

Post COP26

Combatting climate change in Hong Kong and beyond



Call to action: The built environment must play its part to mitigate and adapt to climate change

Climate change is happening more rapidly than scientists have predicted, with heatwaves, droughts, forest fires, rising sea levels and other natural phenomena becoming increasingly frequent and starting to have significant impacts. Climate change is primarily due to human activities releasing large amounts of carbon dioxide (CO₂) and methane into the atmosphere.

CO₂ emissions have risen by more than 50% compared with pre-industrial levels, from about 278 parts per million (ppm) to about 417ppm in early 2021. The global average temperature in the 2000-2019 period was 1.2°C higher than in the 1850-1900 period. Based on the agreement reached at the 2021 Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change, analysts from research group Climate Action Tracker predict a 2.4°C increase by 2100¹.

A **Race to Zero** emissions is necessary to halt global warming. Even if such efforts

are successful, however, the adverse effects of a rise in CO₂ have already been locked into the climate system. This means that climate change impacts will continue for many years, given the time lag between producing carbon emissions and seeing their effects on the climate. The metaphor of a heavy train is often used: you can't stop it at once; there will be a delay between hitting the brakes and the train coming to a halt.

In view of that, we urgently need to adapt and brace ourselves for what we cannot prevent. The UN-backed **Race to Resilience** campaign aims to catalyse a step change in global ambition for climate resilience. This programme puts people and nature first, in pursuit of a resilient world where we do not just survive climate shocks and stresses, but thrive in spite of them.

As a community of city stakeholders, we can help turn pledges into action. This publication offers insights into how practitioners of the built environment can contribute to the collective 2050 goal of achieving net-zero emissions, capitalising on the outcomes of COP26 and giving priority to the most vulnerable people and communities.

This report presents:

- A summary of COP26
- Insights on how COP26 links to the built environment
- Reflections and recommended actions for Hong Kong:
 - Decarbonisation and adaptation of the built environment
 - Towards clean energy
 - Low- and zero-carbon transport systems
 - Nature-based solutions

Acting now is our only option. We must accelerate the pace of the Race to Zero and simultaneously pick up the Race to Resilience.

Shared problems call for shared solutions: we all have a role to play – sharing ideas, providing insights and utilising our unique spheres of influence.

For ourselves and our future.



The climate action roadmap and associated five steps shown in the two diagrams consolidate a number of roadmaps and commitments proposed by Arup, WBCSD and WorldGBC^{2,3,4}. They outline a shared vision and the industry-wide actions needed to achieve net zero in the construction, operation and demolition of buildings and infrastructure. They also describe the steps that are required to make our built environment more resilient to climate shocks and stresses.

In addition, all stakeholders of the built environment are called upon to adhere to three overarching actions that will accelerate progress.

Mainstream best practice

Introduce mandatory whole life cycle carbon assessments that follow clear guidelines. Best practices in mitigation and adaptation should be promoted to encourage at-scale adoption.

Monitor and report

Disclose progress on climate actions, such as performance data and climate resilience, to foster transparency and accountability.

