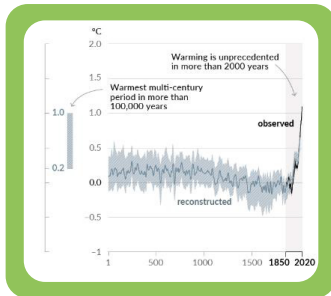




環境及自然保育基金
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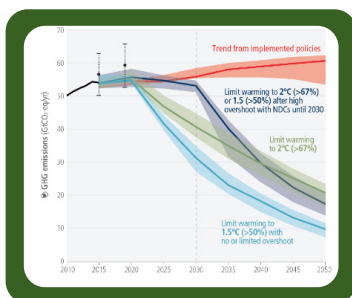
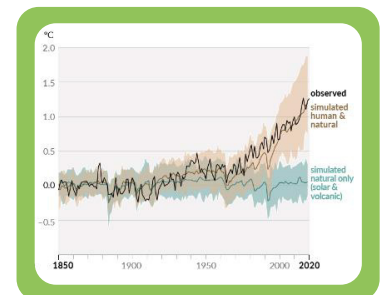
Challenge For the 21st Century



Climate Change Basics

Human activities, principally through emissions of greenhouse gases since the industrial revolution, have unequivocally caused global warming due to the greenhouse effect. Carbon dioxide in the atmosphere is now 50% above the pre-industrial level of 278 parts per million and global surface temperature is now 1.1°C above the pre-industrial level. The warming cannot be explained by natural factors only.

The increase of global greenhouse gas (GHG) emissions has resulted from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production. Human-caused climate change is causing many weather and climate extremes in every region around the world, with widespread adverse impacts on food and water security, human health, economies, society, nature and people.



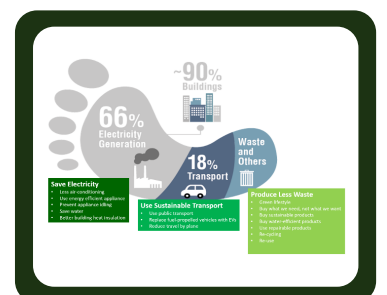
Paris Agreement

Since the United Nations Framework Convention on Climate Change (UNFCCC) entered into force in 1994, the Parties to the Convention held Conferences of the Parties (COPs) annually to pursue effective implementation of the Convention. Despite adoption of the Kyoto Protocol at COP3 in 1997 and its becoming effective in 2005, the increasing trend of global GHG emissions remained unabated. Finally in 2015, the Paris Agreement was adopted by 196 Parties at COP21. Entering into force in 2016, the Paris Agreement is a legally binding international treaty on climate change with the overarching goal to hold the increase in the global average temperature to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The Paris Agreement works on a five-year cycle of increasingly ambitious climate action plans carried out by countries, known as Nationally Determined Contributions (NDCs).

Need for everyone to take action

To achieve the 2°C target of the Paris Agreement, the annual global GHG emissions must be reduced to about 41 GtCO₂e¹ by 2030 and to about 20 GtCO₂e by 2050. There are significant gaps between the current emissions reduction policies of the Parties even taking into consideration of the latest NDCs, and the global temperature rise is now heading towards 2.8°C. Therefore, concerted climate action must be taken by everyone at the local, regional, and global levels in order to reach the Paris Agreement targets and to reduce our risks due to climate change impacts.

¹ Gigatons of carbon dioxide equivalent, a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential, by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.



