

Hong Kong Real Property Federation

Guangdong-Hong Kong-Macao
Co-development Region

2021–2049 Guishan Island
“City of the Century” Proposal

Table of Contents

| | | |
|--|--|-------|
| Part A—Overall Idea | | |
| 1. Vision for Life | (1) Regulating asset bubbles and property ownership | P. 01 |
| | (2) People-oriented and shared community | P. 03 |
| | (3) 4.3.2.1 housing ladder | P. 05 |
| 2. Development Strategy | (1) Balanced and sustainable development | P. 07 |
| | (2) Indo-Pacific network centre | P. 09 |
| | (3) Comprehensive land use planning | P. 11 |
| Part B—Innovation and Technology Industry | | |
| 3. Medical and Elderly Care | (1) Social Development and services demands | P. 15 |
| | (2) Adaption of the aged society | P. 17 |
| | (3) Cross-border integration of medical and elderly care | P. 19 |
| 4. Smart Logistics | (1) Shipping and air transport hub | P. 21 |
| | (2) Replanning Tsuen Wan and Kwai Chung | P. 23 |
| | (3) Fully automation, safety and efficiency | P. 25 |
| 5. Future City | (1) Skyrise greenery and energy efficient roofing | P. 30 |
| | (2) MiC technology and green building | P. 33 |
| | (3) Smart home and Internet of Things | P. 36 |
| Part C—Architectural planning | | |
| 6. Strategic Infrastructure | (1) High efficiency and low emission regional express | P. 38 |
| | (2) Autonomous rail Rapid Transit | P. 40 |
| | (3) Solar energy for waterway transport | P. 42 |
| 7. Construction Schedule | (1) Phased reclamation | P. 45 |
| | (2) Immediate development of elderly communities | P. 48 |
| | (3) Facility relocation and urban renewal | P. 52 |

1. Vision for Life

(1) Regulating asset bubbles and property ownership

Since the beginning of the new century, global financial crises have risen like recurrent waves, the economic entity has soared and slumped, causing turbulence in the society; supposing the pre-consumption and excessive loan of the wealthy economy to be the reason. The government’s deficit is severe and its fiscal discipline is in disarray:

The total assets of the Federal Reserve, the European Central Bank, the Bank of Japan, and the Bank of England have skyrocketed from US\$3.3 trillion in 2007 to nearly US\$20.5 trillion this year, a cumulative increase of 5.2 times. The Bank of England was established in 1694 and the Bank of Japan began in 1882. The year was 1913 for the Fed and 1998 for the European Central Bank. In other words, the US\$3.3 trillion level in 2007 is the total amount of assets accumulated by the central banks of the above four places over dozens or even hundreds of years. However, this total scale has soared by 520% in the last 13 and a half years.

Disorderly quantitative easing eventually leads to uncontrollable asset bubbles, and further provokes extremely inequitable distribution of wealth; the middle class becomes poorer, and the grassroots do not advance but retreat:

The OECD report in 2019 stated: "The global middle class is being severely squeezed, including its percentage of population and consumption power. The governments must reform the tax system to protect the middle class, which is the main force of consumption and production."

Defined by the OECD, the income level of the middle class is between 75% and 200% of the national median. According to their recent report, the situation of middle-class squeeze in the 36 member states has worsened; the proportion of middle class in the population has dropped from 64% in the 1980s to 61%, afflicting particularly the young people. 68% of the aged baby boomers are listed in the middle class, but only 60% of the millennials are among the group. 20% of middle-class families cannot make ends meet and have to rely on loans.

The above short-sighted behaviors and excessive development have also brought about issues like global warming and extreme weather. In the meantime, “ageing society” in advanced countries are soon to reach a dangerous level. In-work poverty, stagnant class mobility, and the decoupling of the virtual and real economy have further exacerbated personal and national debt crisis, and as a result, procured a vicious cycle. This ill-advised mode of development is indeed unsustainable.

In addition to the vast freedom of capital flows and outflows, and paucity of asset-appreciation related taxes in Hong Kong, the lack of residential, industrial and commercial land supply has led to a contradiction between assets expansion and static development more acute and bitterer than

any other city. Middles-class families and the new generation are bearing heavy burdens in life; the Hong Kong Commission on Poverty said:

The poverty rate among young people aged 18-29 reached a new high this year since 2010, accounting for about 10% of the overall population living in poverty. Furthermore, the proportion of middle-class households in Hong Kong plummeted from 32% in 2001 to 20% in 2016. The decline was as high as 40% between 2011 and 2016, which is likely related to the 90% increase in property prices of the same period.

We believe that all virtual economies, from financial operations to real estate investment, must be conducive to the continuous improvement of the lives of the general public. The balance of "market economy" and "social justice" is the prerequisite for harmony, stability and progress. "Market economy" is a device for seeking "cost-effectiveness"; while "reasonable distribution" is the basis for reconciling the rights and interests of all, and maintaining social diversity, balance, and the centripetal force of the people.

Land development and distribution are linked to the decency of life of Hong Kong people and their right to improvement; it is not a purely economic issue, but also a core part of our human rights.

Also, the distribution of "production space" should be led by the "market"; while that of "living space" should take "social equity" into account - it should be in line with the affordability of different classes, that is, the "per capita/household disposable income". Using planning as a means and taking people's quality of life as the criterion to ensure adequate housing supply and proper distribution of ownership and rental rights has become a matter of course for the government.

They must continue to set indicators for per capita living and living space, and through the implementation of relevant mechanisms, to fill the "market economy" benefit distribution imbalance. Both the local and central government must be highly vigilant against the social, political, economic, and moral risks brought about by "land finance". The amount of public revenue should be directly, proportionally, and sensitively reflected by economic activities and people's income, but not easily fluctuated by asset prices, especially property prices. However, the Hong Kong government is still negligent in the “land finance” situation, which is thus getting more serious:

The average rate of the land-premium income to the general revenue has soared from 8% between 2000 and 2005 to 21% between 2015 and 2020, making it the second largest source of revenue for the treasury. In 2019/20, the overall treasury revenue reached \$567.3 billion. Although it decreased by 5.4% year-on-year, the land-premium did not drop but rose by 22% instead; which equals to 25% of the overall revenue. Looking ahead to this fiscal year (2020/21), the government expects that the fiscal deficit will exceed \$280 billion due to the pandemic, and the income from land and property will inevitably become one of the resources to tackle deficit.

According to the government's forecast at the beginning of the year, there will be \$118 billion of land premium among the \$572.5 billion annual revenue, which is over 20%. The reason for the high land-premium income despite the economy being poor is, the government is planning to sell many valuable land plots this year. The

industry believes that this reflects the government’s unwillingness to see great impact on the overall revenue because of the collapse of the property market.

People and manufacturers use real estates as their collateral for wealth and finance, driving mortgage loans to become the main debt for Hong Kong households, which composes up to 80.4% of GDP, second only to South Korea’s 93.9%, and rank no.2 in Asia. This greatly concerns the security of our banking system. Besides land-premium income, the stamp duty revenue is also expanding due to a series of "spicy" measures, and adding up to 5.4% of the overall government revenue.

Land is the fundamentals to economic development and the growth of living space, also the basis for the ideal city built together by the government, enterprises and the society, but not a tool for making huge profits, monopolizing resources and manipulating the market. The primary responsibility of the government is to resume the functions of land, by ensuring production and continuous housing supply, and reallocating.

The government needs to provide more flour for enterprises to make more bread so that the public can taste it; as the economic activities of selling bread and eating bread becomes active, more profits tax and salaries tax will be generated to support public finance. This is a far more sustainable and humanitarian strategy than selling flour for profits.

(2) People-oriented and shared community

The quality of life of the people, especially the middle class and grassroots, is the key aspect to assess the performance of the government. With the rapid increase of the "Gini Index" in big cities,

people’s living conditions and growth potential can no longer be reflected by the economy, annual growth rate and per capita GDP of the city or country as a unit.

Since the Great Depression and World War II, countries have focused on economic recovery and job creation. In 1934, the economist Simon S. Kuznets developed the modern concept of GDP, and it has gradually become an important indicator for measuring social and economic development and even guiding policy making decisions. Although the economic discussions in the early twentieth century centred on how to measure and improve welfare, Kuznets pointed out that GDP cannot be used alone to measure welfare, it is however difficult to shake the mindset of GDP supremacy. GDP refers to the total value of the products and services produced by all residents of an economy within a specified period of time. It only reflects the economic output of market activities, but not the products and services that are not covered by market mechanisms (such as family and community support).

Robert Kennedy said when he was running for the US president in 1968: "Yet the gross national product does not allow for the health of our children, the quality of their education or the joy of their play; it does not include the beauty of our poetry or the strength of our marriages; the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage; neither our

wisdom nor our learning; neither our compassion nor our devotion to our country. It measures everything in short, except that which makes life worthwhile.”

In contrast, regulating housing supply, stabilizing property prices and rents can continuously improve "per capita/household disposable income." Relevant measures can not only reduce income inequality and class stratification, but also promote personal consumption, financial management and long-term investment of "emerging families".

The Hong Kong government implements sophisticated demographic data collection, and housing supply must also stay abreast with the estimated household growth. In addition to continuously improving the living space of "nuclear families", the government must also take more initiative in "community building". Today, from family to society, Hong Kong people have new social welfare aspirations and new means of realization in areas such as waste disposal, childcare services, home care, and family caregiver support. However, the improvement of home and community life mostly depends on the available amount of "non-commercial land". Undoubtedly, compared with redeveloping old districts, planning and building new cities to meet the needs of the new generation is significantly more cost-effective.

Although creating public service and community space is not for obtaining "immediate commercial return", it will bring "long-term economic benefits", which is in line with the "low-carbon" development model. The success of Singapore's "HDB housing" system is not only that it continues to provide "emerging families" with low-cost housing and lowers the barriers to home ownership; at the same time, it provides the grassroots with "local employment" opportunities.

When the concepts of "sustainable development" and "balanced economy" are integrated into "spatial planning" and "community construction", the resulting "urban structure" will be a commercially and industrially diversified livelihood. On the contrary, relying on a single industry and commercial district will hinder the use of human resources and worsen income inequality; also causes serious traffic bottlenecks, inefficient emission, and poor land-use benefits.

From the perspective of both "spatial layout" or "social service", "HDB" acts as the carrier of Singapore's "networked society". In contrast to Singapore, the reliance on a single industrial development has limited the improvement on housing, industrial, environmental and transportation issues in Hong Kong. Both being an urban economy, "network vs. single core", Singapore and Hong Kong are easily compared in terms of their strength and resilience.

The former and current chief executives have focused their policies on solving housing shortage, by finding and reclaiming land. The notions of the two governments are mostly similar. Comparing with the colonial era, an immense breakthrough on political strategies can be seen. First, they substantially adjusted the public-private housing ratio; the government or public organizations play a more active role in protecting the living conditions of the people instead of depending solely on the "invisible hand" of the market. Second, they provide more diversified public housing options to accommodate people of different needs and income levels, including: traditional public rental housing, youth hostels, Green Form, new HOS, “Hong Kong Property for Hong Kong Residents”, and “Starter Homes” provided by organizations such as the Urban Renewal Authority. Third, during the colonial era, HOS was only an auxiliary to the public rental housing system considering its quantity and speed of development; the former can be hardly compared with the latter in terms of number of units and social functions. Nowadays, the different kinds of public housing provided by the government, which carry certain functions or potentials

for investment, value preservation, and refinancing, have become the major option for citizens outside the private market; This constitutes a step-up to the housing ladder. Finally, and most critically, the price of subsidized housing is proportionate to the income level of the public, not the price per square foot of the private market.

(3) 4, 3, 2, 1 • Housing ladder

The core value of the aforementioned thinking is to allow houses to be a living space and investment tools at the same time; on the one hand, it can provide people, especially "nuclear families", with decent living space, and improve the standard of living. On the other hand, through administrative measures, laws and regulations, people of different classes can evenly obtain house ownership. In theory, following the development of various industries and the overall economy in Hong Kong, families and individuals with complete or partial ownership will also benefit from the increase in property rents and quota of reverse mortgage. In fact, many middle-aged and elderly families in Singapore are maintaining livelihoods and their income after retirement by entirely or partially renting out their HDB flats. It can be said that the more even distribution of property ownership in Singapore is the reason why it has a fairer and more reasonable economy than Hong Kong does. In this regard, the HDB housing system has also become an important means for the Singapore government to narrow the income gap of different social classes because of its land tax exemption.

To achieve the same effect, first of all, the Hong Kong government, like the Singapore government, must develop and sustain land reserve in an orderly manner. Sufficient land reserve can not only regulate market supply, but also stabilize the expectations of the people, especially "new families."

To simply put, government land reserve comes as an irreplaceable “stabilizer” for the “demand” and “supply”. Furthermore, on the premise of orderly eliminating "land finance", the ratio of public to private housing must be further increased to make the homeownership ladder structure solid and pyramid-shaped, and each level wider than the previous one.

We propose to establish a "4, 3, 2 and 1 • home ownership ladder", with the consideration of area of land over the number of units: using 40% of the residential land on the Guishan Island new development zone as public housing and Green Form housing development, 30% as new HOS, and 20% as Starters Home, 10% as “Private Housing”.

With the implementation of the Guishan Island Project, there will be continuous supply of “flour”; Active participation of the government in the residential market ensures families of different income levels the right to enjoy the living space and to benefit from property appreciation, but does not necessarily lead to the shrinkage of the private housing sector. In fact, the industry chain of real estate is extremely long; large, medium and small-scale developers directly and indirectly employ architects, surveyors, engineers, lawyers, accountants, advertising personnel, drivers, construction workers, warehouse staff, etc. It involves not only hundreds of thousands of workers, but also people of all kinds of professions. How to greatly improve the living environment of Hong Kong people and share homeownerships with them while taking into account the sustainable development of the real estate and construction industries are indeed important. The sustainable development of the real estate industry is the foundation of that of our new cities.

In fact, to encourage people to buy their own houses, so as to share the dividends brought by the local economic development, just by providing large amounts of subsidized housing is not

enough; the long-term government subsidies for land tax will also cause public financial crisis, or even serious situation of "Policy rent-seeking". Taking the situation in Hong Kong as an example, it shows that providing subsidized housing carries the same weight as promoting economic development and improving social mobility and industrial structure. In the past ten years, due to the serious shortage of “spade-ready” site, the government had to rezone as much industrial, commercial and other types of land as possible for residential use. That led to an even bigger problem of lacking land for economic development; The price per square foot of various office and business spaces fluctuates even more drastically than that of residential properties.

As a result of the continued high rents of those related properties, the purchasing power of Hong Kong people has been harshly eroded. At the same time, it also severely hampers the expansion of various industries and the budding of new businesses, and directly limits the scale of enterprises and staffing, thus restricting potentials for improvement of middle-age and young people. Compared with other mature economies, the proportion of wages to business costs in Hong Kong is relatively low, which is another by-product of high rents of industrial and commercial space.

This further worsens the inequality between people who live on rents and those who do manual or brainy work, and promotes the formation of an unsustainable economic phenomenon in which holding properties obtains greater returns than participating in economic activities.

Therefore, we believe that the development of Guishan Island should centre around the concept of an "industrial park". Unlike the other existing areas that are being developed, especially the recent ones, it should contain a higher proportion of “industrial land”, so as to cluster decent job opportunities for young and middle-aged people. With this as a foothold, Hong Kong's huge real estate industry chain, especially the large enterprises among it, should take this opportunity to start transforming their business structure in the future. On the other hand, although the residential market is dominated by the government, private developers can still participate in “Starters Home” and “Private Housing” projects. The reduction in housing costs for the people is mainly achieved through land tax discounts rather than compromises in construction costs and design standards. Through the introduction of "price-limited land", it can ensure that buyers' income level is proportionate to the price range of Green Form, new HOS or “Starters Home”.

The realization of the above concept must rely on the development and maintenance of land reserves on demand. Otherwise, even if the price per square foot of subsidized housing is changed from being linked to private buildings to citizens' income, it will still only be a lucky draw to get people's hopes up. Since we are not the same as Singapore, where 80 to 90% of families can be allocated subsidized housing, the general public in Hong Kong are still depending on a substantial increase in personal income to pursue their dream of buying first or second hand private houses. The heavy burden and limited social mobility have always constituted the restlessness of the entire society, especially the new generation and middle-class families.

In short, the government should get rid of the fetters of land finance, let the subsidized housing dominate the residential market, encourage developers and related businesses to transform and construct “industrial park” and further expand commercial, industrial, and social land use. The above ideas are the policy guidelines that aim at improving the per capita living area, evenly sharing the dividend from property appreciation and providing more and better employment opportunities.

Above all, the Guishan Island reclamation plan is crucial for carrying out these strategies.