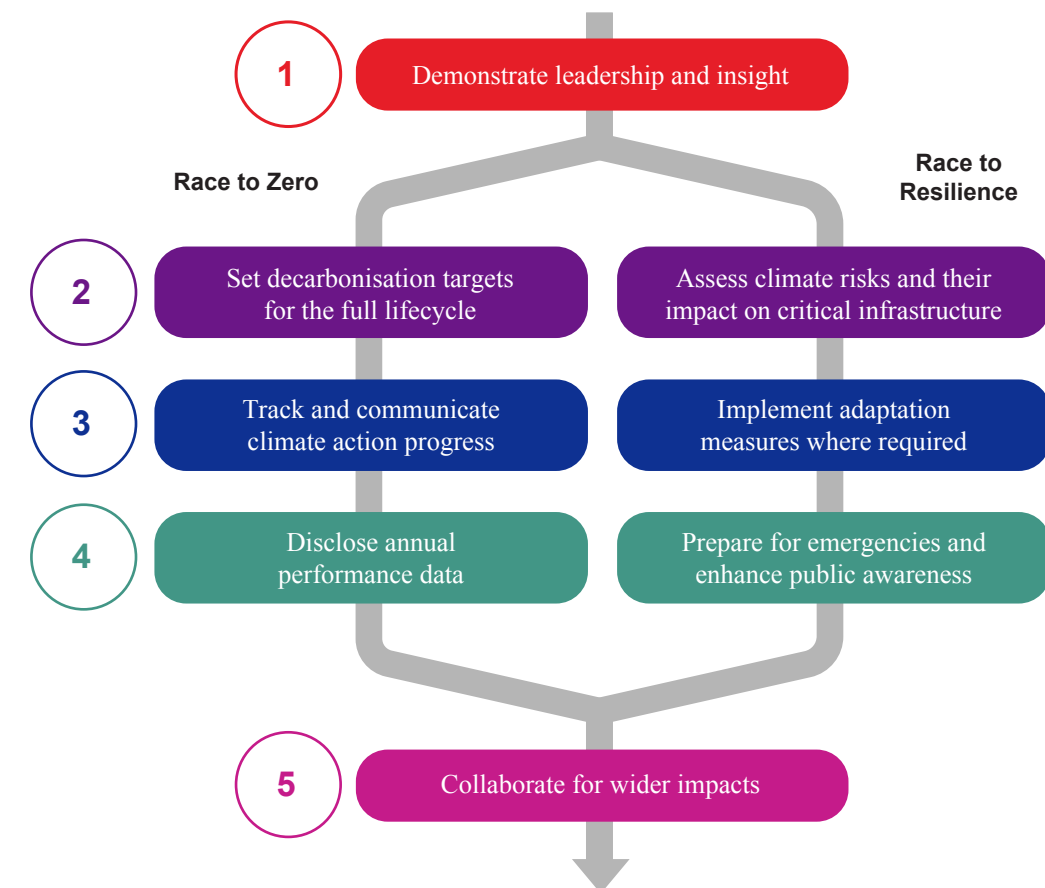
Forge partnerships

Promote public-private partnerships to fast-track action and optimise impact. Closer collaboration between industry, policymakers and the finance sector is essential.

Climate action roadmap: Net zero targets

	By 2030		By 2050		
	Operational carbon	Embodied carbon	Operational carbon	Embodied carbon	
Existing buildings	Net zero	-	Net zero	-	→
Renovations	Net zero	40% reduction	Net zero	Net zero	→
New buildings	Net zero	40% reduction	Net zero	Net zero	→
Infrastructure	-	40% reduction	-	Net zero	→

Climate action roadmap: Five steps to take



Dr Vincent Cheng
Fellow and East Asia Sustainability Leader, Arup



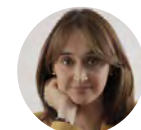
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COP26: success or failure?

Dr Vincent Cheng, Fellow and East Asia Sustainability Leader, Arup
Prof Robert Gibson, Fellow, Civic Exchange

In 2015, countries meeting at the UN COP21 climate summit in Paris agreed to limit the global average temperature increase to well below 2°C, and pursue efforts to stay within 1.5°C. Each country made its individual commitment — called Nationally Determined Contribution (NDC) — to reduce emissions towards this objective. It was recognised even at the time, however, that the totality of these contributions would be insufficient to achieve the stated goal. As a result, COP set up a mechanism to report on and improve NDCs every five years.

