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Post-COP28

Decarbonising Hong Kong, lessons learnt and next steps

Content

Preamble - Climate action is becoming more and more critical

2023 has shattered climate records, accompanied by extreme weather events which have left a trail of devastation and despair around the world. The World Meteorological Organization reports it was the warmest year ever at 1.45°C above pre-industrial levels, greenhouse gas (GHG) levels continued to increase, sea surface temperatures and sea level rise broke records and Antarctic Sea ice reached a new low. [1]

In Hong Kong this translated into the hottest summer on record with a mean temperature of 29.7°C, a Super Typhoon with maximum windspeeds of up to 230km/h and an unprecedented downpour that lasted 16 hours causing disruptions across the city.

The year concluded with COP28, a critical moment for global climate action, as it marked the first time that the parties assessed their collective progress and ambition under the Paris Agreement. This first ever Global Stock Take confirmed that the world is far off track from limiting global warming to 1.5°C, the threshold to avoid the most catastrophic impacts of climate change.

Hong Kong's potential to be a leading example for climate action

We believe that Hong Kong can and should play an exemplary role in reducing GHG emissions and adapting to climate change. Following the increase in climate hazards and the outcomes of COP28, cities and nations around the world will look even more for best practices, leadership and strong partners on how to decarbonise.

This paper elaborates how Hong Kong is uniquely positioned in this regard. It lists out many things that Hong Kong is doing well, what should be further improved and what suggested actions various stakeholders should take to progress at speed and at scale.

- The first section elaborates on the latest climate insights and explains how COP28 responded.
- The second section adopts a journal-like structure categorised in multiple themes, describing Hong Kong's decarbonisation efforts and what is next.
- The third section includes closing remarks.

Robust and speedy action is the only way forward

The call for climate action has been made for decades, and while there has been some progress, overall, we are still far behind in getting on track to create a liveable world for future generations.

This paper is the result of a continuous collaboration between Arup, Civic Exchange and the Institution of Civil Engineers, Hong Kong Association. We believe that the only way forward is to scale up sharing best practices, enhancing collaboration, and constructively highlighting the challenges, opportunities and responsibilities of various stakeholders.

Hong Kong should step up and take a leading role!

To resonate the mantra used at COP28:
Unite. Act. Deliver.

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Key recommendations for Hong Kong stakeholders

Policymakers

- Disclose more details on the progress of CAP2050, including past and planned allocation of resources, intermediate targets and implementation roadmaps.
- Foster a culture of co-creation between the public and private sectors to demonstrate leadership and accelerate the scaling of best practices.

Private sector

- Integrate climate considerations into corporate strategies and decision-making frameworks, risks and opportunities.
- Conduct WLCAs on all projects and publicly disclose the outcomes to facilitate informed decision-making and support market transformation.

Civil society

- Raise awareness, provide training, and facilitate various stakeholders to understand the roles, responsibilities and possible opportunities around decarbonisation.
- Act as a convenor between entities across different borders and sectors by organising cross-over events, collaborations and platforms to share, co-develop and implement climate solutions.

Reflecting on COP28

The latest climate change insights and COP28's response

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What is driving Global Warming?

The answer is that the energy Earth receives from the Sun exceeds the energy Earth radiates back into space. This energy imbalance is mainly due to the increase of Greenhouse Gases (GHS) in the atmosphere since 1750.

Also contributing to the energy imbalance are:

- Warmer air carries more water-vapour which acts like a greenhouse gas;
- Reduced snow and ice cover and reduced aerosols have caused Earth's surface to become darker and reflect less sunlight back into space. The reduction in aerosols has been accelerated by the shipping industry's 2020 switch to lower sulphur fuels.

As shown in Figure A in the Appendix, the increase in CO2e since 1750 is far greater than the change which caused Earth to go into and out of Ice Ages. So, you may ask: "If the changes are so great why aren't we seeing a greater impact?" The answer is that 93% of the energy imbalance goes to warm oceans and 3% to melt ice. Both take a long time, so we are far from a new equilibrium temperature.

The Intergovernmental Panel on Climate Change (IPCC) estimates that Earth's long-term equilibrium temperature for the current level of all GHGs at between 1.5°C and 4.5°C.[2] Fortunately, Methane, which accounts for most of the non-CO2 impact has a short half-life and, per the Global Methane Pledge, action is being taken to reduce its emissions.

Implications of Earth's energy imbalance

Figure 1 shows Earth's average surface temperature increase in the last 100 years and how the rate of increase has accelerated in recent years. 2023 was particularly hot due to the Pacific El Niño / La Niña oscillation being in a phase which warms the atmosphere and due to the Hunga Tonga volcano eruption in 2022 which increased water vapour in the upper atmosphere by around 10%.

The current impacts of global warming are evident in that:

- Weather has become more energetic and erratic. This is resulting in severe storms and heatwaves. Also, changes in the location of precipitation are causing floods and droughts in areas which are not acclimatised to them.
- Weather patterns are being disrupted. For example, there are periods when freezing Arctic air sweeps south, and others when hot Tropical air sweeps north.

Longer-term impacts of global warming are more worrying as they will result in:

- Less water being stored in mountain ice and snow. Hence less run-off in summer and loss of agricultural productivity.
- Melting of the Arctic permafrost. This will cause emissions of methane and CO^2 leading to more global warming.
- Sea level rise. This will destroy fertile agricultural land in river deltas.
- Slowing down of the ocean conveyor belt. Its major ocean currents impact regional climate and help carbon sequestration by oceans.
- Consequential human impacts. These include the likelihood of millions of climate refugees and climate conflicts between nations.

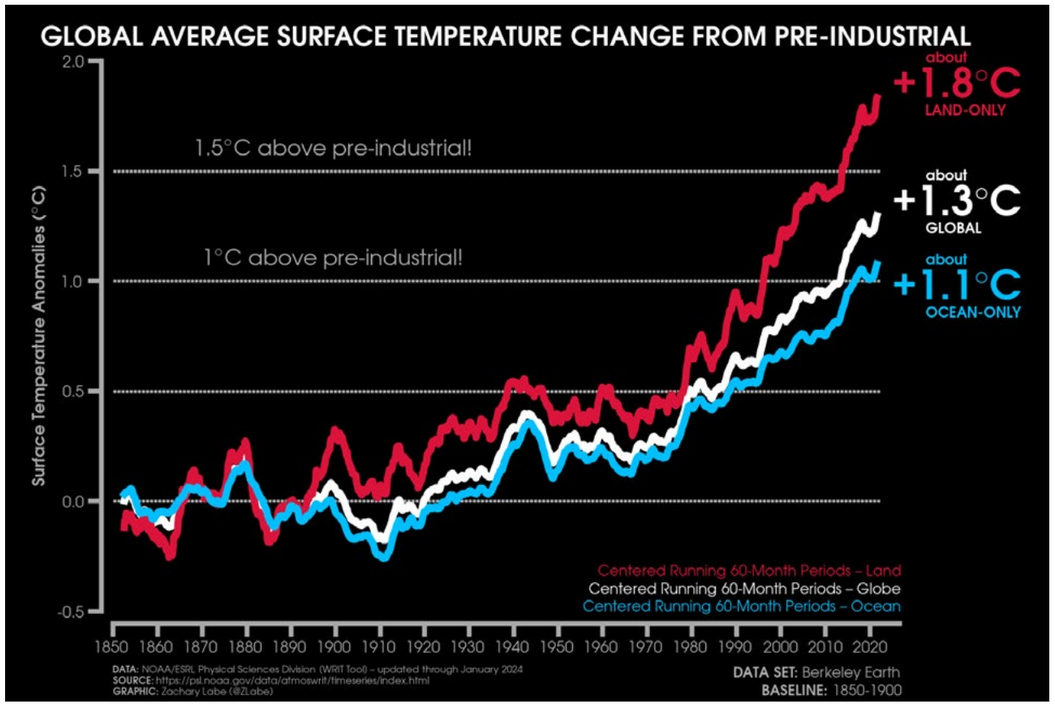

Figure 1 - Global average surface temperature change from pre-industrial [3]

The Global Stocktake

Under the Paris Agreement each country declares its Nationally Determined Contributions (NDCs) to reduce GHG emissions to meet the objective of keeping global warming well below 2°C while trying for 1.5°C.[4] In addition, developed countries are to provide finance, technology and capacity-building support to help less-developed countries develop low carbon economies.

The COP28 Global Stocktake compared action taken so far with what is needed to meet the objectives. The next two years' COPs are tasked with agreeing to improved NDCs which achieve the objective of the Paris Agreement.

The findings of the Global Stocktake are illustrated by the UN Environment Program's Emissions Gap Report 2023.[5] It shows that past growth in GHG emissions means that countries' unconditional NDCs must cut emissions by 28% by 2030 and 37% by 2035 to remain on a pathway to stay within 2°C limit. Staying below 1.5°C looks out of reach as it requires a 42% reduction by 2030. Refer to Figure 2-3 and Figure B in the Appendix for details.

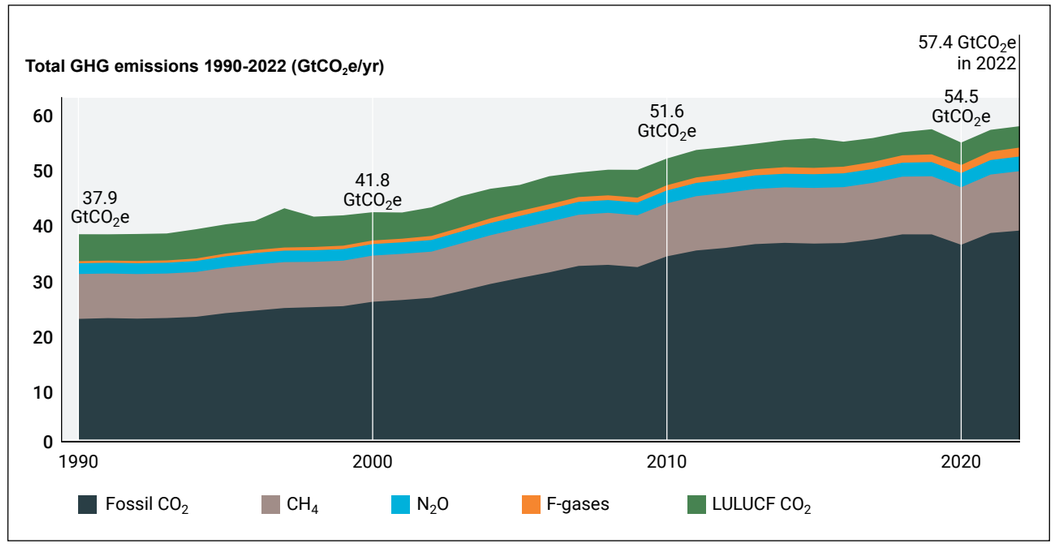

Figure 2 - Total net anthropogenic GHG emissions, 1990–2022 [5]