2. Development Strategy

(1) Balanced and sustainable development

In the "Indian Ocean-Pacific" region, Hong Kong became the first urban economy to enter the "aged society". With the difficult-to-reverse changes in the local "demographic structure", the inherent "high investment-high growth-high return" development model has long been hard to maintain and must be changed. Referring to the development strategies and relevant experiences of the European and American "megapolis", it is necessary to explore the "sustainable development model" that meets the needs and strengths of the society in accordance with the climate, geography, and cultural conditions of southern China; this requires long-term planning and scientific support. The new ideas and technologies also need to undergo a holistic and large-scale experiment. In fact, international organizations have a good evaluation of Hong Kong's promotion of sustainable development.

Arcadis, the world's leading nature and architectural design consulting company, released its "2018 Sustainable Cities Index" in 2018. Although the index is led by European cities, with London chosen as the top in the world; however, as Asia-Pacific cities, Hong Kong and Singapore are among the top ten, ranking ninth and fourth respectively:

These two places are closely connected in different areas of sustainable development. For example, Hong Kong ranks third in economic "profitability", while Singapore ranks first. However, in terms of "people", Hong Kong ranks 21st because of its convenient and comprehensive public transportation services, far surpassing Singapore, which ranks 31st. However, Singapore once again took the lead in the discipline of environmental protection, ranking 41st, beating Hong Kong at 50th. Hong Kong is generally prosperous and regards technology as the main aspect of sustainable development. Such that, Hong Kong, together with London, Singapore and Tokyo, are classified as a city cluster of balanced development and innovation.

Franics Au Kai-Ming, managing director of Hong Kong and Macau of Arcadis, said: "Hong Kong has always been a leader in profitability. In order to maintain Hong Kong's position as an international financial centre, we should continue to develop smart technology and innovative technology, and seize opportunities to connect and cooperate with neighboring cities in the Greater Bay Area. The recently released policy address also mentioned that the government has allocated \$28 billion HKD to support the development of Hong Kong's digital industry and pledged to achieve economic diversification through close cooperation with Chinese and foreign cities."

Au pointed out that recruiting and retaining human capital is equally important to the success of the new economy. In order to attract elites from different parts of the world, Hong Kong needs to deal with various issues related to sustainable development, such as environmental pollution, wealth inequality, and low affordability.

In addition, Au mentioned: "Hong Kong people have encountered many challenges in meeting basic needs, including housing shortage, water and air pollution. While

continuing to develop, Hong Kong must also respond to these needs. In Carrie Lam’s Chief Executive Policy Address issued recently also mentioned plans on housing, welfare, sustainable development and technological innovation, which is certainly encouraging. However, as Hong Kong has accumulated many problems since a long time ago, we need to adopt sustainable solutions to solve these challenges. With the implementation of these forward-looking measures, Hong Kong will gradually become a more sustainable and livable city.”

The so-called "sustainable development" includes three dimensions: environmental sustainability, industrial sustainability and cultural sustainability. On the technological level, there are aspects such as green production, clean energy, and smart communications. On the level of development strategy, it includes: diversified economy, all-round development, and equal benefits. In addition, today’s most cutting-edge "sustainable development concept" emphasizes the long-term coexistence of urban, village and suburban. “Rural area” is not an extension, appendage, or opposite of a “town”; in the framework of "sustainable development", city, town, country and suburb each plays a role that complements each other and cannot be replaced.

The natural environment, traditional culture and comparative advantages of the "South China-South China Sea" region will become the cornerstone of the sustainable development strategy of the "Guangdong-Hong Kong-Macao Joint Development Zone". Local characteristics and advanced prototypes are to be combined here, as it is said, “only the nation is the world”. In recent years, based on its own humanistic and natural conditions, Singapore has determined to explore the "sustainable development model", which is worthy of reference from Hong Kong and surrounding cities:

Man-made environment

Singapore is striving to achieve the goal of having 80% of green buildings by 2030 through the “Green Mark Incentive Scheme”, with an investment of 50 million SGD (about 250 million RMB). According to the 2016 Global Green Building Cities White Paper released by the well-known strategic consulting company Solidiance, Singapore ranked second. As of June 2017, Singapore has more than 3,000 green buildings, equivalent to one-third of the total number of buildings in Singapore. 80 cities have adopted Singapore's Green Mark certification, which is an evaluation system developed by Singapore.

Clean energy

Singapore is the solar energy centre of Asia, with more than 50 international and local world top solar companies of different disciplines, including manufacturing, developing, financing etc.

In 2016, Singapore spent 11 million Singapore dollars to set up the world's largest floating solar photovoltaic system in the Tengeh Reservoir. Also, the Singapore Clean Tech Park, launched in 2013, is the first ecological business park in the region. Equipped with its "plug and play" facilities, the park enhances the development and testing of clean technologies and solutions. Furthermore, the Energy Research Institute of Nanyang Technological University in Singapore runs the "Singapore Renewable Energy Integration Demonstration" platform (REIDS), the largest

microgrid platform in the tropics, which allows co-innovation and development of microgrid solutions.

Water and environment

Singapore is known as the "global hydro hub" and is said to be the place with the proportionally highest amount of water companies in the world.

In 2013, Lux Research, a technology innovation research and consulting agency, listed the National University of Singapore (NUS) and Nanyang Technological University (NTU) as the world's top two universities in the field of water research. Their achievements in membrane technology, water recycling and desalination are particularly outstanding.

Since 2006, the Public Utilities Board (PUB) of Singapore has cooperated with enterprises to implement 150 pilot projects.

Global companies such as Suez Water Technologies & Solution and Black & Veatch are developing local solutions and copying them abroad. These achievements once again prove Singapore to be at the forefront of environmental innovation.

Since 2016, the government has invested 670 million SGD (approximately 3.35 billion RMB) to support innovation and capacity development in the water industry. In 2015, the industry contributed approximately 2.25 billion SGD (approximately 11.25 billion RMB) to Singapore's GDP and provided 14,000 jobs.

Urban travel

Singapore conducted the world's first autonomous taxi test. The world's first autonomous taxi developed by the start-up nuTonomy was launched in Singapore in 2016, which is an important step made by the Singapore government to deploy self-driving cars in the country.

In 2017, two startups in the travel industry were acquired by multinational companies. Quantum Inventions and nuTonomy were acquired by Continental and Delphi (now known as Aptiv) for more than 500 million SGD (about 2.5 billion RMB). Singapore is the first city in the world to use an electronic road toll system to solve traffic congestion problems. They plan to complete the deployment of a road toll system based on satellite communications in 2020.

(2) Indo-Pacific network centre

Guishan Island is located in the middle of the Pearl River Estuary and the "Guangdong-Hong Kong-Macao Greater Bay Area"; it is roughly equidistant from Hong Kong and Shenzhen on the east coast, Macau and Zhuhai on the west coast, and faces Guangzhou on the north. Compared with Hong Kong, the land, sea, and airspace there are much broader; it has more room for development and is easier to connect and cover surrounding areas. The "Guangdong-Hong Kong-Macao Greater Bay Area" is important to the national development strategy, with the geographical advantage of having South China as its hinterland, and facing the entire "South China Sea" area. It is the centre of "ASEAN+1" and "ASEAN+3". Furthermore, the global development prospect lies in the "Western Pacific-Eastern Indian Ocean region", which is also called "Indo-Pacific urban belt." The "South China-South China Sea" economic circle is also the centre of the "Indo-Pacific ". It can be seen that it is located in the middle of the three concentric circles of Guangdong-Hong Kong-Macao, "South China-South China Sea", and "Indo-Pacific";

Guishan Island should be made good use of its geographical conditions and developed into an ocean city network centre.

The "Indo-Pacific" has a population of more than 3 billion, but it is far from being urbanized. Billions of laborers, especially intellectuals and middle-class families, are predicted to migrate to coastal cities in the future. In addition, although land reclamation brings plenty of benefits, a lot of economic, social, and environmental costs have to be paid. Therefore, even though the Guishan Island development plan advocated here is ambitious, the land obtained from reclamation must be used with great care. We believe that Hong Kong has achieved fruitful results in building a "dense and economical city.". On the one hand, we certainly strive to continuously improve the living and development space of everyone; on the other hand, through the comprehensive application of cutting-edge strategy in planning and construction, we can use every inch of our land economically. In the past half century, Hong Kong has evolved from a "vertical city" to a "three-dimensional city". Based on this, we must make better use of underground and mid-air space in Guishan Island.

At the same time, we must also introduce environmental-friendly materials, smart building management and clean energy technologies such as wind power and solar power. Applying this ambitious blueprint does not mean to return to the old extensive approach; the sustainability of the economy, environment, and industry is after all based on the principle of “consolidation”.

Given the geographical advantages and Hong Kong’s rich experience in building "consolidated cities" and "three-dimensional cities", Guishan Island has great potentials to become an international network for finance, logistic, entrepreneurship and information. The goal is to create a further vision, upgrade industrial structure, apply innovative technology and implement humanistic management, so as to break through the existing system and technological bottleneck, and establish an all-round urban economy. In the future, it will become an example for marine city development in the South China Sea and the Indo-Pacific region.

Regarding the cooperation and division of labour among Guangdong, Hong Kong and Macau, we have a suggestion as follows,

Land ownership – Central Government

Guishan Island and its affiliated islands, together with the surrounding sea area and reclaimed land, are all owned by The State Council of the People’s Republic of China.

Administration and judiciary - Hong Kong government

As per this proposal, after the full development of Guishan Island, the first phase of the project will be the construction of a "road-rail bridge", which will be connected to the southwest corner of Lantau Island.

Taking into account the pedestrian flow, logistics and costs, the two ends of the road connecting Guishan Island and Lantau Island will not include any checkpoint or port, and will be under the same jurisdiction. We suggest that Guishan Island and its associated development land all implement the Common Law; people, enterprises and institutions on the island are only subject to the jurisdiction of the law enforcement agencies and judiciary of HKSAR. Regarding the administration and law enforcement areas, a nautical zone before the coastline will be delineated, and abide by the same rule of law as Hong Kong waters.

Authority of urban development and planning – Guishan Island Development and Investment Fund

The provincial, municipal, and SAR governments in the Guangdong-Hong Kong-Macao Greater Bay Area "9+2" will establish the “Guishan Island Development and Investment Fund” according to their respective investment needs and financial status; it will be responsible for the supervision of urban planning, land and industrial development. The successful experiences of "City Investment" in China, "Temasek" of Singapore, and "GIC" can be used as a reference for similar operations. As the "seed fund" of this project, “Guishan Island Development and Investment Fund” will not only provide the start-up capital, but also strategies and human capital based on the comparative advantages of each province and city in "9+2". The benefits to Guangdong-Hong Kong-Macao Greater Bay Area generated from the four major industrial parks will be further discussed in the proposal.

Besides, it should be ensured that the "Guishan Island Development Investment Fund" deploy the full functions of the national and international status of Hong Kong’s, Shenzhen’s and other cities’ capital market. On the one hand, the issuance of Hong Kong dollar and Renminbi bonds and fund products produces abundant and long-term funding for this project. On the other hand, it also provides investment products with stable returns and low transaction costs for investors in the region and abroad, especially retirees. Finally, it can also promote the diversification of Hong Kong and Shenzhen financial markets, and expand the variation and influence of investment products.

Land use rights and land transfer rights

Land use rights can be transferred flexibly, and the effective period can be set according to different planned uses. With reference to Singapore’s successful experience, land of different usage will eventually be recovered, re-planned, and relaunched pursuant to the effective period.

The granting of land use rights either is for land reclamation or depends on the cost of maintenance, with the principle of a fair, open and transparent market, and the purpose of obtaining evenly allocated benefits to everyone. It aims at allowing land resources to be efficiently allocated, developed, recovered, and recirculated, rather than retaining public finances. The "Guishan Island Development and Investment Fund" will ensure a stable supply of land and expand land reserve under strict compliance of the basis of planning. The fluctuation of land prices must be linked to economic development and changes in people's income level.

(3) Comprehensive land use planning

The long coastline from the Western Pacific to the Eastern Indian Ocean now becomes the fastest and strongest region for "urbanization"; it will determine the world's social and economic development and the geopolitical trend in the coming decades. As the population moves from inland to coastal cities, we have to face new problems and witness the continuous emergence of new problems. "Future City" is a holistic concept supported by new scientific research and new technology; at the same time, it also shows new production models and lifestyle.

Guishan Island can be used as a demonstration for the "future city" for people to experience its advantages. At the same time, it will become a development platform for related industries and make city operation and city management into industries. The professional community in Hong

Kong should good use of their characteristics and experience to build and plan the “three-dimensional city”, with the focus of energy-saving and advancement of MiC technology.

The basis of a "three-dimensional city" is to use land sparingly and wisely. In terms of cost, land reclamation requires considerable time, environmental, social, and economic costs; in terms of benefits, expanding the city upwards and downwards at the same time can maximize the geographical value of coastal cities. More intensive and efficient economic activities and more convenient living conditions have in turn shared the various costs of land reclamation.

Instead of remodeling the flat urban design and landscape from the 20th century, Guishan Island should be planned with a “ three-dimensional” vision. The utilization of underground space is rather falling behind compared to the high-rise development in Hong Kong. In 2019, the Hong Kong Government announced that it would enhance the underground space expansion plan of Kowloon Park, Victoria Park and Southorn Playground.

Later, societies of architectural, surveying, planning, and landscape issued a joint statement, advocating that the "Lantau Tomorrow Vision" project should be led by life vision rather than infrastructure planning. Prof Hui Ching, Vice Chairman of the Institute of Future Cities of Chinese University of Hong Kong, pointed out:

When we look at the above two news items together, we find that the continuous improvement of technological means and sufficient public finances allow Hong Kong people to develop urban space more effectively through different methods. As a world-famous "vertical city" and "three-dimensional city", apart from developing upwards, Hong Kong should also take care of the space below the horizon.

...based on the development cost and usage characteristics of the underground space, it is suitable for retail, catering and other commercial uses. This frees up more space on the ground for housing, schools, hospitals, recreation and social welfare. The development and distribution of underground space is basically operated on commercial principles and market mechanisms; relevant laws, plans and measures should be established. However, the above-mentioned development ideas are only the method, not the purpose; the purpose is to consider the overall interests of society and the well-being of people and introduce more non-economic elements to allocate the future ground space. In short, the commercialization of underground space is for the de-commercialization and de-infrastructure on the ground in order to achieve socialization and civilianization.

...I certainly do not oppose horizontal development of Hong Kong cities and the expansion of more public and private land, but we have to fully understand the limitations and costs of these ideas, and further expand the new path of "vertical development" and "three-dimensional development" on the existing basis. A few years ago, Melbourne architecture and engineering scholars wrote “The Making of Hong Kong: From Vertical to Volumetric” on local city appearance, which was later translated into Chinese by local and mainland scholars and published in simplified and traditional Chinese.

Vertical city refers to Hong Kong, which is composed of high-rise and super high-rise buildings, and it relies heavily on vertical transportation tools such as elevators. However, although the capacity of a vertical city is large, if the transportation of people and goods always needs to return to the ground and then move laterally, it cannot be considered efficient and may even cause transportation bottlenecks and hidden safety hazards. Therefore, based on the "vertical city" of the

1970s and 1980s, Hong Kong has transformed into a "three-dimensional city" through the connection of horizontal and diagonal high-altitude passages in the past two to three decades. This can of course be seen in the high-altitude corridor system from Sheung Wan to the CBD, and in new towns such as Shatin, Tsuen Wan and Tseung Kwan O.

The formation of Hong Kong’s vertical urban landscape is driven by demand brought about by insufficient land, but also based on natural landforms. Except for a few river valleys in Hong Kong, Kowloon and New Territories, most of the flat land is located on the coastline. These livable coastlines are backed by high mountains that can act as windshields, and supported by underlying soil that is mostly solid and thick granite. Compared with the Yangtze River Delta and the Pearl River Delta, which are mostly alluvial plains, Hong Kong's landforms and mountains are particularly suitable for high-rise buildings since there are less problems with wind pressure, heat preservation, earthquake, and subsidence. The rich experience of Hong Kong professionals and companies in building "three-dimensional cities" on granite islands can also be used in Wanshan Archipelago, which have similar geographical and hydrological conditions.

In theory, "three-dimensional city" should include upward or downward development. However, due to the solid geology of granite, the cost and technical requirements for deep drilling are high. Compared with the cities with limited land such as Tokyo and Kansai in Japan, where underground transportation is well-developed, the utilization rate of underground space in Hong Kong is relatively low. However, the planning and laying of underground pipelines in Hong Kong, especially power grids and telecommunications networks, are significantly better than those in surrounding cities such as Japan. Spider-web-like overhead cables for household use are easily seen in Tokyo, Osaka and Seoul.

In addition to the well-developed underground "water and electrical network", Hong Kong should now expand the underground space for commercial purposes. In fact, with the popularization of large-scale drilling equipment in China and the world, related engineering and financial difficulties have been broken one by one. Once the land shortage issue in Hong Kong has deteriorated, we would be prepared for systematic planning, construction and the utilization of underground space. The Hong Kong government plans to develop the underground spaces of Kowloon Park, Victoria Park and Southorn Stadium since there are not many buildings on them, and the technical requirements and safety risks will be low. At the same time, since the relevant areas are close to MTR stations such as Tsim Sha Tsui, Causeway Bay, Wan Chai, etc., social and economic benefits would be high if the nearby underground space is open.

