a tremendous rise to prosperity with its high-tech manufacturing sector. The city is home to more than 150,000 industrial enterprises among various product categories. Specifically, Dongguan is well-known for its production talents in electronics information manufacturing, such as electrical machinery and equipment

manufacturing, textile, clothing and shoe, food and beverage manufacturing, and paper products.

Figure 8

Industrial Topics Mentioned in Dongguan NDRC Policies

Dongguan focuses on energy, green development, and smart manufacturing



To push factories up the value chain, Dongguan's policy makers mentioned smart manufacturing in 14% of Dongguan's 2,600 PRD-related policies. Throughout its rise and still today, the city strongly prioritizes moving its manufacturers up the value-added chain and as a result, drawing in larger tech brands. To some extent, this push has seen results: Oppo, Vivo, and Huawei -- China's largest smartphone producers -- produce 350 million smartphones in Dongguan annually.

Expect a large proportion of this push to be driven by the development of manufacturing robotics. Dongguan is home to more than 400 companies focused on robotics and manufacturing automation, and the blossoming industry has an economic output valued at 35 billion yuan. As a piece of the "Dongguan Manufacturing 2025" plan, Dongguan plans to double the output of manufacturing automation technologies to 70 billion yuan by building more than 20 robotics industrial parks and 68 intelligent equipment industrial agglomeration areas.

Tier 2 Cities

China's second tier cities are medium-sized cities, at least by Chinese standards, with an average annual GDP between US$68 and US$299 billion. Second tier cities are commonly composed of provincial capitals and have populations between 3 and 15 million people. A 2018 report from Morgan Stanley[xxxiv] has shown that the household income gap between first and second tier cities is shrinking, alongside which the firm anticipates that private consumption in second tier cities could triple by 2030 to US$6.9 trillion.

Although second tier cities are considerably developed, it is expected that municipal governments would place a larger policy emphasis on infrastructural development and manufacturing, as China's second tier cities lag behind their tier 1 counterparts in terms of high-tech industries and research. In addition, it is logical that energy would be prioritized to support the quickly growing industries and increasingly wealthy consumers of second-tier cities.

Foshan

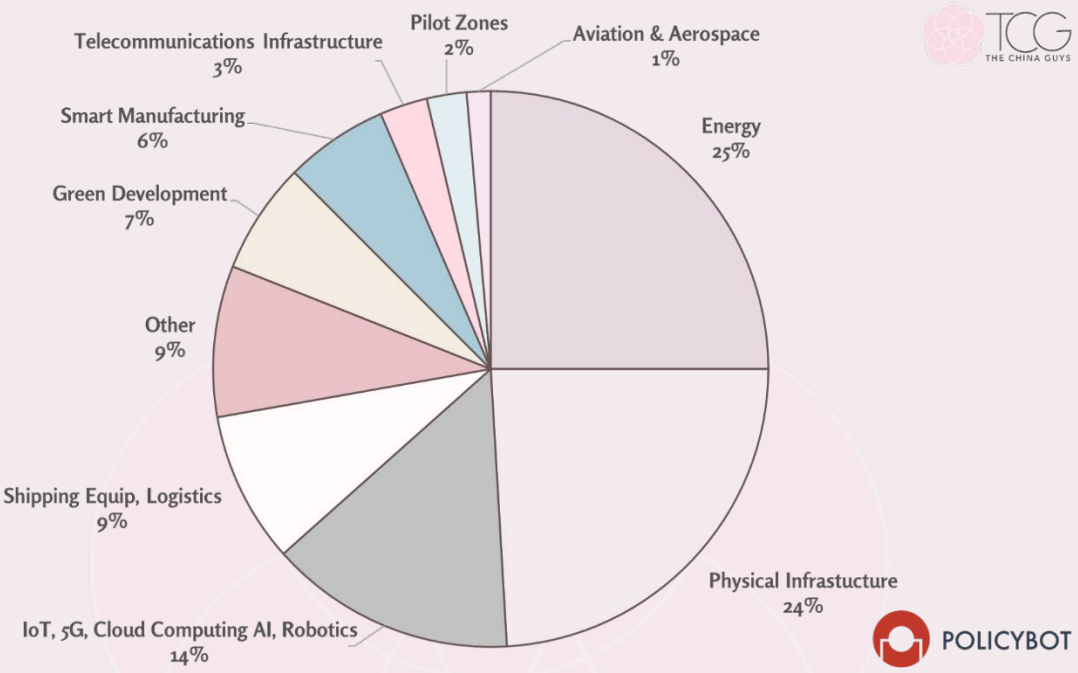
Foshan is a prefecture-level city that sits just 20km southwest of the provincial capital, Guangzhou. Its rise to an annual GDP over US$1 trillion was built on the back of manufacturing, and the city is often held up as a benchmark for manufacturing quality in China. Within the PRD framework, among the key initiatives to drive the development of the city are physical infrastructure, energy, and technology. Earning special mention, logistics and manufacturing respectively were mentioned in and of all policy documents for the city.

Like most other cities in the region, Foshan has a growing population, which draws attention to the energy supply; the cases for infrastructure and technology development in this city are more interesting cases for the city's growth.