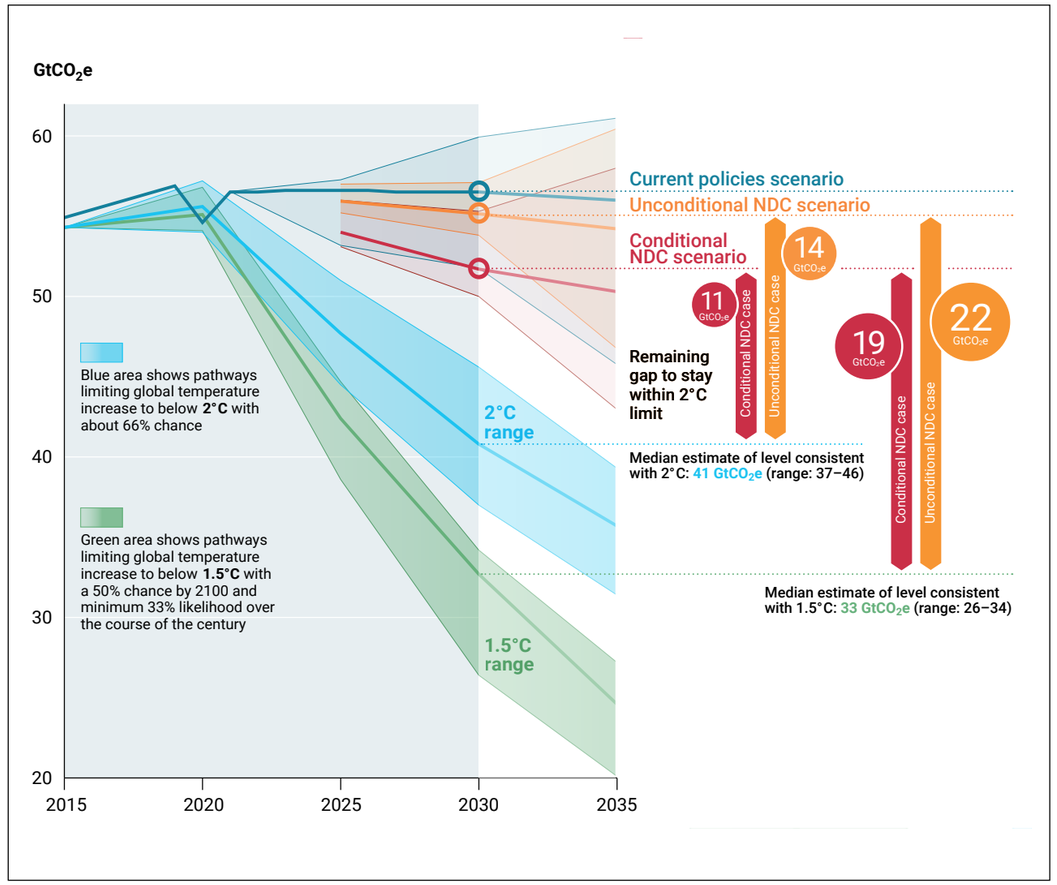

Figure 3 - Global GHG emissions under different scenarios and the emissions gap in 2030 and 2035 (median estimate and tenth to ninetieth percentile range) [5]

Statistics from the World Bank help understand why emissions grew between 1990 and 2022, and hence why it will be very challenging to make the cuts now required. Refer to Figure 4.

World Bank statistics	1990	2022	Increase
GDP (US$ Trillion)	51.4	139.3	171%
Population (Billion)	5.3	8.0	50%
GHG (Giga-tonnes CO_2e)	37.9	57.4	51%
Ratios			
GDP (US$/capita)	9,724	17,525	80%
GHG (Tonnes CO_2e) / (US$ million GDP)	737	412	-44%
GHG (Tonnes CO_2e) / (capita)	7.16	7.22	1%

Note: GDP is measured in 2017 US$ with conversion from other currencies on Purchasing Power Parity basis.

Figure 4 – Insights drawn from World Bank statistics [6]

These statistics tell us that between 1990 and 2022, economic activity per capita increased 80%, while technology improvements reduced the carbon intensity of the economy by 44%, leaving a net 1% increase in emissions. Add the 50% growth of the global population in this period and we get the 51% increase of GHG emissions which occurred. In conclusion, technology improvements alone were not enough to compensate for the increase of emissions resulting from the global growth of wealth and the global population growth.

Transitioning away from burning coal

As the International Energy Agency (IEA) forecast in Figure 5 shows, consumption of coal in China, India and ASEAN has increased over the years with their rapid development. At the same time, burning of coal in the EU and USA has declined. As a result, China, India and ASEAN together accounted for 72.4% of global coal consumption in 2022, and this figure is projected to rise to 86.6% in 2023 and 89.3% in 2026. Refer to Figure C in the Appendix.

China will start reducing its coal consumption, but India and ASEAN continue to grow. Reasons why reducing coal consumption is difficult include:

- Many of their coal-fired powerplants and factories are relatively new and thus have a substantial remaining economic life.
- The powerplants and the related coal mines are a source of employment. What will these people do?
- Substantial capital investment is required for renewable energy generation and the needed distribution infrastructure.

To help on these issues, developed countries are contributing to the Southeast Asia Energy Transition Partnership (ETP) [7] which supports the decarbonising of electricity supply and provides for the workers and communities affected by the transition.

Coming out of the same programme are Just Energy Transition Partnerships (JETPs), which aim to fund the transition. Examples include:

- A US$20 billion JETP with Indonesia in 2022. A report on the financial implications of early retirement of coal-fired power plants in Indonesia was published in March 2023. [8]
- A US$15.8 billion JETP with Vietnam in 2022. A resource mobilisation plan was agreed and published in December 2023. [9]

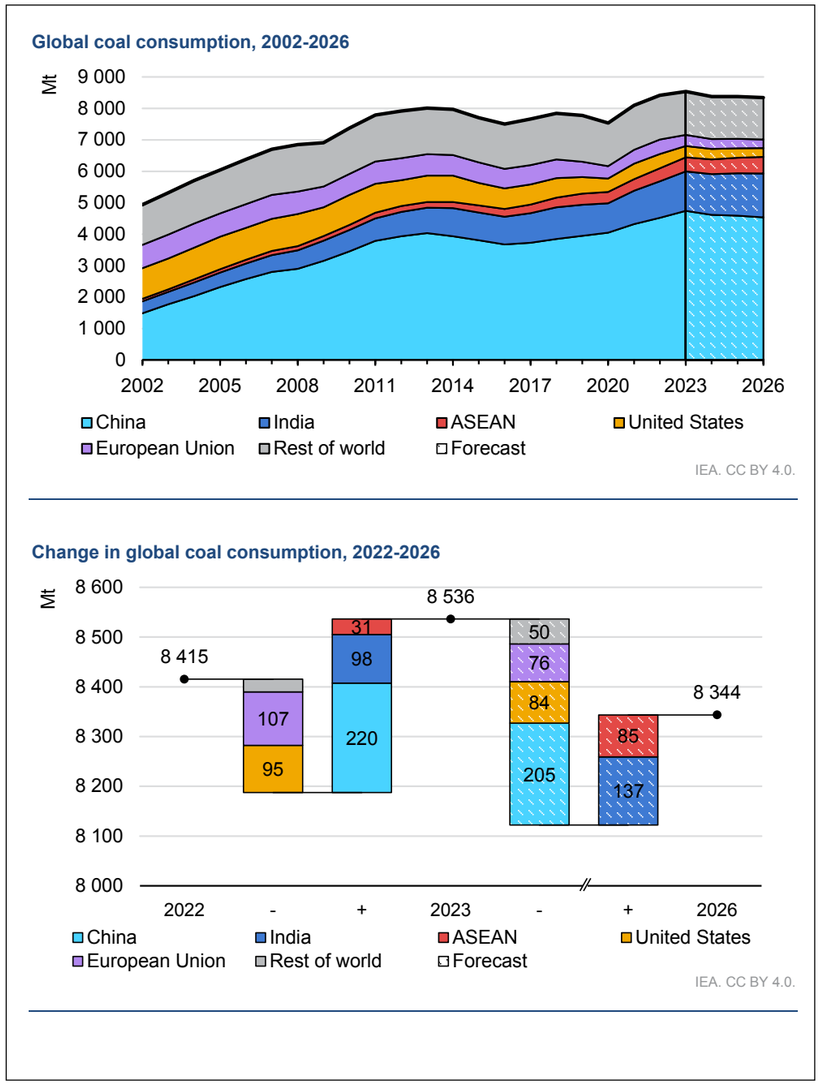

Figure 5 - Global coal consumption and change in global coal consumption, 2022-2026 [10]

What did COP28's 'Decision' achieve given the need for rapid decarbonisation?

As with all COPs, COP28's 'Decision' had to be unanimously approved. And as per usual, this was achieved by the 'constructive ambiguity' of stating action needed. Meaning words were added to get the agreement of countries which wish to limit their contribution and efforts to decarbonise. Refer to clauses 27 to 29 in Figure 5 on decarbonisation from the 11,600+ words 'Decision'. [11] To show the 'constructive ambiguities' find highlighted in green the words committing to decarbonisation, and in red the words weakening the requirement.

27. Also recognizes that limiting global warming to 1.5 °C with no or limited overshoot requires deep, rapid and sustained reductions in global greenhouse gas emissions of 43 per cent by 2030 and 60 per cent by 2035 relative to the 2019 level and reaching net zero carbon dioxide emissions by 2050;

28. Further recognizes the need for deep, rapid and sustained reductions in greenhouse gas emissions in line with 1.5 °C pathways and calls on Parties to contribute to the following global efforts, in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways and approaches:

(a) Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030;

(b) Accelerating efforts towards the phase-down of unabated coal power;

(c) Accelerating efforts globally towards net zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century;

(d) Transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science;

(e) Accelerating zero- and low-emission technologies, including, inter alia, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production;

(f) Accelerating and substantially reducing non-carbon-dioxide emissions globally, including in particular methane emissions by 2030;

(g) Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero and low-emission vehicles;

(h) Phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible;

29. Recognizes that transitional fuels can play a role in facilitating the energy transition while ensuring energy security;

What might countries have been thinking when they supported the inclusion of the words highlighted in red?

"My country is poor and must burn more coal to develop. Our efforts are pressing rich countries to decarbonise faster"

"My country has efficient fossil fuel subsidies - we can keep them"

"Gas is a good transitioning fuel for my country"

Figure 6 – COP28's 'Decision' which was unanimously agreed with the 'constructive ambiguities' of wording committing to decarbonisation in green and words weakening the requirements in red.

What did COP28 achieve in addition to its 'Decision'?

Declarations made at COP28

Declarations pledging action were made for issues which have widespread support but are not included in the COP decision due to objections from some countries.