Anyhow, the cost of developing underground space is always higher than that of building multi-storey buildings. With its nearby MTR and ground transportation, it is more suitable for commercial use, especially retail stores. In fact, in the past 30 years, "Metro-train-bus" three-dimensional transportation hubs such as Kowloon Tong and Mong Kok have already shown a good use of underground space for space.

Retail stores need flow of people and continuous space, but low requirements for natural light and natural ventilation, which is opposite to that of residence, school, hospital, and recreation space. Non-commercial life and social welfare facilities should be placed in relatively convenient, closed and quiet areas with natural light and natural ventilation, which is beneficial to the physical and mental health of children, the elderly, and patients, but also more in line with the principles of environmental protection and energy conservation.

For the underground city, it is necessary to introduce low-speed rail transportation, which is similar to the tram that Hong Kong people are familiar with. With the development of artificial intelligence and optical systems, the mainland is in trial operation of manned/unmanned trolleybuses, which are low in speed, have moderate passenger capacity and controllable cost. The biggest advantages are that it has high adaptability, it is convenient for construction and can be used in narrow space. It can be used as ground transportation and can go deep underground and connect to the underground rail systems.

By transferring commercial land use to underground can effectively free up ground space for non-commercial use, economic returns of underground commercial activities can also support underground transportation facilities. The above changes have allowed us to reduce ground traffic and the space needed for transportation infrastructure. Hong Kong and large cities, such as Shenzhen and Guangzhou, can now experience "three-dimensional city" design concepts through the upward and downward development on Guishan Island. In 30 years, it will be a model of the "future city" along the Indo-Pacific coast.

3. Medical and Elderly Care

(1) Social development and services demands

It is crucial to ensure the balanced development of the virtual economy and the real economy. The first is to manage asset bubbles, so that different classes can share the land dividend yield and property rights. Second, to make use of the geographical advantages in Hong Kong and respond to social needs, Hong Kong should provide a continuous environment for "technology and innovation" and "cultural and creative" industries. We believe that in terms of technological innovation, Hong Kong's areas of advantage to realize its potential are medical care for the elderly and smart logistics. In terms of cultural innovation, the key development areas are education training and creative media.

In respect of technology and innovation, Guishan Island can provide land and new supporting infrastructure in a continuous and orderly manner, making it a carrier of creative and technological industries in Hong Kong and surrounding cities. For Hong Kong's economy, enterprises, and the new generation, the industry chain in related fields is long, but it can be roughly divided into supporting nature and main business. As it is located at the mouth of the Pearl River in the middle of the sea, Guishan Island is at a moderate distance from the "9+2" cities; it can support the development of industries from east to west and from south to north, such as petrochemical, electronic communications, and genetic research in Huizhou, Dongguan, and Shenzhen. It can also support the development of shipbuilding, electric vehicles, artificial intelligence, biotechnology, and health medicine in Guangzhou, Zhongshan, and Zhuhai; and also motorcycle, robots and train manufacture in Foshan, Zhaoqing, and Jiangmen etc.

As Guishan Island is close to the southwest corner of Lantau Island, it can be connected to Lantau Island conveniently with bridges. The pillar innovative technology industry on Guishan Island should be positioned based on the needs of the local society and the advantages of the industry. Along this line of thinking, the medical care and elderly service industry stands out. In 2017, Bloomberg Health-Care Efficiency Index compared 55 countries and regions with an average life expectancy of more than 70 years, and rank by analyzing their data of life expectancy, the percentage of the GDP that the average medical care expenditure per capita and related expenses account for. That year, Hong Kong scored 88.9 points, with 83.98 years of expected life expectancy and US\$2,021 (approximately HK\$15,160) of average expenditure, accounting for only 5.4% of the GDP, and was rated as the most efficient medical care system in the world.

Having the best efficiency probably means that the government, enterprises, and individuals have yet to increase their investment in related fields, but at the same time, it also shows that Hong Kong has professional management, talent training, technical applications, technological equipment, and medicines in the field of healthcare. In fact, in the fields of modern medicine and nursing, it is indeed based on talent reserves and technological updates. More than a hundred years ago, post-secondary education in Hong Kong started with the Hong Kong College of Medicine, the alma mater of Dr. Sun Yat-sen. Since medical schools and biotechnology schools in many universities have been the centre of the “scientific research – technology application” system, the healthcare industry holds a unique competitiveness in Hong Kong. Regarding the potential and development bottlenecks of related industries, Pierre Chan, a legislative councilor representing the medical profession, said:

"In recent years, Hong Kong's public and private medical expenditures have been about HK\$50 billion to \$60 billion. If Hong Kong successfully develops the medical

industry, its contribution will be tens of billions. Hong Kong uses about 6% of the GDP as medical and health expenditure. According to statistics from the Food and Health Bureau, public healthcare expenditures accounted for 3.1% of the GDP in 2017/2018, while private healthcare accounted for 3% of GDP. It would be a game changer if it is doubled. A report compiled by KPMG estimates that in 2017, medical tourism brought 49 billion THB (approximately HK\$12.6 billion) to private hospitals in Thailand.

In the end, it will be limited by the lack of land supply in Hong Kong, which is often the case. However, medical care is not just a burden, it has room for development. "

Dr. Pierre Chan emphasized that we already have the advantage of developing the medical industry, but it is only in Hong Kong. He also pointed out: "Medical care is not just about expenditure. A mature medical industry can bring considerable income and put the surplus into the local public medical system to form a self-sufficient cycle." Under the violent impact of the epidemic, local technicians and technology companies have accomplished great result in researching, developing and manufacturing protective equipment and vaccines, their efficiency is especially admirable. However, insufficient industrial land and the full northward shift of production industries have repeatedly hindered the development of local scientific research and industrial potential. As Dr. Pierre Chan said, only by breaking through the bottleneck of land supply can the advantages of Hong Kong's healthcare industry be fully utilized.

Undoubtedly, the healthcare industry is not only the commanding heights that many technological powers are competing to invest in and develop, but also a very long industrial chain. It ranges from medical diagnosis and treatment, large, medium and small surgery, rehabilitation care, to the research and development of various drugs, technologies, and equipment. Therefore, in the broad medical care industry system, Hong Kong and surrounding areas should first consider their own relative advantages and market space to determine the breakthroughs of the industry and technologies. As seen in the above Bloomberg report, an efficient healthcare system is closely related to the longevity of Hong Kong people. In the face of the local ageing society, we must also modernize our thinking to allow urban planning, construction, and services to fully adapt to changes in the population structure. In this regard, since "population ageing" is an unavoidable challenge in Hong Kong society, more initiatives should be taken. Elderly services and related technologies need to be the core development of the local "healthcare industry chain", and further extended to be a long-term investment.

Furthermore, Hong Kong not only has the advantages of talents and social needs for the development of medical and elderly care industries, but also has a lot of potentials for expansion and to be the role model for other regions. The population structure of surrounding cities is certainly more youthful than that of Hong Kong, especially Shenzhen; however, nationwide, under the influence of the "family planning" policy for 40 years, the population of 1.4 billion has yet to reached the middle to high income levels before we had to face the challenges of shrinking labor force and rapidly increasing demand for medical services.

In order to ensure the quality of life of the people, especially the elderly, through the adjustment of urban planning and construction, and the improvement of the medical and elderly care systems,

while maintaining economic growth and social progress, Hong Kong and surrounding cities do have the conditions and needs to set an example.

(2) Adaption of the aged society

Regardless of the parties, most of the representatives of Hong Kong medical care industry suggested that the government should give full play to the strengths of Hong Kong’s medical care industry; let Hong Kong be the leader in handling the issue of ageing society and transform social welfare challenges into a new market demand. Member of the Legislative Council (Health Services) Joseph Li proposed:

The development of the Greater Bay Area is an important project between the country and Hong Kong. In the 2017 policy address, it was mentioned that the Hong Kong government’s role and purpose in the "Guangdong-Hong Kong-Macao Greater Bay Area Urban Cluster Development Plan" include active participation in construction, development of innovation and technology, encouraging Hong Kong people to live and retire in the Greater Bay Area, promoting the flow of people, capital, products and information, and create a great living area for Hong Kong people.

...To achieve mutual benefits, we should strengthen Hong Kong’s unique advantages on the one hand, and at the same time project Hong Kong’s system to the Greater Bay Area through our professionals, integrate and optimize their medical and health systems to accomplish the goal.

...The SAR government completed a review of medical manpower planning and professional development strategies in 2017, and put forward 10 recommendations to set the future direction for the professional development and manpower planning of Hong Kong's medical professionals. These policies helped maintain Hong Kong’s medical services at an international level. To develop medical and healthcare services in the Greater Bay Area, we suggest to start with the formulation of a registration system for medical professionals, and then coordinate with specific human resource planning to create an indicator based on the population and service volume, and international standard nurse-patient and nurse-supervised ratio, etc. These practices will indeed improve the standard of medical services in the Greater Bay Area.

In addition, population ageing is a problem faced by many places. Hong Kong has been promoting the "ageing in place" policy, which is to utilize Community-based primary health services to help the elderly identify and control health risks early and reduce their need for hospitalization. At the same time, Hong Kong also has various types of elderly home, which are regulated by the "residential care home (elderly persons) ordinance" to ensure a safe living environment for the elderly.

We believe that the Greater Bay Area must make comprehensive plans for the problem of population ageing, including the establishment of "one-stop" elderly service which provides continuous services such as comprehensive prevention, transition and rehabilitation care, and cross-sectoral home care services provided by

the medical team including psychological counseling, rehabilitation exercises, referral services, home consultations and nursing care, etc.

In addition, various places can also set up dental services for the elderly, hearing therapy, and speech therapy services to improve their quality of life and promote their social health. Let Hong Kong people have the confidence to live and elder care in the Greater Bay Area and create a quality life circle. Since Hong Kong's medical services have reached international standards, our outstanding medical professionals can communicate with the Mainland to promote the development of medical and elderly services in the Greater Bay Area and make it a better living environment.

Dr. Joseph Li emphasizes that the strengths of Hong Kong's medical, health, and elderly services can complement each other with neighboring cities; thus, local advantages can be radiated to the Greater Bay Area to form a larger service group and industry. And Dr. Lam Ching Cai, a member of the Executive Council, emphasized that the entire city, in terms of concepts, planning, architecture, and services, should comprehensively consider and embrace the "aged society".

The Hong Kong government has taken various measures at the policy level in recent years to meet the short, medium and long-term needs of elderly people, and to recover from the late start, but from the perspective of the chairman of the Elderly Commission, Lam Ching Cai, this kind of mentality of "chasing backward" will turn into "lagging behind". He took urban design as an example and pointed out that Hong Kong is still under "new development and old thinking" when doing city planning. He also said that Hong Kong, which does not lack an elderly policy, has the above-mentioned wrong approach in elderly care. The fundamental reason is that the entire society still only regards population ageing as a problem to be "solved". "In fact, the entire society must embrace the concept of population aging," so that all aspects of society can coexist with the elderly.

"If we continue to hold the idea of youthfulness to develop the entire city, it will just make the society even less conscious of the elderly in daily life." Lam Ching Cai believes that nowadays, the area that seems to be well-designed is actually old-fashioned, and is not suitable for a city that has become an aged society. "There are big parks, stadiums, theaters and other facilities in our city, of course, young people will feel convenient, but this is not the case for the elderly."

As a city with an aged population, what kind of urban design does it need? Lam Ching Cai proposed the principle of "splitting into parts", which is to transform a big city into small communities, and evenly smaller resting space and gathering spots, to create a truly livable place for the aged society. He added, "The area of activities of the elderly are very limited, even if they have a two-dollar bus fare discount, they need to first be able to get on the bus, right?"

He pointed out that the reason why Japan, which has entered a super-aged society, is an elderly friendly society is, there are stores that sell everything in their communities, which is exactly what the elderly needs. Therefore, he believes that if Hong Kong wants to catch up in this regard, the government needs to break the established thinking of the development of new towns in the past and abandon large parks, large shopping malls etc.

...Lam Ching-choi, who has been involved in the affairs of the Elderly Commission for more than ten years, became a non-official member of the Executive Council last year. He bluntly said

that understanding the needs of the grassroots is merely the basic requirement for elderly policy making. If those in power strive for tackling elderly issues in an all-round and in-depth manner, they should transcend social welfare into a broader perspective and infiltrate elderly care elements into every aspect of governance. "Whether it is medical care, planning, education, etc., we must consider elderly care, because there is no sector that has nothing to do with the elderly." He emphasized that only when the government considers the issue of the elderly without the classification of sectors can it lead the society to embrace the trend of population ageing...

(3) Cross-border integration of medical and elderly care

On December 8th, 2018, the Hong Kong Society for Rehabilitation, Helping Hand, the Hong Kong Association of Gerontology, The Institute of Active Ageing, The Centre for Gerontological Nursing of The Hong Kong Polytechnic University, the Sau Po Centre on Ageing and the Asia-Pacific Institute of Ageing Studies of the Lingnan University held a "Cross-Border Elderly Care Seminar" with the theme of cross-border medical and elderly care opportunities. Participants at the conference agrees that the "integration of medical care and elderly care" is an important path for Hong Kong to develop elderly care industry with surrounding cities:

In her welcoming speech, Pamela Leung, president of the Hong Kong Society for Rehabilitation, said that the problem of population aging is worthy of attention, and the demand for cross-border elderly care services is increasing. Take the elderly home Yee Hong Height in Shenzhen as an example, its current occupancy rate is over 90%, of which 60% are Hong Kong residents. In addition, the report of the 19th National Congress of the Communist Party of China mentioned the development of elderly care, indicating there will be a lot of opportunities for cross-border elder care service.

Anthony Leung Kam-chung, Chairman of Nan Fung Group and New Frontier, pointed out that in addition to the serious problem of population aging, the number of patients of chronic diseases has also increased significantly, and medical expenses in Mainland China will be huge. Therefore, the elderly care industry will be marketized, the quality of nursing and disease management will be raised, and more doctors and nurses will be employed, to reduce the medical burden of the ageing society.

The Permanent Secretary for Labor and Welfare Chang King-yiu emphasized that in the notion of "letting money follow the elderly", the elderly can have a choice of receiving suitable services. In the past few years, the government has conducted different forms of pilot programs, including giving community care and residential care service vouchers to the elderly, and extending the Guangdong program from Guangdong Province to Fujian Province. The government will also continue to study and evaluate the results of the elderly service plan. In the short term, it will try out a "case management" model to study the needs of individuals and provide them with more appropriate services.

Chairman of the Elderly Affairs Committee Lam Ching-cai pointed out that in addition to administrative considerations on the policy, the development of cross-border medical care also needs to be assisted by the private market to turn it into an industry; the flexibility of social welfare service can also make the scheme more

practical. However, the wishes of the elderly are also an important aspect that all stakeholders should look at...

The seminar and roundtable attended by representatives from politics, business, academia, industry, and social organizations summarized many suggestions to inspire the development of Hong Kong’s “medical care and elderly” industry; including: 1. A better medical package can help enhance the confidence of the elderly when considering cross-border elderly service; 2. Promoting outreach medical services; 3. Exploring video telemedicine services; 4. Strengthening disease prevention in primary medical care; 5. Studying the market for Hong Kong elderly to purchase medical insurance in the Mainland, etc. We believe that the provinces, cities and SAR in the Greater Bay Area should apply the approach of “industrial parks” to carry out various attempts of “medicine and healthcare integration”, service and management innovation, and finally form a complete industrial chain on Guishan Island. Not only can the quality of life health of the elderly can be improved, this also provides more diverse and decent job opportunities for the new generation.

4. Smart logistics

(1) Shipping and air transport hub

The location of the Asia-Pacific or even the world’s largest port changes from time to time with the trend of the manufacturing and logistics industries; it was once in Hong Kong, then in Singapore, and now in Shanghai. In fact, the spots of the container terminals inside those cities also change every ten to twenty years, or half a century, according to each of their urban development. In the past one and a half century, the terminals, ports and other freight facilities in Hong Kong have migrated from the south coast of Victoria Harbour to the north coast, and then to the Rambler Channel, which is today’s Kwai Chung and Tsing Yi.

The geographic location of the terminal has continued to change in this process; the equipment, technology, and logistics facilities for loading and unloading are also constantly improving. The relationship between local businesses, global economy and the various industries centring around the terminals are also constantly evolving. Today, Hong Kong plays the role of an entrepôt, 60% to 70% of the merchandise imported are to be exported again, and are not entering the local transportation network into Hong Kong Island, Kowloon and New Territory. On this matter, we need to conduct a comprehensive review on the economic value of the land now used as Kwai Chung Container Terminal. From another perspective, will finding a new location for shipping industry be more conducive to the integration of regional resources and business opportunities? And is it beneficial for implementing more innovative technology and enhancing the competitiveness in Hong Kong?