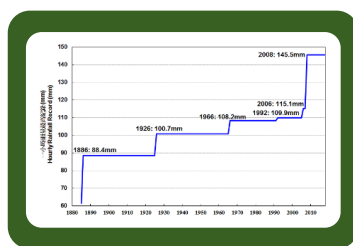
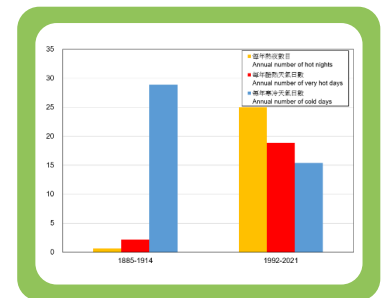
Observed and projected changes for hong kong

Hot extremes: Hot extremes, including heatwaves, have become more frequent and more intense. The monthly mean temperature² of 30.3°C in July 2022 became the highest ever on record for any month in Hong Kong since records began in 1884. There were 15 days in 2022 with a maximum temperature exceeding 35.0°C, while the normal figure is only 0.8 day per year for the period 1991-2020. The increase in the number of hot nights³ and very hot days⁴ in the past century or so is equally alarming:

	Hot nights	Very Hot days
1885 - 1914	0.6 nights	2.2 nights
2022	52 nights	52 nights
Projection for 2100 under intermediate GHG emissions scenario*	117 nights	95 nights
Projection for 2100 under very high GHG emissions scenario ⁺	167 nights	152 nights

* Under the intermediate GHG emissions scenario of the sixth assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), where the world is currently heading towards, the annual mean temperature in Hong Kong will increase by 3.3°C⁵ by 2100.

+ Under the very high GHG emissions scenario, the annual mean temperature in Hong Kong will increase by 4.9°C.



Heavy rain: Global warming increases the frequency and intensity of heavy precipitation events, bringing more flooding, landslides as well as other severe weather phenomena. The frequency of extreme rainfall events has doubled in Hong Kong over the last century, with records being broken with greater magnitude and frequency.

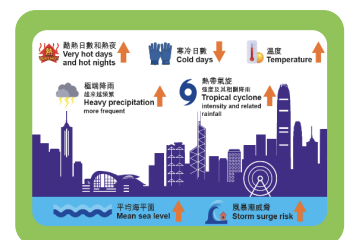
On 7 June 2008:

- new hourly rainfall record of 145.5 mm.
- 600 mm of rain recorded over Lantau Island in 24 hours
→ More than 25% of the annual rainfall.

This extreme event brought several hundred reports of landslides and one thousand reports of flooding. Under the intermediate and very high GHG emissions scenarios of the IPCC AR6, the annual maximum daily rainfall will increase by 16% and 28% respectively⁶ by 2100, posing increasing risks of flooding and landslides. While more heavy rain is projected, the opposite – **drought** – cannot be ruled out and Hong Kong also needs to be prepared.

Sea level rise: Rise of global mean sea level is mainly caused by thermal expansion of the oceans by warming, retreat of glaciers and collapse of ice sheets in Antarctica and Greenland. Tide gauge records in Victoria Harbour show considerable rise of the mean sea level at an average rate of 31 mm per decade. As the global mean sea level will continue to rise over the 21st century and beyond, sea level in Hong Kong will increase by 0.56 m and 0.78 m by 2100 under the intermediate and very high GHG emissions scenarios respectively⁷. These increases will become 0.94 m and 1.36 m respectively in 2150. Should the low confidence scenarios considered by IPCC AR6 materialize, which represent the potential impact of deeply uncertain ice sheet processes, sea level will increase by 0.57 m and 0.91 m under the intermediate and very high GHG emissions scenarios respectively by 2100.⁸ These increases will become 1.0 m and 2.06 m respectively in 2150.⁹

More intense tropical cyclones: With global warming, the proportion of intense tropical cyclones is projected to increase, which will lead to increasing threats from storm surges and heavier rain. In Hong Kong, the storm surge brought by Super Typhoon Mangkhut in 2018 caused the water level in Victoria Harbour to peak at 3.88 m above Chart Datum, the return period of which is about 50-100 years at the present day. Under the intermediate and very high emissions scenarios in IPCC AR6, the return period of such an extreme sea level is expected to be greatly shortened to about 15 years and 5 years respectively, or even shorter, by 2100.