Figure 9

Industrial Topics Mentioned in Foshan NDRC Policies

Foshan focuses on energy, infrastructure, and emerging technologies



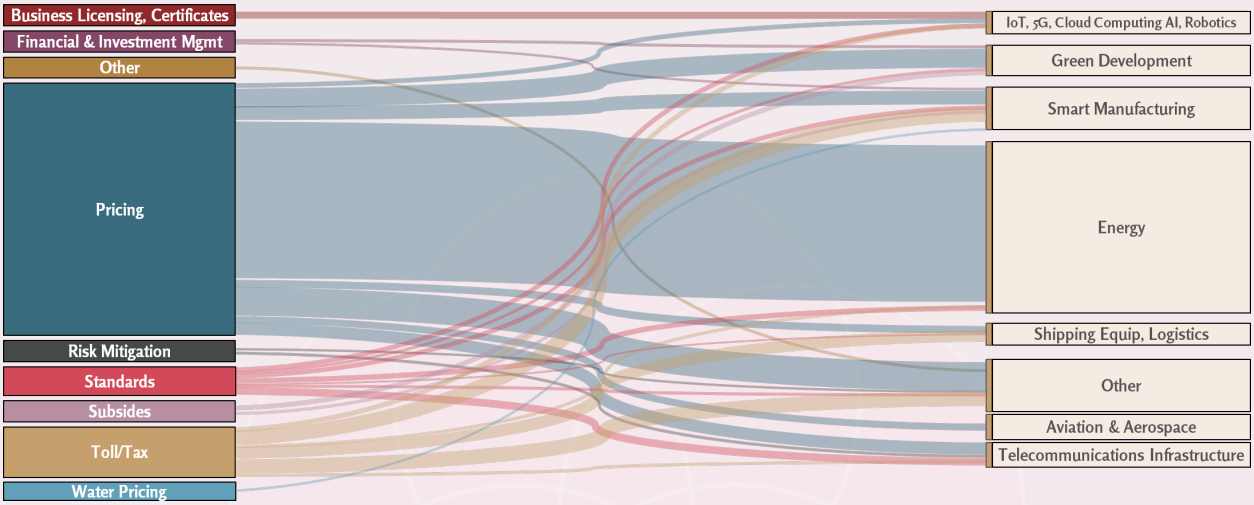
The emphasis placed on physical infrastructure can be traced back to its central location in the Guangdong province, making it a key transport hub for the Pearl River Delta. Foshan is a significant piece of the Guangzhou-Foshan Metropolis Circle, and as such, has been working to enhance regional connectivity in transport infrastructure in recent years. Foshan boasts strong rail connectivity, including the West Railway Station, Foshan Railway Station, and Sanshui Railway Station, all servicing high-speed bullet trains among the Hong Kong-Macau-Greater Bay Area. Its high-speed rails also offer freight stations, which help connect Foshan to various ports, including the famous Nansha Port, a joint project between Foshan, Guangzhou, and Zhongshan. Infrastructure, although already quite strong in the city, will continue to see continued policy backing. In the first half of 2020 alone[xxxv], Foshan began construction of 33 new infrastructure projects with a total investment of 38.31 billion yuan.

As for technology, Foshan is an industry center in the Bay Area known for its manufacturing sector specializing in household products. To move up the value chain, the city has its eyes set on bolstering innovation among cutting edge technologies like Internet of Things, 5G, artificial intelligence (AI), and robotics. The city plans to integrate big data, AI, and robotics in particular with its manufacturing to increase labor productivity. In 2018, for example, the city announced its "Plan of Foshan to Promote Robots Applications and Support the Robots

Industry Development (2018-2020)" to guide the development of the local robotics industry. Where the government sets its gaze, expect investment to follow.

Figure 10

Foshan Regulatory Instrument Associations with Industrial Topics



Behind the key industrial topics lie the various types of policies that are associated. To advance development of infrastructure, energy, and a variety of technologies, Foshan will be using pricing, tolls, and standards. Out of those three, pricing stands out as the most important piece to multiple industrial topics, especially energy and physical infrastructure.

For energy, the emphasis placed on pricing is likely due to the complicated relationship that the state has with pricing goods such as electricity. Before 1978's economic reform, energy prices were set by the state, but have undergone intensive reforms so that the market has a larger say in resource allocation[xxxvi]. Today, energy is still regulated by the National Development and Reform Commission, but price control lies with each province. With different sources of energy being developed under the banner of green development, pricing remains at the forefront of the government's mind. Additionally, energy pricing could also be used as a method to deter certain industries and enterprises from failing to meet environmental protection requirements.