The efficiency of the Kwai Chung Container Terminal is globally admired; all operators can meet customer needs and keep up with the schedule with the shortest time and the least space. However, from another point of view, even though the water depth in Kwai Chung and Tsing Yi South is sufficient, their geographical and water areas are extremely narrow, which restricts business expansion, efficiency enhancement, and technological upgrading. The international ranking of Hong Kong's shipping industry has fallen year after year, which is closely related to the geographical restrictions of container terminals. Still, the number of employees and output value in shipping, aviation, and related logistics and trade industries still rank first among all industries in Hong Kong. The society should face its challenges more actively, rather than bear its decline. The Task Force On Land Supply established by the current government has also considered finding land to build a port in order to maintain the competitiveness of relevant industries, and cited several conditions:

- 1. According to international standards for port facility, each berth provides 25 hectares of container yard to support terminal operations; the water depth of the new location must be at least 17.5 meters below the baseline to allow large ships to berth;**
- 2. According to the current size of container ships, the length of the berth shall not be less than 400 meters;**
- 3. The waterway must have sufficient water depth;**
- 4. Before relocating, it is necessary to predict the freight volume to determine the number of berths and whether it needs to be expanded in the future;**
- 5. The new port must be closely connected to the main areas of Hong Kong, including the relevant strategic sea and land transportation network;**
- 6. Due to the large demand for land area, reclamation is very likely needed.**

In fact, a container terminal relocation and expansion plan that is far more ambitious than the local land supply team envisaged is currently undergoing in Singapore. According to the report from Bauhinia Foundation Research Centre:

Singapore’s Prime Minister Lee Hsien Loong announced in 2013 that before 2027, several city ports, such as the Tanjong Pagar Terminal in the south of Singapore, will be relocated to Tuas in the west of Singapore. The redevelopment plan of the Tuas Port terminal is divided into four phases, and will be gradually put into operation in 2021. At present, 40% of the reclamation works have been completed and it is estimated that by 2020, when the first phase of the project is completed, all the reclamation works required for building the terminals will also be completed.

The entire project is expected to be completed in 2040, by that time, Pasir Panjang in the south will be moved to Tuas Port. The size of the entire new terminal will be twice the area of Ang Mo Kio, a new town in Singapore, which is about 28 square kilometers. The container throughput will be doubled compared to that in 2017, and will be capable of handling 65 million TEUs per year. After the new terminal is completed, 1,000 hectares of land will be released from several old container terminals, and the government will repurpose it for commercial and residential use.

After all, Hong Kong was first built as a harbor. The government, enterprises, and the private sector should not let go of their ambitions to revive the shipping industry. Not only the shipping industry of Guangzhou, Shenzhen, Macau and other places will benefit from the relocation of container terminals, also the business development in shipment financing, insurance and asset management in Hong Kong. In fact, Shanghai has been able to surpass domestic and foreign rivals and become the world’s largest port due to the integration of Jiangsu, Zhejiang and Shanghai in the Yangtze River Delta. Also, Shanghai solves the problems of narrow waterways and insufficient expansion space through introducing the latest engineering and automation technology and build deep-water ports in the sea centre. As stated by Savantas Policy Institute:

As early as 2005, Shanghai built the Yangshan Port in the waters under the administrative jurisdiction of Zhejiang, and connected it to Shanghai city with a sea-crossing bridge. Furthermore, they continued to expand its construction using advanced automated management technology to reduce labor costs. Phase IV of Yangshan Port automated terminal has now become the world's largest intelligent terminal. The entire terminal area is empty, even the trucks carrying cargo is autonomous. Only in the control room is labors needed to monitor the facility and ensure its safety. When Hong Kong's shipping industry is short of manpower, the pilot zone has to build automated facilities to improve its efficiency. Unmanned operations can be done for tasks like lifting container, transporting towing ships etc., and help Hong Kong adapt to the shortage of manpower in the shipping industry.

In addition, as the container terminal moves to the southwest, Lantau Island and the southern waters can become the strategic position of the shipping and air transport hub in the region. After several years of turmoil, the AA finally used its own financing to build the third runway of Hong Kong International Airport, the new terminal building and other supporting facilities. However, the controversy over the "third runway" is still ongoing. One of the reasons is that the cost of the expansion is equivalent to the construction of another medium-sized airport; the other is that it is limited by the terrain of Lantau Island, especially the tallest Phoenix Mountain in Hong Kong in

the north and Tai Mo Shan in the north, thus make it difficult to fully utilize the wide airspace near the southern Lantau sea area. Besides, including the “third runway”, the entire Chek Lap Kok International Airport and the rapidly developing Shenzhen Bao’an International Airport share the same airspace in certain area, which leads to conflicts of interests in terms of income and technology that take a long time to solve.

During the colonial era, Chek Lap Kok was not the only potential location for the new airport. Except for Tung Lung Chau, the industry was actually in favor of the northwestern New Territories. Similarly, a report completed by NATS, an external government consultant in the United Kingdom, also pointed out that the cost-effectiveness of building a new airport in the waters of Southern Lantau Island is not necessarily lower than that of the “third runway”. The airspace utilization rate and the safety level of take-off and landing are even higher. The "third runway" project is now in progress; however, even according to the most optimistic estimates of the Hong Kong Government and the Airport Authority, its "saturation period" will soon arrive within ten to twenty years. It is necessary to plan ahead and evaluate the cost-effectiveness of building a combination of container terminals and airport on Guishan Island.

(2) Replanning Tsuen Wan and Kwai Chung

The conditions for the realization of the above-mentioned ideas have gradually been materialized, all due to the rapid development of the surrounding transportation networks, especially railways and highways. Within Hong Kong, the first capstone of the development of northern Lantau Island was the completion of Chek Lap Kok International Airport, Tung Chung New Town and supporting infrastructure more than twenty years ago. The second apex is the expansion of Tung Chung new town, the opening of Hong Kong-Zhuhai-Macao Bridge Hong Kong port, Tuen Mun-Chek Lap Kok Link and the extension of the MTR Tung Chung Line. To the north of Hong Kong is the urban clusters on the east and west coasts of the Pearl River Delta with Guangzhou as the core area, including Shenzhen, Dongguan, Foshan, Zhongshan, Zhuhai, Macau and other places. These cities form a passenger rail transit network with High Speed Rail, Inter-city Rail and Mass Transit Railway, and increase the production capability of the freight railway. Finally, the commissioning of the Hong Kong-Zhuhai-Macao Bridge has prompted the government and the industry to think about the unique role of Hong Kong in the integration of "Southeast Coast-Southwestern Provinces" and even "South China-ASEAN".

The above development ideas will bring about new opportunities in the logistics and trade industry chain of Hong Kong and surrounding cities in the long-term; in the short run, it can also release a large amount of precious land in Kwai Chung and Tsing Yi, and further develop the function of "Tsuen Kwai Tsing" in the development of Hong Kong. Moving the container terminal to the southwest will allow Kwai Chung, Tsing Yi South, and the surrounding areas to vacate a full 380 hectares of square disposed site. Considering that the "road-rail-waterway" network of the relevant area is complete, the conditions are far more favorable and mature than any land in the New Territories for the development of commercial, residential and public area. it can create job opportunities in the area and will also greatly improve local living environment.

Tsuen Wan is one of the earliest satellite towns in Hong Kong. There is now a need to comprehensively review its urban planning, public facilities, and industrial positioning. Since the beginning of the 21st century, there have been many railways, tunnels, and highways connecting Shatin, Yuen Long, and the urban area. The highway leads to this area, and the population, traffic flow, and commercial activities in Tsuen Wan, Kwai Chung and Tsing Yi have all increased

significantly. At the same time, Ma Wan, Tsing Yi, and Northern Lantau Island in the west of Tsuen Wan have also continued to develop as the airport, Disneyland, Western Corridor, Hong Kong-Zhuhai-Macao Bridge, and Tuen Mun-Chek Lap Kok Link have commenced services. Lately, the opening of the high-speed rail and the enhancement of service have also invigorated the cultural and commercial district of West Kowloon. With Tsuen Wan as the core area, the surrounding districts to the south and west will become an active area for local economic and social development in the next one to two decades. However, Kwai Chung and Tsing Yi South Container Terminals has prevented "Tsuen Kwai Tsing" from fully functioning as an economic hub. From the perspective of interdistrict integration, industrial upgrading, and living environment improvement, the Hong Kong government should put the relocation plan and the repurposing of Kwai Tsing land on the agenda as soon as possible.

The room for business growth in shipping and logistic industries is mostly based on the import, export and transit throughput; the relocation of container terminals is precisely in pursuit of greater expansion space for the industrial growth and development. In view of the impact of the epidemic this year, the Financial Secretary announced in the Budget the financial policy to support the shipping industry, in order to consolidate Hong Kong’s status as an international shipping centre. To attract more international shipping business operators and clients to station in Hong Kong, other tax measures are being studied. Although these are right approaches, there is little attention to revitalizing Hong Kong's traditional shipping industry. However, Edward Liu, the chief representative of the China Office of the International Chamber of Shipping and a member of the China Committee of the Hong Kong Shipowners Association, wrote in May this year:

... On November 21st (last year), the world’s most influential International Chamber of Shipping set up a Chinese office in Hong Kong, which is the first overseas branch of this 100-year-old global shipowner organization based in London. In addition, the Baltic and International Maritime Council officially included Hong Kong in the arbitration clauses of various maritime standard contracts on December 15th , confirming that Hong Kong is an international maritime arbitration centre on the same level as London, New York and Singapore. Also, the Marine Department has been established in Shanghai, London and Singapore, and has gradually operated the overseas support team of the Ship Registry, providing support services for Hong Kong ships in these most important shipping centres in the world. These can be achieved partly because Hong Kong has played the roles of “facilitators” and “promoters” during the cooperation with the industry in recent years.

Although the international rankings of container terminals have been surpassed by other rivals, Hong Kong's shipping industry still has its weight in the region. Edward Liu cited Singapore as an example to illustrate the relationship between traditional shipping industry and its high-valued business growth:

...Singapore followed a comprehensive development strategy; it first promoted maritime transport, then maritime insurance; first developed the shipping industry, then ocean engineering; first expanded the port throughput, then increased the manpower; first expanded the industry clusters, then developed high-end services. After more than a decade of development, Singapore has ranked first in the

"Xinhua-Baltic and International Maritime Council Development Index" for 6 consecutive years, surpassing competitors such as London, Hong Kong and Shanghai.

Compared with Singapore, the lack of institutions that specialize in shipping and port affairs has also become a major constraint on the development of Hong Kong's industry. Taking the handling of the epidemic as an example, the Maritime of Port Authority (MPA) of Singapore responded quickly in the beginning and adopted a series of proactive measures to help shipping companies tide over. Recently, MPA has launched a financial support package, "MaritimeSG Together", of US\$27 million to provide financial support for shipping company operations and training, as well as economic and employment support for Singaporean seafarers...

(3) Fully automation, safety and efficiency

In order to transform and upgrade the shipping industry, besides applying the strategies mentioned above, the implementation of smart technology and full automation system is equally important.

The breakthrough comes from the full application of 5G mobile communication technology and the arrival of the "Internet of Things Generation". Roger Chung Yun-tai, research director of Deloitte 5G Research Institute, said:

With the assistance of 5G technology, Hong Kong can finally enter the era of smart ports, where full automation of operation, monitoring and supervision can be realized. Devices that were unable to be wired in the past can now be remotely controlled and connected using 5G, which can greatly improve the operational flexibility and work efficiency of port equipment. At the same time, through a high degree of automation, labor costs are greatly reduced. 5G also has a characteristic of ultra-low latency, which enables accurate control and movement of containers.

For instance, Qindao Port is jointly built by China Unicom, Ericsson, Shanghai Zhenhua Heavy Industries Company etc. It is the first smart port to use 5G technology to realize unmanned loading and unloading on shore, unmanned horizontal transportation, and unmanned gate inspection. With the customized 5G network built by China Unicom, edge computing, 5G industrial control gateway, satellite positioning and other technologies, Qingdao Port is equipped with a basic framework for automation equipment communication. It can achieve low latency (within 14 milliseconds), large bandwidth (over 200Mbps), strong anti-interference, and highly stable 5G signal.

In fact, Qingdao Port has become the seventh largest port in the world. Its fully automated terminal began operation in May 2017, and its efficiency has been greatly improved through automation technology. It can operate more than 40 units per hour, which is 30% more than traditional terminals, and lowers the manpower by 70%. The construction and operation of container terminals in Tianjin didn't begin as early, but it has already become a model for smart ports in Northern China. The local automated track and autonomous container trucks have increased the operating capacity by 10%, equipment utilization rate by 35%, and have stabilized the efficiency of loading and unloading at more than 30 units per hour.

The Hutchison Ports in Xiamen also strives to complete the intellectualization of quay cranes, gantry crane control, shoreside loading and unloading system and trailers by 2021, with the help of Internet of Things, big data, cloud computing, A.I., 5G and other information technologies.

Some European ports have also completed the intellectualization of loading and unloading technologies, and are looking forward to the breakthroughs in the industry:

The Port of Rotterdam in Netherlands launched a pilot project on July 9th this year. In this project, containers can be processed and released without the use of a PIN code, which is a widely used verification method in the transportation field. The project revolves around a new application, Secure Container Release, which replaces the PIN code with a digital signal and can reduce the risk of fraud.

...This project does not only improve the efficiency of container handling, but also make it safer. CMA CGM, Hapag-Lloyd, MSC, ONE-Line, Hutchison Ports ECT Rotterdam, Rotterdam Fruit Wharf, Milestone Fresh, VTO, Portmade and application developer T-Mining have participated in a three-month trial.

In the Port of Rotterdam, millions of containers are unloaded every year; the containers are then transported to various inland areas, and the container collection and distribution process is particularly complicated and hectic. In related operations, transportation companies, freight forwarders, and terminal operators must work closely together to ensure efficient and safe delivery. Emile Hoogsteden, Commercial Director of the Port of Rotterdam Authority, said that through new technologies, port operations can be made smarter, faster, more efficient and safer. During transportations, different participants will use blockchain applications and follow the requirements of all parties to complete the delivery process safely and effectively:

Hoogsteden stated that drivers who plan to collect specific containers at the port must have a valid authorization to receive, which is issued by the transportation company. The freight forwarder then instructs the transportation company to retrieve the containers at the terminal. Usually, document authorization is confirmed at the port through a PIN code, which requires many different manual operations. Any error in this process may lead to a waste of time, and cause conflicts between customers and transportation companies, and may lead to fraud. The application tested in this trial can completely replace PIN-based authorization.

This pilot project will test how to effectively improve the security of the container transportation process in the entire supply chain, from transportation companies to end users. The application is based on blockchain technology, and its security can be compared to online banking system. During the authorization process, a blockchain application will be used to convert the PIN into a digital token, and this token can be smoothly passed from one place to the next, it can prevent authorization code from being stolen or copied and secure the transportation process.

It is worth noting that the port operator can be assured that the container has been delivered to the correct driver because there is only one valid digital token. Another advantage of this program is that it does not reveal who has handled the digital tokens, which means third parties cannot access potential confidential information. Even the software developer of this application, T-Mining, cannot view this information. T-Mining was selected into the PortXL accelerator project earlier this

year, and is currently working with companies of the Port of Rotterdam Authority to implement this pilot project.

In addition, Ocean Technology and the data of ocean dynamics have also advanced the automatization, digitization, intellectualization of the container terminal. The Port of Rotterdam cooperates with manufacturers such as IBM and Cisco to build a complete inter-ship network. In order to do that, they will install sensors at the sea and on the site across the entire port area to collect information about tides, ocean currents, temperature, wind speed, water level, visibility, and real time berth availability. The hydrological and climatic data will be gathered, analyzed and provided to captains, navigators port operators and related units to achieve safe and efficient port operation management.

There are more than 100,000 ships entering and leaving the port every year. In the past, it took a few hours to arrange a ship to berth and unload. In the future, it will analyze big data through the cloud computing in the Internet of Things, draw up decision-making references to predict the best time for optimal water level and arrange ships to arrive and depart. As the waiting time for ships is reduced, shipping companies can save considerable berthing fees, and more berths can be vacated to minimize operational pressure..

In fact, the Port of Rotterdam has set the goal of completing "connected shipping" in 2025. In the future, there will be no need to rely on the command of pilot ships to enter the port. When the ships are connected to the network, they can sail automatically in the port waterways without worrying about colliding with other ships.

More importantly, the new technology does not only improve the efficiency of loading and unloading, save manpower, and reduce operational hazards, but also significantly lower the impact the logistics industry has on the surrounding environment. Maersk Line (APM-Maersk) installed a containerized 600 kWh marine battery system on their own ship, Maersk Cape Town, to reduce carbon dioxide emissions, improve the ship performance and reliability. Magnus Hansson, the director of energy management technology at Trident Maritime System, said that some service providers can indeed provide similar marine battery energy storage systems, but many of them have not yet fully prepared for the increasingly stringent environmental regulations. He also pointed out:

Containerization has happened in the field of sea transportation for more than 60 years. The battery energy storage system we see now is another application of containerization. It allows flexible placement without needing additional space. In the future, it may even allow related parties to standardized the installation for different types of ships.

