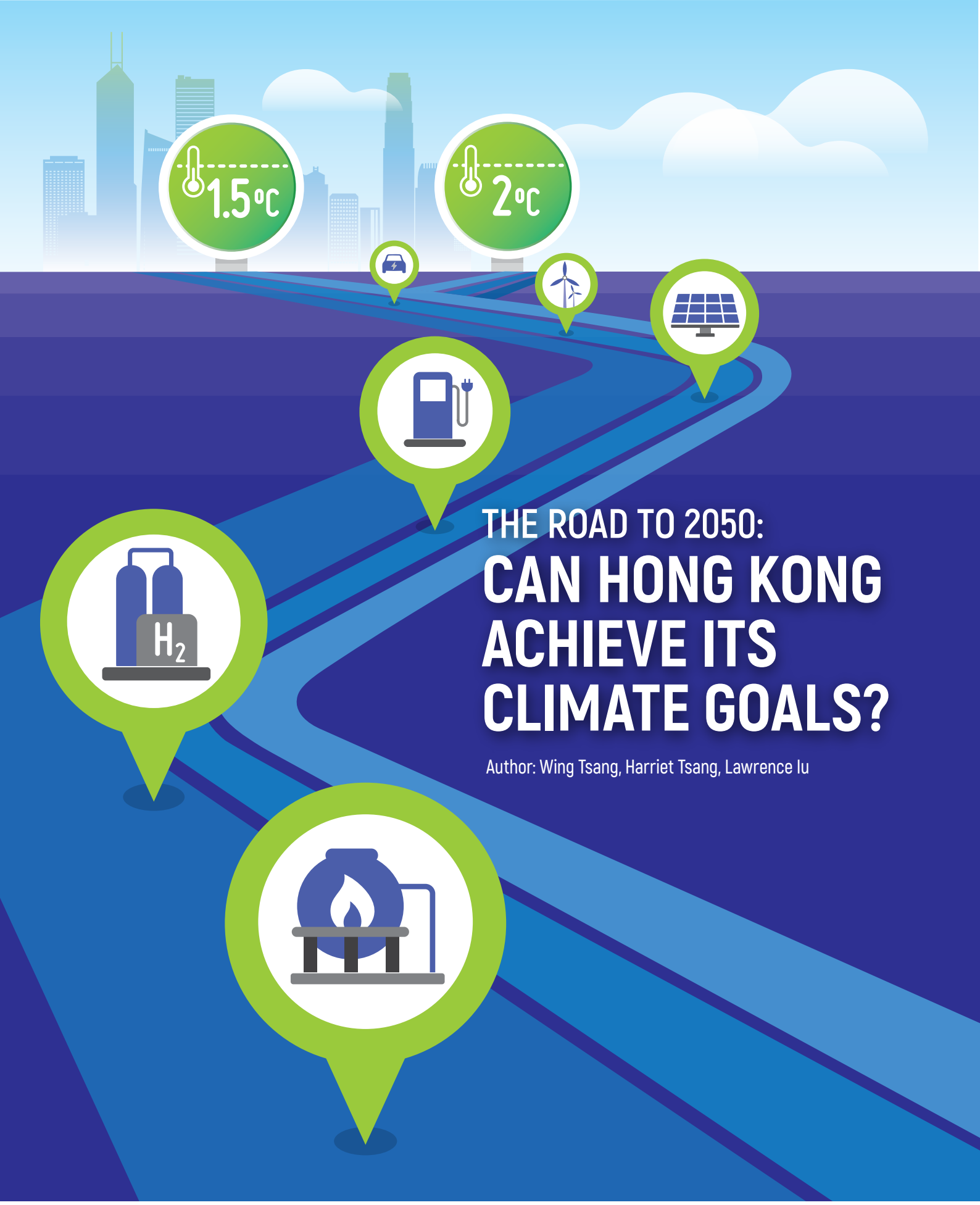

THE ROAD TO 2050: CAN HONG KONG ACHIEVE ITS CLIMATE GOALS?

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思匯 CIVIC EXCHANGE

HONG KONG 2050 IS NOW

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EXECUTIVE SUMMARY:

CAN HONG KONG ACHIEVE ITS CLIMATE GOALS?

Hong Kong is a densely populated global financial services centre that has made significant progress towards carbon neutrality. However, four years after the publication of Hong Kong's Climate Action Plan 2050 (CAP2050), the question whether its policies are sufficiently aligned with the Paris Agreement's goals of keeping *"the increase in the global average temperature to well below 2°C above pre-industrial levels"* and pursue efforts *"to limit the temperature increase to 1.5°C above pre-industrial levels[1]"* still remain.

This report examines Hong Kong's climate actions and whether current strategies can close the 1.5°C or 2°C emissions gap. By switching electricity generation from coal to gas and reducing its energy consumption, Hong Kong was able to achieve a 24% reduction in GHG emissions between 2014 and 2022. Reducing energy consumed, and hence emissions from transport and buildings remain a challenge, raising concerns as to whether it will meet its 2035 targets and strive to achieve carbon neutrality before 2050[2].

This report identifies key elements that should form emission reduction efforts over the next decade. These include:

- Further decarbonisation of electricity generation
- Further decarbonisation of gas production
- Transport electrification
- Substantial improvements in building energy efficiency
- Maximise energy released from waste incineration in landfills to generate electricity

Post-2035 progress remains uncertain, highlighting the need for a long-term strategy. New policy initiatives are essential to align business interests with the goal of carbon neutrality. Hong Kong must adopt proven existing technologies to accelerate decarbonisation while simultaneously enhancing efficiency and competitiveness.

Compared to other major Asian cities, the baseline of Hong Kong's mid-term target is set in 2005. It reflects the city's early commitment to environmental and climate change issues, which gained momentum in 2007 when Hong Kong announced a voluntary target to reduce carbon intensity by 50-60% by 2020, based on 2005 levels. This report recommends that Hong Kong revisits and advances its mid-term target to 2030 to ensure greater comparability with other major Asian cities, better align with the Nation's midterm target timeframe, and facilitate easier communication with the international community.

To take a significant step beyond the Paris Agreement, Hong Kong can explore ways to reduce its embodied emissions, positioning itself as a lighthouse for climate action.

The following table lists the questions explored in this report, outlining Hong Kong's climate progress, challenges, and the necessary policy adjustments to meet its carbon neutrality goals.

How has Hong Kong laid out the foundation for climate action before the Paris Agreement?	Hong Kong initiated its climate policies in 2007, released the Climate Change Strategy in 2010, and set a 50-60% carbon intensity reduction target by 2020. The Hong Kong Government is actively responding to climate change.
What changes have occurred in Hong Kong's climate policies and emissions since 2014?	Post-Paris efforts saw the launch of the Climate Action Plan 2030+ in 2017 and the Climate Action Plan 2050 in 2021, which focused on renewable energy, energy efficiency, green transport, and waste reduction. However, financial transparency in implementation remains a challenge. Policies provide a roadmap, but implementation has been uneven. The power sector is on track to meet its goals, but the transport and building sectors are lagging.
Does the Climate Action Plan 2050 (CAP2050) align with the Paris Agreement's commitment?	The climate targets outlined in CAP2050 are well-aligned with the 2°C commitment. However, even if these goals are achieved, the city will exceed its carbon budget for a 67% chance of reaching the 1.5°C target commitment by 2029. This highlights the necessity for more ambitious measures to align with 1.5°C and address the vast climate impacts between the 1.5°C and 2°C targets.

Which policies require reinforcement to achieve carbon neutrality before 2050?	
What is the current status of Hong Kong's emission reduction efforts?	GHG emissions fell by 24% between 2014-2022, with electricity-related emissions seeing the largest drop (-32.7%). Transport and waste emissions have been slower to decline.
What will be the key actions of emissions reduction in the next decade?	1) Electricity and Power sector: complete the phase-out of coal and switch from natural gas to renewables and nuclear. 2) Transport: increase electrification of road vehicles alongside a further shift from private cars to public transit, such as the MTR and buses. 3) Buildings: Implement stricter energy efficiency policies, as this sector needs the most accelerated action.
What comes after 2035? Does Hong Kong need a long-term climate strategy?	While emissions are projected to decline sharply until 2035, reductions are expected to stagnate afterwards. Hong Kong must plan for post-2035 innovations, including carbon capture, hydrogen energy, and stronger policy commitments.
How does Hong Kong compare against its regional peers in climate action?	Hong Kong has lower per capita emissions than Singapore and Seoul but slightly higher per capita emissions than Tokyo. Its 2035 target is ambitious, but its mid-term target could be enhanced to create an apple-to-apple comparison with Tokyo and Seoul. Hong Kong needs to account for its imported emissions to truly achieve carbon neutrality.
What urgent measures are needed to close Hong Kong's emissions gap?	1) Accelerate Hong Kong's transition to zero-carbon electricity. This will be helped by investing in grid (ie: very large) batteries to help match electricity demand with supply from renewable energy and nuclear. 2) Accelerate the phase-out of fossil fuel vehicles. 3) Require annual disclosure of the energy efficiency of large commercial buildings and provide incentives to achieve good energy efficiency. 4) Strengthen renewable energy policies. 5) Formulate a clearer roadmap for energy security and affordability

1. United Nations Framework Convention on Climate Change (UNFCCC). (n.d.). The Paris Agreement. UNFCCC. https://unfccc.int/process-and-meetings/the-paris-agreement
2. Appendix 1 – Comparison: Net- Zero vs. Carbon Neutrality

INTRODUCTION

The rapid acceleration of global warming has heightened concerns on whether current climate policies are sufficient to safeguard the public and environment of Hong Kong. As a densely populated financial hub, the city faces significant challenges in reducing its carbon emissions while maintaining economic growth and urban liveability. In response, the Climate Action Plan 2050 (CAP2050) was introduced as a roadmap to guide the city towards carbon neutrality before 2050. However, with global climate targets updating and being reinforced, a critical question arises: does CAP2050 align with the Paris Agreement's 1.5°C goal, and do any policies need to be reinforced?

The CAP 2050 was published on 8 October 2021. At the time of this report's release, emission and energy-use data in the public domain are only available up to 2022. To ensure fair benchmarking, we used data from 2014 to 2022, as this timeframe provides a robust time series for analysing emission reduction trends and evaluating the effectiveness of policies. Furthermore, 2014 marks the establishment of the Paris Agreement, which serves as a key reference point for evaluating Hong Kong's climate action efforts following its adoption.

Therefore, this study analyses the climate policies implemented in Hong Kong since 2014 to accurately track policies' impacts and effectiveness, emissions trends, and the city's progress towards decarbonisation. The research will explore the following key questions:

1. **What changes have occurred in Hong Kong's climate policies and emissions since 2014? P.14**
2. **Does CAP2050 align with the Paris Agreement's goals? P.18**
3. **Which policies require reinforcement to achieve carbon neutrality? P. 20**
4. **How does Hong Kong compare against its regional peers in climate action? P. 27**
5. **What urgent measures are needed to close Hong Kong's emissions gap? P. 30**

To address these questions, this study will employ a two-pronged analytical approach:

1. Comparative Data Analysis (2014-2024)
   - Evaluate Hong Kong's emissions and policy effectiveness using official government reports, sectoral data, and international benchmarks.
   - Assess progress across key sectors: power, transport, buildings, and waste.
2. Future Emissions Projection (2021-2050)
   - Utilise the Energy Policy Simulator (EPS) to model Hong Kong's future emissions trajectory.
   - Identify potential challenges and policy adjustments necessary to achieve carbon neutrality before 2050.

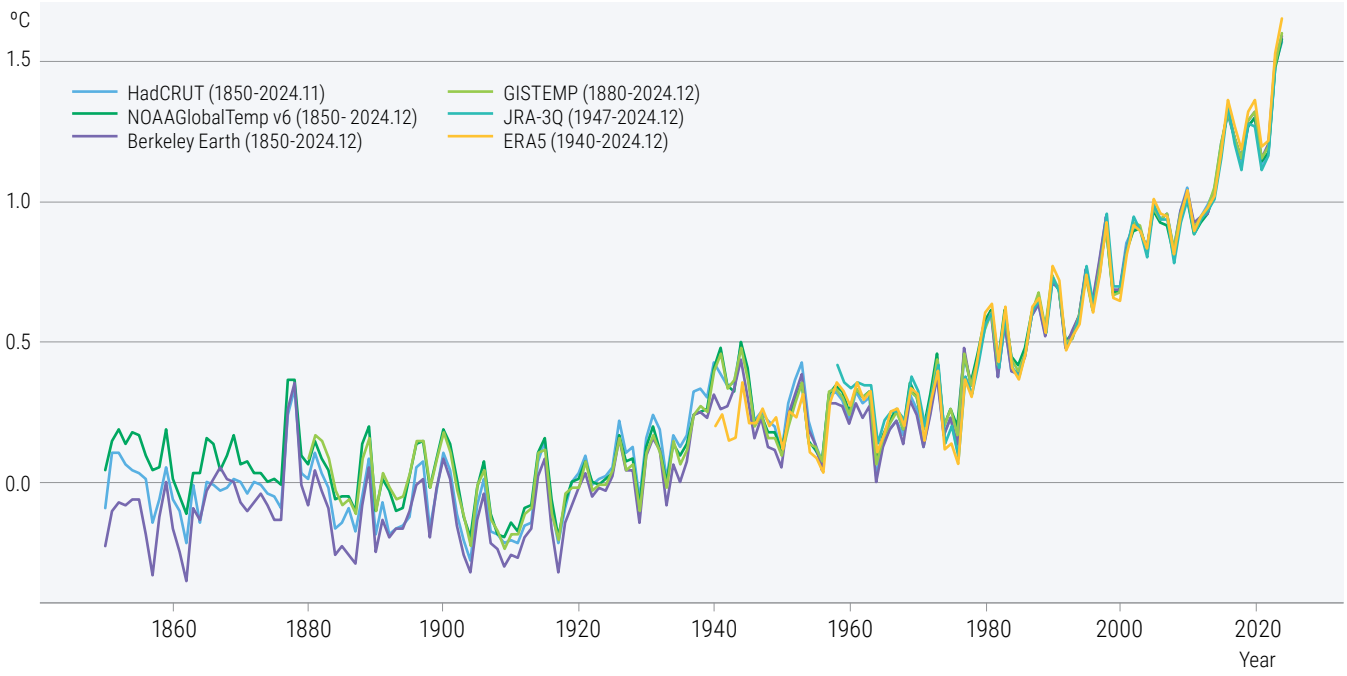
Additionally, this study reviewed Hong Kong's pre-Paris Agreement policies to understand how the city has laid its foundation for future climate action (Appendix 3 – How Has Hong Kong Laid the Foundation for Climate Action? - Pre-Paris Agreement Developments and Appendix 4 – Pre-Paris Agreement Government Environmental Policies). By examining both historical policy trends and future projections, this research aims to provide data-driven insights into the effectiveness of CAP2050 and highlight areas that require urgent policy reinforcement.

What motivated Civic Exchange to review and benchmark the progress of Hong Kong climate action?