Multiple declarations and pledges were made or enhanced at COP28. For example, the Global Methane Pledge, with the goal to reduce methane emissions by 30% by 2030. [12] This pledge started at COP26 in 2021 and received substantial extra support at COP28 with 156 countries covering over 50% of global emissions now signed up and satellite real-time monitoring of performance.

Side events at COP28

In addition to the 'Decision', declarations and pledges, there were thousands of side events exploring related issues and presenting policies or proposals. One side event which is important to countries selling to the European Union (EU) was on its Carbon Border Adjustment Mechanism (CBAM). From 2026 the EU will extend its Emissions Trading Scheme to in-EU production of steel, cement and some other carbon intense products. At the same time, it will charge a tariff on imports of these products into the EU, so that the same carbon price as in-EU production will be paid.

Did COP28 produce a 'good' result?

COP28 succeeded in making it clearer than ever that achieving net zero is essential and that the use of fossil fuels without adequate CO_2 removal must stop. To quote a knowledgeable observer [13]:

"What will drive meaningful action around the world – that is, massive cuts in greenhouse gas (GHG) emissions – is the combination of market realities and public policies (with both having impacts on the other).

The most important public policies – whether carbon taxes, cap-and-trade instruments, performance standards, or technology standards – have been and will be enacted at the national level, the regional level in the case of the European Union, and sometimes the sub-national level (for example, California).

Those policy developments are linked with what happens at the annual COPs, but the direction of causation is fundamentally bottom-up, not top-down."

A very important example of a bottom-up policy development linked to COP was the November 2023 Sunnylands, California meeting between Xie Zhenhua, China's special envoy for climate change, and his US counterpart, John Kerry. This meeting resulted in the Sunnylands Statement on Enhancing Cooperation to Address the Climate Crisis [14] [15] covering:

- Energy transition
- Methane
- Circular economy and resource efficiency
- Low-carbon and sustainable provinces/states & cities
- Deforestation, and other items.

Planning for a 2°C world

Confronting climate change requires the mentality of a marathon runner not a sprinter. Sustained effort will be required over a long period of time, in this case, over a century or more.

COPs bring climate change to the top of agendas each year as:

- Scientific advice is updated.
- News organisations pay attention.
- Countries review their climate policies and consider how they can address the problems and look good on the world-stage.
- NGOs focus their lobbying around the COPs.
- Companies listen, lobby and factor climate issues into their business planning.

Finally, while we should strive to keep global warming below 2°C, there is now a significant risk that this level will be exceeded. We must therefore plan for actions needed if this happens.

Simon Zadek, a writer and advisor focused on business and sustainability, considers this in his booklet Time to plan for a future beyond 1°5C. He notes that at 2°C warming, about 40% of the world's population are expected to face severe heat waves, with up to one-third experiencing chronic water scarcity. This leads him to consider the following issues:

- The prospect of an extremely large number of migrants forced to move by climate change
- The need for new ways of producing food given the likely decline in conventional agriculture
- Regulators directing finance towards decarbonisation and adaptation

Hong Kong's potential for being a leader in decarbonisation

The need for regional leadership

Curated by:
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ARUP

The Asia Pacific region holds a crucial role in addressing climate change due to its significant contribution to global carbon emissions, currently accounting for about half of the world's total. [17] Its importance will only further increase in the future as its population is expected to grow from 4.6 billion to 5.3 billion in 2050. [18] Considering that the percentage of the region's population living in urbanised areas will increase from 51% in 2020 to 66% in 2050, [19] it clearly indicates that the way we design our cities will be instrumental.

Although most governments in the region have established climate action plans, they often face challenges in implementing those due to a lack of capital and natural resources, limited expertise and an absence of transparent and feasible strategies on how to translate high-level plans into implementable actions. Following the Global Stock Take's outcomes, these action plans may very well need revision to sharpen ambitions. As such, a growing demand for best practices and leadership can be anticipated.

Hong Kong possesses multiple favourable conditions for becoming an example on how to decarbonise, including a robust financial sector, widespread adoption of advanced technology, high-quality infrastructure, and a supportive policy and business environment. However, several challenges and opportunities must be addressed, and the various stakeholder groups all have a role to play in further accelerating the decarbonisation of the city.

This section includes insights and recommendations that are based on the pre-COP28 'Race to Transition' Asia event series, multiple stakeholder interviews and extensive desktop study. The findings are categorised under multiple themes to ease readership.

Acknowledgements

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- Jenny Lee – Deputy Secretary General, Hong Kong Green Finance Association
- Kevin O'Brien – Chief Executive, Gammon Construction Limited; Chairman, Business Environment Council
- Peter Ho – Director and Honorary Secretary of the Hong Kong Association of Energy Service Companies

Pre-COP28 'Race to Transition' Asia event series

4 events

4 hosting cities across Asia

20+ influential speakers

18 partnering organisations

Attendance (Virtual & in-person) **~1400**

Total no. of media coverage **180+**

The Road to COP28: Driving collective climate action across Asia

Watch more

Transition to Circular Economy

Watch more

Transition to Integrated Water Management

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Transition to Sustainable Development

Watch more

Launch an ambitious decarbonisation strategy

Intro

Ideally, a national or city-wide strategy for the transition to a low-carbon economy outlines specific goals, timelines, and actions. It should ensure that government policies and initiatives are aligned and avoid contradictory measures. It ought to create a predictable environment for businesses and investors, encouraging investment in green technologies and infrastructure, whilst fostering public awareness and support. However, major challenges such as economic implications, political will and public acceptance have proven to significantly hinder the formulation and implementation of successful and ambitious decarbonisation strategies across the Asia Pacific region.

What works well

Launched in 2021, Hong Kong's Climate Action Plan 2050 [20] (CAP2050) sets out the vision of "zero-carbon emissions and liveable city sustainable development" and outlines the strategies and targets for combating climate change and achieving carbon neutrality. Decarbonisation strategies are categorised under the themes of net-zero electricity generation, energy saving and green buildings, green transport and waste reduction. The plan's ambition is to achieve carbon neutrality before 2050, with an interim target of reducing carbon emissions by 50% before 2035 compared to the 2005 level. In addition, various measures and plans are included to address climate change adaptation and mitigation, such as the Energy Saving Plan for Hong Kong's Built Environment, the Clean Air Plan for Hong Kong 2035, the Hong Kong Roadmap on Popularisation of Electric Vehicles and the Waste Blueprint for Hong Kong 2025.

CAP2050 has been essential to trigger dialogues between various stakeholders

Upon its launch, the plan represented a significant improvement from previous plans such as Hong Kong's Climate Action Plan 2030+. It has been essential to trigger dialogues between various stakeholders as it outlines the ambitions of the Government and specifies the themes to focus on. The plan has increasingly become a catalyst for the public and private sectors to have discussions, seek collaboration and appoint responsibilities.

To strengthen co-ordination and promote deep decarbonisation, the Office of Climate Change and Carbon Neutrality was set up in 2023. The Office has been very proactive in constructively engaging with the various sectors and advising what the strategy means to them. A Council for Carbon Neutrality and Sustainable Development will also be formed to advise on decarbonisation strategies.

Progress has been made across the listed measures and numerous new initiatives are in the pipeline. For example, in 2023 the Government announced that it will formulate the Strategy of Hydrogen Development in Hong Kong with the aim to address the production, storage, transportation and application of hydrogen energy. Meanwhile it has already been committed to helping the implementation of hydrogen technologies which in turn enabled Citybus, one of Hong Kong's public bus operators, to launch the first double-decker hydrogen bus in February 2023. Other studies such as hydrogen fuelled light rail vehicles, hydrogen tube trailers and hydrogen power generation on construction sites have been given an agreement-in-principle.

Case study – CLP Power Hong Kong

CLP is one of the two electricity providers in Hong Kong which provides electricity to more than 80% of the population. Aligned with CAP2050 they aim to achieve net-zero greenhouse gas emissions by 2050.

CLP progressively adopts an approach that addresses both demand and supply. It is accelerating Hong Kong's energy transition with a holistic range of strategies, including gradually phasing out coal-fired generation, promoting local renewable energy development, exploring new technologies such as green hydrogen, encouraging electrification, and enhancing regional cooperation for more zero-carbon energy sources.

Case study – Post COP26 – Combatting climate change in Hong Kong and beyond

Following COP26, there is a growing realisation that the world must take more ambitious and immediate actions towards decarbonisation and adaptation to avoid the irreversible damage of climate change. Hong Kong has a role to play. To achieve its carbon neutrality target by 2050, the Government has formulated the Hong Kong Climate Action Plan 2050.

This report elaborates the key features of the plan and suggests some next steps such as clearer timetables to reach the targets and the formulation of policies and incentives to ensure compliance.

What is next

Three years after the launch of CAP2050, it would be desirable to conduct and disseminate a comprehensive review of climate action progress. Furthermore, in CAP2050, it is stated that in the next 15 to 20 years, the Government will be investing HK$240 billion to support a series of actions to combat climate change. Details on how this funding has been allocated and will be allocated are still to be disclosed. Yet in the current economic turbulent times, a clear plan that includes spending principles plays a very important role in strengthening Hong Kong's position as a leading hub for green technology and sustainable finance, as the plan will reinforce confidence in Hong Kong's private sector and attract international investors.

To align with the IPCC recommendations and to demonstrate its leading role, Hong Kong should consider bringing its 50% reduction commitment forward to 2030. This goal is ambitious, yet feasible, particularly since Hong Kong is easier to decarbonise than most other jurisdictions given that less of its economy is in the hard-to-abate industrial and agricultural sectors.

While individual Government bureaus and departments endorse the goals set in CAP2050, a remaining challenge is that each has its own set of priorities which do not always align or contribute constructively to achieving net-zero by 2050. To address this, either the role of the Office of Climate Change and Carbon Neutrality should be expanded, or a dedicated high-level agency should be established to drive integrated policymaking, help line up priorities and monitor progress across Government entities.

In terms of the renewable energy generation targets, a substantial share of this energy is generated outside Hong Kong's territory. While this may be unavoidable due to the city's limited capacity for local generation, it underscores the need for a stronger focus on the demand site reduction. This is particularly important considering the large stock of energy inefficient ageing buildings, a topic that will be further elaborated in the next sections.

Regarding hydrogen, technology seems to develop faster than regulations. For example, Citybus' first double-decker hydrogen bus is currently only serving the area of Kowloon, as that's where the existing hydrogen refill station is located and that, due to existing regulations, hydrogen buses cannot travel in tunnels. Likewise, Hong Kong regulations remain somewhat vague with regards to the import of hydrogen into the city. It is an important task for the Government to expedite the definition of a regulatory framework on hydrogen which is aligned with the city's structural demands, technological capabilities, and environmental aspirations.

Approved by the Government in 2021, the progress on the waste charging bill which requires residents to buy designated plastic disposal bags, has been postponed twice since December 2023 after poor public response and discussions among politicians and former officials. This slow progress in waste management harms Hong Kong's reputation and should be resolved as soon as possible.