There are many challenges for ships to use batteries as power, but in many cases it has been successful, in which most of them are small passenger ships and small container ships. For example, there is “Ellen”, which is a fully electric short-distance passenger ship operating between Port of Soby and Fyshav in Finalnd, and “Yara Birkeland”, which is the

world’s first electric autonomous container ship (with a container capacity of 120 TEU).

...Maersk Line mentioned that as the technology matures, it is interested in cooperating with Trident Maritime Systems to explore more possibilities for energy conservation and emission reduction. Ole Graa Jakobson said that the future battery energy storage system can be used in other assets operated by the Maersk Group besides ships, such as the terminal area. Electricity will play an important role. The lights, shore cranes, collection and distribution systems, software systems and refrigerated container yards all require power support. Nowadays, ships can reduce emissions by switching fuel oil, adjusting speed and other feasible methods, while port emissions reduction are mostly done with shore power technology, but the investment in terminal automation construction is very large and the cost recovery period is long. The industry expects that battery energy storage system can become a cost-effective solution in the future. Other types of ships (such as tugboats and salvage vessels) can also use battery energy storage system to maximize the economic efficiency.

Regarding the progress of digitalization in the Greater Bay Area and its neighboring ports, Hong Kong International Terminals learned from the fully automated operation in Tobishima Terminal in Nagoya a few years ago, and introduced Japanese Magic Eye technology to build a remote lifting system. However, comparing to surrounding areas, from Taiwan to Guangdong, Hong Kong has made less aggressive improvement.

For example, Taiwan International Ports Corporation has launched the " Trans-SMART Project." It includes transformation plans for seven important smart ports, including: auxiliary system for intelligent ship control, Internet of Things maritime meteorological real-time system, intelligent harbor adjustment and integration system, maritime robots, port area intelligent transportation system, intelligent monitoring management system and automated container terminals. A large number of advanced technologies such as sensors, unmanned ships, robots, and big data analysis will be used to gather data of winds, waves, currents, tide level and other useful information in real time. These help give out warnings for abnormal conditions and provide automation Support services such as berthing, tugboat dispatch etc., to improve the efficiency and port operations.

Taiwan International Ports Corporation also cooperated with the Trade-van Info Services to develop the "Smart Port Blockchain and e-Port Service Platform". It intends to create more transparent and effective sharing to enhance the information flow of cargo, finance, customs clearance, trade etc., supported by the security, reliability and real-time validity of blockchain. Information can also be shared with the third parties such as banks and insurance company in the meantime, to eliminate unnecessary procedures in between.

If blockchain technology is applied in the import and export logistics operations of smart ports, the transparency of the transportation process will be greatly improved. For example, the container or the products in the container can be easily tracked, more efficient information exchange between organizations can be promoted, payment and transaction process can be sped up, thus the movement of containers will be faster. In the past, it was necessary to manually verify the transaction certificate and notification, which often took several days. Through blockchain technology, from the moment the container is unloaded, you can share data with related parties at the same time, immediately complete the freight payment, tax declaration and

verification. Automatic shipping notification can be made in a few minutes, along with the custom clearance process.

In addition, blockchain technology can also make all Internet of Things devices become information receiving nodes. For example, after a container is installed with a tracker, it can be combined with a 5G network to continuously transmit information and automatically encoded. The sensor can also monitor the status of the goods at any time and report back, without the need for any user to do it manually. For the tracking and management of reverse logistics, blockchain can also come in handy. Enterprises can easily track the amount and source of returned products, and carry out suitable recycling operations, which is in line with the notion of circular economy.

The largest modification plan for container terminals among the Guangdong-Hong Kong-Macao Greater Bay area is in Guangzhou Nanshagang. On May 8 this year, Guangzhou Port Group, Shanghai Zhenhua Heavy Industry (Group), China Unicom Guangzhou Branch, and Huawei signed a letter of intent for the cooperation of 5G joint application and innovation of smart ports in Nansha District. They jointly proposed the construction model and content for the 5G construction project, and will jointly build the first fully automated terminal in the Guangdong-Hong Kong-Macao Greater Bay Area in Nanshagang with four phases of construction. The 5G application in this project will also be a demonstration of the country.

This project aims at integrating 5G technology with the digitalized infrastructure in the port. 5G technology will be applied in different production process, to develop IGV autonomous system, precise remote control for large machinery, A.I. smart tally, AR remote inspection and supervision, unmanned vehicles for on-site inspection etc...

After the completion of the phase VI Nanshagang 5G fully automated terminal, through the use of big data, artificial intelligence, unmanned driving, Beidou Navigation Satellite System and other technologies, the number of operators will be reduced by 60% compared with the traditional terminal. Besides saving manpower, loading and unloading operations can also be made safer. Since most of the equipment in the automated terminal is electric, a large amount of exhaust gas emission is avoided, thus pollution is reduced. At the same time, the Nansha Phase IV storage yard adopts a parallel layout, so IGV can enter the storage yard, which eliminates the use of high-power rails to lift and move containers and lessens energy waste.

5. Future city

(1) Skyrise greenery and energy efficient roofing

In our “future city”, we do not only aim at continuously improving people’s productivity and living conditions, but also aim at maintaining the natural environment, which is based on the balance of temperature, humidity, carbon emissions and absorption. As the senior project manager of Friends of the Earth (HK) Dr. Jeffrey Hung Oi-shing pointed out:

... The "Special Report on Global Warming of 1.5°C" issued by the Intergovernmental Panel on Climate Change shows that global carbon dioxide emissions are rising rapidly, causing the global average temperature to be about one degree Celsius higher than before industrialization, and it is expected to increase 0.2°C every ten years. As the temperature continues to rise, no country is detached from this reality. France had a record-high temperature of 46°C this summer, killing 1,435 people. Hong Kong has also been threatened by various extreme weather these years, such as extremely hot weather and heavy rain. The damage caused by the super typhoons "Hato" and "Mangkhut" in the last two years is still vividly remembered.

A large amount of “modern buildings” were constructed since the end of the twentieth century, and they are less correspondent to the new demands for energy conservation and carbon footprint reduction comparing with traditional buildings. By introducing new concepts, new technologies, and new usage, our urban architecture can be more in line with the theme of harmony between nature and development. This is for us, and for our next generation.

After nearly one to two decades, low carbon architectural design and technology in construction have matured; the reliability has raised and the cost has lowered. Among all the innovation, the use of “smart façade” and the integration of green energy system and urban planning have brought the most significant benefits. The former can be seen in various types of “vertical greening” systems outside buildings, and the latter is mainly reflected in the popularization of rooftop solar panels.

"Vertical greening" originated in Europe and the United States. In the past ten years, it has also been employed rapidly in Asia-Pacific countries such as China, South Korea, Japan, Singapore, Thailand, and Australia. According to different needs, costs, and technical constraints, it is mainly divided into six types: modular, paving, climbing, hanging, swinging, bag and trough. It can adapt to the climate of different latitudes, and can also be used for interior walls and exterior facades; it is of considerable value for heat insulation, energy saving, carbon reduction, and improvement of city appearance.

In 2016, the urban development consultancy Arup gathered 15 experts in different fields to study the environmental benefits of "vertical greening", and then to establish the actual impacts and design principles of different urban scales. The research project "Cities Alive—Green Building Envelope" studied the effect of vertical greening on “air pollution”, “noise pollution” and “urban heat island” problems in five cities, including Berlin, London, Los Angeles, Melbourne and Hong Kong. The actual situation is explored with numerical simulation methods:

Air pollution

Vertical greening can reduce the concentration of airborne particles by 10-20%

The efficiency of air purification largely depends on the correlation between the aspect ratio of buildings to that of streets

Air purification benefits are mainly seen in the narrow valleys on the streets, not the area further up.

According to statistics from the World Health Organization (WHO), there were approximately 3,700,000 premature deaths worldwide in 2012 that could be attributed to air pollution, 25% of which occurred in Southeast Asia, mainly caused by heart and respiratory-related diseases. Appropriate street scale and mass planning can shape natural air ducts, guide airflow between cities, and reduce air pollution. In addition, the choice of green plants also affects the efficiency of air purification. Species that are leafy and can cover a large area are the preferred options.

Noise control

Vertical greening can reduce traffic noise by about 10 dB

There is no significant effect if the vertical greening system is close to the sound source

Vertical greening has a low noise reduction effect on decentralized audio sources

Vertical greening works best for reducing low ambient noise and sudden noise at night

There are mainly three types of urban noise: direct noise, reflected noise, and surrounding noise. Modern streets are mostly composed of hard materials such as concrete, stone brick, asphalt, and glass. The noise is constantly reflected and loudened within the narrow streets built with these materials, which is the main reason for the deterioration of urban sound environment. Although a green wall cannot reduce direct noise, it can effectively absorb sound energy and avoid the reflection of noise between streets, thereby reducing the overall noise level.

Urban heat island

Vertical greening is beneficial to pedestrian space and can effectively remove about 50% of solar radiant heat

Vertical greening has the most significant effect in mitigating the heat island effect in cities with an aspect ratio greater than 2, such as Hong Kong, where the atmospheric temperature can be reduced by about 10°C.

The average mitigation effect is much lower than the highest mitigation figure, which is consistent with the observation of urban heat island phenomenon

For cities that already have a lot of greening, vertical greening has less impact on the issue of urban heat islands, like Berlin; for cities with high density and mostly cement structures, such as Hong Kong, the effect is more significant

For cities with wide streets and low-rise buildings, the greening benefits at the street level are higher

Vertical greening has a greater impact on cities with an aspect ratio of less than 1.

Direct solar radiation is the main source of heat in the city. After the surface of the building absorbs the solar radiation heat, part of it is conducted into the building body, and part of it is reflected to the atmosphere and other buildings, and heats the surrounding air by convection. One of the main factor that greening helps slow down the urban heat island effect is the photosynthesis of plants. After green plants receive solar radiation, they will be converted into energy and oxygen for growth, thereby reducing the energy of reflection and convection, and avoiding the accumulation of heat.

As revealed in the Arup research report, Hong Kong, which is located in a subtropical and oceanic climate, has the most obvious effect from "vertical greening". The technology and design of "vertical greening" can of course be used for old building modification, however, the cost-

effectiveness would naturally be higher if aspects such as lighting, drainage and landscape are taken into account at the beginning of planning and before construction.

As mentioned above, "vertical greening" can effectively reduce the use of energy required for cooling and heating, and planting trees has always been the first choice for oxygen production and carbon absorption; however, from vertical transportation to the application of various smart devices, there will be an increasing demand for electricity. How to stop relying on "petrochemical energy" and produce more renewable energy has become another essential topics of "energy saving and carbon reduction". Guishan Island and its adjacent areas have vast sea and air, and the conditions for harvesting wind energy, tidal kinetic energy, and light energy are satisfactory. In fact, in recent years, many developed countries and mainland China have made many breakthroughs in solar energy adoption and storage technologies. Under the principle of "cherishing land to build cities", how to fully utilize the roof space to harvest energy has become an essential topic. In this regard, Switzerland, which is constantly making progress in the field of sustainable development, has been promoting revolutionary improvements in recent years.

Currently, there are about 9.6 million roofs in Switzerland suitable for installing solar panels. If all of them are installed, they can meet up to 40% of the country's electricity demand. The main source of electricity in Switzerland now is hydroelectric power, which accounts for 65%, nuclear power accounts for 35%, and wind power and solar power account for less than 5%. However, Switzerland held a referendum in mid-2017 and has already passed a ban on the construction of new nuclear power plants, and 60% of the people support the government to expand the use of renewable energy. In order to accurately calculate the potential usage of the roof in Switzerland, the Solar Energy and Building Physics Laboratory (LESO-PB) of the Swiss Federal Institute of Technology Lausanne (EPFL) uses machine to combine geographic data and physical models:

In addition to analyzing solar radiation, the team also considers the roof area and avoid adding the chimneys and other areas that are not suitable for installing solar panels. It also considers whether the roof faces south, whether the building is in the city centre, etc. The above data will affect the power generation of solar panels. The final study pointed out that at least 55% of all roofs in Switzerland, that is, 9.6 million roofs, are suitable for installing solar panels, and 43% of electricity demand can be met by only installing on south-facing roofs.

LESO-PB also used artificial intelligence (AI) technology to analyze the potential of rooftop solar energy in Switzerland before. It is the first study to use AI to quantify the potential of large-scale rooftop solar energy. Said Jean-Louis Scartezzini, head of LESO-PB, “The calculation method successfully improved the spatio-temporal resolution and created a new 100% renewable energy model.”

The team mainly used the Swiss National Geographic Data System SIG-Énergie to create more accurate building models, and also applied machine learning to find out which areas on the roof will not be obscured to estimate the total amount of solar panels that can be installed. Actual installation was done to get a preliminary understanding of the site condition.

According to the research published by the team in Applied Energy, the total solar power generation capacity of Swiss rooftops is 24TWh, with a margin of error of 9TWh, and is 10 times the amount of energy gain from existing solar installations.

Compared with Switzerland, the efficiency of using solar roof on Guishan Island is much higher. It is because Switzerland is located in the mountains of Western Europe and has a cold and dry

climate, where the electricity demand is highest in winter, while the peak of harvesting solar energy is in summer. For this reason, LESO-PB's solar system must be coordinated with wind power, hydropower, or energy storage systems to configure electricity supply.

It shows that Hong Kong and its neighboring areas have great potential for the development of wind power, tidal power, and solar energy industries. In recent years, the Construction Industry Council (CIC) is working hard to study the thermal insulation and power generation performance of the "vacuum glazing" technology and its potential to be applied to buildings in Hong Kong. Related projects include: "Development of Precast BFRP Grid-Reinforced Geopolymer Sandwich Wall Buildings for Green Building Construction", "Feasibility of Delivering High-rise Low Carbon Buildings in Hong Kong", etc. In addition, in terms of "energy management systems", local public institutions and enterprises have also achieved considerable results and experience through the promotion of "energy labels" and "smart meters".

(2) MiC technology and green building

The construction of “future city” should carry out the principle of high sustainability, low carbon emission and energy saving. Its process and method also need to be markedly upgraded. Essentially, the urban construction industry is also a manufacturing industry. Not only finished products and by-products consume energy and raw materials; the production process and the level of technology and management involved also determine the level of pollution. For a long time, all kinds of on ground or underground buildings are seen as "products", and are mostly "made on site."

Since it is mainly completed in the open air, the resulting air, water, light and noise pollution is very difficult to control in terms of technology and cost. The construction industry and engineering industry in the past ten years, has derived Modular Integrated Construction (MiC) technology from the “Prefab” construction method. Last year, we organized an international academic seminar on "MiC" with the School of Engineering of the University of Hong Kong, allowing local, domestic and overseas political, business, academic and industry representatives to exchange views on its cutting-edge developments in various regions.

Under the pandemic, the progress of Modular Integrated Construction wasn't slow down but sped up. Many large-scale quarantine facilities and temporary hospitals construction projects are using or planning to use related techniques and components. In order to promote MiC built buildings, the Development Bureau has targeted six major types of buildings. Since April this year, construction contracts of the related types being tendered for require the use of MiC technology, as long as the conditioned floor area (CFA) is higher than 300 square meters.

Under the new policy, government offices, school classrooms, residential units, and even general wards of hospitals will all be prefabricated and transported to the site for installation. This is expected to speed up site construction. As for transitional housing projects promoted by the private sector, the Buildings Department is also determined to expedite the approval process and encourage people in the industry to submit design proposals as soon as possible. The Department will preview them so that the project proponents will know in advance whether MiC can be applied, to push ahead with the application of MiC system.

After a round of land donations from developers a while ago, the government expects there will be a significant increase in the number of projects that adopt MiC system. According to the news, the Buildings Department will loosen up procedures or provide facilitation when approving certain MiC projects, so as to increase the design flexibility and operational efficiency without affecting the safety standard. The Buildings Department also intend to encourage the industry to submit design proposal in advance for them to assess; if the design is approved, it will provide the project with a five-year construction period.

Here are the large-scale construction projects completed or will be completed with MiC system in Hong Kong for the last few years:

Project Elderly’s Home at Jat Min Chuen in Shatin

Overview The Hong Kong Housing Society plans to build an elderly’s home at Jat Min Chuen with steel-structured MiC method for relocating the elderly and encourage them to vacate the big units

Project Hong Kong Science Park Inno Cell

Overview The Science Park will use MiC to build a dormitory for innovators, which will become a community of smart living, innovation and collaboration.

Project Residential Homes for the Elderly in Kwu Tung North

Overview The Architectural Services Department "Multi-welfare Services Complex" for the Social Welfare Department in Kwu Tung North is a 8-storey building, which will be built using MiC technology.

