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Research Centre for Sustainable Hong Kong¹

Policy Paper 21

The Policy Framework to achieve emission reduction targets ²

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Focus of this article

- Hong Kong's annual per capita emissions in year 2020 is 4.5 tCO₂-e (ton equivalent), which is lower than Singapore's by more than 50%. To achieve the government's target of reducing Hong Kong's carbon emissions by 50% before 2035 as compared to the 2014 level (per capita 3.0 tCO₂-e), the current emission reduction policies must be reviewed.
- Emission reduction policies can be classified into 'push factors' and 'pull factors', with six major policy tools: **regulatory reform, market control, commercialisation mechanism, financial/fiscal mechanism, direct investment and governance mechanism.**
- Compared to Singapore's, Hong Kong's emission reduction policies in the areas of 'market control' and 'commercialisation mechanism' can be strengthened.
- Using the six policy tools as an analytical framework, Hong Kong should increase **the renewable fuel mix for electricity generation** and phase out **fuel vehicles more promptly** to achieve the 2050 carbon neutrality goal.

¹ Established in June 2017 by a cross-disciplinary research team, the Research Centre for Sustainable Hong Kong (CSHK) is an Applied Strategic Development Centre of City University of Hong Kong (CityU). CSHK conducts impactful applied research with the mission to facilitate and enhance collaborations among the academic, industrial, and professional service sectors, the community, and the government for sustainable development in Hong Kong and the Region. Linda Chelan Li, Professor of the Department of Policy and International Affairs at CityU, is Centre Director. This policy paper is the first chapter of the centre's Hong Kong Emission Reduction Policy Research Series. For comments on this policy paper, please send email to sushkhub@cityu.edu.hk.

² This policy paper is developed from the academic paper of Yunhong Liu, Liang Dong and Meng Fang: Liu, Y., Dong, L., & Fang, M. M. (2023). Advancing 'Net Zero Competition' in Asia-Pacific under a dynamic era: A comparative study on the carbon neutrality policy toolkit in Japan, Singapore and Hong Kong. *Global Public Policy and Governance*, 1-29. <https://doi.org/10.1007/s43508-023-00065-2>

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1. Introduction

Achieving carbon neutrality by 2050 is a common objective for nations in the world. To achieve this, the Hong Kong government published the ‘Hong Kong Climate Action Blueprint 2050’ in 2021. Outlining four major strategies and measures to reduce carbon emissions, namely ‘net-zero electricity generation’, ‘energy-saving and green buildings’, ‘green transport’ and ‘waste reduction’, the government aimed at reducing Hong Kong’s carbon emissions by 50% before 2035 as compared to the 2014 level.

Compared with Singapore, Hong Kong has performed well in reducing emissions, and it is being more aggressive in achieving carbon neutrality. Due to the different economic structure, Singapore’s high energy-consuming secondary industry accounts for nearly 30% of its GDP, and produced far more emission than the tertiary industry of Hong Kong, which accounts for 94% of Hong Kong’s total economic output. However, if Hong Kong intends to achieve the carbon emission level of 3.0 tCO₂-e per capita by 2035, we shall need to further reduce carbon emission by one-third as compared to the 2020 level (Table 1).

Formulating effective emission reduction policies requires the use of **push factor** and **pull factor policies**. ‘The push factor’ policies aim at encouraging society to abandon the use of high-emission technology and energy by increasing the cost of such technology and energy. By contrast, the pull factor policies focus on enticing the society to use more low-carbon technologies and energy by reducing the cost of such technology and energy. This policy paper compares the emission reduction policies in Singapore and Hong Kong, outlines the different areas of emphasis for the two city’s respective emission reduction strategies and recommends some directions to enhance the effectiveness of Hong Kong’s emission reduction policies.