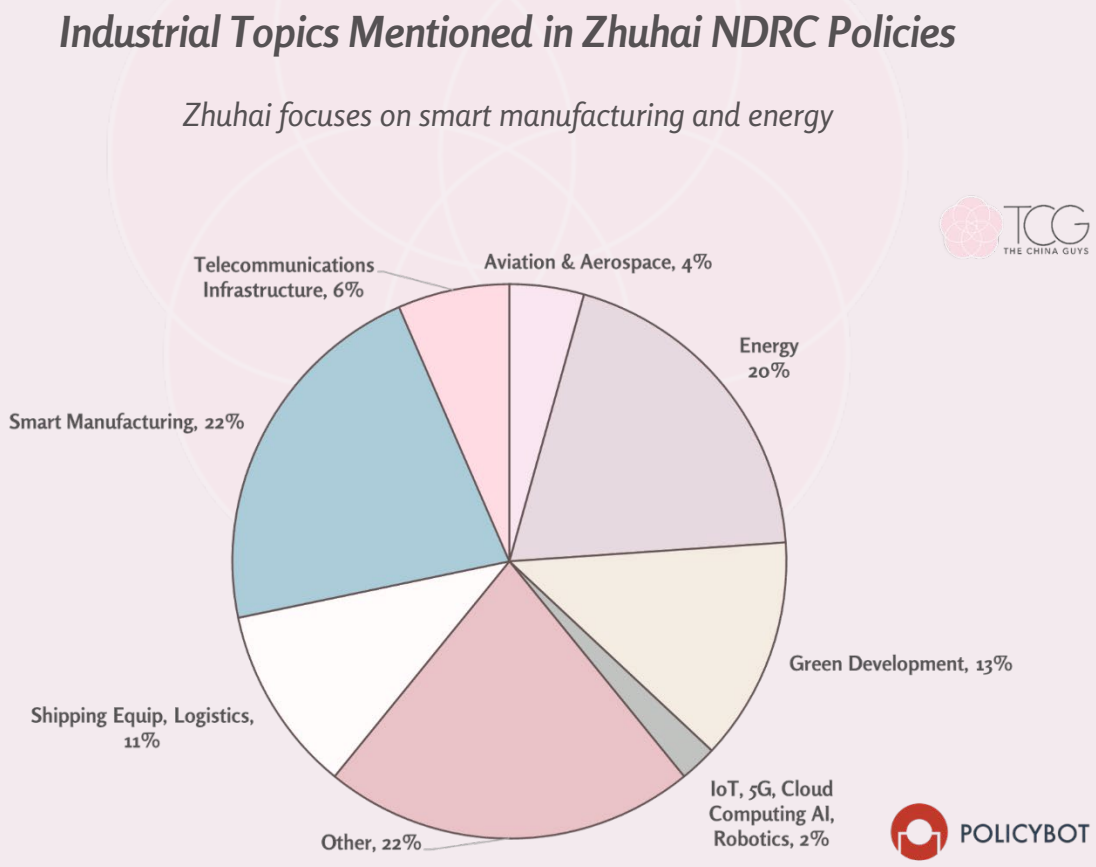
Pricing comes into play with physical infrastructure in a big way as well. Some of China's past physical infrastructure investments are notorious for receiving negative returns, and even in famous cases, simply being abandoned. By setting pricing standards on the industrial components, land, and inputs, China seeks to create a more level system for infrastructural development.

Zhuhai

Sitting across the Pearl River estuary from Hong Kong, Zhuhai is one of the five Special Economic Zone cities in China. Zhuhai's SEZ status grants the city special tax exemptions for foreign investments, greater autonomy in international trade, and more open capital markets. Typically, SEZ zones are export-oriented economies. Considering its beneficial ocean access, well-developed port, and transportation system, Zhuhai is no exception.

Compared to the rest of Guangdong province, Zhuhai takes home a larger portion of economic growth each year from secondary industry -- which includes industrials, construction, and manufacturing. In 2018, secondary industry comprised 49.19% of the city's growth, compared with 41.8% for that of the entire province. To continue moving up the value-added chain, the city has placed a large priority on upgrading smart manufacturing, which took up 22% of the city's PRD related policies.

Figure 11

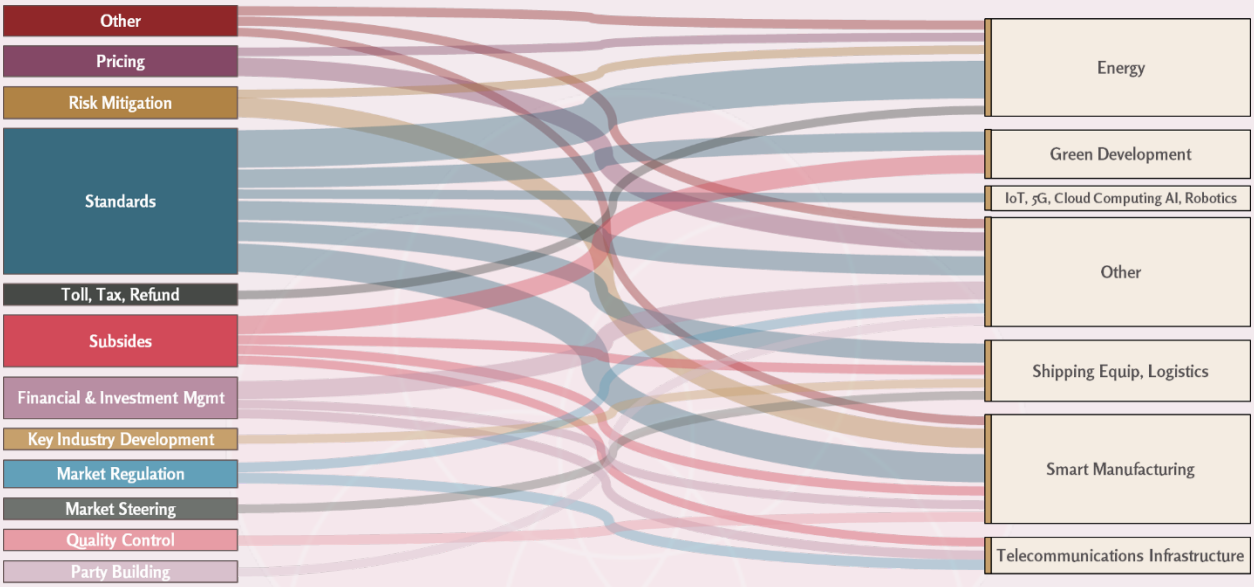


In 2019, Zhuhai introduced various financial incentives to encourage the building of smart manufacturing industrial parks, talent upgrading, and investments, all of which amounted to

over CN¥80 billion[xxxvii]. As a part of the program, the city set out to subsidize smart manufacturing projects whose output or revenues exceeded CN¥10 billion, prioritize household registration and other services for prime talent, and reward industry acquisitions and consolidations amounting to more than CN¥30 million.

Figure 12

Zhuhai Regulatory Instrument Associations with Industrial Topics



Another strategic emphasis of the city's PRD related policy is energy. Although Zhuhai has the second smallest total permanent resident population among GBA cities at less than two million, the city is preparing for rapid growth in population. According to the "Guangdong Provincial Population Development Plan," Zhuhai has plans to more than double its population to more than five million by 2030. To support such a large increase in residents, the city is preparing to meet the increased energy expenditures in tangent. As laid out in the "Outline Development Plan for the Guangdong-Hong Kong-Macau Greater Bay Area," a key function for Zhuhai is to strengthen the region's energy storage capacity by building liquified natural gas (LNG) terminals, building feeder pipelines, and increasing oil storage capacities.