Project Student Residence at Wong Chuk Hang Site for the University of Hong Kong

Overview A new student residence of HKU at Wong Chuk Hang has been selected by Development Bureau as a pilot MiC project. The funding for this project has been approved by the Finance Committee of the Legislative Council. Construction commenced in the third quarter of 2019.

Project Transitional Homes at Nam Cheong Street in Sham Shui Po

Overview The Hong Kong Council of Social Service (HKCSS) launched the "Modular Social Housing Project". The project adopts MiC method to build transitional social homes. The first project is located in Sham Shui Po. HK\$35 million subsidies has been approved by the Community Care Fund. Meanwhile, the developer will rent the site for HK\$1. The project is now under progress.

Project Transitional Homes at Yen Chow Street in Sham Shui Po

Overview HKCSS launched the second project under "Modular Social Housing Project". It is an idle government land located at Yen Chow Street in Sham Shui Po where around 205 household units will be provided.

Project Public Housing Development at Tung Chung Area 99" (TC99)

Overview A 12-storey domestic block in the "Public Housing Development at Tung Chung Area 99" (TC99) project has been selected as the MiC pilot project. The whole TC99 project includes five residential blocks, shops and kindergarten, etc. The total project estimate is about \$5 billion. As the project is still in the preliminary design stage, the project estimate will be further adjusted in the process of the detailed design. The foundation works of the TC99 project commenced in March this year, and the building works on the superstructure is expected to be completed in early 2024.

Project Transitional Homes at Yip Shing Street in Kwai Chung

Overview HKCSS launched the third project under "Modular Social Housing Project". It is an idle government land located at Yip Shing Street where around 100 household units will be provided.

Project Disciplined Services Quarters for the Fire Services Department at Pak Shing Kok, Tseung Kwan O

Overview It includes the construction of five quarters blocks with 16 to 17 storeys, with eight units on each floor, producing a total of 648 three-bedroom units of 50 square metres, together with the provision of ancillary facilities such as covered walkway, amenity and communal areas. The total construction floor area reaches 47,000 square metres. The project, at an estimated cost of about \$1.625 billion in money-of-the-day prices, commenced in August 2018 and is expected for completion in the second quarter of 2021. The development consists of about 3 800 modules, which have had most of its finishes, interior fittings, fixtures, etc., assembled ahead in the factory. The MiC modules adopted in the project are manufactured in Huizhou, Guangdong Province, and delivered to the construction site by land transport. The Architectural Services Department (ArchSD) had received a total of four tenders in respect of the project.

The Disciplined Services Quarters for the Fire Services Department at Pak Shing Kok is the larger project among those on the list. The Director of Architectural Services Department Lam Yu Ka-wai said that the project started in August last year, and since the adoption of MiC method has sped up the construction process, the contractor now expects to complete the project by the end of next year, earlier than the anticipated completion date which is the second quarter of 2021.

Project Manager AU Siu-man, Amy, of the ArchSD says that more than 10 percent of the installation work has been completed at the construction site so far, and block two, the tallest among the five blocks, has had four storeys installed. She says that the department consulted with the Water Supplies Department, the Electrical and Mechanical Services Department and the Fire Services Department regarding the project's inspection and acceptance standards at the end of last year. Between June and July this year, a visit was conducted by the ArchSD and related departments to the contractor's factory in the mainland to inspect the assembly of the boxes, and to ensure their safe transportation.

The contractor's Project Director, NGAN Siu-tak, Emil, says that more than 80 percent of the interior fitting-out processes are completed in a prefabrication yard. The fitting of the modules to the building calls for precise calculations. It takes about five working days to assemble each floor, and 30 minutes to install a module. Lifting units to higher floors takes around five minutes longer. Looking at the early result of applying MiC method, the environmental impact is lowered;

efficiency and safeness are significant improved. In the UK, Singapore and Australia and other places, MiC method is widely used in building hotels, student dormitories, residences, etc.

A 44-storey residential building in Croydon, London, is currently the tallest building constructed by MiC method. Nevertheless, the Avenue South Residence, a 56-storey residential development in Singapore, will become the tallest building constructed using the MiC method upon its completion. This new construction system is indeed beneficial for the development of Guishan Island.

(2) Smart home and Internet of Things

At the macro level, MiC method is mainly promoted by the government and public departments for our “future city”; at the micro level, the "smart home" of the "future city" is mainly promoted by enterprises and the general public. The idea of "smart home" originated from the integration of home appliance systems, such as the integration of network systems, home lighting control, security monitoring, intercom, home theater and multimedia, home environment control, energy management, etc. In the early years, Microsoft tried to use the personal computer as the core device for “smart home”. Its founder Bill Gates (Bill Gates) invested 97 million US dollars and built the "smart mansion" in 7 years. It has indeed become a buzzword.

In the end, the “smart home” era was marked by the first smart speaker “Echo” released by Amazon in November 2014. In the same year, Apple released the HomeKit "smart home" platform, and the first batch of devices supporting the HomeKit platform went on sale the following year. At the Apple Developer Conference in June 2016, Apple announced the cooperation with real estate developers to sell homes with built in HomeKit system. Later, Google launched the Google Home smart speaker in October 2016.

In just a few years, five major categories have been developed: Home Security, Smart Home Appliances and Energy Management (HEMS), Elderly Care, Life Services (Food, Clothing, Housing, Transportation, and Entertainment), and digital entertainment such as video streaming services. "Smart home" involves different home appliances of different sizes and network platforms; most of them are equipped with automatic functions and integrated with the "Internet of Things".

Because of the different communication and computing systems of various enterprises, the coordination and integration between products and between products and systems has become particularly critical; otherwise, the lack of communication and coordination will also lower the convenience, efficiency, reliability and safety of “smart home”. Earlier, the ZigBee Alliance, the wireless network protocol alliance, established a working group with Apple, Google, and Amazon to jointly develop "smart home" and improve the compatibility of new products:

With the goal of creating an open standard and solving the situation of incompatibility, the Zigbee Alliance proposes the specification named "Project Connected Home over IP" and establishes an Internet Protocol. At present, the first specification is applicable to Wi-Fi, and maybe to Ethernet, mobile network, broadband and other technologies in the future.

The current members in the alliance include IKEA, NXP Semiconductors, Samsung SmartThings, Schneider Electric, Signify, Silicon Labs, Somfy, Wulian, Legrand, Resideo and other companies that provide smart home technology or products. After Apple, Google, and Amazon have also joined, Amazon Alexa, Apple Siri, and Google Assistant can hopefully be made compatible with other smart home services, thus accelerate the interconnection of various IoT devices.

Various IoT devices currently support different connection specifications, but under the "Project Connected Home over IP" specifications, they will be able to interconnect using the existing network IP safely and easily.

As far as consumers are concerned, now they can save the trouble of ensuring that the specifications of devices are the same, and can have more choices and flexibility when setting up smart homes. They can use suitable devices according to their personal needs. "Project Connected Home over IP" is expected to be available to the public in the second half of 2020.

In Mainland China, Alibaba, Xiaomi and Baidu are also following the same steps in the development of "smart homes". Besides, Chinese science and technology entrepreneurs are also willing to promote "healthy homes". On March 5th of this year, the Mainland launched the "Healthy Home Quality Certification", which is for evaluating the efficacy of household products, such as air conditioners, washing machines, purifiers, vacuum cleaners, garment irons, air purifiers, 84 disinfectants and other products, by referring to their anti-bacterial, sterilization, purification, fresh air and self-cleaning performance. Undoubtedly, "intelligentization" and "integration of medical and care" will be the major path for home environment improvement in the "future city".

6. Strategic infrastructure

(1) High efficiency and low emission regional express

Nowadays, the use of electricity are widely involved in construction and households; in the “future city”, we will be relying on electricity even more, in terms of public transportation and personal commute. The reason is simple, first, most of the renewable energy sources mentioned above, such as light energy, wind energy, water power, and tidal energy, are converted into electricity for storage, transportation and to use. Secondly, under the steady development of the "Internet of Things", the number of electronic products in future household and commercial appliances will increase. Clearly, electricity has a better energy generating efficiency for electronic devices than other petrochemical method.

In the field of mass transportation, the development of new vehicles driven by electricity and electromagnetic force is mainly in train systems, that is, rail transit. For household and individual, the main focus is the development and popularization of electric cars of different sizes and supporting facilities. Within the region, Guangzhou-Kowloon Railway is among the earliest rail transit. Hong Kong’s development of electrification and rail transport were also very early. However, in the past ten years, related developments in neighboring counties and cities have surpassed Hong Kong's level in terms of length and number of networks.

A complete rail transit system should include at least four layers: 1. Light rail, elevated monorail, or tram; 2. Dense underground rail network; 3. Regional express lines between neighboring cities, or between city centres and satellite cities; 4. Long-distance passenger and freight railways. Long distance passenger railways are mainly high-speed rails nowadays. Regarding Guangzhou, Shenzhen, Dongguan, Zhuhai, Zhongshan, Foshan and other places, not only their railway system continues to expand, the number of lines, mileage and service area of individual cities have all surpassed Hong Kong, in addition to the completion of regional express lines, or “intercity railway” and the upgrade of high-speed rail system in these places. The aforementioned four layers of railway system prompts the improvement of the city's appearance, convenience, and industrial structure. This can be reflected by the success in Berlin:

The biggest feature of the railway transport in Berlin is its multi-level rail transit system, which includes four major types of railways: tram, U-Bahn, S-Bahn and regional railway (or commuter rail). The network is built with the centre of Berlin as the core area, covering other satellite cities within a radius of 50 kilometers.

Trams

The tram is the most original rail system in Berlin. Its long history can be traced back to 1865. In the early 20th century, the tram in Berlin began to be electrified. After the end of World War II in 1945, Berlin was divided into East Berlin and West Berlin by Allied forces. In West Berlin, trams were removed and replaced by buses and other means of transportation. However, due to economic reasons in East Berlin, trams are still the core of urban public transportation. After the reunification of the two Germanys, the tram system in East Berlin has not been dismantled. Instead, the use of new vehicles and the expansion of rights-of-way have greatly improved operational efficiency and service quality. In recent years, more and more tram lines have been extended to the original territory of West Berlin, playing a central role in

urban ground transportation. Most of the trams in Berlin now have been modernized. Low-entrance and long trams are widely used to ease the traffic flow during peak hours and in busy areas.

U-Bahn

U-Bahn is operated by Berliner Verkehrsbetriebe. It now has 10 lines and 173 stations, 139 of which are underground, and the total length of the road network is 146 kilometers. Within Berlin's transportation system, the U-Bahn railway is mainly for short- and medium-distance large-capacity transportation, going between the city centre and nearby destinations. Unlike the Chinese railways, U-Bahn is not for medium and long-distance travel, such as from the suburban satellite city to the city centre.

S-Bahn

S-Bahn is the abbreviation of "Stadtschnellbahn" in German, which means urban rapid railway. It is operated by S-Bahn Berlin GmbH, a subsidiary of Deutsche Bahn. There are currently 15 S-Bahn lines. At present, Berlin's S-Bahn is mainly divided into three types regarding to the route direction: one is the S1, S2, S25 and other lines through the north-south tunnel (the S26 line as a branch of the S2 line is not included); the second is the east-west elevated railway S5, S7, S75, S9 and other lines; the third is S41, S42, S45, S46, S47, S8, S85 and other lines running in circular route . In addition, there is an independent S3 line and other lines. From the map, we can see that the S-Bahn system in Berlin can basically be seen as a loop line plus a main radial line from east to west and north to south, separated in the form of tree branches in the suburbs. The trains would share lines on the main route, which different from the general railway idea of independent operation of each line of the subway, and is very "railway" like.

In Berlin's transportation network, the S-Bahn and U-Bahn railways play part of the same role. Compared to U-bahn, S-Bahn has a larger operating range, speed and capacity, and covers a larger area. Due to the ground operation and railway management system, S-bahn is also more efficient, and is the main body and backbone of urban transportation and suburban transportation.

The RegionalBahnen (RB) and Regional-Express (RE) operated by Deutsche Bahn (DB), namely regional trains and regional express trains, have come to bear the task of commuting passengers between Berlin and satellite cities. The service area of RB and RE trains is very broad, covering the farthest to a radius of 40-50 kilometers, including the major satellite cities of Berlin.

At the moment, Hong Kong lacks regional express routes like RB and RE, which could help stimulate the flow of human capital and synergy with surrounding cities. The main target users of RB and RE trains are office workers living in the satellite cities of the Berlin metropolitan area; people who take RB and RE get on the train near their residence and arrive at the hub station in the urban area of Berlin, and then transfer to U-Bahn or S-Bahn train to the office. RB and RE trains have a large volume and fast transportation speed, but people still need to access other transportation to complete the journey.

Therefore, several major railway stations in Berlin are both railway hubs and urban rail transit hubs. In the Berlin Central Station, the railway lines intersect and the urban rail transit system is

connected, thus the transportation efficiency is very high. In fact, the "commuting passenger flow" borne by RB and RE trains is only part of their transportation tasks, they are also for trips between Berlin and surrounding cities. Besides commuters, RB and RE trains also bear the short- and medium-distance railway passenger. In this way, the capacity of the train is fully utilized.

In addition to RB and RE trains, many passengers will also choose other trains of Deutsche Bahn for commuting. Even ICE high-speed train is one of the choices for commuters. Living in surrounding cities and commuting to Berlin by high-speed rail every day is not uncommon in Berlin. Thinking of China's high-speed rail, a group of commuters traveling across cities by Beijing-Tianjin intercity and Shanghai-Nanjing high-speed rail can be regarded as similar to the situation in Berlin. By referring to the experience of the Mainland and Europe, Hong Kong has fully considered the construction of the regional express line to connect the new towns in different districts, as well as the surrounding cities and industrial areas. As for Guishan Island, it is obvious that there is such a demand and possibility.

(2) Autonomous rail Rapid Transit

Among the existing multi-layer railway systems in Hong Kong, the underground railways, as well as the East Rail and West Rail lines, are relatively more developed. Regional express lines and high-speed rails are the upper layers that need to be developed. Also, the lower layers such as small-capacity and low-speed railways are becoming more mature. Among them, the "Automated Transportation System" (AGT) and the "New Trackless Transportation System" are the most revolutionary:

The new transportation system AGT first appeared in the United States. It was originally a short-distance transportation vehicle. After gradually developing into an urban passenger transportation system, it was called the "passenger transportation system." Later, Japan and France made further technological transformation and development, and made it into a medium volume passenger transportation system in the city.

In the new transportation system, train operation and station management can be unmanned.

It is completely controlled by the computer in the central control room with a high level of automation. The new transportation system has many similarities with conventional rail transportation. The biggest difference is that in addition to running tracks, the new system is also equipped with guiding tracks. Therefore, it is also called automated guideway transit. At present, there are dozens of new transportation system lines with different scales, different uses and different structures all over the world.

There are 10 lines in Japan, 9 of which were built in the 1980s and 1990s. These lines do not carry over 10,000 passengers/hour during the peak period. The Vancouver Skytrain in Canada, is the world's longest unmanned new transportation system, which commenced operation in January 1986. There are 3 lines, 47 stations, 69.6 kilometers in length, and 225,000 passengers per day.

New trackless transportation system

The new trackless transit system is the latest member of the rail transit family, and there is only one of its kind called Autonomous rail Rapid Transit.

This new type of transportation system combines the advantages of modern trams and buses. It seems to be trackless, but in fact they have "tracks." It uses various sensors to identify virtual track lines on the road, and transmits operating signal to the "brain" (central control system) of the train. According to the instructions of the "brain", the train undergoes intelligent operation to perform motions such as traction, braking, and steering, and travels on a predetermined "virtual trajectory" to.

The Autonomous rail Rapid Transit adopts design methods such as multi-axis steering systems, which can intelligently track and control the virtual trajectory, so that the turning radius of the entire train is equivalent to that of ordinary buses, and the channel width is smaller than that of ordinary buses. This minimizes difficulties of turning caused by the super long body. At the same time, the autonomous train uses a dual-head design similar to high-speed rail, eliminating the hassle of turning around. Due to the flexible marshalling mode of high-speed rail, smart rail trains can also adjust capacity according to changes in passenger flow, which can effectively solve the shortcomings of small capacity on ordinary buses and greatly increase traffic efficiency.

The Autonomous rail Rapid Transit is designed to have a maximum speed of 70 kilometers per hour. Since it does not rely on rail to travel, the construction period of a running line only takes one year, and it can be quickly put into use. In addition, this kind of system also have zero emission, pollution-free characteristics, and support multiple power supply methods.

The Autonomous rail Rapid Transit is not only a supplement to passenger rail transportation in first-tier cities, but also as the main passenger transportation in second- and third-tier cities. It is also the transportation of special routes from new districts to new districts, from the centre to tourist areas, and can be fully integrated with the existing public transportation system, to create a three-dimensional transportation network underground, on the ground and in mid-air, and to provide a new solution to the modern urban transportation problems.