² Unless otherwise stated, weather records in Hong Kong refer to those at the Hong Kong Observatory headquarters.

³ Days with a minimum temperature of 28°C or above.

⁴ Days with a maximum temperature of 33°C or above.

⁵ Relative to the average of 1885-1904.

⁶ Relative to the average of 1995-2014.

⁷ Median values relative to the average of 1995-2014. The likely ranges are 0.37-0.82 m and 0.57-1.08 m respectively.

⁸ Median values relative to the average of 1995-2014. The 17th-83rd percentile ranges are 0.37-0.93 m and 0.57-1.72 m respectively.

⁹ Median values relative to the average of 1995-2014. The 17th-83rd percentile ranges are 0.58-1.62 m and 0.92-5.10 m respectively.



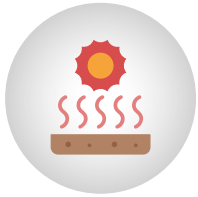
Risks for Hong Kong

The natural ecological system and human societies have evolved to adapt to the weather and climate in a particular location. Therefore, changes in weather parameters, including temperature, rainfall, sea-level, and intensity of tropical cyclones, can potentially impact Hong Kong in various ways, including but not limited to the following:



Coastal erosion and landslide:

Rising sea levels and frequent storms can cause erosion of coastlines, leading to the loss of property and infrastructure. Hong Kong is a mountainous area, and climate change increases the risks of landslides, particularly in areas next to steep terrain.



Urban heat island effect and social inequalities:

Increased temperatures in dense urban cities can intensify urban heat stresses by increasing exhaust heat. Typically, these and other impacts can disproportionately affect poor and vulnerable groups, such as low-income households and marginalized communities with limited adaptive capacities, exacerbating existing social inequalities.



Biodiversity loss:

Climate change can lead to the loss of species and ecosystems as they struggle to adapt to changing temperatures and weather patterns. For example, increased ocean temperatures can lead to coral bleaching, which can have a devastating impact on coral ecosystems that are important habitats for many marine species.



Air pollution:

Climate change can worsen air pollution through higher emissions of volatile organic compounds (VOCs) by plants, faster production of secondary pollutants like ozone with higher temperatures, creation of more stagnant air masses, and increased frequency and intensity of wildfires in the region.



Health impacts:

Climate change can have negative impacts on human health, including increased risks of heatstroke, respiratory illnesses, and vector-borne diseases such as dengue fever, Japanese encephalitis, and malaria. Climate change-related stress, trauma, and anxiety can also have negative impacts on mental health, particularly for vulnerable individuals.



Economic impacts:

Climate change can have substantial economic impacts due to direct damage to property and infrastructure, as well as indirect damage due to disruption of supply chains or a decrease in tourism. It can also increase insurance costs due to higher risks of property damage and loss.

The Earth's atmosphere currently has a CO₂ concentration not seen in the past million years, and hence the globe is entering a climate regime that the current ecosystem has not encountered before. Consequently, beside the above impacts, we should also try to learn from climate change impacts in other dense urban cities to be better prepared for new types of complex climate impacts that we may not have experienced before.

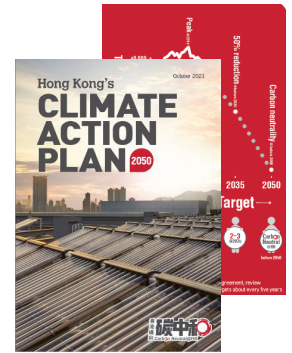


Targets and actions from the top

Local, national and international leadership

The Government of the Hong Kong Special Administrative Region (HKSARG) launched Hong Kong's Climate Action Plan 2050 in October 2021, mapping out a roadmap to carbon neutrality by 2050. The strategies include:

- Net-zero electricity generation, energy saving and green buildings, green transport, and waste reduction. Specifically, use of coal for daily electricity generation will be ceased by 2035, with increase of supply of zero-carbon electricity to 60-70% at the same time.
- The Clean Air Plan for Hong Kong supported by the Hong Kong Roadmap on Popularisation of Electric Vehicles will be implemented by 2035.
- The Waste Blueprint for Hong Kong will be implemented by 2035 to realise the vision of "Waste Reduction · Resource Circulation · Zero Landfill".