Global temperature leapt more than 0.4°C in the past two years, with the 12-month average peaking in August 2024 at +1.6°C relative to the 1880-1920 baseline.[3]

In 2024, the Earth experienced its hottest year on record, with global temperatures reaching 1.5°C above pre-industrial levels—a critical threshold set by the Paris Agreement. This milestone marks the beginning of a "new era" of climatic conditions, characterised by a rise in extreme weather events such as heatwaves, floods, and droughts.

Global mean temperature 1850-2024[4]



BOX 1

What's Driving the Rapid Acceleration of Global Warming?

Recent analyses have revealed that global temperatures are escalating at an accelerated pace, surpassing prior projections. This phenomenon is attributed to increased greenhouse gas emissions and the amplification of positive feedback mechanisms within the climate system due to these anthropogenic emissions.

- **Water Vapour Feedback:** As temperatures rise, the atmosphere can hold onto more water vapour, a potent greenhouse gas which results in further warming.
- **Albedo Changes:** Melting ice reduces the Earth's albedo (reflectivity) due to exposure of darker surfaces, causing more solar energy to be absorbed and further increasing temperatures.[6]
- **Permafrost Thawing:** The thawing of permafrost releases methane, a greenhouse gas with a global warming potential more potent than CO_2, thereby accelerating warming.[7]

Consequently, recent studies suggest that the Earth's climate sensitivity may be higher than previously estimated, implying that "a doubling of carbon dioxide in the atmosphere would lead to an increase of 4.8 ± 1.2 °C, significantly above earlier estimates."[8]

The latest research revealed that "global warming has accelerated since 2010 by more than 50% over the 1970–2010 warming rate of 0.18 °C per decade"[9]. Furthermore, the Intergovernmental Panel on Climate Change's Sixth Assessment (IPCC AR6) Report predicts a warming rate of 0.24 °C per decade between 2015 and 2050 under current policy scenarios. This rate is approximately 26% faster than the warming observed since 1970.

These studies highlight the pressing need for immediate and robust climate action to curb greenhouse gas emissions and mitigate the far-reaching consequences of accelerating global warming.

Has global collaboration been effective in addressing climate change?

The Answer is "No"

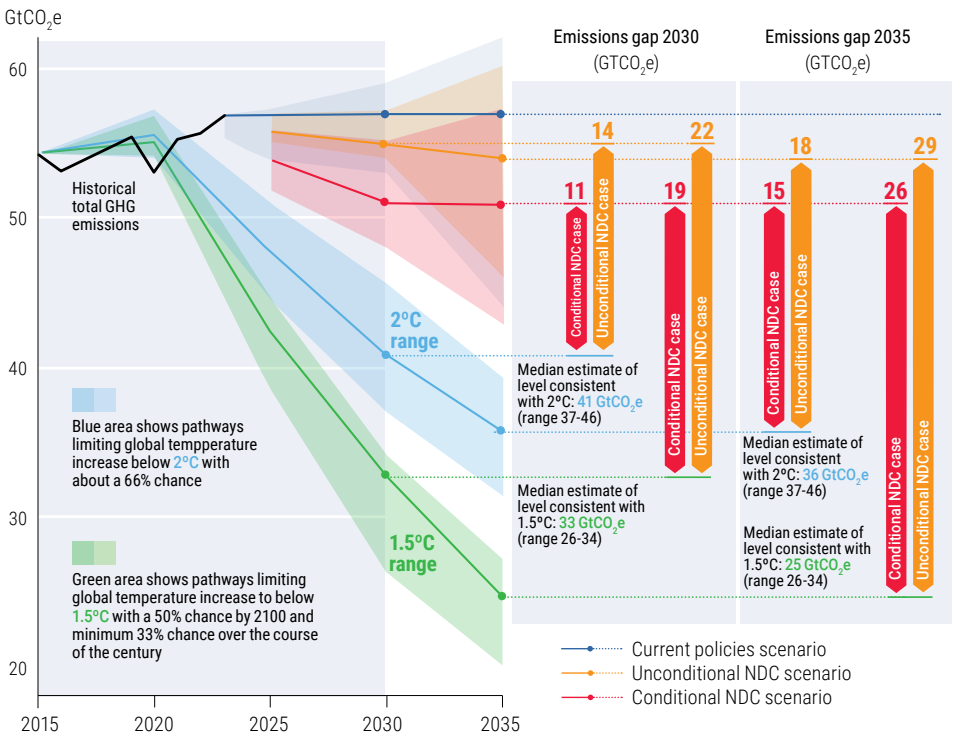
The UNFCCC recently stressed that the current implementation of Nationally Determined Contributions (NDCs) is not sufficient to meet the mid-century targets. Although the Technical Dialogue of the Global Stocktake reports that global climate efforts are proceeding, it also reports that current NDCs efforts have only partially offset emissions growth by 15-33%. It stresses that significant and urgent measures are needed in both climate action and NDCs implementation to reach the mid-century decarbonisation target. Additionally, the IPCC AR6 Synthesis Report also underscores that the emission gap in 2030 remains high, with an implementation gap of 4 to 7 $GtCO_2$-eq in 2030, additionally reporting that without the strengthening of policies, emissions are expected to hit a median global warming of 3.1°C by 2100.

For more details of global collaboration to against climate change, please refer to Appendix 2 – The shaping of Global climate strategies.[10]

What is the benefit of continuing to pursue 1.5 C from Hong Kong's perspective?

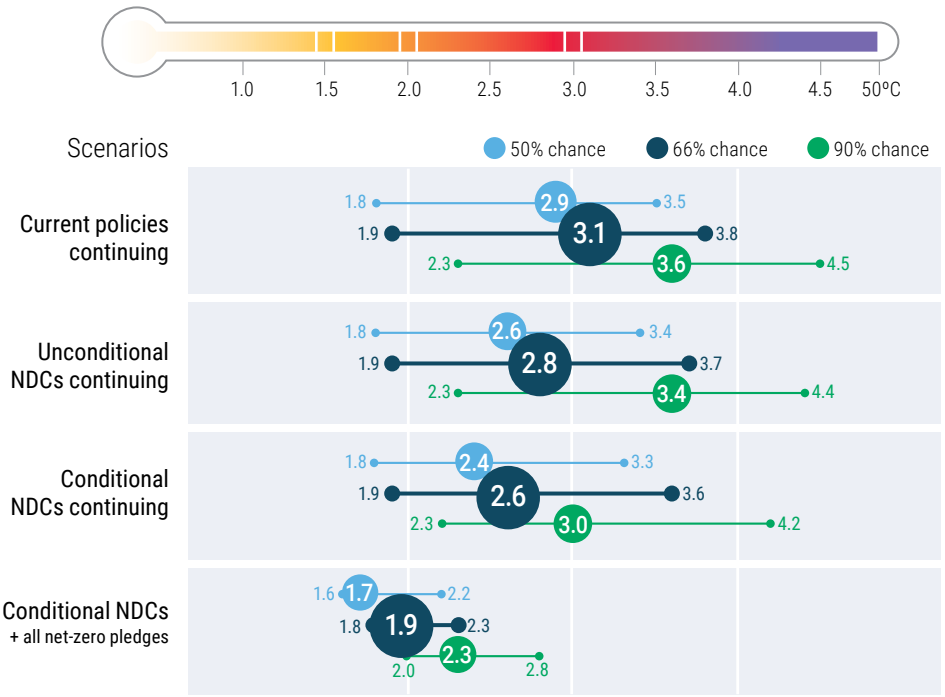
Hong Kong will not be exempt from these climate-related risks, as evidenced by record-breaking temperatures in 2024 and the unprecedented number of Very Hot Days and Hot Nights warnings from the Hong Kong Observatory (HKO).[11] The HKO reports that the annual mean temperature was 24.8°C, a staggering 1.3°C above the 1991-2020 normal.[12]

Global GHG emissions under different scenarios and the emissions gap in 2030 and 2035



Projections of global warming under the pledge-based scenarios assessed[11]

Peak warming over the twenty-first century (°C) relative to pre-industrial levels



Cost and Benefit analysis of Climate action[13]

	Global	Hong Kong[14]
Cost of inaction before 2050	US $7.9 trillion	US $22.91 billion
Benefits of proactive climate action by 2030	US $26 trillion	US $75.4 billion

Climate action is often debated in terms of economic feasibility, however, a cost-benefit analysis demonstrates that the benefits of proactive climate mitigation far outweigh the costs of inaction. Using both global scale and Hong Kong-specific economic projections, it is clear that failing to act on climate change will result in severe economic consequences, while proactive measures offer substantial economic benefits.

BOX 2

Threats and opportunities for Hong Kong under climate change

Safeguard from sea level rise and storm surge

Hong Kong's coastal geography exposes the city to significant risks, including storm surges and rising sea levels. Historical data indicates that between 1954 and 2024, the annual mean sea level at Victoria Harbour had risen an average rate of 32 mm per decade.[15] Hong Kong has also seen the occurrence of more extreme weather events, evidenced by Super Typhoons Hato (2017) and Mangkhut (2018), which caused storm surges of up to 3.88 meters and resulted in severe flooding in areas like Eastern Hong Kong Island, Tseung Kwan O, and Sai Kung. With sea levels projected to rise by up to 1.1 meters by 2100, it is expected that extreme sea-level events that are currently deemed rare could occur annually by 2100[16].

Green economy opportunity that can benefit Hong Kong citizens

Pursuing the target of 1.5°C will pose many challenges, however, it also presents many opportunities for Hong Kong. As the conduit between the Mainland and the world, Hong Kong is uniquely positioned to leverage itself as a forerunner of green finance and the green economy within the Greater Bay Area (GBA). For example, more than US$56 billion green and sustainable debts was issued in 2021; four times more than the amount from 2020 and the most in Asia, emphasising Hong Kong's commitment to reaching carbon neutrality.[17]

As global efforts to combat climate change fall short of expectations, it is evident that the world is not on track to meet critical climate targets. Rising temperatures, escalating extreme weather events, and insufficient policy implementation highlight the urgent need for stronger action.

How Is Hong Kong Advancing Its Climate Goals Towards Carbon Neutrality? - Post-Paris Agreement Developments

Following the Paris Agreement, Hong Kong mobilised more ambitious climate actions with the announcement of the Climate Action Plan 2030+ ("CAP2030+") in 2017.

BOX 3

Climate Action Plan 2030+

The CAP2030+ set the target to lower per capita emissions from 3.3 to 3.8 tonnes by 2030, and also reduce carbon intensity by 65% to 70% by 2030, relative to 2005 levels. This goal translates to an absolute reduction in carbon emissions of 26% to 36%. To achieve these targets, CAP2030+ outlined strategies such as the phase-down of coal-fired electricity generation, expanding the use of natural gas and renewable energy, enhancing energy efficiency in buildings, and promoting green transportation. The plan also emphasised the importance of public engagement and cross-sectoral collaboration to drive Hong Kong's decarbonisation efforts. This plan marked a significant step towards establishing carbon reduction targets and adaptation measures across different high emitters of the economy, such as electricity generation, buildings and infrastructure, and transportation.

A few years later, the Government released CAP2050 in October 2021 based on the Hong Kong Long-term Decarbonisation Strategy Consultation result[18], which outlines a comprehensive strategy to achieve carbon neutrality before 2050.

BOX 4

Climate Action Plan 2050

The CAP2050 focuses on four key decarbonisation areas:

1. **Net-Zero Electricity Generation:** The plan sets the goal of ceasing coal for daily electricity generation and to increase the share of renewable energy to 7.5%–10% by 2035, with a further increase to 15% thereafter. Strategies included exploring new energy sources and strengthening cooperation with neighbouring regions to achieve net-zero electricity generation before 2050.

2. **Energy Saving and Green Buildings:** The Government aims to reduce electricity consumption in commercial buildings by 30%–40% and in residential buildings by 20%–30% from 2015 levels by 2050, achieving half of these targets by 2035. Strategies included enhancing energy efficiency through stricter building codes and promoting green building practices.

3. **Green Transport:** The plan promotes the adoption of electric vehicles (EVs) and the development of related infrastructure, with the aim to reach zero vehicular emissions before 2050. Strategies involved setting timelines for phasing out fossil fuel-powered vehicles and expanding the EV charging network.

4. **Waste Reduction:** The Government has set a vision of "Waste Reduction Resources Circulation·Zero Landfill" and outlines strategies to tackle waste management challenges up to 2035. This includes promoting waste reduction at the source, enhancing resource recovery, and developing waste-to-energy facilities.

From this overarching strategy, 4 sector-specific policy documents were publicised to supplement CAP2050's targets and steer Hong Kong's future climate direction in accordance with international agreements.

Keeping with the spirit of the Paris Agreements, it was agreed that these policy documents would be subjected to a review and renewal every 5 years.

- The Waste Blueprint for Hong Kong 2035, published in February 2021
- The Hong Kong Roadmap on Popularisation of Electric Vehicles, published in March 2021
- The Clean Air Plan for Hong Kong 2035, published in June 2021
- Strategy of Hydrogen Development in Hong Kong, published in June 2024

In the 2021 Policy Address, the Government announced that it would devote approximately $240 billion towards climate change adaptation and mitigation measures within the next 15 to 20 years.[19] However, since its publication in 2021, there has been very little information released regarding the breakdown of the funds or the expenditure for each sector.

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WHAT CHANGES HAVE OCCURRED SINCE 2014 IN HONG KONG'S CLIMATE POLICIES AND EMISSIONS?

Since **2014**, following the Paris Agreement, Hong Kong has seen a **significant decline in greenhouse gas (GHG) emissions** despite economic growth and population increases. The reduction in emissions was largely driven down by shifts in energy consumption patterns, improvements in efficiency, transitioning to clean energy, and policy-driven efforts to decarbonise major sectors.

Economic Growth and Emissions Decoupling

Year	GDP in Hong Kong in chained 2022 HKD (HK$ million)	Population ('000)
2014	2,669,554	7,230
2022	2,808,981	7,346

Hong Kong has achieved absolute decoupling, as emissions have declined while the economy has grown.

- **GDP Growth:** Increased from HK$2,669,554 million in 2014 to HK$2,808,981 million in 2022 (+5.2%).
- **Population Growth:** Increased from 7.23 million in 2014 to 7.35 million in 2022 (+1.6%).
- **GHG Emissions:** Declined from 44.2 million tonnes CO_2-e in 2014 to 33.5 million tonnes CO_2-e in 2022 (-24%).
- **Per Capita Emissions:** Decreased from ~6.1 tonnes CO_2-e per capita in 2014 to 4.55 tonnes CO_2-e per capita in 2022(-25%).

Emission Reductions by Sector (CO_2-e in kilotonnes)

Sector	2014 (kt CO_2-e)[20]	2014 Share	2022 (kt CO_2-e)[21]	2022 Share	Change (2014-2022)
Electricity Generation & Energy	31,200	71%	21,000	63%	-32.7%
Transport	1,950	16%	1,860	19%	-4.6%
Other End Use of Fuel	2,500	4%	2,580	6%	+3.2%
Waste	1,620	6%	1,600	8%	-1.2%
Industrial Processes & Product Use	30	4%	30	5%	No Change
Total	**44,150**	**100%**	**33,490**	**100%**	**-24.2%**

Key Insights:

- **Electricity-related emissions** dropped significantly (-32.7%), driven by a transition away from coal and greater energy efficiency measures.
- **Transport emissions** declined slightly (-4.6%), despite growing energy demand in the sector, suggesting progress in vehicle electrification and public transport efficiency.
- **Waste-related emissions** increased from 6% to 8% of total emissions, reflecting challenges in waste reduction.