Suggested actions for Hong Kong stakeholders

Policymakers

- Disclose more details on the progress of CAP2050, including past and planned allocation of resources, intermediate targets and implementation roadmaps.
- Consider bringing the 50% reduction commitment forward to 2030.
- Align priorities and monitor progress across Government entities, possibly by a high-level agency.
- Strengthen the focus on reducing energy demand side.
- Expedite the formulation of a regulatory framework on hydrogen.
- Resolve the slow progress on implementing the waste charging scheme.

Private sector

- Assess how CAP2050 and other decarbonisation initiatives and frameworks might impact business and assess both the transition risks and opportunities.
- Integrate climate considerations into corporate strategies and decision-making frameworks. risks and opportunities.

Civil society

- Provide constructive criticism to CAP2050, monitor progress, hold decision-makers accountable, and ensure that decarbonisation efforts are transparent and equitable
- Highlight the responsibilities that various sectors should take in implementing CAP2050 and be a convener in bringing stakeholders together.
- Support the development and deployment of hydrogen technologies.
- Help to increase support among the public for the implementation of the waste charging scheme.

Design for net-zero communities

Intro

Large and dense urban areas are commonly associated with environmental degradation, particularly in terms of air pollution and disruption of natural systems. However, they also play a pivotal role in tackling climate change and reaching the goal of net-zero emissions. Density tends to encourage lifestyles that are less carbon intensive. Journeys, whether for work or for leisure, are often shorter, requiring less energy and encouraging active travel like walking or cycling. In addition, a compact form can make city-wide or neighbourhood-wide public transport more efficient and foster the implementation of shared infrastructure that deals with energy, waste or water more efficiently.

What works well

Hong Kong is one of the most densely populated areas in the world, with a population density of 6,753.77 people per square kilometre as of 2024. [21] This high density and the need to optimise the use of limited space has led to the development of mixed-use buildings and neighbourhoods that combine residential, commercial, and sometimes industrial components.

Also, the planning of so-called New Development Areas (NDAs) follows a similar combination of density and mixed-use, adopting a 15-minute city concept, where the essential daily services are accessible within 15 minutes walking or cycling. In addition, these NDAs hinges on strong public transport connections connecting them to other parts of the city.

Hong Kong boasts one of the world's highest rates of public transport usage

Hong Kong is renowned for its efficient and extensive public transport system. It boasts one of the world's highest rates of public transport usage, with over 12 million passenger trips made daily, accounting for over 90% of the total passenger trips. [22]

It is encouraging to see the development of the Traffic and Transport Strategy Study [23] (TTSS) which takes a people-centric approach in formulating strategies for further enhancing passengers' experience of public transport services, improving walkability, creating more sustainable neighbourhoods by better integrated transport and land use planning and building a new generation of so-called Transport Interchange Hubs.

Hong Kong has also set an ambitious target to phase out conventional fuel private cars by 2035 [24], and has introduced incentives and support for electric vehicle adoption, such as tax concessions, charging facilities and parking spaces.

To improve energy efficiency at a neighbourhood level, Hong Kong has made District Cooling Systems (DCS), a key initiative for all NDAs in the coming years. Completed in 2022, the first-ever is the Kai Tak DCS which provides cooling to about 1.73 million m^2 of floor area and as such saves about 85 million kWh of electricity annually. [25]

Case study – Smart Green Resilient (SGR) approach

Arup's Smart Green Resilient (SGR) approach is an exemplar model for adopting an integrated design methodology to combat climate change and ensure long-term resilience. It is based on years of experience and applied to projects across the Asia Pacific region.

SGR initiatives include concepts such as 15-minute neighbourhoods, smart and sustainable mobility with green transport corridors, car-free precincts, breezeways and district cooling systems. These help to ensure climate adaptability and facilitate Hong Kong to achieve its carbon neutrality targets.

What is next

When designing a new neighbourhood or district-scale urban renewal project, an ambitious vision with measurable KPIs on how to reach climate ambitions should be formulated. Taking advantage of the balance between scale and agility, neighbourhood projects can pioneer new policy, trial innovative partnership arrangements, consider creative ways to increase citizen participation and test new technologies or products.

An improvement to consider is to further shift away from large-scale, car-oriented development sites towards a finer grained system that encourages walkability. Ideally, this would involve further optimising mixed-use areas and integrating continuous public open spaces.

The Government's Hong Kong 2030+ initiative proposes a minimum open space provision of 3.5m^2 per person throughout the city. [26] While this is already adopted for new development areas, a more assertive approach is needed to ensure compliance for existing urban areas. Especially older, densely developed areas should enjoy gradual improvements towards the target through means of comprehensive urban renewal projects.

Besides encouraging walkability, this would also address the urban heat island effect. The many buildings, concrete and poor airflow can make some city areas feel much hotter than others. To create indoor relief from the heat, this increases the amount of air conditioners being switched to maximum power, leading more heat being released outdoor and more energy being used, which in turn causes more emissions. A vicious cycle.

Government policies should further shift towards sustainable transport and walkability. For example, some current planning standards, such as (increased) parking minimums, speed limits and road design, seem to prioritise vehicular traffic over pedestrians. Improving walkability has been on the Government's agenda for a long time, yet progress has been slow.

While smart motorway management with the aim to optimise the use of limited road space is appreciated, a missed opportunity is setting the ambition to reduce private car ownership as is the case in other global cities. For example, the Government could consider discontinuing the 'one-for-one' electric vehicle replacement scheme and increase car license fees.

Lastly, responding to CAP2050, an overarching transport decarbonisation pathway could be more clearly defined and adopted to achieve net-zero emissions. This necessitates an integrated approach to rethink land use and transportation for future planning.

Suggested actions for Hong Kong stakeholders

Policymakers

- Increase the formulation of ambitious visions with measurable KPIs on how to meet climate ambitions when planning a new neighbourhood or district-scale regeneration project.
- Update guidelines to encourage the implementation of finer grained development sites and increase the amount of public and private green space.
- Set an overarching transport decarbonisation pathway and prioritise walkability over for example optimising the utilisation rate of existing road space..

Private sector

- Optimise the integration with and connectivity to public transport for new developments and re-developments.
- Investigate going beyond standards and guidelines when it comes to green space and parking provisions within new developments.

Civil society

- Educate the public, provide training, and empower individuals to adopt decarbonisation and energy-efficient practices at a neighbourhood level.
- Contribute to best practices for decarbonisation and develop innovative solutions tailored to the unique context of Hong Kong's neighbourhoods.

Decarbonise existing and new buildings

Intro

Globally, buildings are currently responsible for 39% of global energy related carbon emissions: 28% from operational emissions, including the energy needed to heat, cool and power them, and the remaining 11% from the embodied emissions linked materials and construction. [27]

In the case of Hong Kong, buildings consume 90% of the city's electricity while generating over 60% of carbon emissions. [28] In addition, from the total of 50,000 buildings in Hong Kong, 9,100 were older than 50 years in 2021. By 2030, that number will be closer to 14,000. [29] This brings out two major priorities. The first is the need to increase energy efficiency, especially for older buildings. The second becomes apparent when considering the often-overlooked embodied carbon emissions; retrofitting and thus upgrading older buildings becomes essential as the embodied carbon associated with a new building is on average twice that of a deep retrofit.

What works well

To promote continuous decarbonisation in buildings, CAP2050 sets a medium-term target of reducing the electricity consumption of new and existing commercial buildings by 15% to 20%, and that of residential buildings by 10% to 15% by 2035, using the operational conditions of 2015 as the comparison basis. [20] CAP2050 also commits to achieve net-zero carbon emissions for all new government buildings by 2030 and for all new buildings by 2050.

The city has introduced its own green building rating system in 2010, Building Environmental Assessment Method (BEAM) Plus, which covers the assessment of new and existing buildings, interiors, and neighbourhoods. Beyond passive energy saving strategies such as natural ventilation and lighting, it encourages innovative green building technologies, such as smart meters, building information modelling, and district cooling systems.

The HKGBC has been instrumental in facilitating the building industry to align with CAP2050

Stepping up further action, in June 2023, the Hong Kong Green Building Council (HKGBC) launched the 'Climate Change Framework for Built Environment'. This framework assists the building industry in setting net-zero carbon goals, managing climate risks and utilising tools for benchmarking energy and carbon performance. It aims to support CAP2050 and includes the Zero-Carbon-Ready Building Certification Scheme which has been developed with the participation of more than 10 major developers.

Case study – TKO Plaza

TKO Plaza, opened in 2004, is a prominent retail property of Nan Fung Group with a total mall area of around 34,910m². Embracing science-based targets initiatives (SBTi) to decarbonise, the Group appointed Arup as the consultant to lead TKO Plaza's retro-commissioning.

Driven by data, the collaborative corporate-asset approach has successfully steered the project's daily operations towards carbon neutrality. After the two retro-commissioning projects in 2018 and 2022, the Plaza's overall energy consumption has been reduced by over 25%.

What is next

It's time to think even more ambitiously about speeding and scaling up the transformation of buildings in Hong Kong. The focus for new buildings should shift from making green performance optional through gross-floor-area incentives and nice-to-have certification, as is currently the case, to mandating high green performance standards.

In the 2023 Policy Address, the Government did propose amending the Buildings Efficiency Ordinance, mandating the disclosure of information in energy audit reports. [30] While this is strongly supported, it is also recommended that the scope of regulations is to be expanded to include more types of buildings and to disclose more energy-related information, enhancing transparency and participation. It is also suggested that the interval of energy audits be shortened from the current 10 years to 5 years, aligning with international trends and practices.

Furthermore, conducting and disclosing whole lifecycle carbon assessments (WLCAs) should be considered to become mandated over time, starting with redevelopment projects. The private sector's leadership is demonstrated by Arup, who in 2021 committed to implementing WLCAs for all its building projects, allowing valuable data to be shared with clients and industry partners.

Financial resources and incentives are also integral to encouraging building retrofits. Hong Kong's financial services sector needs to engage more actively with the Government and building owners to develop sustainable financing frameworks for long-term retrofit programmes, particularly those addressing the challenges of scattered building ownership. Increasing tax credits, property tax incentives and grants should also be explored.

The Government could lead by example in setting higher sustainability standards, showcasing best practices and disclosing the energy and carbon performance when retrofitting its own existing assets or undertaking new projects. Such practices should also be adopted by quasi-governmental organisations such as the Urban Renewal Authority and the MTR Corporation Limited, reinforcing the Government's commitment made in CAP2050.

Suggested actions for Hong Kong stakeholders

Policymakers

- Expand the scope of the Buildings Efficiency Ordinance to include more building types, disclose more information and shorten the interval of energy audits from 10 to 5 years.
- Lead by example in setting higher sustainability standards and disclosing energy and carbon performance (WLCA) for retrofitting and new construction.
- Encourage existing building owners to retrofit their assets through providing more incentives such as tax reduction and grands.