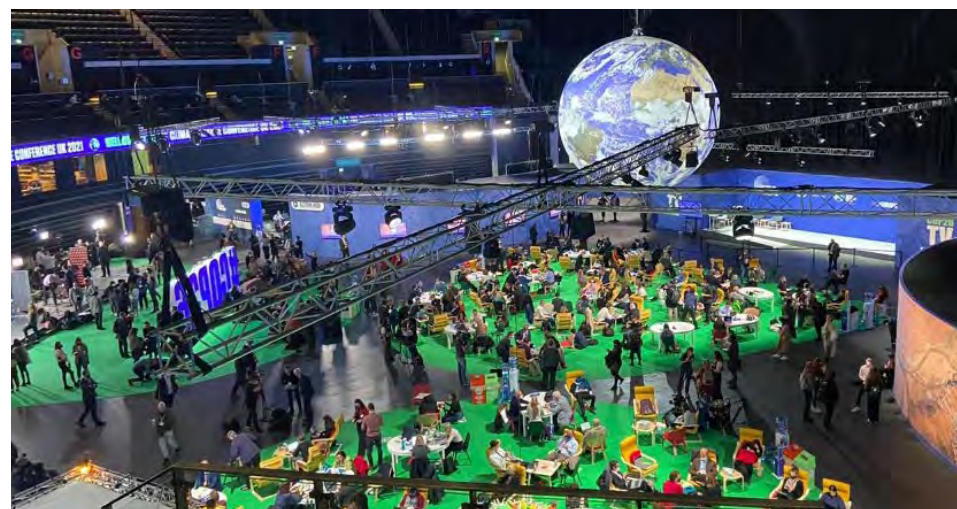
At Glasgow's COP26, in November 2021, countries were asked for the first time to tighten their NDCs. But the big question remains: were the commitments made after two weeks of intense negotiations enough to put us on a safe pathway?

The Glasgow Climate Pact, as the agreement reached at the end of COP26 is known:

- Expressed “alarm and utmost concern” that human activities have already caused around 1.1°C of global warming, and resolved to pursue efforts to limit the temperature increase to 1.5°C

- Recognised that such a target requires cutting global carbon dioxide emissions by 45% by 2030 from 2010 levels, reducing them to net zero by around mid-century and deeply reducing other gases as well
- Finalised the “rulebook” for the Paris Agreement, making considerable progress on issues such as international carbon trading and how countries report carbon emissions
- Acknowledged that country commitments are still too weak, calling for all countries to commit at the next COP, in November 2022, to greater emission reductions by 2030.

While the formal negotiations did not generate sufficient action, many pledges on the sidelines represented progress, especially from the private sector. Despite many businesses currently profiting from practices that threaten our collective future, they can also be a force for good through innovation and the scaling up of solutions to climate change. Enhanced commitment by businesses at COP26 is a strong sign that the world is starting to align with net zero.



Overview of the 'blue zone' at COP26

Key highs:⁵

- An increase from 40% to 90% in the number of countries making net-zero NDC commitments in the two years running up to COP26
- Countries asked to provide their NDCs for 2030 at the end of 2022
- Calls for accelerated efforts towards the phase down of unabated coal-fired power generation and phase out of inefficient fossil-fuel subsidies
- Agreement on the rulebook for implementing the Paris Agreement, including mechanisms for transparent reporting (Article 13) and international carbon markets to accelerate emission reductions (Article 6)
- Commitment by the finance sector to align US\$130 trillion of investment to the 1.5°C goal
- More than 100 national governments, cities, states and major business committed to The Glasgow Declaration on Zero Emission Cars and Vans, to end the sale of internal combustion engines by 2035 in leading markets, and by 2040 worldwide
- The Glasgow Leaders Declaration on Forests and Land Use, whereby 141 countries committed to halt and reverse forest loss and land degradation by 2030
- The Global Coal to Clean Power Transition Statement, whereby 46 countries announced their commitment to stop building new unabated coal-fired power stations
- The Global Methane Pledge, whereby countries representing 30% of global methane emissions committed to reduce them by 30% by 2030 from 2020 levels.

Key lows:²

- Even if all commitments in NDCs are implemented, projected global warming is about 2.4°C by 2200. This level of global warming would be catastrophic
- The change of wording from ‘phase out’ to ‘phase down’ in relation to the use of coal
- The failure by developed countries to meet the goal of mobilising US\$100 billion per year by 2020
- Countries which industrialised early recognise their past emissions are part of the reason for vulnerable countries suffering from climate change. They are working towards helping them on this. BUT they are not going to sign up to an unlimited obligation to counter the impact of climate change
- Not a single country with short-term policies in place to put them firmly on track to net zero.