Emissions from Electricity Consumption by Sector[22] (CO_2-e in kilotonnes)

Sector	2014 (kt CO_2-e)[20]	2014 Share	2022 (kt CO_2-e)[21]	2022 Share	Change (2014-2022)
Commercial Buildings	20,413	65%	13,758	66%	**-32.6%**
Residential Buildings	8,565	27%	5,907	28%	**-31.0%**
Transport	570	2%	407	2%	**-28.6%**
Industrial	1,652	5%	927	4%	**-43.9%**
Total	**31,200**	**100%**	**21,000**	**100%**	**-32.7%**

Key Insights:

- The largest reductions in emissions came from commercial (-32.6%) and residential (-31.0%) sectors due to efficiency gains and cleaner energy.
- The industrial sector saw the steepest drop (-43.9%), aligning with Hong Kong's economic shift away from manufacturing.
- Transport-related electricity-use emissions fell (-28.6%), reflecting progress in electric vehicles (EVs) and rail system enhancements.

Hong Kong fuel mix

Energy Source	2014 Share[23]	2022 Share[24]
Coal	53%	29%
Natural Gas	22%	63%
Nuclear (Imported)	23%	25%
Renewable Energy	0%	0.90%

Key Insights:

The reduction is aligned with the 2014 Government project's expected result for basic situation in 2023 in the Future Fuel Mix for Electricity Generation.

- Coal usage dropped significantly as Hong Kong transitioned to cleaner energy sources, reducing emissions and improving air quality.
- Natural gas became the dominant source of electricity, aligning with decarbonisation strategies and reducing reliance on coal.
- Nuclear energy imports remained relatively stable, supporting Hong Kong's energy transition by providing a low-carbon baseload.
- Although renewable energy is still currently a small fraction of the fuel mix, it reflects the initial steps towards sustainability.

Total Energy Consumption

	2005[25]	2022[26]
Energy End-use/ GDP HK$ billion	170	96

Key Insights:

The Government set a target in the "Energy Saving Plan For Hong Kong's Built Environment 2015-2025+" (Energy Saving Plan) to reduce Hong Kong's energy intensity by 40% by 2025, using 2005 as base year. Hong Kong's energy intensity has decreased by 43.5% from 2005 to 2018, with the Government achieving the target 3 years ahead of schedule.

However, Hong Kong's dependence on using energy intensity as a metric fails to cover absolute emission reductions as the GDP and emissions decouple. With a service-based economy, efficiency gains yield diminishing returns. Global standards prioritise absolute cuts, not intensity. To stay competitive, Hong Kong must adopt absolute emission reduction targets and align itself with international climate policies.

For the detailed target, please see Appendix 5 Target Comparison between CAP2030, CAP2050, Energy Saving Plan.

Energy Consumption by Sector

Sector	2014 (TJ)[27]	2014 Share	2022 (TJ)[28]	2022 Share	Change (2014-2022)
Commercial	119,600	42%	118,435	44%	-1.0%
Residential	62,118	22%	64,347	24%	+3.6%
Transport	88,278	31%	74,106	28%	-16.1%
Industrial	13,028	5%	12,009	4%	-7.8%
Total	**283,024**	**100%**	**268,897**	**100%**	**-5.0%**

Key Insights:

- **Energy Consumption** refers to the amount of electricity, towngas & LPG, and oil & coal products used by various sectors.

⬇ Total energy consumption declined by 5%, despite economic and population growth.

⬇ Commercial sector remains the largest consumer (44%), indicating the continuous demand from office buildings, retail, and services.

⬇ Transport sector energy consumption fell by 16.1%, likely due to electrification and increased energy efficiency in public transit.

⬆ Residential energy consumption increased by 3.6%, reflecting growing household demand and urbanisation.

Electricity Consumption

Sector	2014 (TJ)[29]	2014 Share	2022 (TJ)[30]	2022 Share	Change (2014-2022)
Commercial	103,471	65%	105,806	66%	+2.3%
Residential	43,415	27%	45,427	28%	+4.6%
Transport	2,888	2%	3,132	2%	+8.5%
Industrial	8,374	5%	7,131	4%	-14.8%
Total	**158,148**	**100%**	**161,496**	**100%**	**+2.1%**

Key Insights:

- **Electricity consumption** refers to the amount of electricity generated from coal, natural gas, nuclear energy, and renewable energy used by various sectors.

⬆ Total electricity consumption increased by 2.1%, with the gap widening away from the target, despite an overall decline in total energy-use. This highlights the need for Hong Kong to intensify its efforts to achieve the targets set in the Energy Saving Plan.[31]

⬆ Commercial electricity-use grew by 2.3%, driven by increasing demand from businesses.

⬆ Residential electricity consumption grew by 4.6%, likely due to higher living standards and more appliance use.

⬆ Transport electricity-use surged by 8.5%, indicating progress in electrification.

⬇ Industrial electricity consumption dropped by 14.8%, aligning with the broader decline in industrial energy-use.

CONCLUSION

Hong Kong's Post-2014 Emission Reduction Trend

⬇ GHG emissions fell by 24% after peaking in 2014, despite GDP and population growth.

⬇ Electricity-related emissions dropped the most (-32.7%), reflecting cleaner energy generation and efficiency gains.

⬇ The transport sector saw the largest decline in energy consumption (-16.1%), indicating improved efficiency and EV adoption.

⬆ Residential and commercial energy-use increased slightly, reflecting economic activities and urbanisation, the Government must put more effort into the building sector.

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31. Appendix 5 *Target Comparison between CAP2030*, CAP2050, Energy Saving Plan

DOES CAP2050 ALIGN WITH THE PARIS AGREEMENT'S COMMITMENT[32]?

This study projects Hong Kong's emissions from 2021 to 2050, with the results helping to contextualise whether Hong Kong is aligned with the Paris Agreement's commitment. The remaining carbon budget refers to the total amount of CO_2 emissions that can still be released while limiting global warming to a specific temperature threshold, such as 1.5°C or 2°C above pre-industrial levels.

However, it is important to note that the division between 1.5°C and 2°C pathways does not fully capture the Paris Agreement's context, because both targets are part of a continuum rather than separate goals.

BOX 5

IPCC AR6 1.5°C or 2°C global carbon budget

In 2021, the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6) revealed the remaining carbon budgets for the world to limit global warming to specific temperature thresholds, as of 2020.[33] They are estimated as follows:

Probability of limiting warming	Carbon budget ($GtCO_2$)
50% to 1.5°C	500
67% to 1.5°C	400
50% to 2°C	1,350
67% to 2°C	1150

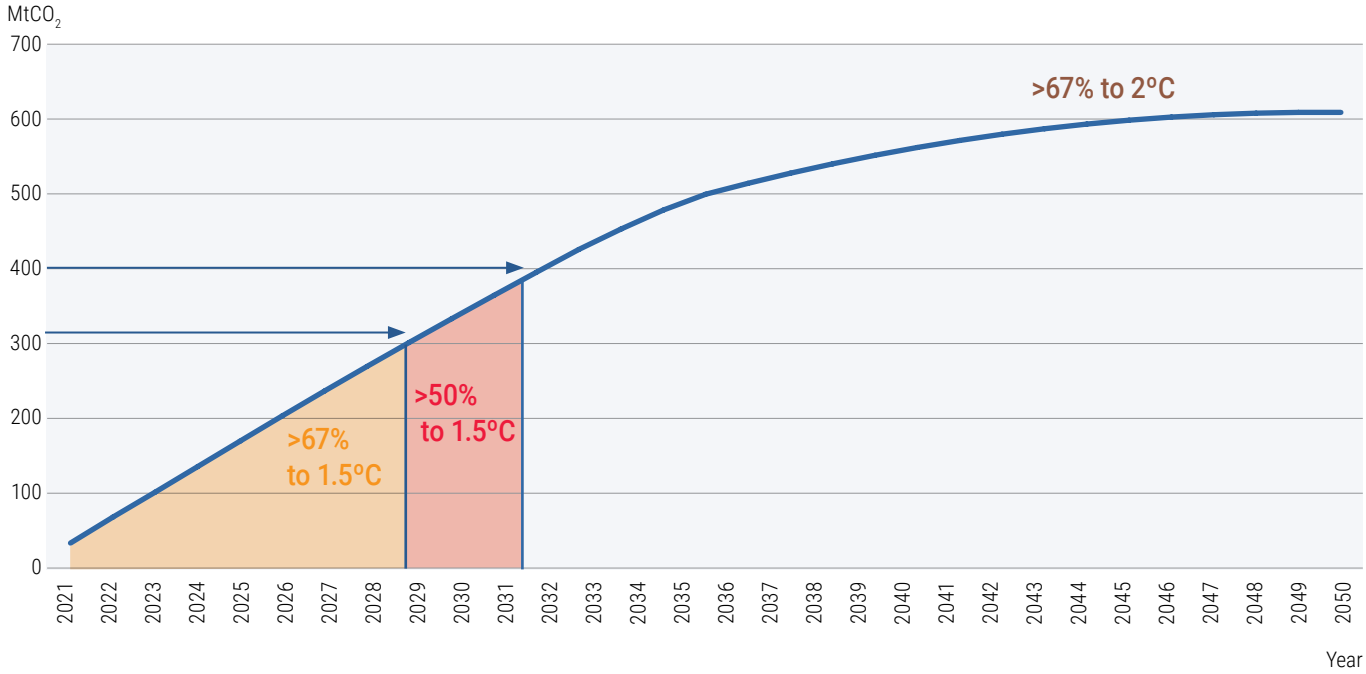
BOX 6

Hong Kong carbon budget

Assuming Hong Kong's share of global emissions in 2020 was approximately 0.087% of total global emissions,[34] the city's remaining carbon budget is:

Probability of limiting warming	Carbon budget ($GtCO_2$ / $MtCO_2$)
50% to 1.5°C	0.40 / 401
67% to 1.5°C	0.30 / 314
50% to 2°C	1.14 / 1,143
67% to 2°C	0.97 / 968

Cumulative emission ($MtCO_2$)



Although Hong Kong's CAP2050 targets may align the city to keep within the 2°C Paris Agreement's commitment, its cumulative emissions by 2050 are projected to be 610 $MtCO_2$, which is well-below the 2ºC threshold of 960$MtCO_2$. Nonetheless, the city is still at risk of exceeding its fair share of the 1.5ºC carbon budget. Based on current projections, Hong Kong is expected to exceed its 67% probability carbon budget for 1.5ºC by 2029 and its 50% probability budget by 2032. It indicates that without significant emission reductions, it will surpass its 1.5°C budget well before 2035. Exceeding its fair share under the 1.5°C Paris Agreement target does not necessarily mean Hong Kong is at serious risk, but Hong Kong would still be highly likely to experience extreme weather events when 1.5°C limit is not in reach. To strengthen its climate resilience and align more closely with global efforts to limit warming to 1.5°C, CAP2050 must be further reinforced with more ambitious emission reduction strategies.

Conclusion

Given the urgency of the climate crisis, it is now the time for the Government to enhance its ambition and accelerate decarbonisation efforts to close the emissions gap. The largest gap is expected to occur between 2025 and 2035, with at least 200 $MtCO_2$ needing to be mitigated. The upcoming climate action plan review must be guided by updated benchmarks, sector-specific challenges, and more aggressive reduction targets to ensure that all sectors can effectively transition within the remaining carbon budget.

32. The increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels

33. Intergovernmental Panel on Climate Change. (2021). *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (V. Masson-Delmotte et al., Eds.). Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/

34. Approximately 47.5 gigatonnes of carbon dioxide equivalent ($GtCO_2e$). https://www.wri.org/data/world-greenhouse-gas-emissions-2020?utm_source=chatgpt.com

WHICH POLICIES NEED REINFORCEMENT TO ACHIEVE CARBON NEUTRALITY?

Since the release of CAP2050, the Government has committed to various climate actions to achieve its established carbon targets. Appendix 6 - Policy Blueprint after the release of Climate Action Plan 2050 and Appendix 7 - Key environmental ordinances in Hong Kong and expected amendment date are tables of the various Government initiatives and polices that have been enacted since the release of CAP2050.

This study conducts a comprehensive review, providing both qualitative and quantitative insights to explore how we can achieve the 1.5°C trajectory. By gathering information and data from various sources, it seeks to improve policymakers' decision-making and ensure a more robust and informed approach in Hong Kong's climate actions.

Comparative Data Analysis (2014-2024)

Since 2021, CAP2050 has been the foremost authority of Hong Kong's climate targets. It established significant goals, namely achieving carbon neutrality before 2050, making it the first Chinese city to formulate a carbon-neutrality target. CAP2050 builds upon the targets from CAP2030+ and reinforces the city's climate action ambition.

As one of the world's most densely populated urban centres, Hong Kong faces significant challenges in reducing carbon emissions whilst pursuing economic growth and urban liveability. In response to the global climate crisis, Hong Kong's Government has implemented a series of policies and strategies aimed to achieve carbon neutrality before 2050, including sector-specific targets in power generation, transport, and buildings—three of the largest contributors to greenhouse gas emissions. While these policies provide a clear roadmap for decarbonisation, it remains uncertain whether the set targets are optimal or suboptimal in effectively mitigating emissions.

By this, the report defines 'optimal' as being aligned with the goals established with CAP2050, whilst 'suboptimal' refers to current progress not aligning with CAP2050 targets. However, it must be noted that even if this report has identified that a sector is optimally aligned with CAP2050, the sector must continue decarbonising accordingly and even plan for more ambitious targets to maintain the pace of decarbonisation. Likewise, even if a sector is determined to be 'sub-optimally' implemented, this does not mean that the sector is unwilling to decarbonise, rather there are additional challenges in place preventing shareholders from working collaboratively.

To determine the policies' implementation, this report compared the data published by the Hong Kong Government to analyse the policy impact.

Power Sector

It is shown that Hong Kong is currently optimally aligned to meet its targets for electricity generation, given both power companies are retiring old coal-fired plants and the recent addition of natural gas to the fuel mix.

Because both CLP and HKE are decarbonising quicker than other high-emitting sectors, the Government should consider enabling the power sector to galvanise and spearhead other sectors that this report deems suboptimally aligned whilst also balancing decarbonisation initiatives to prevent over-burdening citizens and other end-uses from the strains of the transition.

Transport Sector

However, efforts to curb transport emissions and building emissions have not been as rapid. Although Hong Kong is on track to meet its interim target to terminate the registration of new fuel-propelled private cars by 2035, progress to electrify the city's taxis and buses has been suboptimal, with their projected numbers far below the expected target.

Given that the transportation sector is on-track to meet its 2035 interim target for private vehicles, it is recommended that the transportation sector implements more ambitious goals for other vehicle types, such as commercial vehicles and taxis.

Building Sector

The progress in achieving the targets for both commercial and residential buildings has also been suboptimal. As a massive contributor to Hong Kong's carbon emissions, mandating energy saving improvements and improving regulatory tools and codes have a significant potential to drive down buildings' carbon emissions.