Table 1. Emission Targets for Singapore and Hong Kong

	Hong Kong	Singapore
Recent emission level	4.5 per capita tCO ₂ -e (Year 2020)	9.0 per capita tCO ₂ -e (Year 2019)
Carbon peak year	Year 2014 (6.2 per capita tCO ₂ -e)	Year 2030
Carbon neutral year	Year 2050	Mid-21 st century
Medium-term target for per capita emissions	3.0 tCO ₂ -e (Year 2035)	---
Distribution of carbon emission	Power Generation (60%) Transportation (20%) Industrial Production (5%) Waste (9%) Construction (6%)	Power generation (39%) Transportation (14%) Industrial Production (45%) Waste (1%) Construction (1%)

Source: Legislative Council Research Group, Legislative Council of the Hong Kong Special Administrative Region of the People's Republic of China

2. Six emission reduction policy tools

Based on the push and pull factors, we have deduced six emission reduction policy tools as below:

Table 2. Six Policy Tools for Emission Reduction⁴

Push and pull factors	Emission reduction policies
Push Factors	1. Regulatory reform
	2. Market control
Pull Factors	3. Commercialisation mechanism
	4. Financial/fiscal mechanisms
	5. Direct investment
	6. Governance mechanism

‘Regulatory reform’ and **‘Market control’** measures adopt the pricing method of the social cost of carbon emissions. They price in the emission fee and increase the total cost for high-emission technologies and energy.

- Regulatory reform focuses on the influence from the government, such as raising the price of fossil fuels through administrative means.
- Market control focuses on establishing trading mechanisms, such as establishing carbon emission trading systems and imposing carbon taxes to induce compliance from the market.

‘Commercialisation mechanism’, **‘financial/fiscal mechanism’**, **‘direct investment’** and **‘governance mechanism’**

- Commercialisation mechanism promotes the use of brand new low-carbon technologies through commercial means and market mechanisms, such as providing financial guarantees for investors.
- Financial/fiscal mechanism refers to policies that ensure higher profits or lower operating costs in low-carbon technologies for investors. such as direct or indirect subsidies (e.g. feed-in tariffs) or loans with below-market interest rates.
- Direct investment refers to government funding to specific projects or companies to support the development of low / net-carbon energy technologies.
- Governance mechanism refers to guidelines that evaluate the operations of a company (e.g. environmental, social and governance (ESG) standards), it helps investors to identify whether the company can achieve the carbon reduction targets.

⁴ The classification of the six policy instruments refers to Peñasco, C., Anadón, LD, & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of 10 types of decarbonisation policy instruments. *Climate Change*, 11(3), 257–265.

3. Comparison of the emission reduction policies for Singapore and Hong Kong

We further break down the 6 policy tool kits into 31 sub-items, and highlight the differences of the emission reduction policy compositions between Hong Kong and Singapore (Table 3). We note two major differences:

- For market control policy tools, Hong Kong lags behind in the development of ‘**carbon tax/energy tax**’ and the ‘**carbon emission trading right**’ mechanism.
- For commercialization mechanism policy tools, Hong Kong does not have ‘**technical standardisation**’ and ‘**risk hedging investment**’ tools.

Table 3. Emission Reduction Policy Tools in Hong Kong and Singapore

Policy Classification		Hong Kong	Singapore
(1) Regulatory reform	Debt Scheme/ Quota	0 ⁵	0
	Renewable Portfolio Standard/Renewable Energy Obligation (Generation Generation)		
	Renewable fuel standards or blending obligations (end users)	0	0
	Deregulation of energy projects (e.g. small projects)	✓	✓
	Tariff/Grid Regulation	0	0
	Standard		
	Pollution and Waste Control	✓	✓
Pollution and Waste Recycling	✓	✓	
Energy Efficiency Limits	✓	✓	
Corporate Information Disclosure	✓	0	
(2) Market control	Carbon Price and Carbon Trading	0	✓
	Carbon Tax / Energy Tax	0	0
	Carbon emissions right trading	0	0
Tradable Green Certificate	✓	✓	
(3) Commercialisation mechanism	Technical standardisation	0	✓
	Risk hedging investment (e.g. Insurance, Loan Guarantees, Green Equity, Power Purchase Agreements (PPAs))	0	✓
	Transnational cooperation	✓	✓
	Business incubation	✓	✓
(4) Financial/fiscal mechanism	Tax incentives/reductions (e.g. acquisition tax, value-added tax, corporate income tax and accelerated depreciation)	✓	0
	Tax plan		
	R&D tax incentives (for R&D research investment)	0	0
	Tax Credits (Production Tax Credit (PTC), Investment Tax Credit (ITC))	0	0
	Financial plan		
Green bond	✓	✓	
Green fund	✓	✓	

⁵ ‘0’ = The policy tool is not applied here. ‘✓✓’ = The policy tool is applied here.