Some hailed COP26 as a success, others as a failure. Its outcome is perhaps best summarised by the UN Secretary-General António Guterres:

“The approved texts are a compromise. They reflect the interests, the conditions, the contradictions and the state of political will in the world today. They take important steps, but unfortunately the collective political will was not enough to overcome some deep contradictions.”

COP26 revealed the tremendous differences in interests across the world. Towards the end of the negotiations, there was an increasing pressure to water down commitments on fossil fuels, and coal in particular. At the same time, small island states clearly warned that an increase exceeding 1.5°C will be catastrophic to them.

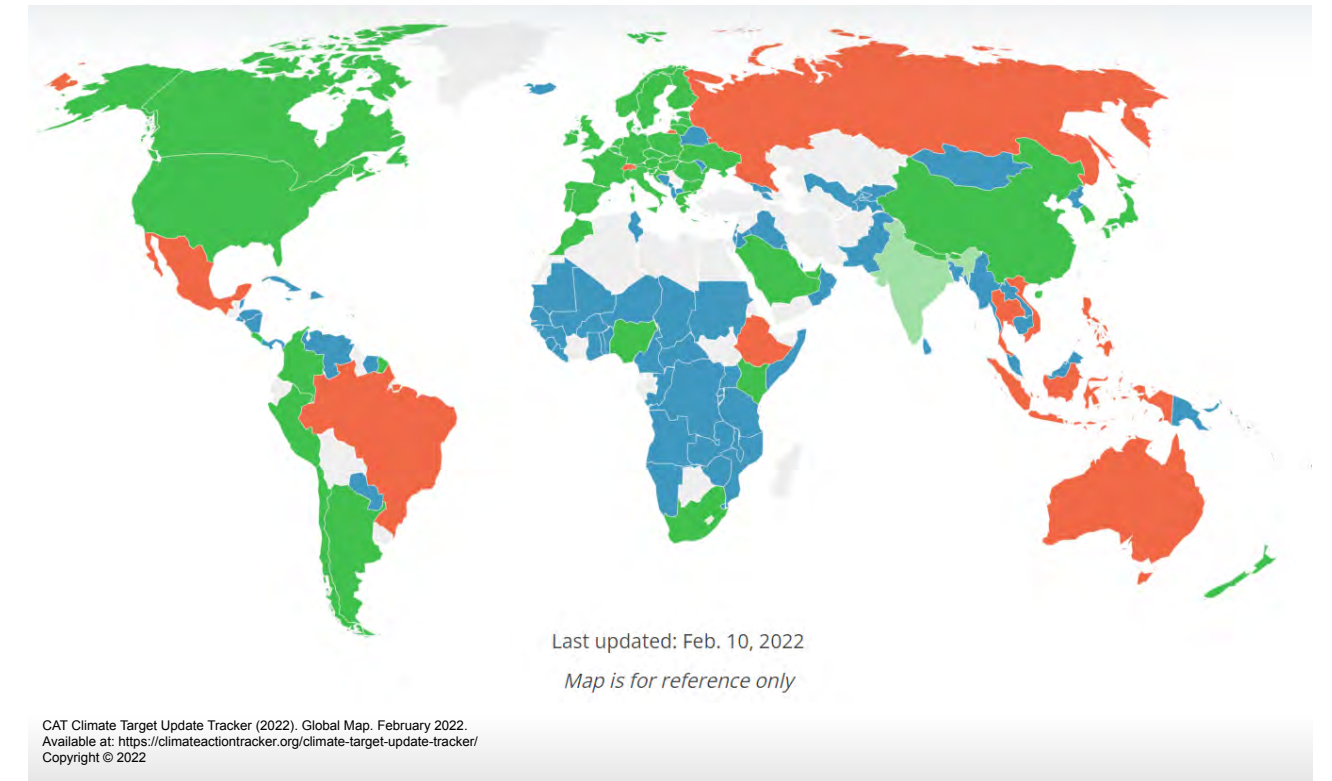
Progress was made in many areas. COP26 reaffirmed the importance of collective and inclusive global action to address the climate crisis, and recognised the important role played by civil society, indigenous peoples, local communities, youth and other stakeholders.