For the detailed results, please see Appendix 8 – Implemented Government environmental policies after CAP2050 and Appendix 9 - A review of key policy target progress towards climate action plan 2050

Future Emissions Projection (2021-2050)

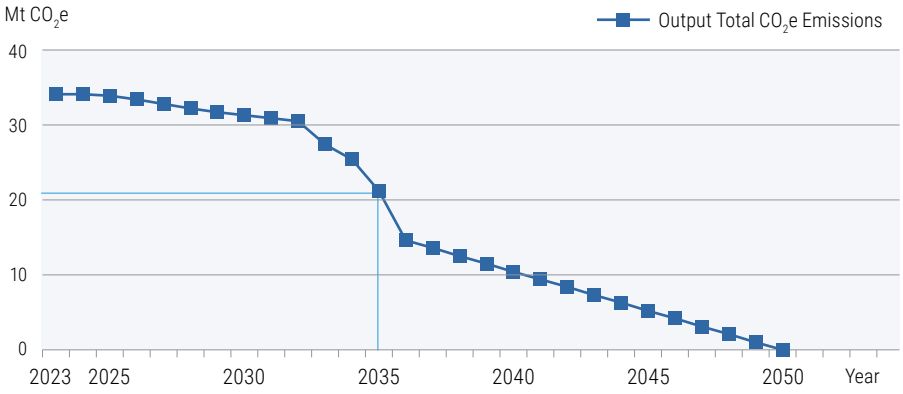
The method for building Hong Kong CO_2e emissions trajectory projection

After conducting a qualitative approach, this study adopted the Energy Policy Simulator (EPS), an open-source model developed by Energy Innovation[35], a non-partisan energy and climate policy think tank. It is crucial to conduct an in-depth study to assess whether the policy aligns with global climate action efforts. This evaluation reflects that CAP2050 is consistent with international climate commitments, such as the Paris Agreement, and incorporates best practices from leading climate policies worldwide.

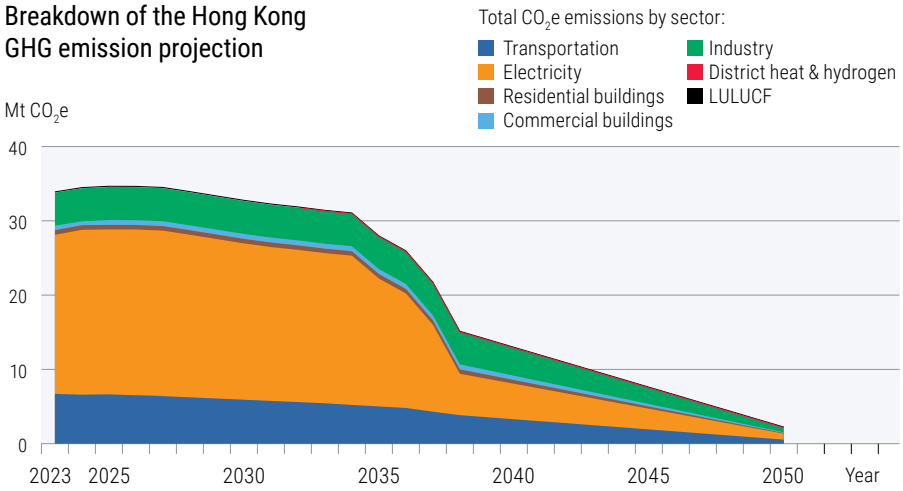
For the details on the methodology, please see Appendix 10 - The method for building Hong Kong CO_2e Emissions Trajectory projection.

CO_2e Emissions Trajectory and Policy Implications for Hong Kong

Hong Kong Emission Projection



Breakdown of the Hong Kong GHG emission projection



The **Hong Kong emission projection graph** presents Hong Kong's emissions trend from 2022 to 2050 and reveals three distinct phases: an initial stabilisation period, a sharp decline, and a gradual tapering off. While significant reductions are projected up to 2035, the long-term trajectory suggests that additional policies and innovations will be necessary to sustain momentum beyond that point.

Emissions Trend Analysis - Can Hong Kong achieve the CAP 2050 mid-term target?

1. **2022-2028: Initial Stabilisation**
   Emissions begin at approximately 33 metric tons (T) CO_2e and exhibits minor fluctuations without significant reductions. This stagnation is likely due to the continued electricity demand growth from the population and economic expansion, while immediate mitigation efforts remain constrained by the absence of new gas turbine installations and the gradual phase-in of energy efficiency measures.

Can Hong Kong achieve the mid-term target stipulated in CAP2050 of reducing 50% carbon emissions before 2035, as compared to the 2005 level?

The EPS simulates Hong Kong's emission levels in 2035 at 21.2 $MtCO_2e$. Compared to Hong Kong's emission levels in 2005, which were 41.3$MtCO_2e$, this represents a 48.6% reduction. With only a 1.4% emissions reduction difference, a figure close to zero, Hong Kong is well-positioned to confidently achieve its mid-term goal of halving emissions by 2035.

Therefore, the Government can consider accelerating its efforts to close the remaining 1.4% emission gap.

2. **2028-2035: Sharp Decline**
   A steep drop occurs during this period, with emissions reducing by nearly half by 2035. With the current policy instruments in place, Hong Kong is well-positioned to achieve its mid-term target. This decline is primarily driven by Hong Kong's energy transition efforts, particularly the phase-out of coal, the expansion of natural gas usage, and an increased reliance on zero-carbon energy. The effects of these policies take time to materialise due to the inherent lag in infrastructure deployment—typically ranging from 10 to 20 years—but by the early 2030s, their impact should become evident.

3. **Post-2035: Slower Decline and Uncertainty**
   Beyond 2035, the decline in emissions slows, indicating that the most immediate and accessible decarbonisation strategies will have been largely exhausted. This suggests that further policy interventions are needed to ensure the reduction can still reach 7% emission reduction per year. Significant technological breakthroughs and systemic transformations will be required for Hong Kong to continue to achieve the reduction.

What Will Be the Key Actions of Emissions Reduction in the Next Decade in CAP2050?

Power Sector

- Coal-to-Gas Transition: The planned phase-out of coal by 2035 significantly reduces emissions as Hong Kong shifts towards cleaner energy sources. Natural gas serves as a transitional fuel in this process, offering a lower carbon alternative to coal while renewable energy infrastructure and technologies continue to develop and scale up.

- Increased Nuclear and Renewable Energy-Use: A greater share of nuclear energy, coupled with renewable energy integration, contributes to the steep emissions drop. However, the increase of renewable energy is slow.

BOX 7

Immediate reinforcement action for power sector

Stakeholder:
Environment and Ecology Bureau, Power Companies

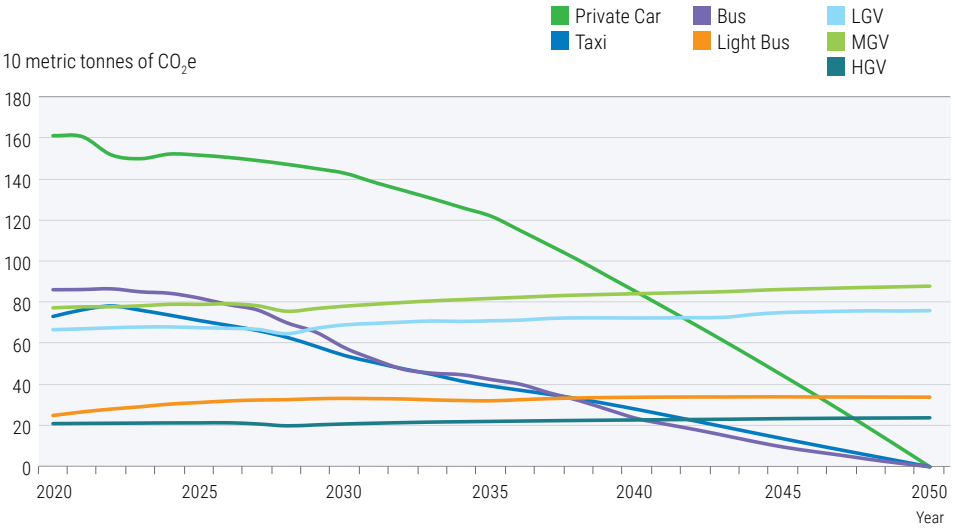
The Government should explore a commercial deal with the power companies to accelerate their decarbonisation, meanwhile, balance the pressure of tariff increases exerted on the power companies.

Transport Sector

- Sectoral Electrification: Expanding electrification helps reduce reliance on fossil fuels. Hong Kong has achieved a high rate of electrification for private vehicles, with 7 out of 10 new private vehicles being electric (EVs) in 2024. The Government should focus on electrifying commercial vehicles, which accounted for 7.9% of Hong Kong's total GHG emissions in 2019[36].

- The following graph demonstrates various vehicular emissions, as the current situation presumes no specific decarbonisation policies on duty vehicles, buses and taxis.

Projections on roadmap vehicular emissions by vehicle types



BOX 8

Immediate reinforcement action for transport sector

Stakeholder:
Environmental Protection Department, Transport Department, Taxi Owners, Truck Owners

- Because the progress of decarbonisation for trucks (small, medium and heavy) is lagging behind compared to other vehicle types, the Government should focus more on electrifying commercial vehicles, especially prioritising minivans and cross-boundary traffic by leveraging Shenzhen's advantage for the next five years by using proven technology.
- Taxi average carbon emissions is 40 tonnes per year[37] and account for 17% of carbon monoxide emissions in Hong Kong in 2019[38]. "The costs of air pollution and carbon emissions create a strong rationale for accelerating the pace of electrification. Besides the existing 3,000 taxis that are more than 12 years old, the Government should also encourage taxi fleet license awardees to increase the e-taxi ratio to 100% in the next round tender.

Building Sector

Energy Efficiency Policies: Enhancements in industrial, commercial, and residential energy-use have contributed to the emissions reductions. The key actions for emission reductions in the building sector have been electrification and efficiency improvements. However, the combination of historically cheap electricity tariffs and the absence of mandatory energy disclosures has resulted in property owners lacking the motivation to improve buildings' energy efficiency. Moreover, most buildings were constructed between 1980 and 1999 (41.2% of the total stock)[39], meaning that the sector's contribution regarding energy efficiency improvements or emission reduction measures remain minimal, as absolute building energy consumption did not improve significantly from 2014 to 2022.

BOX 9

Immediate reinforcement action for building sector

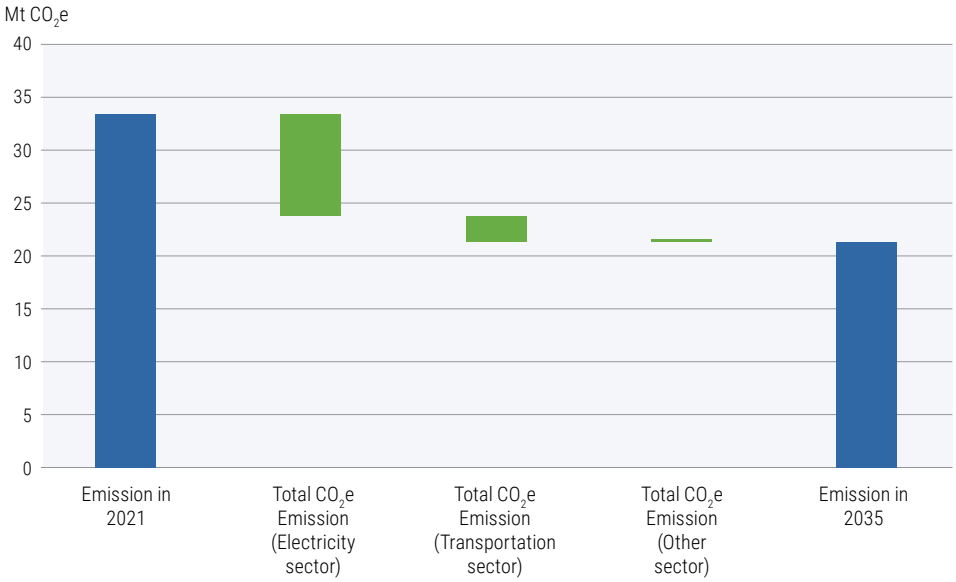
Stakeholder:
Environmental Protection Department, Power Companies, Commercial building owner.

Smart meter: To achieve the energy efficiency and conservation (EE&C) initiatives by 2025, between the period of 2019 to 2023, the two power companies' New Development Plans mandated the full-scale replacement from electromechanical meters with smart meters. Looking ahead, smart meters would be crucial in measuring and monitoring energy consumption and the decarbonisation progress of various sectors, thus identifying underperforming sectors that require urgent interventions. Furthermore, smart meters improve transparency in emission data, letting users optimise cost-savings by taking advantage of lower energy rates during off-peak hours.

Emission reduction projection 2021-2035

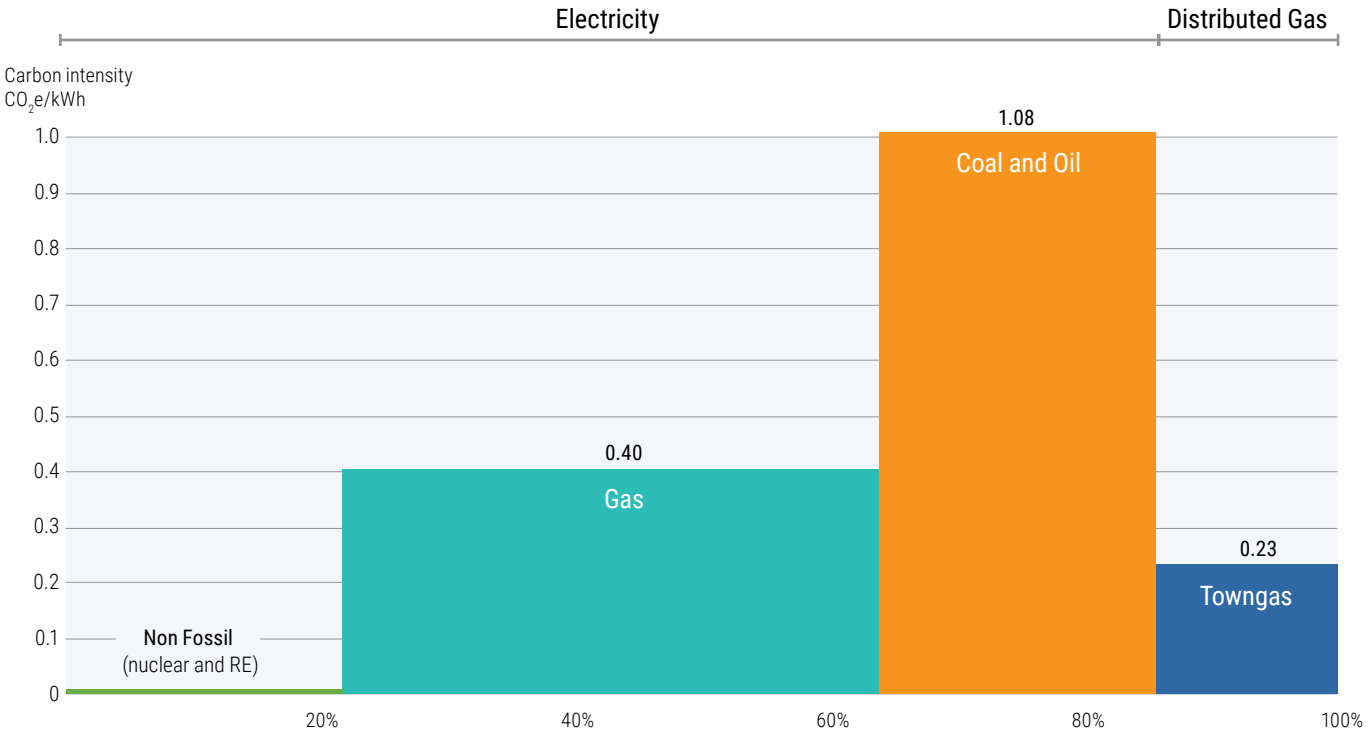
	Power	Transport	Other
Total CO_2e Emissions Reduction by Sector (Mt CO_2e)	9.71	2.4	0.04

Emission reduction driver between 2021 and 2035



Given the significant carbon budget deficit between 2021 and 2035, we need to identify how Hong Kong can take immediate action. Beyond continuing to reduce carbon intensity, Hong Kong must make further efforts to decrease its overall energy consumption, with the transport and building sectors needing to form the key pillars in the Government's approach to enhance its climate ambition.