Private sector

- Conduct WLCAs on all projects and publicly disclose the outcomes to facilitate informed decision-making and support market transformation.
- Shift towards retro-commissioning or retrofitting of assets to enhance energy efficiency and carbon performance.

Civil society

- Raise awareness about the importance of decarbonisation and advocate for policies that promote sustainable building practices.
- Educate the public, provide training, and empower individuals to adopt decarbonisation and energy-efficient practices at a building level.

Unleash green finance

Intro

Green finance is critically important to accelerate and scale up decarbonisation efforts. It provides the necessary capital to fund renewable energy projects, energy efficiency improvements, and other initiatives that contribute to reducing carbon emissions. Financial instruments like green bonds, green loans, and carbon market instruments, help to guide investments towards environmentally sustainable projects.

What works well

Drawing upon its history as a global finance centre, proximity to mainland China and extensive network, Hong Kong possesses the expertise to lead and shape global initiatives.

Several influential and cross-sector bodies have been formed over the years to accelerate the growth of green finance, co-ordinate the management of climate and environmental risks and support the Government's climate strategies. Examples include the Green and Sustainable Finance Cross-Agency Steering Group and the Green Technology and Finance Development Committee.

Hong Kong's long-standing dedication to advance green and sustainable finance positions it as a key player in the global transition to a low-carbon economy.

Monetary Authority continued with regular institutional Government green bond issuances in the 2022-23 financial year, issuing US$5.75 billion equivalent of green bonds in early January 2023, the largest ESG bond issuance in Asia. [31] Also, the Government Green Bond Programme has introduced several 'firsts', positioning the city as a frontrunner in this area. These include the issuance of the first retail green bond, the first inflation-linked retail green bond, the first multicurrency offering, and the first tokenised green bond issued by a government.

Hong Kong continues to establish world-class regulation through alignment with global standards. The Hong Kong Exchanges and Clearing Limited (HKEX) announced that Hong Kong will adopt the International Financial Reporting Standards (IFRS) Foundation's International Sustainability Standards Board (ISSB) in 2025, making Hong Kong one of the first jurisdictions worldwide to align local sustainability disclosures with benchmarks published by ISSB.

Case study – Leveraging finance to decarbonise Hong Kong and the GBA

This report investigates the development of transition finance in global markets and contextualises them for the GBA. It identifies the challenges faced by banks and corporates as they navigate the transition to net-zero. The findings present opportunities for policymakers and practitioners to support and enhance transition finance efforts.

The report flags that while there has been strong progress in the development of the green bond market, there is a much bigger challenge in terms of decarbonising the hard-to-abate sectors.

What is next

The Guangdong-Hong Kong-Macau Greater Bay Area (GBA) is expected to lead by example in advancing its carbon emission peaking and carbon neutrality ambitions. Also, it aims to establish itself as a regional benchmark for green and low-carbon development. While several efforts are being made, Hong Kong should strengthen cross-regional agency coordination mechanisms in the GBA. This would facilitate the interoperability of transition finance taxonomies and information disclosure standards, promoting sustainable practices across the region.

The finance sector could explore setting a more granular level of carbon disclosure including continuous monitoring and quantitative reporting. Furthermore, banks and asset investment firms should systematically assess in which years assets would become carbon stranded across various jurisdictions, so they can decide whether to further invest in retrofitting or divest. Lastly, banks and asset investment firms should not only rely on high-level tools to assess physical climate risk at a portfolio level but should also push businesses to identify and implement appropriate actions at the asset level to respond to extreme climate events. High-level portfolio assessments can only identify potential risks but insufficient to generate genuine and appropriate actions.

Hong Kong faces the same challenge many global finance centres face: a shortage of ESG talent. Although the Government launched the Pilot Green and Sustainable Finance Capacity Buildings Support Scheme, it has not been sufficient to close the gap. The city needs to either step up capacity building efforts or focus on attracting overseas ESG talents. Through publications such as How far are we from adopting ISSB , NGOs such as Civic Exchange have been instrumental in capacity building. Their publication highlights roles and responsibilities and elaborate on the next steps that should be taken.

Suggested actions for Hong Kong stakeholders

Policymakers

- Strengthen cross-regional agency coordination mechanisms in the GBA to facilitate the interoperability of transition finance taxonomies and information disclosure standards.
- Step up capacity building efforts and focus on attracting overseas ESG talents.

Private sector

- Explore setting a more granular level of carbon disclosure including continuous monitoring and quantitative reporting.
- Systemically assess in what years assets would become carbon stranded across various jurisdictions.
- Identify and implement appropriate actions at the asset level in addition to using high-level tools to assess physical climate risk at a portfolio level.

Civil society

- Raise awareness, provide training, and facilitate various stakeholders to understand the roles, responsibilities and possible opportunities on financing decarbonisation.

Foster business transition

Intro

Businesses play a crucial role in climate action for multiple reasons. They can provide significant financial resources to fund climate mitigation and adaptation projects, closing the gap that public sectors alone can't fulfil. Furthermore, they often drive innovation, develop new technologies and practices that can lead to more sustainable and climate-resilient operations. Lastly, businesses have the power to influence markets and consumer behaviour, by directly or indirectly promoting more sustainable consumer patterns and lifestyles.

What works well

The inaugural Global (Asia Pacific) Business Sustainability Indices (BSI) assesses 69 Hang Seng Index, 50 Australia S&P/ASX50 Index and 30 Straits Time Index constituents, providing a benchmark for regional and industry reference. Overall, Hong Kong companies topped the chart in the total score and ranked as the top 10 companies in the region. [33] As an explanation for the good performance, BSI suggested the growing regulatory requirements on ESG disclosure from the Hong Kong Stock Exchange made the difference.

Businesses in Hong Kong are increasingly aware of and acting upon the need to transition

Several factors are driving businesses to increase their awareness and subsequent actions to transition to a low-carbon economy. These Include the positive impact of CAP2050, the role of the city's finance sector particularly in green finance and related disclosures, and the numerous events where experts from the Hong Kong business community gather to exchange thoughts.

The overall sentiment is clear: mitigation and adaptation to climate change not only safeguards businesses from physical risks such as asset damages and downtime but is also essential to ensure business viability in the near future – a changing climate is very likely to cause major shifts in regulations, supply chains and consumer demands. Lastly, there is a growing understanding of the opportunity this transition presents – businesses can do more than simply survive the changing conditions; they can thrive by unlocking and seizing new markets.

An indicator of the scale of businesses that are transitioning to a net-zero future is the number that committed to or set science-based targets (SBTs) for decarbonisation. Up to 11 March 2024, 79 companies in Hong Kong have done so, including developers, property investors, transportation and logistics companies and other built environment practitioners. In comparison, 48 companies from Singapore have signed up for the commitment. [34]

All major developers in Hong Kong have announced their net-zero transition plans to stakeholders and issued green and sustainability-linked bonds and loans to facilitate their transition. The proceeds from these financing instruments are being used to invest in emerging green technologies, implement renewable energy sources, minimise waste, promote recycling, and decarbonise supply chains.

Case study – Henderson's landlord-tenant ESG partnership

To help Henderson Land account for Scope 3 emissions related to its tenants, Arup has designed an industry-first Landlord-Individual-Tenant ESG Partnership Programme, taking sustainability to the next level for all of Henderson Land's building occupants.

The programme is designed to motivate and incentivise tenants and their employees to pursue sustainable goals based on data, as well as to take part in ESG-positive initiatives and be rewarded for it. The goal is to enable a collective shift towards ESG advancements.

What is next

While larger conglomerates and established organisations have made good progress, small and medium-sized enterprises (SMEs) face several challenges in decarbonising their operations. These challenges include obtaining buy-in from top management, lack of resources, capital, and knowledge on how to transition their business operations, as well as difficulties in collecting and reporting carbon emissions data and implementing appropriate technologies.

Given that SMEs constitute 98% of Hong Kong's economy and employ 45% of the private sector workforce [35], the Centre for Green and Sustainable Finance and the Government recognise the need to provide SMEs with more support and resources to decarbonise and are promoting capacity building initiatives. However, more needs to be done to overcome the cost implications of adoption, and to address the perceived conflict between sustainability goals and short-term profitability.

To accelerate and scale up the transition, private sector frontrunners should be more proactive in sharing their best practices and helping businesses in the same or other sectors to step up. A welcome side effect is that this would enhance their own branding.

Many businesses still have difficulties in fully assessing and understanding the implications that CAP2050 might have for them. Besides the ongoing efforts from the Government, civil society can play an important role in bridging knowledge gaps and providing platforms for sharing.

Suggested actions for Hong Kong stakeholders

Policymakers

- Enhance the allocation of resources for capacity building and guidance for business to transition, especially for SMEs..

Private sector

- Assess how CAP2050 and other decarbonisation initiatives and frameworks might impact businesses and assess both the transition risks and opportunities.
- Secure buy-in from top management and compose a feasible transition plan with clear milestones and responsibilities.
- Be proactive in sharing best practices to help businesses across various sectors with their transition.

Civil society

- Take a proactive approach in coordinating action across sectors and geographies and translate how CAP2050 and other decarbonisation initiatives and frameworks directly and indirectly impact businesses.
- Provide platforms for the private sector to share best practices to help businesses across various sectors with their transition.

Collaborate across borders

Intro

The need for enhanced collaborative efforts that transcend borders was once again stressed at COP28. Collaboration ensures a concerted effort towards common goals and helps avoid contradictory policies that could undermine decarbonisation efforts.

Varying levels of expertise and technology among countries could be overcome through the sharing of knowledge, innovative technologies, and best practices. Working together can also lead to more cost-effective solutions as countries can pool resources, invest in shared technology development, and create economies of scale. Developing countries may lack the resources, yet collaboration can help ensure that all countries, regardless of economic status, can participate in and benefit from the transition to a low-carbon economy

What works well

In the field of decarbonisation, Hong Kong is increasingly proactive in sharing knowledge and acting as a matchmaker for various organisations across different borders.

For example, a delegation led by Secretary for Environment and Ecology attended COP28 in Dubai. Through various means it highlighted Hong Kong's commitment to combating climate change and its drive to spur innovation in green technology. As part of an ambitious showcase on the international stage, multiple forward-thinking companies from the Hong Kong Science and Technology Parks (HKSTP) joined the delegation, including Archireef, i2Cool and Neuron Digital Group.

Through the participation in and organisation of various international events, Hong Kong proves to be a highly valuable bridge.

Underpinning Hong Kong's role as a vital bridge between East and West and as a centre for international collaboration was the One Earth Summit hosted in March 2024. This summit marked a pivotal global gathering for sustainability leaders to forge a path towards achieving net-zero emissions and pioneer sustainability transformation in the region.

Another related example that took place in the same month is the China-California Bay-to-Bay forum. Similarly, it highlighted the role of Hong Kong in business and international corporation as it promotes exchange and collaboration between China's GBA and San Francisco, its American counterpart.