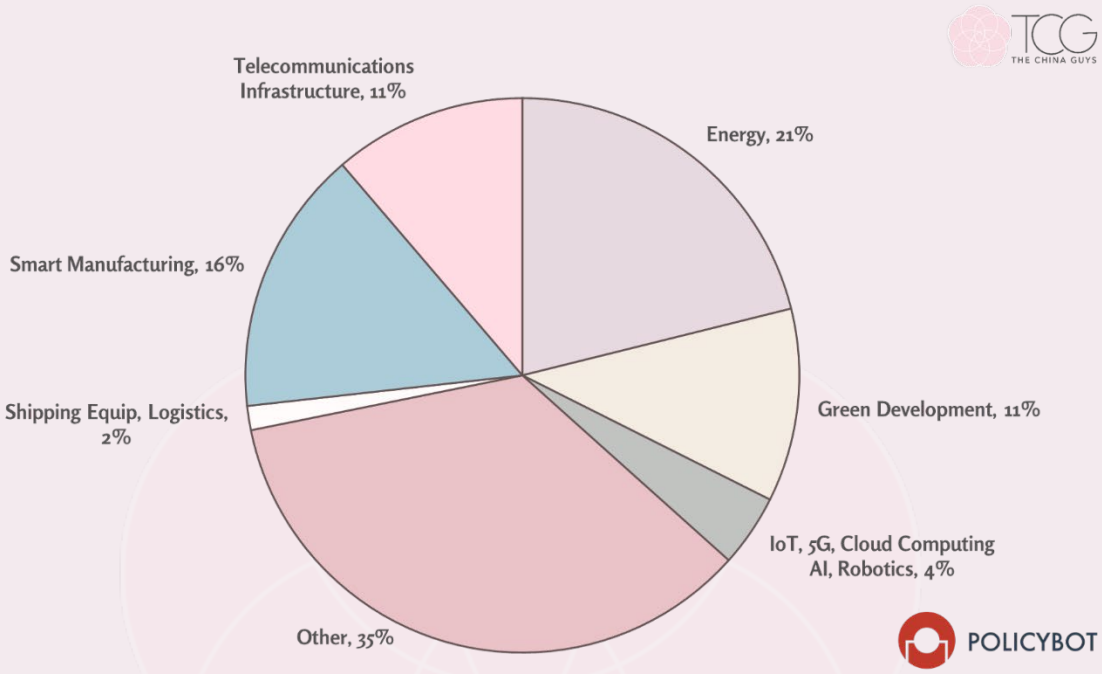
Huizhou

Huizhou, the second closest mainland Chinese city to Hong Kong, has set its sights on new industries including car and equipment manufacturing and clean energy to rejuvenate an economy that plummeted 8.7 per cent in the first quarter of 2020. Together with automotive and equipment manufacturing as well as clean energy industries, these four areas form the modern industrial system of Huizhou.

Figure 13

Industrial Topics Mentioned in Huizhou NDRC Policies

Huizhou focuses on energy and smart manufacturing



The city's two existing pillar industries – petrochemicals and electronics – have fallen victim to weaker external demand as the Covid-19 pandemic continues to severely impact the global economy. The Daya Bay Petrochemical Zone has reached oil refining capacity of 22 million tons/year, and ethylene production capacity of 2.2 million tons/year, ranking first in the country in terms of the scale of petrochemical-refining integration. For five consecutive years, it ranked the top 20 among chemical industrial parks of the country. The Huizhou Zhongkai Hi-tech Industrial Development Zone is the country's first national electronic information industrial base, with relatively complete supply chains of mobile communications, panel display, automotive electronics, LED, and new energy.

Huizhou is classified as one of the "outer ring" cities in the Greater Bay Area (GBA), alongside Zhaoqing and Jiangmen. While Huizhou made it into the tier 2 city bracket, the other two cities are the less developed cities towards the periphery of the zone. Zhaoqing and Jiangmen have lower land and labor costs and are where heavier industries are beginning to congregate.