(3) Solar energy for waterway transport

As mentioned above, "rail transits" built at all levels can be highly compatible with the "power supply system". In recent years, the technology for passenger and cargo ships driven by solar energy has matured. Guishan Island is located in the centre of the Pearl River Estuary and has a wide sea surface. Whether it is for solar energy collection or for the development of waterways, it undoubtedly has unique advantages. A good waterway network can replace part of the traditional land transportation, prompt "energy-saving and carbon reduction", and also helps to free up ground space, improve pedestrian and vehicle competition, and traffic congestion.

However, the investment in the water and land transportation network in the region is obviously far from being balanced. The 2020 Guangdong Provincial Transportation Work Conference was held in Guangzhou on the 4th. The provincial government announced that it will accelerate the construction of 54 projects with more than 2,700 kilometers including the Shenzhen-Zhongshan Bridge. By the end of this year, the province's highway mileage is expected to exceed 10,000 kilometers. At the same time, Guangdong will focus on building an unimpeded rapid transportation network within and outside the Guangdong-Hong Kong-Macao Greater Bay Area to promote the development of transportation in the Greater Bay Area. In 2020, Guangdong's highway and waterway fixed assets investments has reached 130 billion RMB; of which, the completed investment in highways will reach 90 billion RMB while the port will only be 6.5 billion RMB.

In fact, a 5,000-ton ship is equivalent to the transportation capacity of 100 cars and 100 railway wagons. The energy consumption ratio of water transport, railways, and highways per revenue ton mile is 1:1.8:14; the unit emission ratios of water transport, railways, and highways are 1:1.2:4.8. Through the construction of a comprehensive coastal transportation corridor, the development of "railway-water network", "road-water network", and "Pearl River-open sea" integrated transportation, there will be huge economical benefits to the region. In addition to the water network infrastructure with the passenger terminal as the core, the design, driving and manufacturing technology update of passenger ships, the biggest breakthrough in recent years has been the improvement of the efficiency of lithium batteries and the significant reduction in the production and usage costs of thin film solar cell.

In recent years, as a clean energy source, lithium batteries have become a popular choice in the ship power industry. According to statistics from Clarkson Research in the United Kingdom, as of the end of May last year, the number of electric ships in operation and planned to be built in the world was 155, in which, 75 is in operation and 80 are to be built. China's inland water electric ship technology started later than Europe, but its development is rapid, and it is applied widely to different ship types. Electric ships have now become an important path to achieve energy saving, emission reduction, transformation and upgrading of the shipbuilding industry.

On June 13th last year, the first Electric Ship Innovation and Development Seminar was held in Ningde, Fujian. More than 130 experts and scholars from associations of the industry, shipbuilding companies, scientific research institutes, shipping companies, and universities gathered to discuss "the development status and future trends of electric ships", "key technologies for electric ships and marine batteries" and "standards and regulations for electric ships". Maritime Transport Technology Research Centre of China Waterborne Transport Research Institute, China Institute of Marine Technology and Economy of China State Shipbuilding Corporation, Guangzhou Shipyard International Company Limited, the 712 Research Centre of China Shipbuilding Industry Corporation, Hangzhou Modern Ship Design and Research Co., Ltd.,

Wuhan Institute of China Classification Society and Contemporary Ampere Technology Limited jointly presented for the three topics. The participants analyzed the following issues in detail and proposed solutions:

The scheme of lithium battery power;

Domestic and foreign application and application proportion in ports and terminals have pointed out the main problems of electric ships in terms of economy and technical standards;

Suggestions for promoting the electrification of inland watercraft and the development of the electric ship industry, including strengthening government guidance and policy support;

Prioritize the development of economical hybrid electric propulsion systems to rapidly expand the market scale;

Strengthen shore power construction, explore the establishment of inland river bank power grids, and formulate overall design and optimization standards for electric ships;

safety and protection standards;

Operation management and maintenance standards, etc.

Not only in Hong Kong and surrounding cities, but from East China to South China to Southeast Asian countries, the water network was originally an efficient system for communicating between cities before the Industrial Revolution. Bangkok, the capital of Thailand, is one of the many "Oriental Venice"; the city's canals not only serve as a long-term transportation artery, but also serve as a support for people along the coast to earn a living and live. In recent times, it has been abandoned due to the blockage of rivers and the expansion of the road network. Nowadays, under the impetus of academia, industry and civil society, it has gradually recovered and has become an "ancient way" to solve the traffic congestion problem in Bangkok. However, the so-called "ancient prescriptions" have gradually become new ideas, new technologies, and new thoughts:

On November 11th last year, a modified fully solar-powered boat with a length of about 8 meters, passed through the Damnoen Saduak Floating Market in Bangkok for inter-community transportation. Different from the common hand-operated rowing boats and fuel-powered boats in Thailand, Hanergy New Energy Technology Co., Ltd. has given this boat a brand new function, which is to run by solar power, so that the boat does not need manual paddling, refueling, or post-maintenance. It can run without electricity within a certain mileage, and does not produce rumbling noise and water pollution. The secret behind it lies in the two Hanergy MiaSolé flexible power generation components on the roof.

According to Wang Zhixing, an engineer of Hanergy's Technical Support Department, since the canal of the Bangkok Floating Market is very narrow, the black smoke and noise produced by fuel-powered boats are very problematic. As a touristic country, Thailand is eager to replace fuel-powered boats with electric boats. However, the promotion of electric ship replacement and ship charging will put a lot of pressure on the electric grid. Moreover, it is extremely dangerous to pull multiple wires to charge ships in crowded water. Therefore, ASPP, the world's leading motor research and development company, invited Hanergy to build a fully solar-powered

demonstration ship at the Damnoen Saduak Floating Market. Hanergy built a customized thin-film solar power system, while ASPP provided electric motors and propellers.

This ship is equipped with two Hanergy MiaSolé flexible solar modules. With the day length in Bangkok, the daily power generation is about 3 degrees, which can fulfill the power needed for commuting at the Damnoen Saduak Floating Market. Based on the roof area, up to 3 solar cells can be installed, and the daily power generation is about 5 degrees. After the solar boat was officially launched, it soon won the affirmation of local customers and Thai Prime Minister Prayut Chan-o-cha, who once visited the site to inspect solar boats. He said the modification of fuel-powered boats can improve the regional living environment and the development of tourism.

In Thailand, solar boats are a blue ocean market that has yet to be invested. According to statistics, there are 600 commuter boats in the Damnoen Saduak Floating Market alone, and there are 5,000 to 10,000 commuter boats in the inland river of Thailand. The provision of a variety of thin-film solar components and comprehensive application solutions is Hanergy's technical foundation in sharing this huge potential market. The weight of Hanergy's flexible solar components is only about one-fifth of the weight of traditional solar components. After modification, the roof of the ship can only bear a weight of seven or eight kilograms, considering the stability of the ship.

The same thin-film solar power modules can also be applied to the roof of large-tonnage cruise ships as auxiliary power to meet the power requirements of all household appliances in the ship. Compared with ordinary diesel-powered ships with the same main engine power, the operating cost of solar-powered ships is only 17%, the cabin noise is only about 60 decibels, and there is zero exhaust emission. In recent years, with the development of technology, the cost of thin-film solar cell has dropped significantly, and its cost-effectiveness has gradually become prominent.

7. Construction Schedule

(1) Phased reclamation

As early as before Hong Kong’s handover, especially after World War II, due to the peculiar financial principles and system of the colony, land development in Hong Kong was slow, and the vast land in New Territories, Lantau Island and nearby waters were long regarded as the buffer zone to separate Hong Kong Island and Kowloon from Guangdong Province. The development of new towns in the New Territories and Lantau Island happened in the last few years of the colonial era in the 1970s and 1980s. Therefore, the lack of space for development and the tight living environment have long plagued Hong Kong society.

After the handover and in the end of the 1990s, there have been many financial crises which led to quantitative easing worldwide. This has caused sharp fluctuations in local land prices and property prices, and then a sharp rise. In addition, the land and housing policies of several SAR governments are inconsistent, which deteriorated the reliance on land finances and worsened the accumulated land shortage problems. Right now, there are tens of thousands of subdivided housing tenants, but the number has been rising year after year, which has become the most serious humanitarian problem in the region. It is also increasingly difficult for the middle class and professionals to save the down payment and purchase their own properties.

The problems of development and living condition in Hong Kong are not only old, big, and difficult, but also urgent. Therefore, for the development of Guishan Island to succeed, there are two strategic goals to achieve. First of all, it should be a long-term plan for the development of local and surrounding cities and the synergy between them. The land development, distribution methods and the establishment of industrial parks must be strategically planned with international perspectives. Under this consideration, a clear industrial policy and ambitious development plan are necessary. In addition, the land shortage problem that needs to be solved urgently can be immediately relieved within a few years or even months.

Regarding the second point, we must prioritize different land and housing issues in Hong Kong; at the same time, we have to consider the advantages and limitations of developing Guishan Island in the short term. We believe that in ten years, the surrounding waters of Guishan Island can be reclaimed to create more land, from near to far, small to large, and gradually build three artificial islands within thirty years, so as to fulfill the short, medium and long-term needs of land of the elderly, medical care, logistics, education, cultural, science and technology industries. In the mean time, with the "4, 3, 2, 1 Housing Ladder", 700,000 people are subsidized to live and work in this same district.

There are multiple considerations for building several artificial islands in a phased approach. First, Guishan Island is located at the mouth of the Pearl River, which it is much wider than the internal waters of Hong Kong, Shenzhen and Guangzhou, but it is still an important waterway of the "Pearl River-South China Sea". The formation of islands in a phased approach is conducive to the long-term development of ocean shipping industry. Second, the impact on the local marine ecology, hydrology, coastal and deep-water aquaculture industry would also be significantly reduced. Third, although the land area and economic benefits are important, the coastline also has its strategic role, economic and social value, having multiple islands is useful for the development of various coastal industries and the establishment of waterway transportation. Fourth, the long

coastline is favorable for the construction of a pleasant residence and living environment, thus become a convenient, low-carbon, and almost free public recreation space for people on the island.

Referencing from the experience of the expansion construction of the "Pasir Panjang Terminal" in Singapore, the excavated soil from land construction can be used for reclaiming, partially replacing sea sand. As well as in Tianjin Port and Shanghai Yangshan Port, the soil is obtained by dredging the estuary. Also, Guishan Island is located at the mouth of the Pearl River, and the waters must be thoroughly dredged to ensure smooth navigation. Besides, Fujian, Guangdong, and Guangxi on the southeast coast of mainland China are currently rebuilding the old towns that were built in the 1960s and 70s, a huge amount of construction waste must be processed.

Hong Kong has relevant experience and technology of utilizing construction waste for reclamation after it had undergone strict health and environmental testing. The southeastern provinces have long coastlines and developed water transportation, so transporting construction waste to Guishan Island by ships is very cost-effective and efficient. Through the above methods, the demand for sea sand can be greatly reduced, the cost is effectively controlled, and the development of the recycling industry is also promoted.

In terms of different phases of construction, the first phase of the project (2021-2030) includes the development and construction of existing land on Guishan Island, and the reclamation project along its west coast. The original ten square kilometers of land on the island, plus ten square kilometers of land obtained from reclamation, 20 square kilometers of land will be acquired after the completion of this phase of the project. It can accommodate a population of nearly 200,000, and mainly engages in the elderly, medical and logistics industries.

The second phase of the project (2031-2040) will take place in the eastern waters of Guishan Island, namely Dazhuzhou and Xiaozhuzhou, and reclaim 20 kilometers of land. Education, cultural and creative industries will be core, and the population is expected to exceed 200,000. The third phase of the project (2041-2049 years) is done in the west of Guishan Island, which is Qingzhou, Sanjiao Mountain Island and other places, reclaiming 30 kilometers of land, with the "future city" industries as the main focus and a population of over 300,000.

Together with the existing area of Guishan Island, approximately 70 square kilometers of land will be available after this project is completed, which allows 700,000 people to live and to work in the area. The 70 square kilometers of land of the three islands are initially and equally divided into four major land uses, which are residence, industrial parks, transportation infrastructure, and recreation. The height of buildings gradually descends from the centre of the island to the coastal area. The average "plot ratio" is 6. For a "nuclear family" of 2 to 3 people, the living area would be 600 square feet, that is 200-300 square feet of living area per capita.

According to "Part A·Chapter One·Section 3" of this report, the residences on the island are divided by area rather than number of units: 40% GSH, 30% new HOS, 20% “Starter Homes”, 10% “Private Housing”. Referencing to the prices of subsidized housing on Hong Kong Island, Kowloon, New Territories, and Lantau Island in the past two years, a 600-square-foot GSH on the three artificial islands would be at HK\$3 million; new HOS of the same size is about HK\$4.5 million and Starter Homes is HK\$6 million, in terms of the local currency value in 2020.

Based on the above calculation, the Guishan Island reclamation plan will focus on industrial zones and a diversified economy, and increase the ratio of "economic land: land for living" to 1:1. At the same time, by reclaiming land and allocating in a reasonable manner, the per capita living

area will be increased by 25-85% compared to the current situation in Hong Kong. On the basis of the "4, 3, 2, 1 housing ladder", a substantial improvement in living space does not mean an increase in mortgage stress. All of this is to allow the Hong Kong government to gradually eliminate "land finance" and develop "industrial parks" to obtain tax and support social welfare. The key ideas above are summarized as follows:

Phase One 2021-2030: the existing land of Guishan Island and reclamation along its west coast

Housing target: 80,000

32,000 GSH, 24,000 new HOS, 16,000 Starter Homes, 8,000 Private Housing

| Industrial Zone | Strategic Function | Infrastructure |
|-------------------------------------|---|---|
| 1. Medium-density elderly community | Fulfill the demands of elderly homes | Expand the container terminal in Guishan Island |
| 2. Compact correctional facility | Vacate a large amount of land in developed area | “Guishan Island – Lantau Island” Bridge |
| 3. Smart logistics zone | Vacate a large amount of land in developed area | Cargo airport, terminals and railways |

Phase Two 2031-2040: reclamation in Dazhuzhou & Xiaozhuzhou

Housing target: 80,000

32,000 GSH, 24,000 new HOS, 16,000 Starter Homes, 8,000 Private Housing

| Industrial Zone | Strategic Function | Infrastructure |
|-----------------------------------|--|--|
| 4. Education industry | Industrial upgrading Diversified employment | Bridge to Guishan Island Passenger and freight terminal |
| 5. Cultural and creative industry | Industrial upgrading Diversified employment | Bridge to Guishan Island Passenger and freight terminal |

Phase Three 2041-2049: Reclamation near Qingzhou and Sanjiaoshan Island

Housing target: 80,000

32,000 GSH, 24,000 new HOS, 16,000 Starter Homes, 8,000 Private Housing

| Industrial Zone | Strategic Function | Infrastructure |
|-------------------------------|--|--|
| 1. Energy technology industry | Industrial upgrading Diversified employment | Bridge to Guishan Island Passenger and freight terminal |
| 2. Green building industry | Industrial upgrading Diversified employment | Bridge to Guishan Island Passenger and freight terminal |
| 3. Smart home industry | Industrial upgrading Diversified employment | Bridge to Guishan Island Passenger and freight terminal |

The blueprints of the second and third phases of reclamation plans have been briefly introduced in "Part B" of this report, so it will not be repeated here. Following is the key ideas of the first phase development plan.

(2) Immediate development of elderly communities

Elder care in Hong Kong is one of the most urgent issues that the society needs to tackle. The development of Guishan Island has an immediate effect in related fields. Guishan Island has very flat landscape, and is close to the land in the southwest corner of Lantau Island, which is suitable for the development of an elderly community with a complete industrial chain. As mentioned above, by using the MiC technique, tens of thousands of elderly units can be built within the year. The island will be gradually equipped with specialist clinics, senior technology research and development centre. Combining the existing land on the island to the new land obtained from reclamation, there will be an area of ten square kilometers for building elderly communities. This is sufficient to meet the long-term needs of the elderly society for elderly care and medical care service.

Since the elderly and workers of that industry do not need to commute frequently to the city, the elderly communities can be constructed simultaneously with the “Guishan Island-Southwest Lantau” bridge. The existing terminal facilities on Guishan Island can be gradually improved, with high-speed passenger and freight ships going back and forth Hong Kong, Kowloon, Lantau Island, west of New Territories and surrounding cities, the daily needs of the people on the island can be fulfilled. The rough estimation of the commuting time between Tung Chung, Tuen Mun, or Tsuen Wan and Guishan Island is within half an hour, and it takes up to 45 minutes to go to Tsim Sha Tsui, Central and North Point from Guishan Island.

The ten-square-kilometer elderly community on Guishan Island can accommodate hundreds of thousands of elderly and related personnel, even if half of the land is reserved for green belts and marine parks. Not only does it serve a large population, it can also be put into service in a short time. Since land leveling does not take much time, it is expected that the first batch of residents can move in between 2021 and 2022. Thereafter, the elderly communities will be expanded through the use of new land obtained from reclamation.

The first phase of the project also includes the construction of the connecting bridge from the northeast corner of Guishan Island to the southwest of Lantau Island. The bridge is about five kilometers long and is a “road-rail” dual-use bridge. The connecting bridge leads to Lantau, then to coastal road or through mountain tunnel, and can connect to Tai O.