Case study – Decarbonisation Pathways and How Finance Can Help to Accelerate Business to Transition in Guangdong-Hong Kong-Macao Greater Bay Area

This report aims to connect decarbonisation solutions with necessary finance required to accelerate the net-zero transition in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA).

It applies a top-down approach to predict macro pathways for the whole GBA, followed by a bottom-up approach to analyse specific decarbonisation pathways and solutions for key energy consuming sectors, highlighting actions most needed to achieve China's decarbonisation goals.

What is next

Considering Hong Kong's proximity to mainland China and its access to the Southeast Asian markets, the fast-growing carbon markets in Asia present opportunities for Hong Kong. As elaborated by the Hong Kong Financial Services Development Council, voluntary carbon markets, among others, emerge as one of the key tools to mobilise finance for the transition to a low-carbon economy. Hong Kong should take on the mission of playing a pivotal role in the regional and global carbon markets, thereby contributing to the decarbonisation goals of Hong Kong, the country and beyond.

The Government could be more proactive in enabling the energy transition across the region. For example, it could leverage Hong Kong's financial industry to facilitate and fund Just Energy Transition Partnerships, so-called JETPs. These enable the transition to low-carbon electricity generation by phasing out fossil fuels in developing countries. The Government and the Hong Kong Monetary Authority can play a significant role in this area as their involvement will make it easier for the city's financial sector to participate in the deals.

Closer cooperation with the mainland is needed as various provincial and municipal governments in China are competing for low carbon energy resources. Hong Kong has limited renewable energy and land resources, while Guangdong province has ample land and offshore areas for renewable energy generation. Leadership and coordination by the Government is needed to mediate the competing needs for these resources between Hong Kong and mainland China.

Hong Kong has a thriving start-up ecosystem, and more international platforms should be explored to showcase local companies focusing on decarbonisation to a global audience. Government-led trade missions are a good example, but there should also be an enhanced provision of subsidies and support for local companies to participate in international events. Besides providing exposure for locally incubated climate solutions, this will also further improve Hong Kong's reputation as a leader in decarbonisation.

Hong Kong, despite its limited local manufacturing, is a hub for entrepreneurs with extensive production investments throughout mainland China and Asia. This offers a massive chance to exert influence and advance decarbonisation efforts beyond Hong Kong's borders. Awareness should be groomed, and more guidance should be provided to these entrepreneurs to seize the opportunity.

Suggested actions for Hong Kong stakeholders

Policymakers

- Play a pivotal role in emerging voluntary carbon markets, especially in Asia, to help mobilise finance for decarbonisation.
- Leverage the city's financial industry to facilitate and fund JETPs across the region.
- Increase cooperation with the mainland to mediate competing needs for renewable resources in Guangdong province.
- Subsidise and support locally incubated climate solutions to gain exposure on the international stage.

Private sector

- Utilise existing production investments in Asia to exert influence and bring Hong Kong's best practices across its borders.

Civil society

- Groom awareness and provide guidance to entrepreneurs that are active, or plan to be active, at a regional level, on decarbonisation opportunities.
- Act as a convenor between entities across different borders by organising cross-border events, collaborations and platforms to share, co-develop and implement climate solutions.

Stimulate the application of innovation

Intro

Innovation is indispensable in the process of decarbonisation as it helps to develop new technologies and improve existing ones. According to the International Energy Agency (IEA), while current technologies can achieve most of the CO_2 emission reductions needed by 2030, achieving net-zero emissions by 2050 will rely on technologies that are not yet ready for widespread use. [36] These especially include advancements in sectors that are hard to decarbonise, such as heavy industry and long-distance transport.

Asia is already setting the pace for cutting-edge technologies, hosting some of the world's biggest science and technology clusters, including the Hong Kong-Shenzhen-Guangzhou cluster. [37]

What works well

Unveiled in 2021, the 14th Five-Year Plan of the People's Republic of China marks a historic milestone for Hong Kong, as it pledges unprecedented support for the city's transformation into a pivotal regional intellectual property (IP) trading hub and a global innovation and technology (I&T) centre. This strategic move not only acknowledges Hong Kong's latent capabilities in I&T advancement but also positions green and environmental protection technology at the forefront of its strategic emerging industries. Leveraging Hong Kong's robust international business ecosystem, its stringent IP protection framework, and its sophisticated service sectors, including finance, maritime, trade, and legal, this initiative lays a solid foundation for fostering the development of green technologies.

Supported by mainland China's policies, Hong Kong continues to nurture the strong growth in its innovation and technology ecosystem.

Hong Kong has demonstrated resilience and growth momentum, with the number of start-ups and employed staff reaching new record highs in 2023. [38] This also is reflected in Hong Kong's 2023 ranking as second worldwide and first in Asia on the Emerging Ecosystems ranking. [39] In recent years, the city has seen a surge in green innovations, ranging from smart buildings and sustainable materials to local energy solutions.

The Government has been actively promoting innovation and technology, focusing on areas like R&D, technology talent, investment funding, and technological research infrastructure. This is manifested in initiatives such as InnoHK, the Innovation and Technology Fund, Innovation & IP Week, StartmeupHK and the various incubation programmes run by the Hong Kong Science and Technology Parks Corporation (HKSTPC) and Cyberport. These go alongside numerous private sector efforts such as ReThink Hong Kong.

Most recently, the Government's 2024-25 Budget introduced several key measures to further accelerate the growth of Hong Kong's start-up ecosystem, including the establishment of an AI Supercomputing Centre in Cyberport, the launch of the Green and Sustainable Fintech Proof-of-Concept Subsidy Scheme and announcing the Co acceleration Programme by the HKSTPC to provide value-added support services to I&T start-ups with high potential and to nurture them as regional or global enterprises.

Case study – Neuron Digital Group

Neuron Digital Group is an innovative Hong Kong incubated start-up that is making waves in addressing decarbonisation of buildings among sustainability solutions that it offers.

Neuron Carbon captures a complete record of emissions from the whole ecosystem of a building. This ranges from direct onsite emissions such as generators and cooling systems to company cars, purchased energy, water, material and waste recycling. The analysis Neuron's algorithms provide helps setting targets and implementation plans, reducing carbon and providing an evidence base for carbon credits.

What is next

In global rankings, such as the one compiled by Startup Genome, Hong Kong's start-up ecosystem is seen as having room for improvement when compared to other Asian cities like Beijing, Singapore, Shanghai, Seoul and Tokyo. [40] However, the city faces challenges in deploying some innovations due to financial constraints, perceived risks, logistical complexities and an inherent resistance to change. Additionally, the lack of a comprehensive and consistent policy and regulatory framework causes uncertainties for investors and innovators.

To overcome these, the Government should lead in developing a holistic and collaborative approach that incentivises stakeholder engagement, enhances public-private partnerships and fosters a culture of co-creation. It should also consider creating a regulatory environment that supports innovation through the creation of sandboxes and accelerating updates to relevant regulations enhancing the adoption of innovative solutions.

Private sector stakeholders are encouraged to initiate more pilot projects and seek collaboration with start-ups and climate technology providers to minimise implementation disruptions and optimise the outcomes for users.

Another challenge is nurturing and retaining diverse innovation talent. Hong Kong should leverage its edge as an international city to actively bring in research talent, leading figures in science and technology and various kinds of professional and technical personnel.

Supported by favourable Government policies, access to financing, and an expanding talent supply, the GBA is making significant strides in strengthening its position as an international innovation and technology hub. Coupled with a strong push from the Central Government to focus on decarbonisation, the potential is enormous. Hong Kong must seek to integrate into the GBA's innovation ecosystem and further leverage its unique position. It can do so through policy alignment, stepping up joint infrastructure development such as San Tin Technopole, increasing R&D investment and developing more partnerships.

Suggested actions for Hong Kong stakeholders

Policymakers	• Foster a culture of co-creation between the public and private sectors through a regulatory framework that supports initiatives such as sandboxing and accelerates updates to relevant regulations. • Seek further integration with the GBA's innovation ecosystem through policy alignment, joint infrastructure development, increased R&D investment and more partnerships.
Private sector	• Initiate more pilot projects and seek collaboration with start-ups and climate technology providers to optimise outcomes and overcome various implementation challenges..
Civil society	• Take a proactive stance in enhancing innovation through interacting and building bridges between businesses, Government agencies and universities for the development and implementation of innovative climate solutions. • Influence policymakers to adopt a regulatory framework that supports initiatives such as sandboxing and accelerates updates to relevant regulations.

Conserve and embrace nature

Intro

Land-based and marine ecosystems help both mitigate against and adapt to the effects of climate change. According to the IPCC, managed and natural terrestrial ecosystems absorbed around one-third of anthropogenic CO^2 emissions from 2010 to 2019. [41] Adaptation related outcomes include, for example, reduced coastal vulnerability, improved water management, prevention of erosion and landslides, and reduced heat island effects in urbanised areas.

On the flipside, climate change is also playing an increasingly negative role in the decline of biodiversity. It has altered marine, terrestrial, and freshwater ecosystems around the world. It has caused the loss of local species, increased diseases, and driven mass mortality of plants and animals, resulting in the first climate-driven extinctions.

What works well

Despite Hong Kong's compact size and reputation as a 'concrete jungle', the territory has an extraordinarily high level of biodiversity. Few places in the world allow people to travel from the city centre to the middle of the natural world within an hour or less. Nearly 75% of Hong Kong's total land area of 1,100km2 consists of non-built-up land, including woodland, shrubland, wetland, grassland and agriculture. The Government has designated roughly 40% of its land area as country parks or special areas for the purposes of nature conservation, recreation and education. In addition, there are seven marine parks and one marine reserve. Hong Kong is also home to the Mai Po Marshes and Inner Deep Bay, which are listed as a Ramsar Site, i.e. a Wetland of International Importance. [42]

About 40% of Hong Kong's land area is designated as country parks or special areas for the purposes of nature conservation, recreation and education.

The first city-level Hong Kong Biodiversity Strategy and Action Plan (BSAP) [43], published by the Government in 2016, has been instrumental to step up biodiversity conservation and support community involvement. A next phase BSAP is scheduled for public release in 2025. To ensure its effectiveness and stakeholder buy-in, the Government has invited more than 60 conservationists from the academic, NGO and corporate sectors to start a collaborative process. The group will discuss progress made under the current BSAP (2016-2021) and make suggestions for the next version.

Other than designation for nature conservation purposes, planning and other administrative controls are also deployed to protect ecologically important habitats from being negatively impacted by incompatible development. Examples include Hong Kong's Town Planning Ordinance (CAP.131) which provides for proper zoning of ecologically sensitive areas on statutory town plans and the Hong Kong Planning Standards and Guidelines to guide town planning processes.