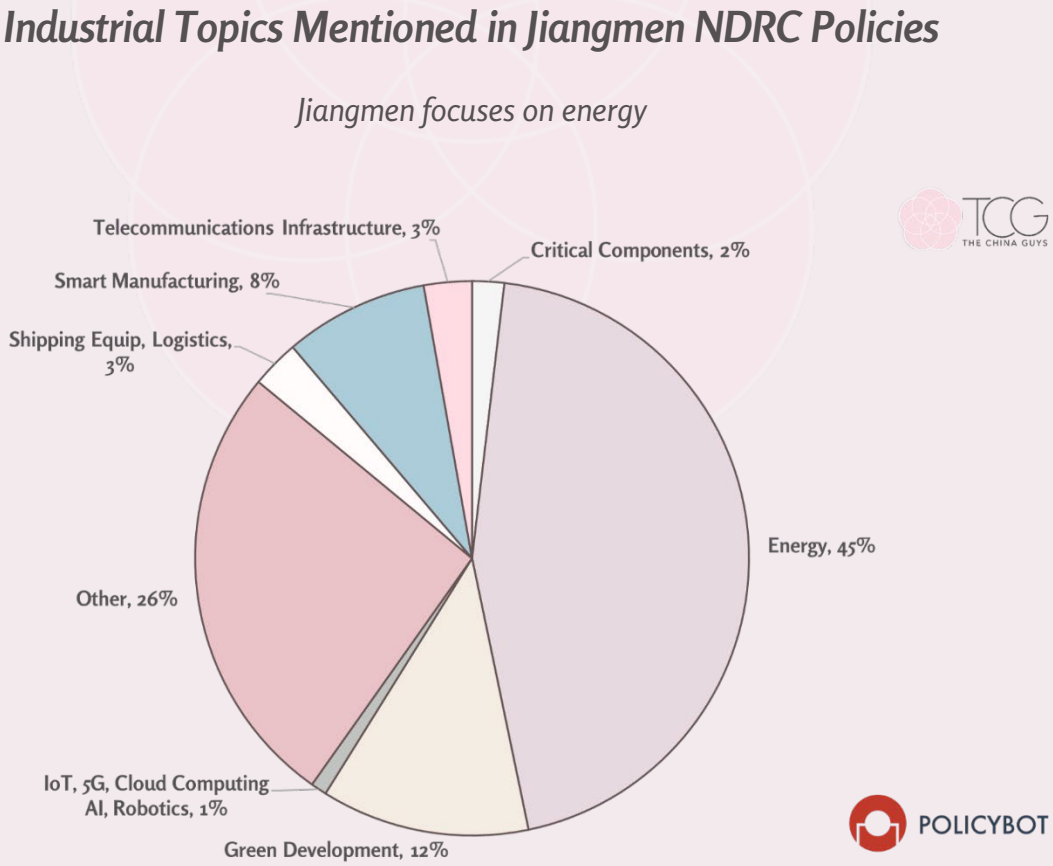
Tier 3 Cities

Jiangmen

Jiangmen lies on the western periphery of the Greater Bay Area, separated from the Pearl River estuary by the neighboring cities Zhongshan and Zhuhai. The urban center of Jiangmen is located some 50 km from downtown Zhongshan, framed by mountainous terrain as well as the rivers Xi and Tan – hence the city's name, 'river gate.' Jiangmen borders Foshan to the north and the smaller Guangdong cities Yunfu and Yangjiang to the west. With a total area of 9,507 km^2 and a population of around 4.5 million, the coastal city is one of the more sparsely populated GBA cities, along with Huizhou and Zhaoqing.

The Outline Development Plan assigns Jiangmen a supporting role as a 'key node city,' along with Dongguan, Foshan, Huizhou, Zhaoqing, Zhongshan and Zhuhai. As such, Jiangmen is positioned to upgrade its vast, largely underdeveloped coastline and boost its maritime economy.

Figure 14

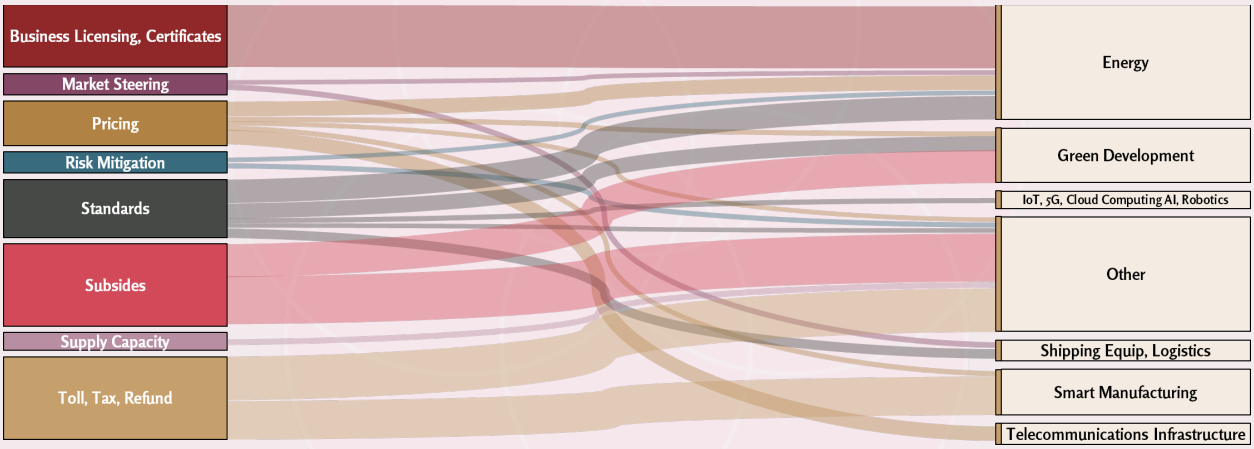


The city boasts several bay areas of its own. For instance, the Greater Guanghai Bay is to be established into an economic development zone in the years ahead, under the cooperation with Hong Kong and Macau. With it, activities in a variety of economic sectors are to be intensified, including finance, e-commerce, tourism, healthcare, and the creative industries.

In addition, the Yinhu Bay area is designated as a future hub for international companies in the fields of energy conservation and environmental protection, and as an attractive area for young entrepreneurs in the region. In June 2019, the Municipal People's Government of Jiangmen issued a statement on "Implementation measures on strengthening the development of innovation and entrepreneurship bases for Hong Kong and Macau youths in Jiangmen." The move enables young talent from Hong Kong and Macau to seek employment or start their own business in the city without much of a hassle.