2022 Energy Carbon Footprint*



* Emission Factor for CLP data was extracted directly, while Hongkong Electric's emission factor was calculated due to the absence of official information on the Hongkong Electric website.

35. Energy Innovation (2024). Retrieved at https://energyinnovation.org/
36. Environmental Protection Department. (n.d.). P.6 Hong Kong Roadmap on Popularisation of Electric Vehicles. The Government of the Hong Kong Special Administrative Region. Retrieved February 14, 2025, from https://www.evhomecharging.gov.hk/downloads/ev_booklet_en.pdf
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38. Government of the Hong Kong Special Administrative Region. (2021, September 8). LCQ5: Electric vehicles. https://www.info.gov.hk/gia/general/202109/08/P2021090800342.htm
39. Appendix 10 – Hong Kong building stock statistic

WHAT COMES AFTER 2035?

THE CASE FOR A LONG-TERM CLIMATE STRATEGY

While current policies ensure major reductions up to 2035, the slowdown beyond this point suggests that achieving **full carbon neutrality before 2050 will require additional measures**. The Climate Action Plan must extend its vision beyond 2035 by focusing on:

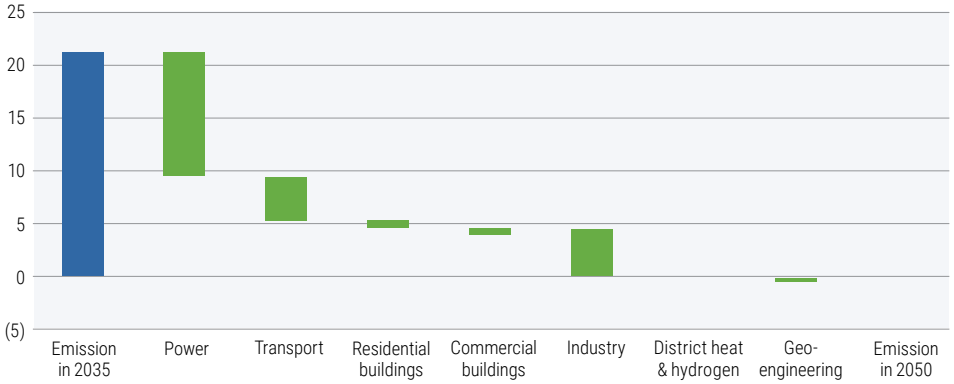
- **Technological Innovations:** Advancing carbon capture, hydrogen energy, and next-generation renewables to tackle residual emissions.
- **Economic and Industrial Transformation:** Reducing reliance on emissions-intensive sectors, and fostering a green economy.
- **Stronger Policy Commitments:** Implementing more ambitious regulations and incentives to sustain momentum towards carbon neutrality.

Hong Kong has made significant strides in climate action, with clear targets such as **phasing out coal by 2035**. However, given the long lead times for energy transitions—often spanning decades—**post-2035 strategies must be developed now** to ensure sustained emissions reductions. Just as the 2010 Future Fuel Mix for Electricity Generation Consultation Document laid the foundation for today's policies, a forward-looking, long-term vision beyond 2035 is crucial to securing Hong Kong's path to full carbon neutrality before 2050.

Emission reduction potential for each sector beyond 2035

	Power	Transport	Residential buildings	Commercial buildings	Industry sector
Total CO_2e Emissions Reduction Required by Sector (Mt CO_2e)	11.71	4.31	0.59	0.68	4.36

Emission reduction driver between 2035 and 2050



While substantial emissions reductions can be achieved by 2035, they are from easier initiatives, particularly the transition away from coal. The graph applies no decarbonisation scenario and assumes a linear projection to zero-carbon emissions from 2035 to 2050. For details on the annual emissions output for this period, please see Appendix 11- Total output of CO_2e Emissions Trajectory Projection. A separate report detailing different decarbonisation scenarios for the post-2035 period will be published at a later stage.

The task of transitioning from the 2035 target to carbon neutrality before 2050 will be more difficult. For example, it will require decarbonising high energy consuming vehicles and vessels, such as ferries and land vehicles. Solutions may include large batteries for ferries and hydrogen for garbage trucks and cement mixers. Moreover, this increases the importance of constructing buildings from hereafter to be energy efficient. Buildings are long-lasting infrastructure and their energy performance will have a lasting impact on emission trends for decades to come. Solutions may include prioritising energy-efficient designs, construction, and retrofitting, so that the long-term energy savings can be locked-in and reduce the burden of future decarbonisation efforts.

Even with these technologies, it is likely that there will be residual footprint which necessitates being offset by buying carbon credits. Minimising the amount required, and hence the burden on Hong Kong's economy, will be important.

CASE STUDY

HOW ARE MAJOR ASIAN CITIES TACKLING CLIMATE CHANGE?

City	Hong Kong	Singapore	Tokyo	Seoul
Population in 2022	7,498,100	5,637,000	14,040,732	9,597,372
Emission in 2022 ($MtCO_2e$)	33.5	58.6	59.4	46.6
Emission change since 2014	-24%	+3.9%	-11.6%	-3.3%
GHG Emission per Capita (tCOe) in 2022	4.5	10.4	4.2	4.9
Mid-term target	Reduce carbon emissions by 50% by 2035 compared to 2005 levels	Reduction of around 60$MtCO_2e$ in 2030 and between 45-50$MtCO_2e$ in 2035 (17-20% reduction)	Reduce GHG emissions by 50% by 2030 (compared to 2013 levels)	Reduce national GHG emissions by at least 40% from 2005 levels by 2030
Emission in mid-term target ($MtCO_2e$)	20.6	60	28.9	25.7
Long term target	Achieve carbon neutrality before 2050	Achieve net-zero emissions by 2050	Achieve net-zero carbon emissions by 2050	Achieve carbon neutrality by 2050

Major Asian Cities

The above table took reference from each cities' latest publications on climate and environmental policies. Singapore, Tokyo and Seoul are comparable to Hong Kong in tackling climate change due to their similarities as dense, highly urbanised cities in Asia with limited land resources. They each face unique yet comparable challenges such as high energy demand, heat island effects, and vulnerability to extreme weather events like typhoons and flooding.

Hong Kong Has a Lower Per Capita Emission Compared to Regional Peers

In 2022, Hong Kong's per capita GHG emissions stood at 4.5 tCO_2e, lower than Singapore (10.4 tCO_2e), Seoul (4.9 tCO_2e) but slightly higher than Tokyo (4.2 tCO_2e). Thanks to proactive government efforts, Hong Kong has already achieved relatively low per capita emissions, particularly following its swift response to the Paris Agreement. Additionally, Hong Kong's economy is predominantly service-based, making it less reliant on industrial activities compared to Singapore, Tokyo, and Seoul, further contributing to its lower emissions intensity. Moreover, compared to 2014, Hong Kong has achieved the highest emission reduction among the cities listed here.

Hong Kong's Mid-term Target is Ambitious and Notable For Its Long-Term Commitment, However, its 30-year Emission-Reduction Timeframe Leaves Room for Further Enhancement to Match Global Peers and Climate Urgency

Although each city has different timeframes and approaches in how they will achieve their respective mid-term goals, Hong Kong's mid-term targets still has additional room for further enhancement. As its 30-year timeframe is relatively long, this means missed opportunities for innovation in Hong Kong further hinders the adoption of new technologies. Accelerating its timeline or increasing its reduction percentage would align it more closely with the urgency demonstrated by other cities.

Hong Kong aims to reduce its emissions by 50% by 2035 (compared to 2005), targeting to reach 20.6$MtCO_2e$. Singapore's strategy involves peaking their emissions in 2030 before implementing a gradual reduction over the next decade. Meanwhile, Tokyo aims for a 50% reduction by 2030 using 2013 levels, thus achieving the same effect and percentage as Hong Kong in a significantly shorter timeframe of just 17 years. Additionally, Seoul targets a 40% reduction by 2030 using 2005 levels, aiming to accomplish its emission cuts within 25 years, which is still shorter than Hong Kong's timeline.

Carbon Neutrality before 2050 – In Line with Global Peers

Unlike Singapore, Tokyo, and Seoul, Hong Kong has committed to achieving carbon neutrality "before" 2050.The challenges lie in decarbonising electricity generation, improving building energy efficiency, and transitioning to electric mobility.
Compared to other regional cities, Hong Kong is relatively low in its per capita and

total emissions but still needs aggressive action to meet its mid-term and long-term targets. The energy transition, transport electrification, and regional energy collaboration efforts will be critical enablers. Given the compact nature of the city, leveraging technological innovation, policy incentives, and international best practices can help Hong Kong enhance its ambition to catch up to Tokyo and Seoul. Apart from reaching the goals of the Paris Agreement, Hong Kong could also consider the dynamic problem of embodied carbon and provide solutions to improve the accountability and transparency, as well as the eradication of embodied carbon before 2050.

Accounting for Imported Emissions: Hong Kong's Role in Singapore's Carbon Footprint

While Hong Kong has achieved significant reductions in its domestic emissions, it has yet to address the emissions embedded within its supply chain. One critical but overlooked aspect is Hong Kong's reliance on imported refined oil products from Singapore[40], which contributes significantly to Singapore's industrial emissions.[41] Singapore is a major regional refining hub and emits greenhouse gases through the processing of crude oil into refined petroleum products, many of which are exported to Hong Kong. These Scope 3 emissions, though generated in Singapore, are driven by Hong Kong's fuel demand.

Avoiding carbon leakage

Hong Kong has outperformed these 3 Asian cities in reducing its domestic emissions. However, as Asia's World City, it must take responsibility for its entire carbon footprint. Ignoring Scope 3 emissions, such as those from imported refined oil from Singapore, risks underestimating its true impact, falling behind global standards, and failing to achieve genuine carbon neutrality.

Emissions embodied in Hong Kong's imports are substantial and may even exceed emissions from within its territory. They include emissions from producing imported fuel, food, manufactured goods and building materials. Furthermore, by some estimates, as buildings become more efficient, the carbon embodied in the materials used for their construction may surpass the carbon emissions generated throughout its entire operating life.

As the global economy moves towards carbon neutrality, it is likely that most jurisdictions will put a price on embodied carbon. For example, the EU's Carbon Border Adjustment Mechanism is an example of policies which may be widely adopted. To plan for this issue, Hong Kong should account for embodied carbon in its major imports. We suggest three initiatives to start this accounting:

- For large new buildings, the Government should require an embodied carbon statement to be filed for publishing on the Buildings Department website within a certain timeframe of the Occupation Permit being granted. Nevertheless, assuming that every city aims to achieve carbon neutrality carbon by 2050, this report focuses more on addressing Scope 1 emissions and less on Scope 3 emissions.

- Secondly, the Government should account for the carbon content of all types of energy imported into Hong Kong.

- Thirdly, the Government should require the embodied carbon content of all vehicles sold in Hong Kong to be provided to the Transport Department when their First Registration License is applied for, with this information being published on Transport Department's website.

These three initiatives will help make the embodied carbon in Hong Kong's imports visible, thus enabling the development of policies to minimise their future burden on Hong Kong as it moves towards carbon neutrality.

40. In 2021, Hong Kong imported approximately $2.01 billion worth of refined petroleum products from Singapore. Observatory of Economic Complexity. (2021). Hong Kong imports of refined petroleum from Singapore. Retrieved from https://oec.world/en/profile/bilateral-product/refined-petroleum/reporter/hkg

41. The associated GHG emissions from burning this amount of refined petroleum would be approximately 10.80 million metric tons of CO_2. This is equivalent to approximately 25.13 million barrels of oil (assuming an average crude oil price of $80 per barrel in 2021).

WHAT URGENT MEASURES NEEDED FOR CLOSING HONG KONG'S EMISSIONS GAP IN THE NEXT CLIMATE ACTION PLAN?

The results show that Hong Kong's existing policies aligns with the UNFCCC's 2°C goal. However, to close the emissions gap and align with the 1.5°C goal, these policies must be further reinforced. In particular, Hong Kong must adopt a more ambitious and adaptive decarbonisation roadmap—one that recognises sectoral challenges and proactively strengthens the city's climate resilience.

If the public consensus reached from the Hong Kong Long-Term Decarbonisation Strategy Consultation remains valid[42], the Government must review and reprioritise its focus areas based on new benchmarks in preparation for the upcoming Climate Action Plan review. The Government should also build an expectation alignment and address conflicts arising from the differing priorities and perspectives between businesses and the public[43]. This will ensure that all sectors of the economy are effectively decarbonised within the timeline.

To achieve carbon neutrality before 2050, the next climate action plan should build upon CAP2050 and address the following questions, outlined in this report. CAP2050 provides a foundation with strategies such as net-zero electricity generation, energy-saving and green buildings, green transport, and waste reduction. The new plan should expand on these initiatives while incorporating more ambitious and targeted measures to accelerate progress towards the 2050 goal.

42. P.6 Environmental and Ecology Bureau (EEB). (Year). Independent Analysis Report on Hong Kong's Long-term Decarbonisation Strategy. Retrieved from https://www.eeb.gov.hk/sites/default/files/susdev/html/en/council/lds_ira_e.pdf.

43. Appendix 13 – A Comprehensive Stakeholder Analysis - Hong Kong Long-term Decarbonisation Strategy Consultation

6 KEY ACTION AREAS FROM THE STUDY AND NEXT STEP

1 Hong Kong's Carbon Budget is Running Out Fast

- **At the current trajectory, Hong Kong will exceed its fair share of the 1.5°C target by 2029.**
- The city is **aligned with the 2°C goal** but not ambitious enough for 1.5°C.
- Urgent adjustments are needed to close the emissions gap.
- Hong Kong could **establish a 2030 target** to identify easily achievable decarbonisation targets and increase comparability between other major Asian cities, for example, establish the target on ceasing of internal combustion engine vehicles' registration by 2030.