COP26, and the process leading up to it, failed to secure a commitment to phase out coal. It also failed to arrange the funding for low-income countries that had been agreed in Copenhagen in 2009. It leaves humanity on a pathway to significantly exceed 1.5°C global warming, with the near-certainty of both triggering the disastrous release of methane from thawing permafrost in the Arctic and risking rapid sea level rise from the melting West Antarctic ice sheet.

Higher temperatures in countries near the Equator will reduce crop yields and make it difficult to live without air conditioning – the use of which will in turn further increase energy use and potentially carbon emissions. As river deltas such as the Mekong are flooded by rising sea levels, food production will plummet. There will be millions of climate refugees.

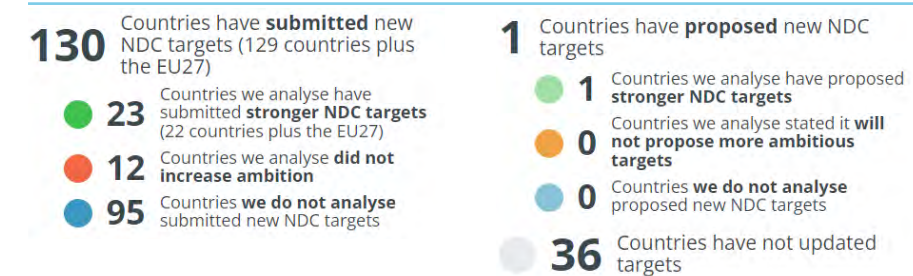
Much more needs to be done to protect people from the truly devastating impacts of climate change. The pressure is on for all countries to substantially strengthen their NDCs, and for rich countries to raise funding for poorer ones at COP27.

CAT Climate Target Update Tracker



CLIMATE TARGETS

Status of the NDC update process



Building ambition: the future of the built environment post-COP26

Cristina Gamboa, CEO, World Green Building Council (WorldGBC)

At COP26 the built environment community showed up, demonstrating its leadership, and was finally given some well-deserved political recognition for its critical role in enabling climate action, resilience and social value. Also, non-state actors or businesses, cities and regions were firmly positioned as key market demand drivers and policy enablers.

We saw the private sector show it understands the scale of the problem. Today, US\$1.2 trillion in real estate assets under management are part of the Race to Zero, a UN-backed campaign for non-state actors to commit to halving emissions by 2030 and achieving net-zero emissions by 2050 at the very latest. As front runners in the Race to Zero, 44 businesses including developers, designers and asset managers representing US\$85 billion annual turnover signed WorldGBC's Net Zero Carbon Buildings Commitment to accelerate action to tackle whole life carbon emissions from the built environment by 2030.

All of this work coalesced at Cities, Regions and Built Environment Day at COP26. Following more than 130 events, the WorldGBC network of

members and partners announced 26 initiatives that exemplify deep collaboration and will inspire further positive systemic transformation in the built environment, including the launch of the UK Green Building Council's Whole Life Carbon Roadmap.

It was most encouraging to listen to the voices of City Mayors, Country Ministers and CEOs who all recognised the critical role our sector can play in mitigating and adapting to climate change.

WorldGBC was also delighted to see that the language of whole life carbon is now mainstream, and there is a common understanding from all stakeholders that action on the built environment requires holistic consideration of both operational and embodied resource consumption.

For the first time, the Pact explicitly calls on countries to rapidly scale up the deployment of energy efficiency measures, which are critical for the built environment to transform into a climate solution. Having witnessed much-needed movement on the policy side, more is needed to truly match the level of ambition already being demonstrated by industry.

Cristina Gamboa, CEO, World Green Building Council speaking at COP26

What's next?

WorldGBC's optimism is strengthened by the energy and appetite for action that was seen in Glasgow — both inside and outside the venue, particularly from the climate activists and youth. Although many of these important voices were not at the negotiating table, it is clear from the leadership on the industry side that they are finally being listened to. Now we need to push the governments that are being too slow to act.