Figure 15

Jiangmen Regulatory Instrument Associations with Industrial Topics

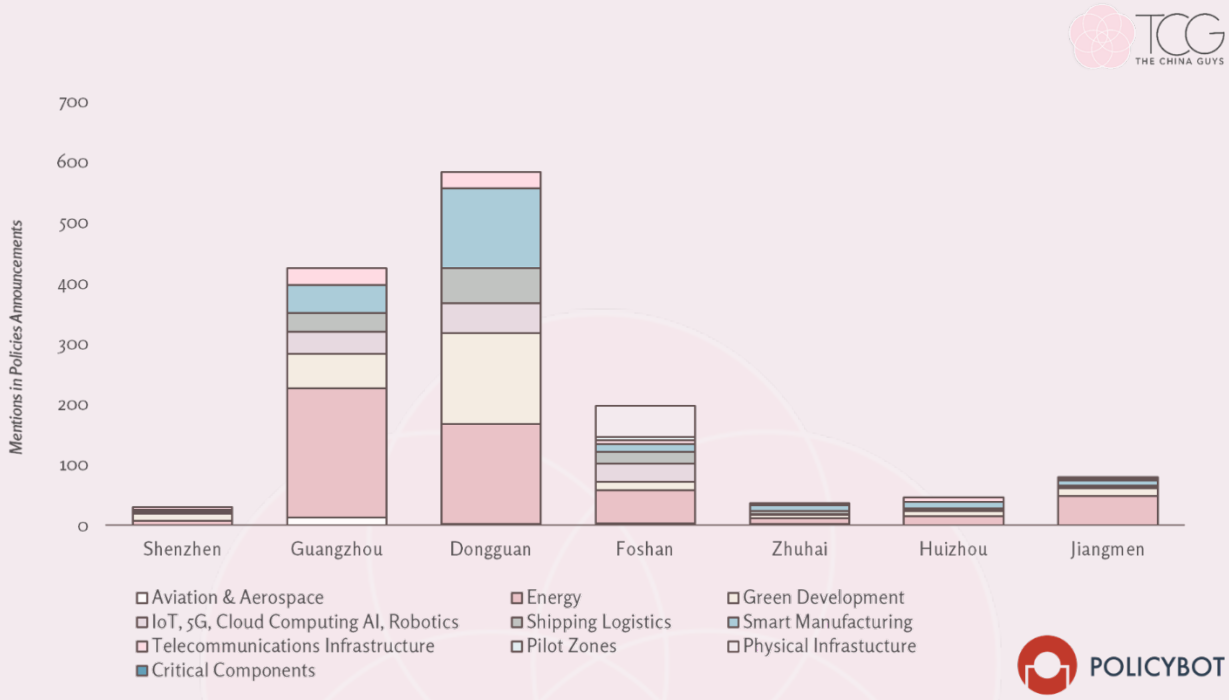


Jiangmen already offers a comprehensive list of innovation and start-up incubation spaces targeted at young entrepreneurs and founders, particularly those who are overseas. These include the Qiaomengyuan High-Tech Development Zone as well as the Torch High-Tech Creative Park, among others, which cater to a wide range of industries from smart manufacturing, sustainable technologies, life sciences and digital industries including FinTech, to animation, comics, and other creative media.

Jiangmen has been making extensive efforts and investing considerable resources into building a conducive infrastructure for young businesses as well as overseas investors from the new industries to settle in the city. Assuming this momentum will be kept alive in the years to come, Jiangmen is set to deliver significant growth opportunities and vitalize business competition in the Greater Bay Area.

Figure 16

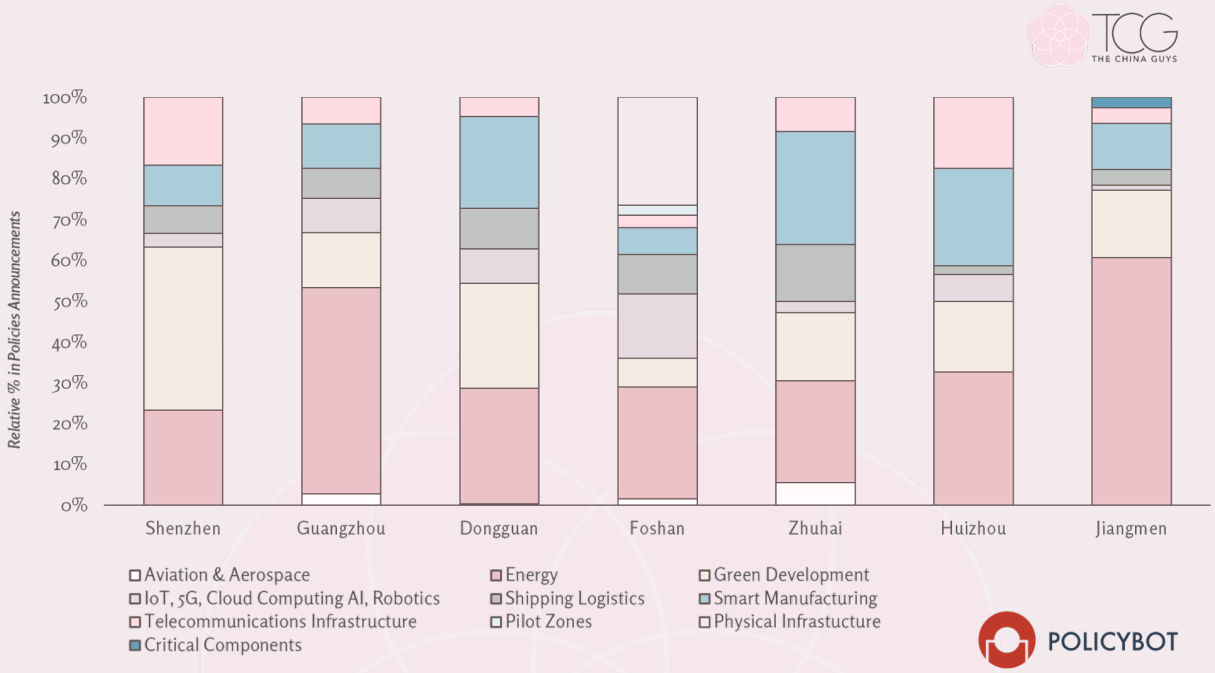
Comparative Industrial Topical Analysis by Guangdong Cities



Looking at the bigger picture, the PRD industry development planning has been quite diverse across all cities. As the policy data shows, across all tiers of Guangdong's cities - 1st tier, 2nd tier, 3rd tier cities - the primary focus has been energy, green development, and smart manufacturing-related industries. Although *Figure 16* shows which cities are the most active in publishing policies, Figure 17 tells a story of the relative policy attention to each industrial sector that each city provides. Our research suggests that, while each city has different priorities in ranking industrial development, more importantly, the proportionality of major initiatives like energy, green development, and smart manufacturing remain the dominant topics across each city.