2 Hong Kong Needs a More Holistic Approach to Climate Action

- Current policies focus heavily on energy and transport, but other areas need more attention:
  - Circular economy & waste management (reducing landfill use, improving recycling)
  - Biodiversity protection (urban greening, reforestation)
  - Climate adaptation (flood protection, extreme weather resilience)
- A multi-sectoral strategy is necessary for long-term success.

3 Post-2035 Strategy is Weak

- **Most emission cuts will happen before 2035**, but after that, reductions slow down significantly.
- Hong Kong must focus on:
  - Carbon capture & storage
  - Hydrogen energy
  - Next-generation renewable technologies
  - Battery Storage, as the IEA emphasised that batteries will need to lead a sixfold increase in global energy storage to enable the world to meet its 2030 targets.[44] While increasing renewable energy to the grid supply, it is essential to explore alternative methods for storing excess renewable energy to meet peak demand and reduce reliance on fossil fuels during high-demand periods. Battery storage must be deployed to maintain a balance between the amount of electricity generated and consumed.
  - More aggressive electrification of transport and buildings
- Without these, achieving carbon neutrality before 2050 will be difficult.

44. International Energy Agency (2023). World Energy Outlook 2023. Retrieved at https://www.iea.org/news/rapid-expansion-of-batteries-will-be-crucial-to-meet-climate-and-energy-security-goals-set-at-cop28

4 The Gap Between Policy and Implementation

- While Hong Kong has strong climate policies on paper, their implementation has been inconsistent.
- The power sector is transitioning effectively by phasing out coal, increasing the use of natural gas, and integrating zero-carbon energy sources.
- The building sector remains a major weak point due to high energy consumption and slow progress implementing energy efficiency upgrades.
- The transport sector is lagging with:
  - A slow adoption of EVs for taxis/buses, and trucks
  - A lack of a clear plan to stop the sale of petrol- and diesel-powered cars, despite electric vehicles representing 75% of all new car sales in Hong Kong in 2024.

5 The Need for Greater Transparency and Accountability

- While the Government has declared that $240 billion will be spent on climate related issues, no plan has been published on how this budget might be spent. Furthermore, there is no information on what the budget has already been committed to.
- Improved monitoring, reporting, and independent audits of sector progress to key stakeholders could strengthen policy execution.

6 The Role of Public Engagement and Education

- Past public consultations have shaped climate policy, but conflicts remain.
- Stronger climate education programs, incentives for low-carbon lifestyles, and better corporate responsibility measures could increase support for stricter policies.

Based on these six action areas, this study recommends the following guiding questions for Hong Kong to collaborate and identify the best-fit solution for its needs.

Key Strategies for Hong Kong's Sustainable Future

	How Can Hong Kong Ensure a Sustainable and Secure Power	How Can Hong Kong Ensure a Sustainable and Low-Carbon Transport Sector?	How Can Hong Kong Drive Decarbonisation in the Building Sector?
Objective	Ensuring Hong Kong has affordable, reliable, and safe energy with zero carbon emissions.	Enhancing the energy efficiency of commercial buildings to reduce electricity consumption and greenhouse gas emissions.	Creating sustainable, liveable NDAs by reducing transport emissions while enhancing quality of life.
Stakeholder involved	**Environment and Ecology Bureau, Power Companies** **Electricity supply** • Accelerate the phase-down of coal before the 2035 phase-out deadline to avoid the early write-off of coal-related asset values, minimise impact on tariffs and improve public health. • The Government and the power companies can lead an impactful transition within a relative short timeframe to reduce the use of coal-fired generation units by prioritising these units as lower-tier energy sources. • Increase grid-batteries in Hong Kong to increase Hong Kong's ability to utilise zero-carbon electricity and minimise the impact from a single incident so that and alternative supply is also available. **Towngas** Towngas endeavours to reduce its carbon intensity, that is currently 0.23 kg CO_2e/kWh, to a lower amount by 2035. To further support Hong Kong closing its emission gap, we would suggest Hong Kong to explore ways of further reducing the carbon intensity of towngas. • Accelerate the adoption and use of zero-carbon fuels such as green naphtha, green methane, and green methanol to replace fossil fuels in towngas production. • Explore Carbon Capture, Utilisation, and Storage (CCUS) for CO_2 emissions generated during towngas production. • Increase the proportion of hydrogen in towngas, preferably using green hydrogen. • The Energy Efficiency Office (EEO) at the Electrical and Mechanical Services Department could identify and promote application scenarios where towngas or electricity can provide higher efficiency and reduce energy loss during energy conversion. – For instance, the EEO can publish a catalogue with the relative carbon intensity of using electricity and towngas for common appliances like dehumidifier, water heater, stoves & hobs, and oven over their expected operating lives.	**Environmental Protection Department, Transport Department, Transport Companies, Vehicle Owner** **AVOID** journeys. Actions include: 1) Encouraging town planning which facilitates walking from residential buildings to shops, schools and public transport. • enables every child to walk to school. • Supports a high percentage of families to walk to buy groceries. • Promote most commuting journeys to be done via MTR. 2) Reforming stamp duty tax to reduce the cost of people moving close to where they work. 3) Revise rules for renting public housing to enable people to move close where they work. 4) Facilitating home delivery to reduce GHG emissions. **SHIFT** to lower emissions mobility modes. Actions include: 1) Facilitating town planning and transport policies which aims to move journeys towards other forms of low-carbon transport. 2) Introducing electronic road pricing. This can be by : • Charging a higher fee for higher-carbon emission vehicles. • Varying the charge by time of day to encourage off-peak travel, thus reducing congestion which can exacerbate increasing carbon emissions when left to idle. 3) Enhancing phone apps to make journeys on low-emission modes of transport easier. 4) Disincentivising private car ownership by: • Increasing the cost of private car ownership • Incentivising developers of new buildings to provide a zip carpool rather than a car park for each accommodation unit. 5) Encouraging transport operators to provide more services to deter people from owning private cars. For example: • Taxies should offer services such as the provision of baby-seats that can be booked through ride-hailing services. • Reducing the provision of parking spaces in shopping centres and instead facilitating transport for hire to help people going shopping get home. **IMPROVE** each mode of transport by using electricity, hydrogen and other synthetic fuels made without carbon emissions.	**Environmental Protection Department, Power Companies, Buildings Department, Commercial building owner. Residential building owner** Hong Kong's economic activity is concentrated in the service sector, with both its agriculture and manufacturing sectors representing a small part of its economy. As a result, in 2022, buildings accounted for 96% of electricity consumption and 60% of greenhouse gas emissions, of which commercial buildings comprised 40%. Thus, the energy efficiency of these commercial buildings are a priority. **The Government** 1) Introduce and publish a metric for the relative energy efficiency of buildings. The benefits of this include: • Using the building's energy efficiency as a metric for prospective renters and tenants. • The Government can incentivise improved energy efficiency by: – Only giving Gross Floor Area (GFA) concessions when energy efficiency is better than a specified level • Review and revise building codes to prioritise energy-efficiency designs • Once the metric is proven, modify the rates tax to charge a higher percentage of rental value for efficient buildings than for inefficient ones.[45] Changing public attitudes and behaviours towards energy-use is crucial as citizens represent a big part of energy consumption. In the residential sector, maintaining an average indoor air temperature between 24-26°C can significantly reduce energy consumption. Additionally, switching off appliances and systems when not in use should become a habitual practice. These small changes, when adopted widely, can lead to substantial energy savings and lower carbon footprints.

45. These changes do not affect the balances so the total tax received by the Government is unchanged.

APPENDICES

Appendix 1 – Comparison: Net-Zero vs. Carbon Neutrality

Net-zero and carbon neutrality are two commonly used terms in climate discussions, but they have key differences in scope, approach, and impact. Below is a detailed comparison:

1. Definition

- Net-Zero: Achieving a balance between total greenhouse gas (GHG) emissions produced and those removed from the atmosphere. It includes all GHGs, such as CO_2, methane (CH_4), and nitrous oxide (N_2O).

- Carbon Neutrality: Balancing only carbon dioxide (CO_2) emissions, typically by reducing emissions and offsetting the remaining CO_2 through carbon credits.

2. Scope

Aspect	Net-Zero	Carbon Neutrality
Gases Covered	All GHGs (CO_2, CH_4, N_2O, etc.)	Only CO_2
Approach	Deep emission cuts first, then **removal** of residual emissions	Emission reductions, but can rely more on **offsets**
Goal	Long-term **sustainable reduction** in global warming potential	Short-term mitigation through **offsets**

Appendix 2 – The shaping of global climate strategies

Global climate action has evolved through decades of negotiations, driven by the urgent need to curb greenhouse gas emissions and mitigate the impacts of climate change.

Since the adoption of the Kyoto Protocol in 1997, international efforts have progressed from legally binding commitments for developed nations to a more inclusive, flexible approach under the Paris Agreement (2015). Nations now set their own Nationally Determined Contributions (NDCs), aiming to limit global warming below 2°C, with efforts to stay within 1.5°C. However, the first-ever Global Stocktake at COP28 (2023) revealed a widening emissions gap, emphasising the need for stronger commitments, accelerated action, and global cooperation. As climate risks intensify, the next phase of climate action must move beyond pledges to decisive, transformative implementation. Table 1 shows a summary of the achievements in major COP events.

Timeline of COP Climate Negotiations

Milestone in COP Climate Negotiations	What is it known for?	Year	Major Achievement	Emission Reduction Targets
The Birth of Global Climate Action (1997-2001)				
COP3 – Kyoto	The Kyoto Protocol	1997	• Adoption of the Kyoto Protocol, a legally binding international treaty under the UNFCCC	• Developed countries committed to reducing GHG emissions by an average of 5.2% below 1990 levels between 2008 and 2012
COP7 - Marrakesh	The Marrakech Accords	2001	• Adoption of the Marrakech Accords which established the rules for implementing the Kyoto Protocol	N/A
Expanding the Climate Agenda (2007-2015)				
COP13 – Bali	The Bali Action Plan	2007	• Shifted the focus towards developed countries providing financial and technological support to developing countries	N/A
COP21 – Paris	The Paris Agreement	2015	• Adoption of the landmark global agreement • Introduction of the NDCs, where countries can set their own emission reduction targets which were to be updated every five years • Established a global reporting system for emissions and climate actions • Developed countries pledged financial assistance to help developing countries reduce emissions	• Established the targets to limit the temperature increase to well below 2°C above pre-industrial levels and pursue efforts to 1.5°C above pre-industrial levels
Strengthening Implementation (2018-2021)				
COP24 – Katowice	The Paris Rulebook	2018	• Established the standardised reporting requirements for emissions • Ratified guidelines for tracking progress on NDCs • Started the Global Stocktake process, where progress would be assessed every 5 years	N/A
COP26 – Glasgow	The Glasgow Climate Pact	2021	• Phase down on coal reliance • Enhanced climate finance and increased support for vulnerable nations	N/A
Taking Stock and Looking Ahead (2023 and Beyond)				
COP28 – Dubai	The Global Stocktake	2023	• Conducted the first Global Stocktake, which provided a collective assessment of progress under the Paris Agreement • Fossil fuel phase-out, with pathways for reducing fossil fuel dependence • Call for increased ambition, with countries being urged to aim for stronger climate commitments by 2025 • Finalised a global carbon market framework	N/A

Nationally Determined Contributions (NDC) as a common language to strengthen their ambitions

A key measure to achieve this climate target is via the creation of the Nationally Determined Contributions (NDCs). Countries which have signed the Paris Agreement must regularly report on their emission progress and their efforts to reduce the emissions. The Paris Agreement emphasises the need to strengthen national climate adaptation and mandates that developed nations provide financial support to developing countries to aid their societal resilience.[46] Since the Paris Agreement lacks legally binding targets, the NDCs can give countries additional flexibility to set targets based on their socioeconomic conditions whilst still contributing towards collective goals. By establishing a framework to monitor progress and financial support, the NDCs play a critical role in ensuring transparency and accountability, establishing the effective implementation through shared guidelines and reporting standards.[47]

The first Global Stocktake concluded in COP28 and was designed to assess the global response to climate change every five years. It is used to keep track of the progress towards the Paris Agreement's emission targets and gauge the overall global climate resilience.[48] By monitoring and reviewing climate actions, countries can identify the gaps and opportunities in their climate policy and establish the necessary sectoral pathways to achieve their net-zero targets.[49] In addition to assessing global progress, the Global Stocktake is also meant to inform countries on how to update and enhance their NDCs in preparation for COP30 and the second Global Stocktake in 2028.[50] It urges countries to regularly review their NDCs and long-term climate strategy.

NDC Status Quo- An Overview

Various countries have since released either laws or policies to further their countries' NDC goals and achieve net-zero. As of September 2023, 97 countries have adopted net-zero pledges either as in law (27 countries), in policy documents or long-term strategies (54 countries) or in an announcement from a high-ranking government official (16 countries).[51] These instruments act as the backbone for the countries' climate action and will typically include further details as required by the UNFCCC standards, such as which year the country aims to reach net-zero by, mid-term decarbonisation targets, reviewing and accountability mechanisms, and the sectors and gases covered under emission reporting.

These efforts were exemplified during COP29, which was held in Baku, Azerbaijan. With the deadline to update the NDCs approaching in February 2025, many countries took the initiative to announce their new targets at the global conference ahead of this deadline. For example, the UK set the most ambitious target, announcing that they would reduce all GHG emissions by at least 81% from 1990 levels,[52] indicating their proactive approach to advance climate action. Brazil also pledged to reduce their emissions by up to 67% by 2035 compared to 2005 levels, encompassing all sectors of the economy and all GHGs.[53] Given that the current NDC implementation is not nearly ambitious enough to limit global warming to below 1.5°C,[54] these developments at COP29 demonstrate the urgency of enhancing NDCs to meet international climate targets.

46. *Ibid*, 10.
47. WRI. "Navigating the Paris Rulebook: Enhanced Transparency Framework." UNFCCC, 17 Dec. 2020, www.wri.org/paris-rulebook/enhanced-transparency-framework.
48. "The Global Stocktake." *UNFCCC,* 2023, https://unfccc.int/topics/global-stocktake.
49. UNFCCC. "Key Aspects of the Paris Agreement." UNFCCC, 2015, https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement.
50. Srouji, Jamal. "What Is the 'Global Stocktake' and How Can It Accelerate Climate Action?" World Resources Institute, www.wri.org/insights/explaining-global-stocktake-paris-agreement.
51. "Emissions Gap Report 2023." *UNEP - UN Environment Programme*, www.unep.org/resources/emissions-gap-report-2023.
52. Whiting, Kate. "COP29: What are NDCs and why do they matter?" *World Economic Forum*, 26 Nov. 2024, www.weforum.org/stories/2024/11/cop29-ndcs-and-why-they-matter.
53. "Brazil Submits Its New NDC — in Alignment With the Paris Agreement — to the UN." Secretaria De Comunicação Social, 26 Nov. 2024, www.gov.br/secom/en/latest-news/2024/11/brazil-submits-its-new-ndc-2014-in-alignment-with-the-paris-agreement-2014-to-the-un.
54. Overholt, Maggie, et al. "What Are Nationally Determined Contributions (NDCs) and Why Are They Important?" *World Resources Institute,* 5 Aug. 2024, www.wri.org/insights/nationally-determined-contributions-ndcs-explained.