The Government also recognises that landowners and rural communities can play important roles in protecting sites of conservation value under private ownership. As such it set up the Environment and Conservation Fund (EFC) to provide funding and assistance to local organisations. Up to date nearly 7,000 green projects and activities have been supported with a total funding of over HK$4 billion. [44]

Finally, Hong Kong has a vibrant community of green groups and environmental organisations. They are involved in various activities aimed at promoting sustainability and environmental protection. Initiatives range from conservation and education to policy advocacy and community engagement.

Case study – Designing a sustainable rural township with nature-based solutions

This research provides practical insights for integrating NbS into the planning of Hong Kong's rural districts to drive the city's sustainable development.

The findings serve as a comprehensive guidebook for diverse stakeholders, including the government, developers and other related sectors, to prioritise sustainability in rural development, foster green financing and ultimately boost Hong Kong's green economy.

Case study – Unlocking the potential of nature in climate action

This report highlights the interconnection between climate change and biodiversity loss and explores the transformative potential of NbS to help Hong Kong achieve its climate goals. It serves as a primer for the Hong Kong government, businesses, and civil society, and provides guidance for initiating NbS in Hong Kong.

What is next

In CAP2050, nature-based solutions (NbS) were briefly mentioned to be adopted, yet up to date no announcements have been made by the Government on how to move this concept forward. NbS include actions such as conserving, restoring, and effectively managing ecosystems that can remove carbon from the atmosphere and increase coastal resilience, while simultaneously benefiting biodiversity and human well-being.

Both Arup and Civic Exchange have recently launched reports to highlight NbS are key to helping Hong Kong achieve carbon neutrality and improve the city's resilience to flooding. Named Designing a sustainable rural township with nature-based solutions and unlocking the potential of nature in climate action respectively, they are especially relevant for the planned Northern Metropolis which is in an area that is rich in floodplains, hills, rivers, fishponds and agricultural lands.

To facilitate the adoption of NbS, it is essential to raise awareness on the potential benefits, revise or create policies and regulations that provide the necessary frameworks and incentives for incorporating NbS into existing planning and decision-making processes, ensure that sufficient funding is allocated, and create a comprehensive and adaptive monitoring and evaluation plan.

The Hong Kong business community, with the requisite resources, expertise and purchasing power, is well positioned to effect positive change along entire supply chains and explore opportunities for doing more for biodiversity and nature. Related is the Taskforce on Nature-related Financial Disclosures (TNFD) which is gaining traction across the world. This international initiative provides a framework for how organisations can address environmental risks and opportunities. Increasing the collaboration between local businesses and the Government will help to better structure the private sector's response to biodiversity loss and align with existing structures such as the Kunming Declaration and the TNFD, with the goal of channelling capital flows into positive action.

Suggested actions for Hong Kong stakeholders

Policymakers

- Ensure the recommendations provided by the more than 60 conservationists are addressed in the updated version of the BSAP.
- Include NbS in the Hong Kong Biodiversity Strategic Action Plan and establish a taskforce for NbS.
- Mainstream NbS into decision-making, climate policy and urban planning processes, including the Northern Metropolis.

Private sector

- Allocate funding for NbS projects and encourage nature-related financial disclosure through TNFD.

Civil society

- Raise awareness on the potential benefits of NbS and build support for implementation.

The road ahead

The road ahead

Climate change is irreversible and as the COP28 Global Stocktake indicated, a pathway which stays below 1.5° Celsius seems out of reach. In 2023, the hottest year on record, the earth was about 1.36° Celsius warmer than in the late 19th century. [45]
At least 12,000 people lost their lives due to floods, wildfires, cyclones, storms and landslides, an increase of 30% compared to the figures recorded in 2022. [46]

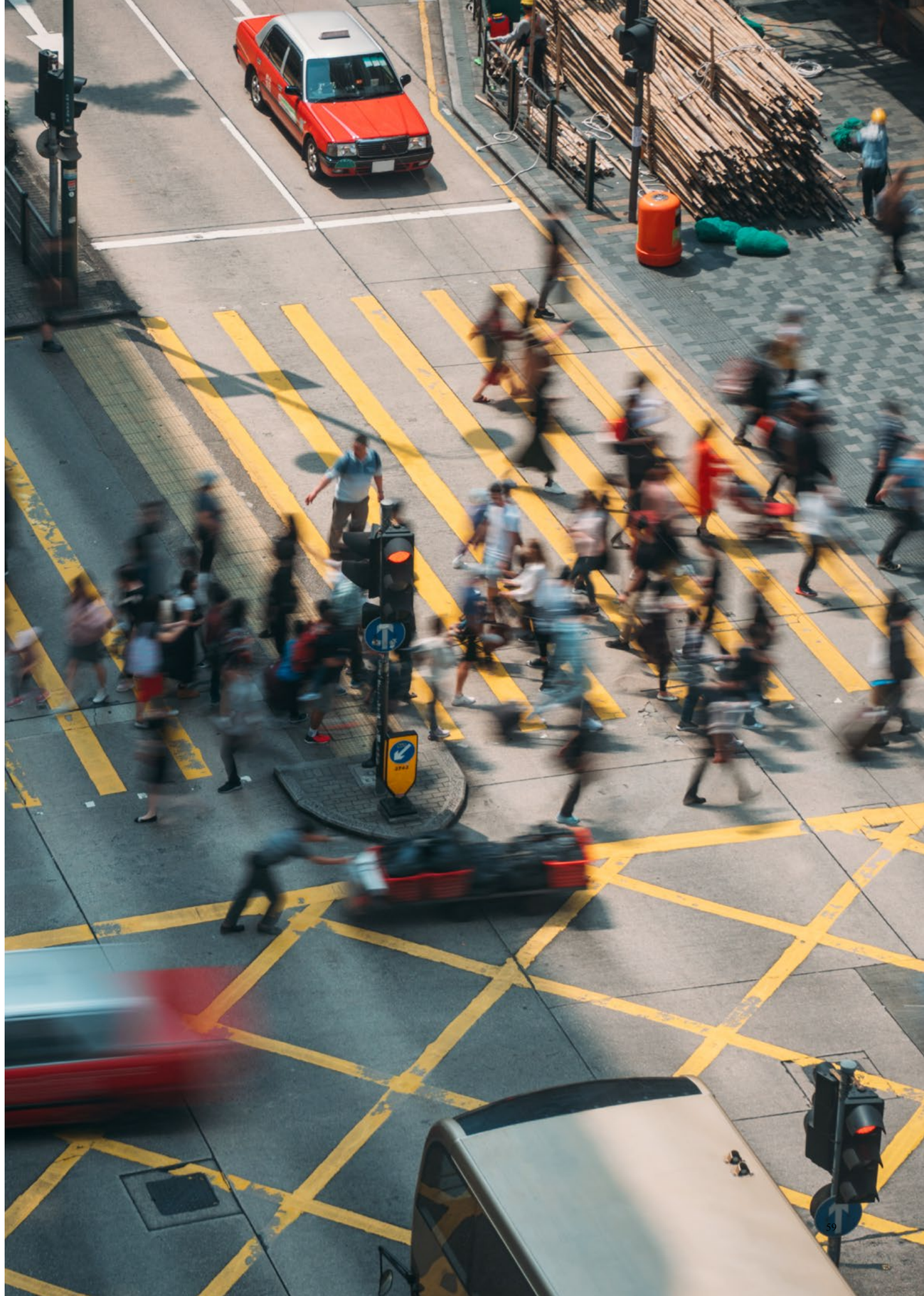
Things will only get worse.

While many governments in the Asia Pacific region have established climate action plans, the dreadful insights provided by the Global Stocktake will trigger them to step up.

If Hong Kong can maintain the decarbonisation momentum, and if various stakeholders can step up their game by increasing communication, collaboration and implementation, the city will be able to not only achieve its own decarbonisation targets, but also emerge as a regional, if not global leader in decarbonisation. This leadership could spur business growth, drive innovation, generate jobs and improve Hong Kong's reputation as Asia's World City.

We hope this paper helps to scale and speed up sharing best practices, enhance partnerships, and constructively highlights the challenges, opportunities and responsibilities of various stakeholders.

This publication does not have all the answers, nor does it cover every detail and initiative, but it does aim to contribute to the ongoing discussions and suggest the next steps that should be taken.



References

1 World Meteorological Organization (2023). 2023 shatters climate records, with major impacts. Retrieved in April 2024 from https://wmo.int/news/media-centre/2023-shatters-climate-records-major-impacts

2 Carbon Brief (2018). Explainer: how scientists estimate 'climate sensitivity'. Retrieved in April 2024 from https://www.carbonbrief.org/explainer-how-scientists-estimate-climate-sensitivity/

3 Zachary Labe (2024). Climate Visualizations © 2024, licensed under CC BY 4.0. Retrieved in April 2024 from https://zacklabe.com/climate-change-indicators/

4 UNFCCC (2015). What is the Paris Agreement? Retrieved in April 2024 from https://unfccc.int/process-and-meetings/the-paris-agreement

5 United Nations Environment Programme (2023). Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again). Retrieved in April 2024 from https://doi.org/10.59117/20.500.11822/43922

6 The World Bank (2022). GDP, PPP. Retrieved in April 2024 from https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD

7 Energy Transition Partnership (2024). About ETP. Retrieved in April 2024 from https://www.energytransitionpartnership.org/about-etp/action/

8 Energy Transition Partnership (2023). Phase 2 report – Study on the financial implications of the early retirement of coal-fired power plants in Indonesia. Retrieved in April 2024 from https://energytransitionpartnership.org/uploads/2023/06/Study-on-the-Financial-Implications-of-the-Early-Retirement-of-Coal-fired-Power-Plants-in-Indonesia_Phase-2-Report-PPT.pdf

9 Socialist Republic of Viet Nam (2023). Resource mobilisation plan – Implementing Viet Nam's just energy transition partnership (JETP). Retrieved in April 2024 from https://climate.ec.europa.eu/system/files/2023-12/RMP_Viet%20Nam_Eng_%28Final%20to%20publication%29.pdf

10 IEA (2023), Coal 2023. Retrieved in April 2024 from https://www.iea.org/reports/coal-2023

11 UNFCCC (2023). Outcome of the first global stocktake – revised advance version. Retrieved in April 2024 from https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf

12 Global Methane Pledge (2023). Fast action on methane to keep a 1.5°C future within reach. Retrieved in April 2024 from https://www.globalmethanepledge.org/#pledges

13 Stavin, R. (2023). What really happened at COP-28 in Dubai. Retrieved in April 2024 from https://www.robertstavinsblog.org/2023/12/15/what-really-happened-at-cop-28-in-dubai/

14 Xu, Y. (2023). Thawing US-China ties lead way in climate steps. Retrieved in April 2024 from https://www.chinadaily.com.cn/a/202311/30/WS6567e5b3a31090682a5f0b2d.html

15 U.S. Department of State (2023). Sunnylands Statement on Enhancing Cooperation to Address the Climate Crisis. Retrieved in April 2024 from https://www.state.gov/sunnylands-statement-on-enhancing-cooperation-to-address-the-climate-crisis/