Figure 17

Comparative Industrial Topical Analysis by Guangdong Cities (100%)



Over the last 20 years during China's pursuit towards industrial excellence, local authorities in Guangdong province have displayed a vibrant development plan. In conclusion, the common policy instruments have been mainly based on price setting, toll/taxes, and standards setting regulations, contrary to the traditional thought of heavy subsidy-based government intervention on local economic development.

Particularly in regulating and guiding the energy and green industries, policy instruments like pricing, standards setting, licensing, and subsidies have been the major modes of government intervention over recent years. By contrast, in guiding the smart manufacturing industry, policy instruments have mainly consisted of toll, taxes, refunds, as well as subsidies.

Conclusion

The Pearl River Delta historically has been a pivotal contributor to the economic miracle of China. With astonishing growth rates, higher than average per capita income, a massive population, a strong financial system, and a marked policy emphasis, the PRD is well prepared to continue its rise over the next decade and a half.

While the PRD should also be understood as a diverse region, amongst which different cities will see growth among varying sectors, it is safe to say that energy, green development, infrastructure, cutting-edge technologies, smart manufacturing, and infrastructural development will continue to develop across the entire region. Continued policy support spanning subsidies, pricing controls, standards, and more will continue to guide the region as it grows into a world-class economic hub.

Following policy support, the cities within the PRD will add value via means of their own economic advantage. However, as a cohesive economic zone, the entire region will develop as cities have direct access to, work with, and become increasingly connected with the other cities in the region. While the nation's growth prospects as a whole are strong, keep a particularly watchful eye to the Pearl River Delta as the future of China unfolds.

Methodology

The methodology is made of three parts: data collection, data processing, data visualization. Given the URLs to all urban city National Development and Reform Commission websites (below), Policybot's information retrieval algorithms scraped relevant publicly available documents associated with each local urban city level government.

Here are the respective sample sizes for this whitepaper analysis:

1. Central government NDRC database;
2. Local Guangdong Province (n = 2,465 documents);
3. Guangzhou City (n = 2,069);
4. Shenzhen City (n = 89 documents);
5. Zhuhai City (n = 110);
6. Foshan City (n = 380);
7. Huizhou City (n = 284);
8. Dongguan City (n = 2,658);
9. Jiangmen City (n = 400)

These raw "unstructured data" from the provided URLs are stored in a PostgreSQL database, every row is an article entry, arrange headers: 'date,' 'title,' 'source,' 'link,' 'body,' 'id.' This data restructuring to storing process guarantees optimal data querying capabilities for data mining and testing machine learning models for different applications. The overall data pipeline directs the data flows from the raw text procurement from data source through the database to the model processing stage for NLP (tokenization, eliminating irrelevant stopwords, etc.), labeling of features, feature engineering, and finally model training.

To guarantee optimal understanding and a smooth ratification process, the way that the official government documents are drafted is very formulaic. This format allows the detection of certain noun-verb combinations. For example, there are strict guidelines in the wording of concepts to reflect easy-to-understand yet efficient communication styles for the state organs to increase implementation efficiency. Furthermore, certain information such as document-type, industry-type , and department-type are located in the same location of web-page layout in almost every document. Thus, these features can be easily extracted with web-scraping algorithms and become part of the dataset for analysis and prediction.

Data processing is essentially the document feature engineering, processing the "unstructured text data" into "structured data" by labeling the conceptual topics into a matrix with extra label features like 'Industry Sector Label,' 'Policy Type,' and 'Market Interference Type' -- also known as the class coding phase. Furthermore, for validating the labeling process, interviews with China industrial policy specialists and domain experts from The China Guys were conducted for labeling evaluation.

In order to teach a concept to the machine, keywords which define that conceptual trait must be deposited into the 'Bag of Words (BoW) algorithm.' This paper uses BoW technique to define the concept for the machine to cross reference. Further text processing on the document corpus level, Tokenization, which is the breakdown of each document into sentences, then into individual words or 'tokens', label into parts of speech ('noun,' 'adjective,' etc.), was used to build a domain specific "bag-of-words," a keyword match algorithm.

Limitations

There are a few limitations to our study. First, the analysis of these outputs are based on the volume of policy documents. Some cities tend to publish more frequently than their neighbors, but since cities like Shenzhen as well as smaller tier 3 cities have a lower output of industrial announcements, fewer generalizations could be made about their industrial regulatory frameworks.

A second limitation lies in our fundamental assumption that industrial priorities are expressed through the frequency that a topic is mentioned in policy documents. Given that our findings are based on this assumption, the industrial priority of central and local planners could potentially perceptually differ because policy documents failed to capture the right information that describes real intentions. In other words, the variation in perceived industrial topics found in policy documents could be explained by other variables, like local authorities' speeches, private meetings, etc. that are not explicitly expressed to the public through public releases.

Despite these limitations, we understand that policy documents matter quite significantly, and that they form a common basis by which China policy experts can deduce China's industrial planning process.