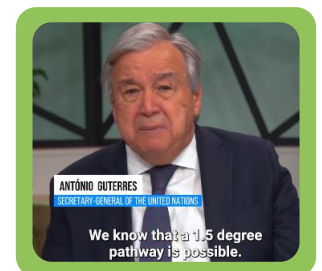


In Mainland China, the Central People's Government has pledged to implement its "dual carbon" goal, which is to peak carbon dioxide emissions before 2030 and achieve carbon neutrality before 2060, in an all-round way, including establishing a national agency to coordinate the top-level design of carbon peaking and carbon neutrality and issuing the guidelines on how to achieve the goal.

At the level of the United Nations, the Secretary-General António Guterres has proposed at COP27 to the G20 a Climate Solidarity Pact in which all big emitters make extra efforts to cut emissions, and wealthier countries support emerging economies to be able to do so. He also presented a plan to super-charge efforts to achieve this through the Acceleration Agenda:

- OCED (Organisation for Economic Co-operation and Development) countries are asked to phase out coal by 2030 and others by 2040.
- Make electricity generation net-zero by 2035 in developed countries and 2040 in all others, while providing access to electricity for all, to stop permitting, funding, and expanding coal, oil and gas – both old and new, and to speed up the decarbonization of major sectors.

These initiatives, if adopted by a future COP, will drive further strengthening of decarbonization efforts throughout the world.



New technologies and green financing

New technologies are crucial in addressing climate problems. These technologies include renewable energy technologies, such as solar and wind power, along with energy storage technologies that complement them. Smart grids are vital for efficient energy distribution, and urban farming technologies offer sustainable local food sources. Green building technologies, including those utilizing advanced materials, contribute to reducing environmental impact. Carbon Capture and Storage (CCS) technologies help in capturing CO₂ emissions at the source, while advanced transportation systems reduce carbon emissions from travel. Internet of Things (IoT) in waste management and climate modeling with predictive analytics contribute to sustainability, and water management systems ensure efficient use of water resources.

Green financing plays a significant role in addressing climate change. It includes instruments like green bonds for projects that are climate friendly and increase climate resilience. Green mortgages or loans encourage energy-efficient housing or

renovations, and targets positive environmental impact. Public-private partnerships and carbon pricing can fund green initiatives. Finally, green banks provide financing support to clean, low-carbon projects. Together, these financing mechanisms promote the development and implementation of sustainable solutions for the future.

Adapt to ensure business continuity

Given that current policies of countries on GHG emissions are not meeting the goal of the Paris Agreement, the world must be prepared for extreme weather and climate events and other calamities which will become more frequent and intense. Government authorities, communities, and individuals alike need to adapt to this new normal to avoid losses and damages. Adaptation measures will include upgrading of infrastructures such as coastal defenses, drainage systems, slope safety systems, security of water, food and power supplies, as well as review of business processes that could be vulnerable and interrupted by such climate risks to ensure business continuity.



Your influence: you, your family, and your choices

Sustainability begins with you as an individual. It's important to be mindful of your daily activities and their environmental impact. By making sustainable lifestyle changes and developing green habits, you can take the first step towards mitigating climate change. Here are some simple habits you can adopt to reduce your carbon footprint, live more sustainably, and help Hong Kong achieve its net-zero goals:



Reduce

- Say NO to products you don't really need.
- REFUSE freebies, discounted, or promotional items.
- REDUCE energy use by turning off lights and appliances when not in use. Use fans instead of AC.
- Use energy-efficient appliances, such as ENERGY STAR certified appliances and LED light bulbs.
- Take shorter showers and use low-flow showerheads to save water and energy.
- Buy locally produced products and choose organic options when available.
- Make a grocery list, only buy what you need, and avoid impulsive purchases.
- Avoid printing, use digital documents. Print double-sided when necessary.
- Reduce meat consumption. Consider going vegetarian once a week, use leftovers for next meal.
- Walk or use public/electric transport. Minimize air travel, pack lightly, use eco-friendly airlines.