Appendix 3 - How Has Hong Kong Laid the Foundation for Climate Action?

Pre-Paris Agreement Developments

Cities are home to more than half of the global population and are crucial in the fight against climate change. Cities contribute significantly to greenhouse gas ("GHG") emissions due to their rapid growth of energy consumption, dense transportation networks, and extensive industrial activities. Their high emissions stem from the heavy reliance on fossil fuels for electricity, cooling, the concentration of vehicles leading to significant transportation-related emissions, and the vast amounts of waste generated, which contribute to methane emissions from landfills.

Prior to the Paris Agreement, the Government set up the Inter-departmental Working Group on Climate Change (the Working Group) chaired by the Environment Bureau in 2007. Subsequently, the Government laid the groundwork for climate action in 2010 with the release of "Hong Kong's Climate Change Strategy and Action Agenda", with a view of achieving carbon intensity reduction target of 50 per cent to 60 per cent in 2020 as compared with the 2005 level. This was further supplemented with the release of the "Clean Air Plan" in 2013, identifying discernible improvement areas in air quality. In 2014, the Government released the publication of the Future Fuel Mix for Electricity Generation Consultation Document. It indicated the contemporary emission efforts at the time and guided the actions of the power sector for the following decade, especially since there is a time delay of roughly 10 to 20 years between the actions and the effects. Additionally, the "Energy Saving Plan for Hong Kong's Built Environment 2015-2025+" provided guidance to enhance energy efficiency across the city. Later, in 2015, the "Hong Kong Climate Change Report 2015" was published, which reviewed the science of climate change and released the status report of Hong Kong's local decarbonisation, adaptation, and mitigation strategies.

These initiatives positioned Hong Kong to effectively engage in international discussions on climate change at COP21. It has been projected that Hong Kong can reach its 2035 GHG targets compared to 2005 levels before the stipulated targets in the Paris Agreement. The "Hong Kong Climate Change Report 2015" presented the adaptation and mitigation efforts that Hong Kong had made at the time of its publication, demonstrating that efforts had been made to halve emissions before 2035. High-emitting sectors such as energy and transport are expected to reach their respective targets by continuous fossil fuel phaseout and zero-carbon energy-use.

Appendix 4 – Pre-Paris Agreement Government Environmental Policies

Policy	Year enacted	Features and Commitments	Targets
Hong Kong's Climate Change Strategy and Action Agenda	2010	•	
Clean Air Plan	2013	• Details the measures to tackle air pollution from power plants, land and sea transport, and non-road mobile machinery to enhance regional collaboration • Identified areas of improvement in air quality • Endorsed regional air pollutant emission reduction plans with specific targets for 2015. Targets to be finalised in 2020	• By 2014, to have New Air Quality Objective (AQO) to come into force and New Air Quality Health Index (AQHI) to complement new AQO • Achieve HK's HK-Guangdong targets for 2015 • Achieve new AQO by 2020 and HK-Guangdong targets for 2020
Future Fuel Mix for Electricity Generation Consultation Document	2014	• Evaluates the existing regulation of electricity supply and fuel mix to prepare for future fuel mix revamp in next SCAs • Highlights contemporary emission efforts and trends which guided the actions of the power sector for the decade • Considers the fuel mix and compares the fuel types for future electricity generation for Hong Kong • Outlines potential fuel mixes for Hong Kong based on analysis and community feedback	• Proposes a choice between two fuel mix options: a) Import 50% of electricity (with 20% being nuclear and 30% being new purchase from the Mainland power grid), 40% from natural gas for local generation, and 10% from coal and renewable energy b) Import 20% nuclear, 60% from natural gas for local generation, and 20% from coal and renewable energy
Hong Kong Climate Change Report 2015	2015	• Presents the existing adaptation and mitigation efforts that Hong Kong had made at the time	• Reduce carbon intensity from the 2005 level by 50-60% by 2020, and to reduce the city's energy intensity from the 2005 level by 40% by 2025
Energy Saving Plan for Hong Kong's Built Environment for 2015-2025+	2015	• Presents a chronology of efforts to achieve higher energy savings in buildings • Highlights successes and caps in the implementation of energy-saving in buildings • Evaluates the energy consumption reduction opportunities up to 2025	• To achieve energy intensity reduction by 40% by 2025, using 2006 as a base • New Government buildings with construction floor area of >5000m^2 with central air-conditioning or >10,000m^2 to achieve at least BEAM Plus Gold • Government buildings to achieve 5% of electricity reduction target by 2020, using 2014 as a base

Appendix 5 – Target Comparison between CAP2030+, CAP2050, Energy Saving Plan

Target	CAP2030+	CAP2050	Energy Saving Plan
Energy Intensity	65-70% from 2005 level by 2030	No Target	40% from 2005 levels by 2025
Timeframe	2017-2030	2021-2050	2015-2025+
Residential Sector			
Electricity consumption	5.4% from 2012 levels by 202[55]	10-15% from 2015 level by 2035 20-30% from 2015 level by 2050	5.4% from 2012 levels by 2025[56]
Zero-carbon in building energy consumption	No specifics	54-63% before 2035[57] 100% zero-carbon by 2050	No specifics
Energy efficiency performance, Retrofit and Retro-commissioning	Promote Energy Audit Code (EAC) recommendations to be carried out by 2030	Strengthen the promotion of retro-commissioning	No specifics
Renewables	No specifics	6.75-9% by 203[58]	No specifics
Commercial Sector			
Electricity consumption	5.4% from 2012 levels by 2025[59]	15-20% from 2015 level by 2035 30-40% from 2015 level by 2050	5.4% from 2012 levels by 2025[60]
Zero-carbon in building energy consumption	1-1.5% in schools	54-63% before 2035[61] 100% zero-carbon before 2050	1-1.5% in schools
Energy efficiency performance, Retrofit and Retro-commissioning	Promote Energy Audit Code (EAC) recommendations to be carried out by 2030	Strengthen the promotion of retro-commissioning	10% above statutory standards in government buildings

55. The target is to reduce energy intensity by 40% by 2025 with 2005 base, that is 6% actual reduction in energy consumption in 2012 on page 70 of https://eeb.gov.hk/sites/default/files/pdf/EnergySavingPlanEn.pdf . Then 6 x 0.9
56. The target is to reduce energy intensity by 40% by 2025 with 2005 base, that is 6% actual reduction in energy consumption in 2012 on page 70 of https://eeb.gov.hk/sites/default/files/pdf/EnergySavingPlanEn.pdf . Then 6 x 0.9
57. Since power companies export 90% electricity to buildings, therefore 60%-70% x 0.9
58. The target is to increase fuel mix for electricity generation with RE into 7.5-10% by 2035; 15% before 2050. Then x0.9
59. The target is to reduce energy intensity by 40% by 2025 with 2005 base, that is 6% actual reduction in energy consumption in 2012 on page 70 of https://eeb.gov.hk/sites/default/files/pdf/EnergySavingPlanEn.pdf . Then 6 x 0.9
60. The target is to reduce energy intensity by 40% by 2025 with 2005 base, that is 6% actual reduction in energy consumption in 2012 on page 70 of https://eeb.gov.hk/sites/default/files/pdf/EnergySavingPlanEn.pdf . Then 6 x 0.9
61. Since power companies export 90% electricity to buildings, therefore 60%-70% x 0.9

Appendix 6 – Policy Blueprint after the release of Climate Action Plan 2050

Policy Document	Policy Summary	Key Goals	Implementation Timeline	Targeted sectors	Key Strategies and actions	Stakeholder Involvement	Challenges and Considerations	Expected Impact
The Waste Blueprint for Hong Kong 2035	The Waste Blueprint for Hong Kong 2035 focused on enhancing waste management practices and promoting a circular economy. It aimed to significantly reduce waste generation and increase recycling rates, thereby minimising the environmental impact of waste disposal.	Reduce per capita waste disposal by 40-45% by 2035, increase recycling rate to 55%, eliminate landfill use, expand waste-to-energy solutions.	2021-2035 (progressive implementation of waste charging, landfill phase-out by 2035)	Waste management, households, businesses, construction	Municipal solid waste (MSW) charging, extended producer responsibility (EPR), green technology adoption.	Government (EEB, EMSD, EPD), Waste Management Firms, Businesses (Real Estate, Retail), Public.	Public adaptation to waste charging, infrastructure for waste recycling, enforcement of policies.	Lower landfill reliance, enhanced recycling economy, reduced pollution.
The Hong Kong Roadmap on Popularisation of Electric Vehicles	The Hong Kong Roadmap on Popularisation of Electric Vehicles was designed to accelerate the adoption of electric vehicles ("EVs") across the city and hasten the commitments to expand charging infrastructure for private cars and commercial vehicles.	Phase-out new registration of internal combustion engine (ICE) vehicles by 2035, develop EV charging infrastructure, promote green public transport.	2021-2035 (new ICE vehicle ban by 2035, EV infrastructure expansion)	Transport, automotive industry, energy sector, consumers	Financial incentives for EV adoption, extensive EV charging network, green transport policies.	Government (EEB, EPD, Transport Department), EV Manufacturers, Power Companies, Financial Institutions, Consumers.	High initial cost of EVs, charging infrastructure expansion, transition for vehicle owners.	Increased EV adoption, reduced vehicle emissions, improved energy efficiency.
The Clean Air Plan for Hong Kong 2035	The Clean Air Plan for Hong Kong 2035 sought to improve air quality through stringent emission reduction targets and enhanced regulations on pollutants. This plan aimed to create a healthier urban environment whilst supporting the overall goals of sustainable development.	Improve air quality to meet WHO guidelines, reduce key pollutants (NO_2, PM2.5, SO_2), expand clean energy-use, promote sustainable transport.	2021-2035 (continuous improvement in air quality, review of policies every 5 years)	Transport, industry, power sector, public health	Stricter emission standards, clean energy transition, expansion of green transport and urban planning.	Government (EEB, EPD, LegCo), Industries, Public Health Agencies, NGOs.	Balancing economic growth with emission cuts, compliance with WHO air quality standards, managing cross-border pollution.	Healthier air, lower respiratory diseases, better urban living environment

Appendix 7 – Key environmental ordinances in Hong Kong and expected amendment date

Ordinance	Latest Edition	Amendment?	Planned future amendment? (as of Oct 2024)	Expected Amendment
Cap. 311 – Air Pollution Control Ordinance	18/08/24	• Introduced a closure notice mechanism • Amended the coverage of "Cement Works"	Y	No plan yet
Cap. 354 – Waste Disposal Ordinance	18/08/24	• Expanded the control scope of the Basel Convention from hazardous EEW to all EEW	Y	January 1st 2025
Cap. 403 – Ozone Layer Protection Ordinance	01/07/22	• Progressively reduced the HFC consumption to meet the phasedown targets set in the Kigali Amendment	Y	No plan yet
Cap. 499 – Environment Impact Assessment Ordinance	1/09/23	• Removal of "Designated Projects" which have adverse environmental harm • Increased the scope that the EIAO is applicable to	N (Last amendment took place June 2023)	N/A
Cap. 598 – Mandatory Energy Efficiency (Labelling of Products) Ordinance	01/09/23	• Expanded the scope of MEELs to cover LED lights, gas cookers and instantaneous gas water heaters	N (Last amendment took place in September 2023)	N/A
Cap. 603 – Product Eco-Responsibility	01/07/24	• Regulated disposable plastic tableware and other plastic products	N	N/A
Cap. 610 – Buildings Energy Efficiency Ordinance	01/07/22	• Proposed amendments: – To include buildings that are considered data centres under the remit of the energy efficiency standard – To require more energy audits – To shorten the interval of energy audits – Mandate disclosure of energy audit report information – Have a sector expert as part of the assessment criteria	Y	No plan yet

Appendix 8 – Implemented Government environmental policies after CAP2050

Electricity Generation

- New Guidance Notes for Solar Photovoltaic (PV) System Installation (24/06/24)
- Set up the $10 billion New Industrialisation Acceleration Scheme to provide financial assistance for enterprises dealing with new energy technologies (2023 Policy Address)
- Practice Note for the Installation of Solar Photovoltaic Systems in Private Developments (11/05/22)
- Earmarking $1bn to install small-scale renewable energy systems at Government buildings and infrastructure (24/2/21)
- Hong Kong Solar Irradiation Map (2021)

RE Projects

- $5 billion Strategic Tech Fund for the Hong Kong-Shenzhen Innovation and Technology Park that will focus on new industries including new energy technology (19/10/22) (2022 Policy Address)
- 3rd Floating Photovoltaic Pilot Scheme at Tai Lum Chung Reservoir (04/22)
- Development of more WtE facilities as part of Waste Blueprint for HK 2035 (01/22)

Nuclear Energy

- Increasing share of nuclear energy in HK's fuel mix was discussed as part of Background Brief on the SCA with the two power companies (22/05/23)

Use of Hydrogen as a Fuel

- Strategy of Hydrogen Development launched (17/06/24)
- Formulated the Strategy of Hydrogen Development in Hong Kong in 2023 Policy Address (25/10/23)

Electricity Storage

- CLP to construct new BESS project in 2023 SCA Interim review (28/11/23)

Targets for Improving Building Energy Efficiency

- Improve the energy performance of government buildings and infrastructure by more than 6% in 2024-25 in the 2022 Policy Address (19/10/22)
- Updated Building Energy Code to improve overall energy efficiency by >23% (12/21)

Tightening Building Energy Codes

- Amending Buildings Energy Efficiency Ordinance from 2023 Policy Address (30/10/23) + Consultation Paper of Proposed Amendments to the Buildings Energy Efficiency Ordinance (11/23)
- Consultation Document for the Fourth phase of MEELs to cover LED Lamps, Gas Cookers and Gas Instantaneous Water Heaters (03/21)

Energy Audits

- Carbon audit for government infrastructure to include fresh water pumping stations, sewage treatment and road lighting systems (30/10/23)

Improving Pedestrian Connectivity

- Looking at ways to increase pedestrian connectivity in East Kowloon, Kai Tak, Hong Shui Kiu in 2023 Policy Address (25/10/23)

MTR Developments

- Hong Kong Major Transport Infrastructure Development Blueprint (18/12/23)

Charging Network for EVs

- Charging network in support of the popularisation of electric vehicles in Hong Kong (21/04/23)
- Hong Kong Roadmap on Popularisation of Electric Vehicles (03/21)

Waste Reduction Target

- Waste blueprint for Hong Kong 2035 (02/21)
- Waste Reduction and Recycling Charter for private residential premises (1/6/24)
- Report of the Municipal Solid Waste Charging Demonstration (6/6/24)

SAF and Green Methanol

- Performing a feasibility study for the usage of green methanol for ship bunkering (25/10/2023)
- Promoting the supply of SAF through the planned formulation of a SAF action plan (25/10/2023)

Appendix 9 – A review of key policy target progress towards climate action plan 2050