Currently, Tai O is only connected to the “South Lantau Road”, which is weakly connected to the North Lantau transportation system. It is complicated and time-consuming travelling to and from Tung Chung and urban area. We suggest the road and railway system of Tung Chung to be extended westward to Tai O, such that a ring road network can be formed in the east, west, south and north of Lantau, that also allows the traffic and people flow of Guishan Island to go north through the “Tung Chung Transport Hub”.

Hong Kong has long been the city with the smallest living area per capita in the world, along with the worsening economic inequality, and an outdated retirement system, the problem of “elderly poverty” is created. The superposition of the above shortcomings in social welfare has caused a serious shortage of annual quotas, nursing services, and living space in elderly homes. Under the epidemic, the lack of space in elderly in Hong Kong has directly threatened the health and safety of residents and employees.

Due to the lack of long-term public finance and land development planning, elderly homes in Hong Kong are now facing three major problems: 1. Subsidized living places and services are acutely insufficient, which prolongs the waiting time and limits the amount of people who can benefit from it. 2. Most of the frail elders are unable to live at home because they do not receive appropriate care services; due to their meager income and limited savings, the elders who cannot

be arranged to live in subsidized elderly homes have to live in cheap nursing homes that their CSSA can afford, and the living space is much smaller than their original residence. 3. Due to the lack of funding, the service quality and safety of many private nursing homes are unable to fully meet the standards and lead to other humanitarian problems.

According to a document submitted by the Labour and Welfare Bureau to the Special Finance Committee of the Legislative Council, as of the end of December 2018, there were only 23,485 subsidized elderly care places in Hong Kong, an increase of only 25 compared to 2017. However, there were 13,598 new applications for subsidized care-and-attention places in 2018, with a waiting list of 33,385 people, an increase of 2,027 people, which is 6.5%, over the previous year.

The average waiting time for subsidized care-and-attention places in 2018 was 22 months, which was an improvement over the 24 months in 2017. The waiting time for subsidized and contract residential care homes in 2018 was 38 months, and for private residential care homes participating in the "Enhanced Bought Place Scheme" is 10 months. The waiting time for residential care services is close to 2 years, and some elderly people passed away before they can get the service. According to the Labour and Welfare Bureau, as of the end of December last year, there were 4,940 elders who had passed away while waiting for subsidized care and attention places, and 6,611 in 2017-18, an increase of 9.7% from 6,027 in 2016-17.

Undoubtedly, there is a chronic shortage of subsidized residential care places. Even if they are willing to participate in the "Enhanced Bought Place Program," the private elderly homes they get may not meet their expectations. Regrettably, the dormitories of individual private residential care homes are actually narrower than the prison cell, which have only about 3 square meters per person, far below the 6.5 square meters required by law. As a result, it is difficult to get in and out of a wheelchair, and residents cannot move around in the dormitory. It is also difficult for employees to provide support, which brings safety hazards and affects the physical and mental health of the elderly. The major reason is that the cost of building private elderly care homes is much lower than that of public elderly care homes.

As stated in "Part B·Chapter Three·Section 2" of this report, even though most elderly want to live at home, but since there is a chronic shortage of community care services, frail elders have to live in nursing homes. Right now, one third of the residents in nursing homes live in subsidized institutions and two thirds live in private institutions. For the former, the government directly subsidizes voluntary agencies or charity groups to provide related services and facilities; but for the latter, most of the expenses are paid through the CSSA system, which is also indirectly borne by the public finances. Most of the elderly or their family members can only afford less than 20% of the fees charged by private homes; therefore, the price level of private nursing homes in Hong Kong is actually linked to CSSA payments. Although the amount of CSSA has increased every year over the past 20 years, the current amount is only between \$5,570 and \$7,985 per elderly. Taking into account the high rents and manpower shortage in Hong Kong, this amount of money is nowhere near to be enough to afford the accommodation and nursing service for the elderly.

Besides, the CSSA payments is much lower than the operating and service costs of subsidized care and attention homes, which is about \$15,000 per place. As early as 2014, the Audit Commission pointed out the staffing ratio of subsidized and private care and attention homes per 100 residents were 40.2 and 16.3, and the per capita area was 17.5 and 7.5 square meters respectively. Insufficient area and high rent have caused many private nursing homes to over-sell places and shortage of manpower.

From a legal point of view, the Hong Kong Government can certainly regulate public and private elderly homes with the "Homes for the Elderly Ordinance." The Social Welfare Department has the right to inspect the nursing homes and urge them to meet the licensing requirements, such as the manpower ratio and the residential environment, etc. However, for a long time, the Hong Kong Administration has often issued warnings and reminders to the elderly homes that do not meet the standards. In recent years, more than 3,000 advisory and warning letters have been issued each year.

According to official statistics for the last three years at the end of December 2016, only 15 cases were convicted. The government has not strictly enforced the law, due to the concern of causing a large amount of elderly homes to close down. However, consistently allowing the quality of many private nursing homes to be mediocre will only impair the deterrent of regulatory laws, thus further worsen the unsafe conditions. Needless to say, in the past ten years, the local media has repeatedly exposed the inhumane treatment and lack of basic respect for the elderly in residential institutions, which has long sounded the alarm.

The SWD set up a "Working Group to Review of Ordinances the Code of Practice for Residential Care Homes" in June 2017 to improve the inspection and follow-up system and strengthen the supervision and enforcement of institutions. As of April last year, the group recommended that the per capita area of high-care homes and homes for the disabled should be increased from the current 6.5 square meters to 9.5 square meters. However, the per capita area of low- and moderate-care homes has only increased to 8 square meters. After the amendment takes effect, there will be an 8-year transition period.

Cheung Chiu-hung, who is also a member of this group, a registered social worker and a teacher of related subjects at the university, predicted that the Legislative Council will not be able to review the amendment until October this year, which means the per capita area won't be fully increased

until 2028 at the earliest. Area per capita. The group also proposed to increase the manpower of the elderly homes, from one caregiver to 60 people to one to 40 people. They also suggest stipulating that all elderly homes must have nurses on duty for 8 hours. Nurses can be counted as one of the staff member, if there are no other care workers in the institution.

Cheung Chiu-hung and Shiu Ka-chun, a legislative councilor of social welfare constituency, issued a “non-government scheme”; they suggested that the per capita area of new residential homes should reach 16 square meters, while the existing residential homes should be upgraded to at least 9.5 square meters within ten years. They also suggested increasing the nursing manpower and including care workers for rehabilitation and social interaction in the contract or subsidized elderly homes. A number of new occupations including physical therapist, clinical psychologist, occupational therapist, pharmacist, nutritionist and social worker are also within their suggestion of manpower.

In any case, Hong Kong has already become an "aged society". As the population ages, the government's social welfare expenditure increases, but the per capita benefit is far from being ideal. According to "Part B·Chapter Three·Section 2" of this report, due to the lack of land investment and community construction policies for the elderly, social welfare improvement is ineffective. The Hong Kong government, general public and enterprises must regard elderly affairs as a new industry driven by new demands, rather than a public financial burden. From this perspective, timely adjustments in land investment, social welfare and fiscal policies will constitute the foundation of an "all-round" elderly community.

On the contrary, Norway, which has a population similar to Hong Kong, has an elderly care system regarded as a role model. Similar to Hong Kong, Norway also faces the challenge of aged society, with an even higher price level, but they have established sovereign funds, good urban planning and housing distribution systems in advance, their elderly care system is now complete, sustainable, institutionalized and humane. Their system ensures that the elderly in need can be accommodated in nursing homes, and also focuses on improving the homes of the elderly, such as installing handrails and providing day care services, so that the elderly can enjoy their lives at home.

In order to ensure the quality of life at home for the elderly, the Norwegian government subsidizes the elderly to purchase technology products and smart home devices such as mattress sensors, which can automatically turn on the room lights when the user wakes up; if the user leaves the bed for too long at night, the smart device will automatically send out warning messages, or even call their relatives, nurses or the police. These smart homes specially designed for the elderly can also interrupt the electricity of household appliances such as stoves and kettles regularly. When patients with dementia are wandering outside, the electronic doors and windows will also sound silent alarms, such assistance arrives in time.

Norway launched a national assistance plan for Alzheimer's patients as early as 2007. The plan is divided into three parts: 1. Provide patients with daily activities to stimulate their brains; 2. Provide patients with suitable housings; 3. Educate the public about the disease. In addition, because multi-storey buildings and tunnel-like corridors can easily disorient patients or cause psychological pressure, the government provides subsidies and low-interest loans to renovate buildings. Between 1997 and 2005, they invested US\$660 million (approximately HK\$51 billion). In these ten years, the appropriation is tens of billions of Hong Kong dollars.

In addition, the government subsidizes sheltered housings exclusively for dementia patients to allow them to live in groups. The original concept is borrowed from Sweden. There are up to 12 people in one house, and one person per room like ordinary apartments, with everything they need and professional caregivers on standby at all time. Poor elderly who pass the asset review can even live there for free. The related expenses are huge, which comes from the "sovereign funds" described in "Part A·Chapter·Section 2" of this report.

Norway reorganized its oil fund into a government pension fund in 2006. They use the foreign exchange surplus of the oil and gas industry, including the generous taxation of oil companies, to support social welfare. All elders over the age of 65 can receive government pensions, at least to ensure that the elders are financially safe in Norway, where everything is expensive. The annual income of Norwegian government is not as abundant as that of Hong Kong government, but they can still properly handle social welfare, expenditure, manpower and technical challenges brought about by the aged society.

One of the key reasons is that the government puts the profit from long-term investment back to the pension fund. Secondly, they enable most elderly people to live in their homes through the provision of professional nursing and medical services. Aiming at the problems of poverty and insufficient self-care ability, they guarantee to provide high-quality homes to maintain their living standard and health condition. In short, Hong Kong government should not only take reference from a single system, service, facility or technology from Norway, but learn to develop a comprehensive thinking and vision on the elderly care industry and its humanitarian aspects.

All of the above are premised on sufficient land supply, elder technology tailored to local conditions, and people-oriented planning. In the first phase of the Guishan Island project, a large-scale elderly community will be built instead of a private nursing home. It will be accompanied by a geriatric clinic and a specialist medical school to fulfill the urgent needs of Hong Kong society. At the same time, it will also become a role model for the Greater Bay Area and even the Indo-Pacific region of coping with the aging population. In the future, elderly care technology and services will become an industry that can be exported to other places.

(3) Facility relocation and urban renewal

This section focuses on the analysis of the relocation and centralized operation of correctional facilities in Hong Kong. Regarding the southward movement of the Kwai Tsing Container Terminal to Guishan Island, please refer to "Part 2·Chapter 4" of this report.

While building elderly communities on the existing land of Guishan Island and building a dual-use "road-rail" bridge to connect to southwestern Lantau, large-scale "non-civilian facilities" in Hong Kong, Kowloon, the New Territories, and Lantau will also be relocated on the island. As a result, those facilities that are currently distributed throughout Hong Kong can be systematically integrated to increase the efficiency and convenience. Secondly, the land in the developed areas can be vacated and repurposed for residential, industrial, commercial, and public service use; the overcrowded living environment and insufficient developmental space in those areas can be alleviated.

In addition to building an "elderly community" as soon as possible, the government can also develop Guishan Island, and make good use of the existing 10 square kilometers of land, and release a large amount of developed land in Hong Kong Island, Kowloon, and New Territories. We advocate that correctional facilities and the Kwai Tsing Container Terminal should be relocated on Guishan Island. After the container terminal was relocated on the existing land on Guishan Island, nearly three-square-kilometer precious space in Kwai Tsing can be vacated, and used for other purposes. Furthermore, the development of the Guangdong-Hong Kong-Macao "smart logistics" industrial zone can become "shipping-aviation" hub for the entire "South China-South China Sea". As mentioned above, the land reclamation along the west bank of Guishan Island can be used as a land reserve for the construction of a "cargo airport" and "railway system." The reclamation and expansion of Guishan Island will consolidate the strategic role of local enterprises and talents in the logistics industry in the region; at the same time, it will also become a powerful carrier for the high-growth business of "smart logistics".

The "prison clusters" under the jurisdiction of the Correctional Services Department will be gradually moving from the urban area to the island in ten years' time, starting with correctional facilities and drug rehabilitation centres, from minimum-security to medium security, then to maximum-security prisons. Except for a small part of the old prison facilities, most of them will be demolished and converted into public and private housing. At present, there are 29 correctional facilities in Hong Kong, including correctional institutions, halfway houses and detention wards in public hospitals. There are 6 maximum-security correctional institutions, 4 medium-security correctional institutions, 14 minimum-security correctional institutions, 4 rehabilitation centres, 3 halfway houses, and 2 detention wards. The Director of Correctional Services Ng Ching-kuo once pointed out that the Hong Kong government may consider building a Super Prison Cluster to bring most prisons and prisoners together to facilitate management. As early as 20 years ago, the

Correctional Services Department also provided documents to the Legislative Council, stating that grouping related institutions has several advantages:

- (a) To cope with the current population in custody and future changes, the construction of a new integrated prison can provide adequate correctional places, thereby alleviating the current overcrowding problem and preparing for the projected increase in population. In addition, space can also be reserved, which can be more convenient and flexible once development is implemented.**
- (b) Improving prison management and strengthening security can improve and streamline prison operations, and solve the current management deficiencies and difficulties of certain institutions. For example, the construction of fully equipped prison cells can reduce the need for prisoners to move around in prison, thus heightening supervision and control and improving the use of manpower resources.**
- (c) Improving the quality of prison facilities and systems used in correctional institutions, such as fire-service installations, energy-saving system and security systems, which have been outdated or has reached the end of its service life. The construction of comprehensive prisons can improve the standards of these facilities, while introducing advanced technology into the prison management structure. Besides, the expenditure on construction and maintenance of facilities for integrated prisons will be less than that of existing institutions.**
- (d) Advanced equipment can be introduced to the integrated prison for prisoners’ educational use and vocational training. The Correctional Services Department and NGOs can also implement various rehabilitation programs more effectively.**
- (e) A comprehensive prison can concentrate manpower to perform on-call and standby duties, thus not only improving emergency arrangements, but also reducing the number of staff required and related allowances. In addition, in the event of an emergency, the management team can mobilize manpower more flexibly and shorten the time required for response.**
- (f) By grouping all correctional institutions in one place, supporting facilities such as security, emergency response, escort, transportation, rehabilitation services, visitor reception, hospitals, kitchens, and laundry can be merged and shared by all institutions.**
- (g) The above-mentioned advantages have resulted in long-term savings in large amounts of recurrent expenditures in terms of operation and manpower.**
- (i) The public benefit from more advanced prison management and facilities, more effective rehabilitation programs, and greater protection of public safety. In addition, relocation of existing correctional institutions also benefits some communities that are currently adjacent to these institutions.**
- (j) Freeing up land for other development uses. The land currently occupied by correctional institutions (about 50 hectares on Hong Kong Island and Kowloon City,**

85 hectares in the New Territories, 60 hectares of which are located on islands) will be freed up for other uses.

Although the construction of "prison clusters" has many advantages, the above report also pointed out various difficulties in the implementation of developed areas:

(a) It is estimated that about 120 hectares of land will be required for the construction of a comprehensive prison. It is not easy to find a place that has sufficient area, cost-effective, and convenient for visits and prison management, and acceptable to the public. Furthermore, the site selection period may involve issues such as land resumption, relocation of cemeteries, and environmental protection. It is not easy to solve these problems and to satisfy the local people and even the entire Hong Kong people.

(b) A large amount of capital investment is needed to build a comprehensive prison, and to concentrate all the correctional institutions in one place. In addition to the high cost, it also involves land resumption, land leveling and construction of infrastructure and other public facilities. The scale of the project will depend on the site selection.

(c) The time cost is huge; its planning, design and construction can take up to ten years. The improvement works of some of the existing dilapidated institutions may have to be put aside during the period, and the prison will continue to be overcrowded.

(d) Residents near the integrated prison may not accept the plan. The general public may be skeptical about the idea of keeping all prisoners in one place because of security or other considerations.

(e) Even though the institutions in the integrated prison operate independently, if a group of prisoners violate rules or riots happen, the situation may spread more easily. Besides, the integrated prison is also more likely to become the target of malicious attacks. In addition, in an event of a serious accident such as a fire, it is more difficult to implement a contingency plan for the evacuation of prisoners. Therefore, in order to cope with such accidents, careful consideration must be given to the design of prisons and the formulation of emergency measures.

Compared with the developed areas, or the wasteland and umber in the New Territories and Lantau Island, the technical, financial and social challenges of building a "prison cluster" on Guishan Island are significantly less. Its biggest advantage is that it does not have the problem of land shortage, so that a more comprehensive and long-term planning can be made, and can reserve room for expansion and transformation for future development; This will create a more advanced, safer, and more cost-effective correctional system for Hong Kong, thus benefiting the society.