NDRC Sites

1. https://www.ndrc.gov.cn/xxgk/wjk/ (NDRC 国家政务文件库)
2. http://drc.gd.gov.cn/gfxwj5633/index.html (Guangdong Province NDRC)
3. http://fgw.gz.gov.cn/ (Guangzhou City NDRC)
4. http://fgw.sz.gov.cn/zwgk/zcfg/gfxwjcx/index.html (Shenzhen City NDRC 规范性文件)
5. http://fgj.zhuhai.gov.cn/zwgk/zcwj/index.html (Zhuhai City NDRC 政策文件)
6. http://fsdr.foshan.gov.cn/jcck/zcxwj/index.html (Foshan City NDRC 政策性文件)
7. http://jhj.huizhou.gov.cn/zwgk/bmwj/zcfg/index.html (Huizhou City NDRC 政策法)
8. http://dgdp.dg.gov.cn/gkmlpt/index (Dongguan City NDRC 政府信息公开目录)
9. http://www.jiangmen.gov.cn/bmpd/jmsfzhggj/zcwj/index.html (Jiangmen City NDRC 政策文件)

10. http://www.gd.gov.cn/gkmlpt/index (广东省人民政府信息公开)
11. http://www.miit.gov.cn/n1146295/n1652858/index.html (MIIT)
12. http://drc.gd.gov.cn/shjfb6110/index.html (广东省申报项目：投资、基础设施等)

Documents

1. http://www.scio.gov.cn/ztk/xwfb/52/9/Document/1057059/1057059.htm (珠江三角洲地区改革发展规划纲要(2008-2020))
2. http://www.gd.gov.cn/gkmlpt/content/0/146/post_146463.html#7 (Guangdong Province 2030 Regional Integration Plan)
3. http://www.gov.cn/zhengce/2019-02/18/content_5366593.htm#allContent (粤港澳大湾区发展规划纲要)

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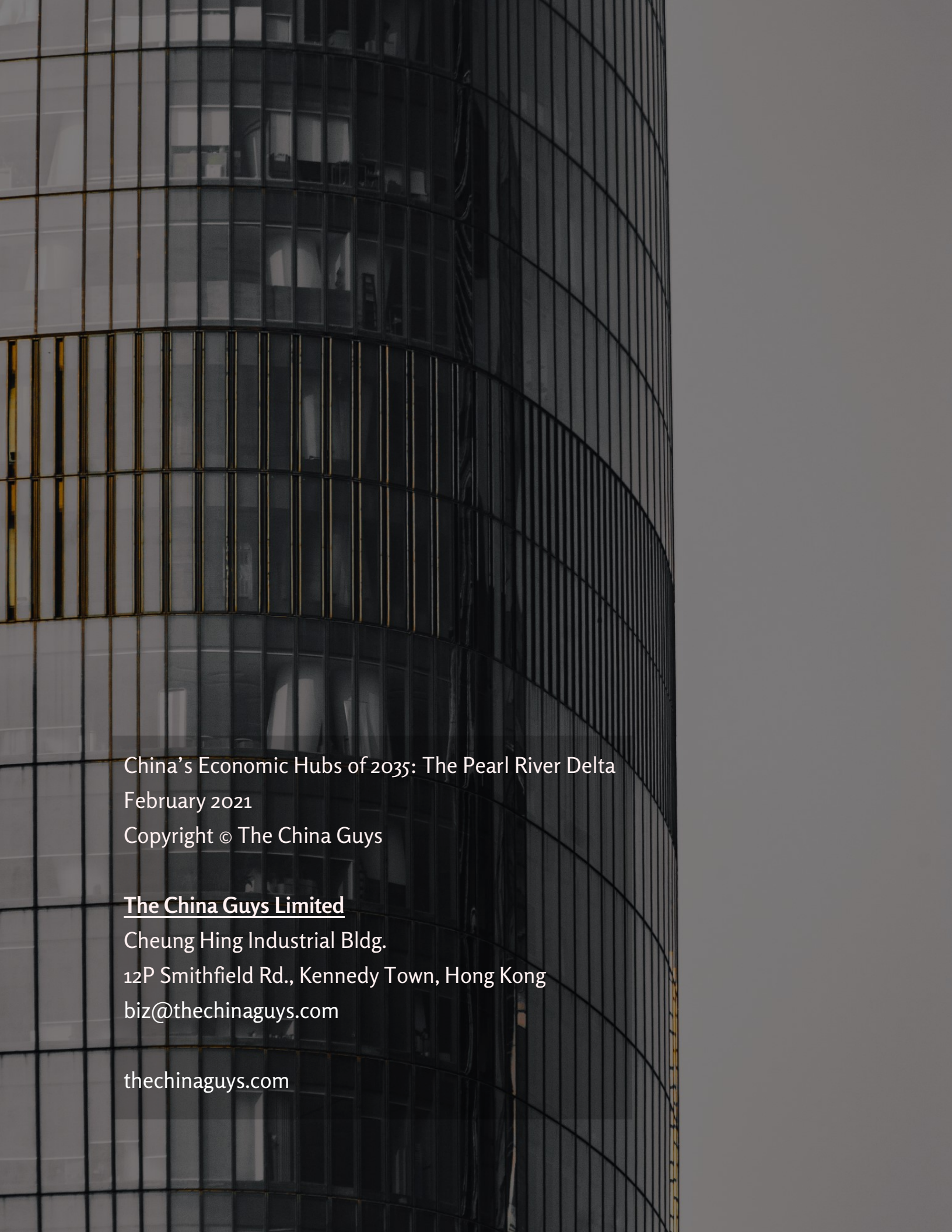

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The China Guys Limited
Cheung Hing Industrial Bldg.
12P Smithfield Rd., Kennedy Town, Hong Kong
biz@thechinaguys.com

thechinaguys.com