Reuse

- Refuse single-use products. Use reusable or multipurpose containers, rechargeable batteries, etc.
- Reuse packaging materials such as cardboard boxes, bubble wrap, and packing peanuts.
- Repurpose old furniture into something new, such as a bookshelf or coffee table.
- Repair and refurbish electronics instead of throwing them away.



Recycle

- Donate and buy second-hand clothing, electronics, and household appliances.
- Use refillable ink cartridges and recycled paper products.
- Recycle and dispose of waste properly.



Reach-out

- Participate in green activities like tree-planting and help spread awareness of climate change.
- You have a lot of influence on your friends and family. By setting good examples and talking with them, you can encourage them to reduce their carbon footprint. This is especially important for kids and young adults, who can encourage their parents to make generational responsible changes.
- Vote and support people with demonstrated action for carbon reduction in various institutions.



Your choices

As an individual, you also have a lot of influence on the businesses you interact with. By advocating and supporting sustainable businesses, demanding transparency, and holding companies accountable, you can encourage them to prioritize sustainability in their operations and products:

- Support companies that advocate sustainable practices, such as promoting energy-efficient practices, reducing waste, and encouraging sustainable transportation options.
- Support companies that set science-based reduction targets in line with the Paris Agreement, engage carbon-responsible suppliers, maintain eco-transparency, and achieve top-tier environmental performance certifications.
- Support companies that conduct life-cycle assessments to evaluate the impacts of their products.
- Support and donate to organizations that promote environmental education.



Resilience and preparedness

To minimize casualties, losses and damages brought by extreme weather and climate events and other calamities arising from climate change, apart from implementation of climate adaptation measures, enhancement of the resilience and preparedness of the communities is crucial. This will entail increasing the awareness of the constituents to disaster prevention and preparedness and boosting our emergency response system, which will be underpinned by early warning systems of severe weather and climate.

Extreme events are by definition rare, at least from a historical perspective, and therefore will be particularly challenging to forecast. Furthermore, there has also been a tendency for multiple hazards to occur at the same time, for example, storm surge inundation, heavy rain flooding, landslides and wind damages could take place within a short period of time when a super typhoon hits. Such multi-hazard

scenarios will be particularly stressful for the weather authorities, emergency response teams and the affected communities. Therefore, early warning systems, contingency plans and emergency facilities will need to be reviewed, upgraded, and tested before the real thing happens.

Normal situation



Emergency situation



More changes are coming, stay tuned and be prepared

We stand at a pivotal moment in our planet's history, confronted with a climate crisis that brings with it rising temperatures, increasing sea levels, and more and more extreme weather events. This crisis threatens our communities, our economies, and the ecosystems that nurture life on Earth. Yet within these huge challenges, we also find the seeds of innovative and transformative solutions.

A new era beckons us, powered by renewable energy, smart grids, urban farming, and green buildings. These technologies, along with more efficient waste and water management, promise to redefine our urban landscapes, making them resilient against climate perils. Yet this transformation isn't just about technology. Green financing, with instruments like green bonds and impact investing, will play a pivotal role in funding this evolution, making the creation of sustainable cities financially feasible.

As we navigate through this critical juncture, collective action is crucial. Yes, the challenges are formidable, but our will to overcome must be stronger. Brace yourself for more changes, because what we have seen up to now is just the beginning, more are coming. Stay informed, be prepared, and join the effort towards a sustainable, resilient, and inclusive future for all.

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