16 Zadek, S. (2023). Time to plan for a future beyond 1.5 degrees. Retrieved in April 2024 from https://www.naturefinance.net/resources-tools/future-beyond-1-5-degrees/

17 World Economic Forum (2023). Accelerating Asia's advantage: A guide to corporate climate action. Retrieved in April 2024 from https://www3.weforum.org/docs/WEF_Corporate_Climate_Action_Asia_Pacific_2023.pdf

18 The World Counts (2024). Population of Asia. Retrieved in April 2024 from https://www.theworldcounts.com/populations/continents/asia

19 Statistica (2023). Share of population living in cities in Asia in 2020, with forecasts to 2050. Retrieved in April 2024 from https://www.statista.com/statistics/1379551/asia-urban-population-share/

20 The Government of the Hong Kong Special Administrative Region (2021). Hong Kong's climate action plan 2050. Retrieved in April 2024 from https://www.eeb.gov.hk/sites/default/files/pdf/cap_2050_en.pdf

21 Macrotrends (2024). Hong Kong population density 1950-2024. Retrieved in April 2024 from https://www.macrotrends.net/global-metrics/countries/HKG/hong-kong/population-density

22 Transport and Housing Bureau (2017). Public transport strategy study. Retrieved in April 2024 from https://www.td.gov.hk/filemanager/en/publication/ptss_final_report_eng.pdf

23 Transport Department (2024). Traffic and transport strategic study. Retrieved in April 2024 from https://www.ttss.gov.hk/en/

24 The Government of the Hong Kong Special Administrative Region (2022). LCQ15: New energy vehicles. Retrieved in April 2024 from https://www.info.gov.hk/gia/general/202303/22/P2023032200450.htm#:~:text=The%20EV%20Roadmap%20has%20set,promoting%20the%20popularisation%20of%20EVs

25 Arup (2022). Realising Hong Kong's 'cool' ambition from concept to implementation. Retrieved in April 2024 from https://www.arup.com/projects/kai-tak-district-cooling-system

26 The Government of the Hong Kong Special Administrative Region (2022). Hong Kong 2030+. Retrieved in April 2024 from https://www.pland.gov.hk/pland_en/p_study/comp_s/hk2030plus/

27 World Green Building Council (2019). Bringing embodied carbon upfront. Retrieved in April 2024 from https://worldgbc.org/advancing-net-zero/embodied-carbon/#:~:text=Buildings%20are%20currently%20responsible%20for,11%25%20from%20materials%20and%20construction

28 The Government of the Hong Kong Special Administrative Region (2023). Climate change. Retrieved in April 2024 from https://www.gov.hk/en/residents/environment/global/climate.htm

29 Loh, C. (2023). Aging building problem needs to be addresses aggressively. Retrieved in April 2024 from https://ienv.hkust.edu.hk/news/aging-buildings-problem-needs-be-addressed-aggressively#:~:text=There%20are%20approximately%2050%2C000%20buildings,of%20the%20rest%20is%20commercial

30 The Government of the Hong Kong Special Administrative Region (2023). The Chief Executive's 2023 Policy Address. Retrieved in April 2024 from https://www.policyaddress.gov.hk/2023/public/pdf/policy/policy-full_en.pdf

31 Hong Kong Monetary Authority (2023). The Hong Kong bond market in 2022. Retrieved in April 2024 from https://www.hkma.gov.hk/media/eng/publication-and-research/quarterly-bulletin/qb202303/fa1.pdf

32 Civic Exchange (2023). How far are we from adopting ISSB? Retrieved in April 2024 from https://civic-exchange.org/wp-content/uploads/2023/11/Civic-Exchange_Adopting-ISSB-Report_202311.pdf

33 CUHK Business School (2023). CUHK Business School Sustainability Indices reveal promising trends in sustainability in Asia Pacific under the new normal. Retrieved in April 2024 from https://www.bschool.cuhk.edu.hk/school-news/cuhk-business-school-sustainability-indices-reveal-promising-trends-in-sustainability-in-asia-pacific-under-the-new-normal/

34 Science Based Targets (2023). Target dashboard. Retrieved in April 2024 from https://sciencebasedtargets.org/target-dashboard

35 Commerce and Economic Development Bureau (2022). SME support. Retrieved in April 2024 from https://www.cedb.gov.hk/en/business-environment/sme-support.html

36 International Energy Agency (2023). Tracking clean energy innovation. Retrieved in April 2024 from https://www.iea.org/energy-system/decarbonisation-enablers/innovation

37 World Intellectual Property Organization (2023). Science and technology cluster ranking 2023. Retrieved in April 2024 from https://www.wipo.int/global_innovation_index/en/2023/science-technology-clusters.html#:~:text=The%20world's%20five%20biggest%20S%26T,Beijing%20and%20Shanghai%2DSuzhou%20clusters

38 Hong Kong Trade and Development Council (2021). Hong Kong start-up survey: strengths and weaknesses of the ecosystem. Retrieved in April 2024 from https://research.hktdc.com/en/article/NjY2Mzc0Njkz

39 Startup Genome (2023). Emerging ecosystems ranking. Retrieved in April 2024 from https://startupgenome.com/article/emerging-ecosystems-ranking

40 Startup Genome (2023). The global startup ecosystem report 2023. Retrieved in April 2024 from https://startupgenome.com/reports/gser2023

41 IPCC (2023). Working group III contribution to the sixth assessment report. Retrieved in April 2024 from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_07.pdf

42 HKSAR Planning Department (2024). Land utilization in Hong Kong. Retrieved in April 2024 from https://www.pland.gov.hk/pland_en/info_serv/open_data/landu/

43 HKSAR Environment Bureau (2016). Hong Kong biodiversity strategy and action plan. Retrieved in April 2024 from https://www.afcd.gov.hk/english/conservation/Con_hkbsap/con_hkbsap.html

44 HKSAR Environment and Conservation Fund (2024). Welcome message Dr Cheng Kam-chung, Eric, SBS, MH, OStJ, JP. Retrieved in April 2024 from https://www.ecf.gov.hk/en/home/index.html

45 NASA (2024). Global temperature. Retrieved in April 2024 from https://climate.nasa.gov/vital-signs/global-temperature/?intent=121

46 EM-DAT (2024). The International Disaster Database. Retrieved in April 2024 from https://www.emdat.be/

Appendix

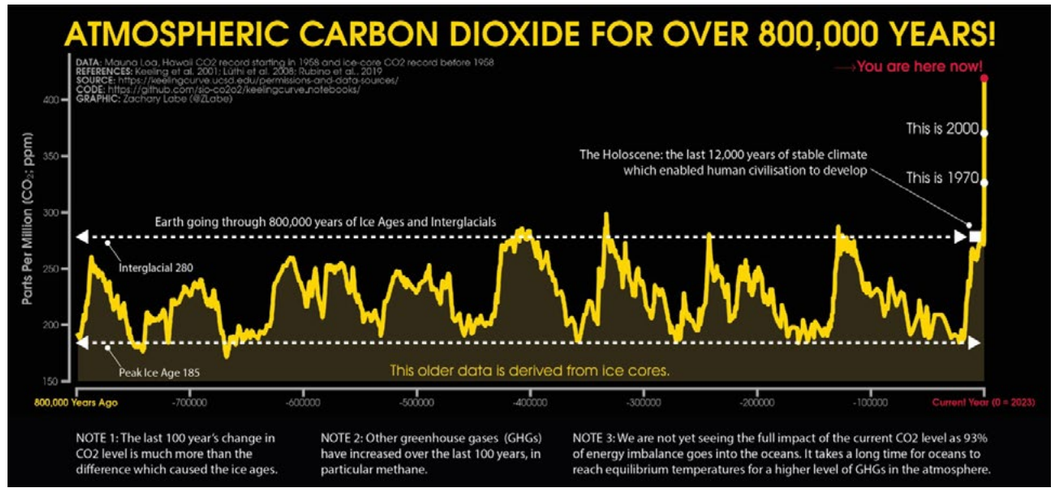


Figure A – Atmospheric carbon dioxide for over 800,000 years

Zachary Labe (2024). Climate Visualizations © 2024, licensed under CC BY 4.0. Retrieved in April 2024 from https://zacklabe.com/climate-change-indicators/. Adapted by adding (1) the lines for the Interglacial and Peak Ice Age, the Holocene and (2) the three notes.

	Current projections	Needed for a 66% chance of ≤2°C				
	Total emissions based on current Unconditional NDCs (A)	Maximum total emissions	Required reduction in emissions as compared to (A)		Required reduction in emissions as compared to 2022 baseline	
	$GtCO_2e$	$GtCO_2e$	$GtCO_2e$	%	$GtCO_2e$	%
2030	55	41	14	25%	16.2	28%
2035	54	36	18	33%	21.4	37%

Figure B – Global GHG emissions projections and gaps to maintain a 66% chance of ≤2°

Table based on data from: United Nations Environment Programme (2023). Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again).
Retrieved in April 2024 from https://doi.org/10.59117/20.500.11822/43922

	2022		Change 2022/23	2023		Change 2026/23	2026		CAGR 2023/26
ASEAN	413	4.9%	31	444	6.0%	85	529	7.3%	6.4%
India	1,162	13.8%	90	1,252	16.8%	137	1,389	19.2%	4.6%
China	4,520	53.7%	220	4,740	63.8%	-205	4,535	62.8%	0.1%
	6,095	**72.4%**	**341**	**6,436**	**86.6%**	**17**	**6,453**	**89.3%**	**1.4%**
Rest of the world	1,404	16.7%	-20	1,384	18.6%	-50	1,334	18.5%	-1.3%
EU	461	5.5%	-107	354	4.8%	-76	278	3.8%	-11.9%
USA	455	5.4%	-95	360	4.8%	-84	276	3.8%	-11.7%
	2,320	**27.6%**	**-222**	**999**	**13.4%**	**-17**	**773**	**10.7%**	**-24.0%**
Total	**8,415**	**100.0%**	**119**	**7,435**	**100.0%**	**-**	**7,226**	**100.0%**	**-3.7%**

Figure C – Coal consumption in Mt

Table based on data from: IEA (2023), Coal 2023. Retrieved in April 2024 from https://www.iea.org/reports/coal-2023

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Civic Exchange is an independent Hong Kong public-policy think tank established in 2000. It uses in-depth research and dialogue to inform policy and engage stakeholders on societal and environmental challenges in Hong Kong. Its research focuses on four areas that are integral to a liveable city: environment, economy, society and governance. Civic Exchange is ranked among the top 50 environmental think tanks in the world by the Lauder Institute at the University of Pennsylvania.

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The Institution of Civil Engineers (ICE) is one of the world's most respected professional engineering associations. Established in 1818, it has 95,000 members across the globe. Hong Kong has the highest membership amongst the regions outside of the UK. The ICE's vision is to place civil engineering at the heart of society, delivering sustainable development through knowledge, skills and professional expertise.

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