Power

	Climate Action Plan 2050	Interim Target in 2035	Current Situation	Status
Coal	Coal kept only as back-up capacity by 2035	Phase out by 2035	CLP plans to retire older coal-fired units at Castle Peak A Power Station and end coal generation at Castle Peak B by 2035. Meanwhile, Hongkong Electric is building a new gas-fired unit at Lamma Power Station, set to replace an old coal unit by 2029.	Optimal
Natural Gas	Natural gas kept between 30% to 40% by 2035 and phase-out by 2050	Between 30% to 40%	49% of CLP's fuel mix in 2023 56% of HKE's electricity output to around 70% in 2024	Optimal
Renewables*	• Expansion of local renewables between 7.5% to 10% by 2035 and 15% by 2050 • A mixture of renewables, nuclear and green hydrogen between 52.5% to 60% by 2035 and 85% by 2050	Between 7.5% to 10%	increases less than 1% per year	Optimal
Nuclear		Between 52.5% to 60%	No idea about the latest negotiations between Hong Kong and the Mainland	Optimal

Building

	Climate Action Plan 2050	Interim Target in 2035	Current Situation	Status
Commercial Buildings	Reduce electricity consumption of commercial buildings by 30-40% by 2050	Reduce electricity consumption of commercial buildings by 15-20% by 2035	2015 level: 42,368 Terajoule 2022 level: 47,427 Terajoule	Suboptimal
Residential Buildings	Reduce electricity consumption of residential buildings by 20-30% by 2050	Reduce electricity consumption of residential buildings by 10-15% by 2035	2015 level: 104,647 Terajoule 2022 level: 105,806 Terajoule	Suboptimal

Transport

Climate Action Plan 2050	Interim Target in 2035	Current Situation	Status
Zero vehicular emissions before 2050	No new registration of fuel-propelled private cars by 2035 or earlier	Hong Kong is reducing first registration at an average of 5065 fuel-propelled private cars per year. Which means, there will be no new registration of fuel–propelled private cars by 2027.	Optimal
Chief Executive's 2022 Policy Address	Introducing about 3,000 e-taxis by end-2027	There are currently 89 electric taxis in December 2024[62] There will only be 272 e-taxis by 2027.	Suboptimal
Chief Executive's 2022 Policy Address	Introducing about 700 e-buses by end-2027	There are currently 118 public and private e-buses in June 2024. There will only be 478 e-buses by 2027.	Suboptimal
Chief Executive's 2023 Policy Address	Increase the total number of public and private parking spaces with charging infrastructure to about 200 000 by mid-2027	Hong Kong is constructing EV chargers at an average of 1400 per year. By mid-2027, there will only be 12,928 EV chargers in Hong Kong.	Suboptimal

62. Environment and Ecology Bureau. *Green Transformation Roadmap of Public Buses and Taxis*. 10 Dec. 2024, www.eeb.gov.hk/sites/default/files/pdf/Bus_Taxi_Roadmap_eng.pdf.

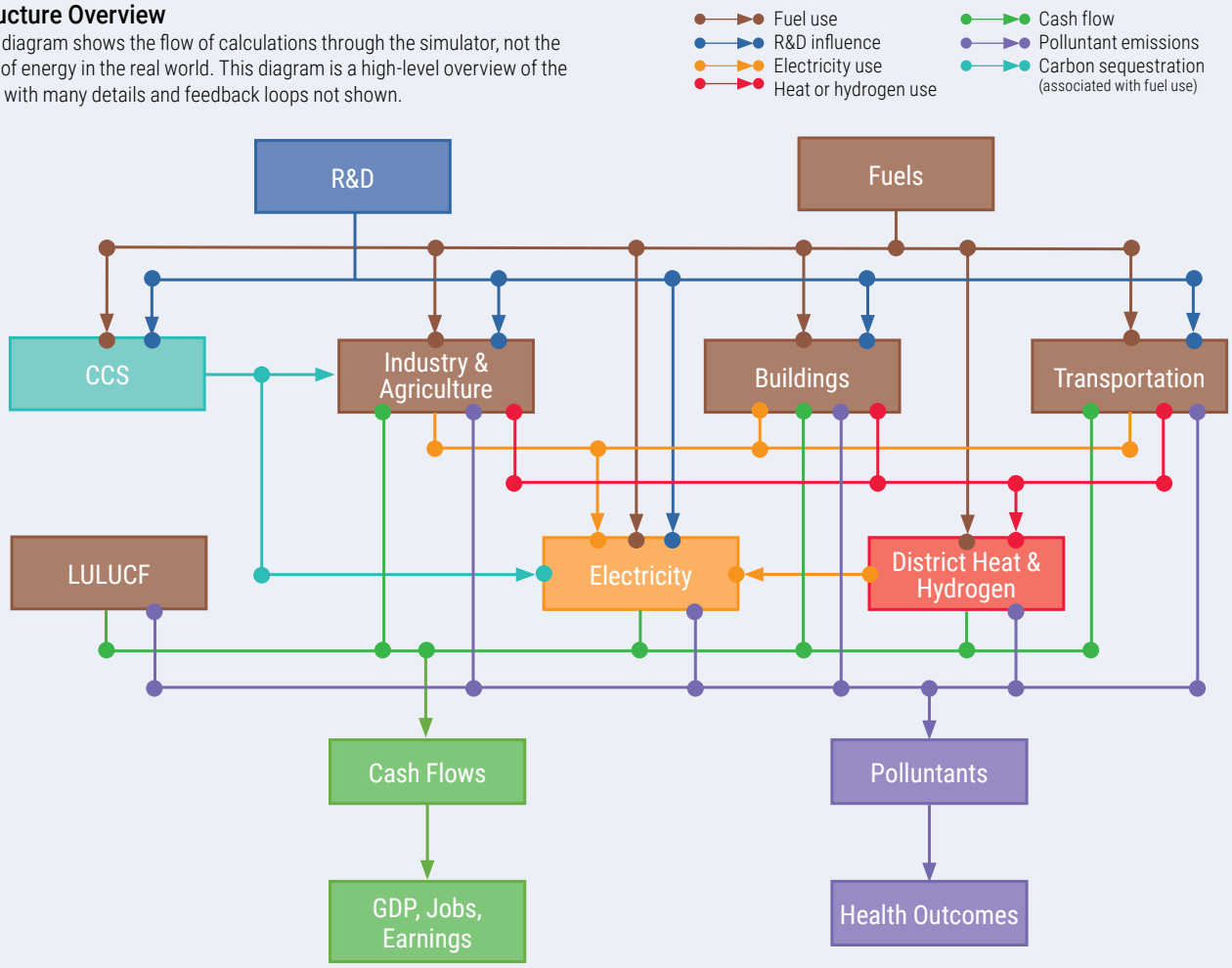
Appendix 10 – The method for building Hong Kong CO_2e Emissions Trajectory projection

This study adopted the Energy Policy Simulator (EPS), an open-source model developed by Energy Innovation which evaluates decarbonisation strategies and policies through scenario analysis, to determine the most cost-effective course to a low-carbon economy. The model can generate different outputs, including emissions, financial metrics, electricity produced, and deployment of vehicles. The EPS was designed to inform and empower decision-makers by visualising the potential dynamics of various policies across sectors, supporting policy development and prioritisation. Building upon a previous 2020 report, the EPS has been updated to include the most recent data and blueprints. This report aims to inform the society of Hong Kong of the scientific evidence on sectoral decarbonisation pathways, facilitating a conversation to implement the city's carbon neutrality target by 2050.

High-level overview and the feedback loop of the EPS

Structure Overview

This diagram shows the flow of calculations through the simulator, not the flow of energy in the real world. This diagram is a high-level overview of the EPS, with many details and feedback loops not shown.



Crucially, the current modelling relies on linear projections for emission reductions, which may underestimate challenges in hard-to-abate sectors, such as energy. These sectors often experience gradual reductions followed by stagnation, making it essential to adopt sector-specific policies that drive deeper, faster cuts in emissions rather than assuming steady, uniform declines. Without a recalibrated approach, Hong Kong risks falling short of its climate commitments, underscoring the need for urgent policy enhancements and accelerated mitigation strategies.

Appendix 11 - Total output of CO_2e Emissions Trajectory projection

Time (Year)	Cumulative emission ($MtCO_2$)	Emission ($MtCO_2$)	Highlight
2020	33.3	33.3	*HK Govt data
2021	68.0	34.7	*HK Govt data
2022	101.5	33.5	*HK Govt data
2023	135.6	34.1	
2024	169.7	34.1	
2025	203.6	34.0	
2026	237.0	33.4	
2027	269.8	32.8	
2028	302.0	32.2	
2029	333.7	31.7	> 66% probability of staying within 1.5°C.
2030	365.0	31.3	
2031	395.9	30.9	
2032	426.4	30.55	> 50% probability of staying within 1.5°C.
2033	453.9	27.4	
2034	479.3	25.4	
2035	500.5	21.2	
2036	515.1	14.6	
2037	528.7	13.6	
2038	541.2	12.5	
2039	552.7	11.5	
2040	563.2	10.4	
2041	572.6	9.4	
2042	580.9	8.4	
2043	588.2	7.3	
2044	594.5	6.3	
2045	599.7	5.2	
2046	603.9	4.1	
2047	607.0	3.1	
2048	609.1	2.1	
2049	610.1	1.0	
2050	610.1	/	

* HK Govt data: https://cnsd.gov.hk/wp-content/uploads/2023/12/Greenhouse-Gas-Emissions-in-Hong-Kong-by-Sector.pdf

Appendix 12 - Hong Kong's building stock statistic

Construction Period	Percentage of Stock (%)	Cumulative	Building Age
Pre-1960	2.1	2.1	>60
1960-69	11.3	13.4	50-60
1970-79	15.1	28.5	40-50
1980-89	22	50.5	30-40
1990-99	19.2	69.7	20-30
2000-09	15.1	84.8	20-30
Post-2009	15.2	100	0-10

From this, we can estimate the **average age of Hong Kong's private building stock**:

- The majority of buildings were constructed between 1980 and 1999 (41.2% of the total stock).
- About **28.4%** of the buildings were **built after 2000**.
- Around **28.5%** of the stock is over 40 years old (built before 1980)

Hong Kong Property Review 2023[63]

63. Rating and Valuation Department. (2023). *Hong Kong property review 2023.* The Government of the Hong Kong Special Administrative Region. https://www.rvd.gov.hk/en/publications/hkpr.html

Appendix 13 - A Comprehensive Stakeholder Analysis - Hong Kong Long-term Decarbonisation Strategy Consultation

Between 2019 and 2020, The Council for Sustainable Development (SDC)'s Public Engagement on Long-term Decarbonisation Strategy gathered extensive feedback through six Focus Group Meetings, 65 engagement events, and receiving over 71,000 public responses. The consultation revealed strong public support for energy efficiency, waste reduction, and low-carbon lifestyles, while highlighting divergent views on nuclear energy and the energy mix. It emphasised the need for a just transition, driven by government incentives, corporate responsibility, and behavioural change. The final 55 policy proposals across eight sectors laid the foundation for Hong Kong's long-term climate strategy and underscored the importance of ongoing public participation in climate governance.

Stakeholder Category	Examples	Interests	Influence
Government Agencies	Environmental Protection Department, Transport & Housing Bureau, Council for Sustainable Development	Policy implementation, infrastructure development, emissions regulation	Regulatory authority, funding and policy-making
Businesses & Industry Groups	Energy providers, real estate developers, commercial tenants, construction firms	Balancing sustainability with economic growth, energy efficiency, corporate social responsibility	Investment decisions, business sustainability strategies, emissions reduction commitments
Non-Governmental Organisations (NGOs)	Environmental advocacy groups, sustainability organisations	Advocacy for strong environmental policies, renewable energy transition	Public awareness campaigns, lobbying efforts, pressure on policymakers
Academic Institutions	Universities, research centres, climate experts	Providing research-driven recommendations, policy analysis, scientific expertise	Scientific data and reports influencing policy recommendations
Community Groups & Individuals	Residents, professional bodies, advocacy groups	Affordable energy, low-carbon living, urban sustainability	Grassroots movements, participation in public consultations, feedback to policymakers

By analysing **Hong Kong Long-term Decarbonisation Strategy Consultation** reports, we can identify how different stakeholders—government agencies, businesses, NGOs, academic institutions, and community groups—contribute to policy discussions and implementation. The table above helps to map out stakeholder dynamics, assess engagement effectiveness, and uncover best practices and challenges in stakeholder consultation processes. Ultimately, it supports a more informed, inclusive, and transparent approach to climate governance and policy development.

In the previous climate action plan consultation, conflicts between stakeholder groups in Hong Kong's climate action consultations arose due to differing priorities. The Government promoted energy transition, carbon pricing, and low-carbon transport, but businesses resisted due to cost concerns and economic impact. NGOs and academia advocated for faster decarbonisation and stricter regulations, while companies preferred voluntary measures. The public supported sustainability but worried of higher costs and policy feasibility. Energy imports from Mainland China faced strong public opposition, while transport operators resisted rapid fossil fuel phase-out. Balancing economic stability, public expectations, and environmental goals is key to resolving these conflicts effectively.

Key Conflicts Between Stakeholder Groups

Conflict Area	Stakeholder Groups in Conflict	Nature of Conflict	Proposed Solution
Energy Transition & Fuel Mix	Government vs. Businesses & NGOs	The Government pushes for a shift to natural gas and renewables, while businesses worry about costs and energy security. NGOs oppose reliance on Mainland China for energy imports.	The Government should invest in local renewable energy projects (solar, wind) to reduce dependency on energy imports and address public concerns.
Regulation vs. Economic Growth	Government vs. Businesses	Businesses resist strict environmental regulations, arguing they increase operational costs and hinder economic growth.	Introduce financial incentives such as tax rebates and low-interest green loans to help businesses comply with environmental regulations without excessive financial burden.
Corporate Responsibility vs. Public Expectations	Businesses vs. Community Groups & NGOs	Businesses prefer voluntary sustainability measures, while the public and NGOs demand mandatory policies and accountability.	Create a Green Business Accountability Framework that includes mandatory sustainability reporting and tiered incentives for responsible corporate practices.
Carbon Pricing & Financial Burden	Government vs. Businesses & Public	Businesses oppose carbon taxes and cap-and-trade schemes, fearing increased costs. The public is concerned about higher electricity and transportation prices.	Implement progressive carbon pricing, where businesses receive tax credits for emission reductions, and revenue is reinvested into public sustainability programs.
Decarbonisation Speed & Feasibility	NGOs & Academia vs. Government & Businesses	NGOs and climate scientists call for faster decarbonisation, while businesses and the G overnment argue for a gradual transition to protect jobs and economic stability.	Establish a phased decarbonisation roadmap with short-term and long-term targets, ensuring businesses have a realistic transition timeline.
Public Transport & Low-Carbon Mobility	Government vs. Businesses & Public	The Government promotes EVs and pedestrian-friendly urban planning, but transport operators resist due to infrastructure challenges and high costs.	Expand EV charging infrastructure, offer fleet transition subsidies, and require corporate fleets to meet green vehicle targets within a specified timeframe.
Waste Management & Circular Economy	Government vs. Businesses & Public	NGOs and the Government push for stricter recycling and waste reduction policies, but businesses argue that logistics and costs make compliance difficult.	Provide subsidies for waste management infrastructure, streamline recycling processes, and implement a gradual waste-charging policy to ease public resistance.

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