	Green loan	0	0
Subsidy programme	Subsidies (for storage infrastructure, restructuring)	✓	✓
	Control subsidy	✓	0
	Bidding and Auction	0	✓
	Feed-in Tariffs (FiTs)	✓	0
(5) Direct investment	Government Procurement	✓	✓
	R&D funding	✓	✓
(6) Governance mechanism	ESG	✓	✓
	Corporate Social Responsibility	✓	✓
	Electronic Measuring Tool	0	✓
	Green taxonomy	✓	✓

Source: Liu, Y., Dong, L., & Fang, M.M. (2023). Advancing ‘Net Zero Competition’ in Asia-Pacific under a dynamic era: A comparative study on the carbon neutrality policy toolkit in Japan, Singapore and Hong Kong. *Global Public Policy and Governance*, 1–29

3.1 Market Control Policy Tool: Sluggish development for Carbon Tax/Energy Tax

Carbon tax/energy tax is a market control mechanism that aims at pressurizing companies and individuals to reduce their carbon footprint by introducing a hefty price tag. A study on Japan’s long-term economic data indicates carbon tax would have a minimal impact on the country’s economy, it also allows an effective allocation of tax revenue towards green energy technology subsidies effectively while reducing other taxes at the same time.

Singapore has started charging carbon tax at USD 11 per ton of carbon dioxide (approximately HKD 86) in 2019. The tax will progressively increase to the target price of USD 29 per ton of carbon dioxide by 2030 (about HKD 227). However, Hong Kong has yet to implement carbon tax, as the city mainly relies on imported coal and natural gas for energy production, imposing carbon tax may harm the stability and cost of energy supply in Hong Kong.

3.2 Commercialisation Mechanism: Lack of Technical Standardisation infrastructure and Risk Hedging Investment Tools

Technical standardisation is a commercialisation mechanism that ensures technical collaboration across regions and organisations. Risk hedging investment is a risk offset strategy for multi-national green investments. Considering the confined territorial areas for Singapore and Hong Kong, the mutual recognition of international carbon credit certificates and cross-border circulation of carbon trading, Hong Kong could use financial, technical and marketing support as incentives to attract local enterprises to participate in global renewable energy projects.

Singapore is the market leader in solar photovoltaics, the city actively promotes international cooperation and technology transfer of renewable energy projects. On the contrary, Hong Kong encourages cross-border collaboration on carbon-neutral technologies but has yet to introduce any concrete measures to facilitate such policy.

In terms of renewable fuel for electricity generation, Hong Kong lags behind Singapore and the world significantly (refer to Table 4), 23% of Hong Kong’s fuel for electricity comes from coal in 2020 (1% in Singapore). Without CLP Power Hong Kong’s purchase of 10 billion kilowatts of electricity from Daya Bay Nuclear Power Plant annually, coal will take up more than 30% of Hong Kong’s total fuel mix of electricity.

Table 4. Fuel mix of Electricity Generation in 2020

	Hong Kong	Singapore	Worldwide
Coal	23%	1%	35%
Fuel oil	--	--	3%
Natural gas	48%	96%	23%
Nuclear energy	28%	--	10%
Renewable energy	<1%	3%	29%

Source: Legislative Council Research Group, Legislative Council, the Hong Kong Special Administrative Region

Without additional ‘social negative cost’, ‘subsidy programmes’, electric vehicles (EVs) won’t be able to compete with fueled vehicles (apart from the ability to fast-charge), and citizens won’t be motivated to purchase EVs. In 2022, Transport Department’s research shows that only 4,570 out of 570,000 registered private vehicles are EVs (less than 10% of all registered private vehicles), vehicles also accounted for 20% of the total carbon emissions in Hong Kong.

4. Summary

This paper examines the differences of carbon reduction policies between Hong Kong and Singapore, and recommend a few directions to improve Hong Kong’s emission reduction measures. There is no one-stop policy solution as each policy has its advantages and limitations, so we shall need to implement a variety of measures to achieve carbon neutrality. In the next paper (Policy Paper No. 22), we shall discuss Hong Kong’s energy policy to illustrate how the six policy tools can enhance the overall effectiveness of carbon reduction policies.