If this energy and enthusiasm can be converted into action to deliver our collective goals, then WorldGBC does believe we can keep 1.5°C within reach. As we turn our attention to COP27 in Egypt, we must build on the momentum started at COP26 and learn to really listen to the voices of those communities most impacted by climate change. Adaptation, climate justice and finance will be high up the agenda.

We ask leaders across the built environment to:

- Work with your governments to ensure building energy efficiency forms a central element of the revised NDCs to be submitted at COP27
- Work with industry and encourage companies to sign WorldGBC's Net Zero Carbon Buildings Commitment and the Race to Zero
- Demand that investors and the finance community only invest in sustainable buildings and infrastructure
- Promote a holistic and systems approach to the development of any infrastructure project
- Accelerate deep collaboration so that we can develop the tools needed to ensure a just transition to a low-carbon economy.



Published in [Building ambition: The future of the built environment post COP26](#). Reprinted with permission.

Decarbonising the 40%: how to transform the built environment to net zero

Roland Hunziker, Director, Built Environment, The World Business Council for Sustainable Development (WBCSD)

We must transform the built environment to tackle the three most pressing global sustainability challenges: the climate emergency, the loss of nature and mounting inequality. Not only does the built environment make up 50% of global wealth and approximately 15% of global GDP and employment, but it also causes close to 40% of global energy-related carbon emissions and 50% of global resource extraction.⁶

To decarbonise the built environment, it is imperative to assess and track operational emissions from the energy used for heating and cooling (70% of the total emissions from buildings), as well as emissions embodied in the building materials and equipment (30% of the total) of all new and existing built assets. This is essential to determine how best to minimise emissions while ensuring resilience for the future.

In the run-up to COP26, WBCSD worked with a global coalition of partners (#BuildingToCOP26) to forge a common vision for all actors to rally behind. This was enshrined in the UNFCCC Marrakesh Partnership for Global Climate Action Human Settlements Pathway⁷:

By 2030, the widespread energy efficiency retrofit of existing assets must be well underway, while all new buildings must be 100% net-zero carbon in operation and reduce 40% of their embodied carbon emissions — with leading projects achieving a reduction of at least 50%.

By 2050 at the latest, all new and existing assets must be net zero across the whole life cycle, including operational and embodied emissions.

Halving the 40% by 2030

The targets mentioned above are within reach. In the recent report *Net zero buildings: Where do we stand?*⁸, we showed that with focus and collaboration we can halve the whole life cycle emissions of buildings by 2030. This requires that building owners, developers, investors, architects, construction companies, energy and material providers, cities and governments, all work together to achieve the common goal. It also demands that we treat carbon with the same importance as cost and price, based on a full life cycle and performance-based approach and by starting to set absolute emissions reduction targets.

Market transformation levers for a net zero built environment⁹

Two underlying enablers are critical to transform the built environment towards net zero:

- A shared understanding of the **importance of the built environment** for climate mitigation, alongside a common vision for its urgent decarbonisation as a system
- **Radical and deep collaboration** within and across all stakeholders of the built environment.

In addition, three fundamental levers to drive the market transformation along the full value chain of the built environment are:

- **Align whole life carbon (WLC) thinking:** adopt WLC and life cycle thinking across the value chain and market to align on key indicators, metrics and targets consistently

- **Integrate carbon cost and price:** internalise the costs of WLC emissions and reflect them in the price of products and services throughout the value chain, including in government and financial sector governance, procurement and taxonomy mechanisms
- **Transform supply and demand dynamics for decarbonised solutions:** promote a positive and reinforcing supply and demand dynamic that incentivises low-carbon solutions along the value chain. This requires signals from government and finance and, most importantly, the collaboration between industry players across the built environment value chain.

The fragmentation among built environment stakeholders makes it difficult to eliminate existing silos and create a system that seeks collaboration across the value chain. Demand-side actors such as developers, investors, owners and end-users, as well as cities, have a critical role to play. Although they are not directly accountable for the emissions, they can set requirements at the very beginning of building projects to improve the overall carbon performance in a holistic way, thereby aligning the full value

chain around delivery. The report *Decarbonizing construction*¹⁰ provides guidance for investors and developers to reduce embodied carbon.

A call to action

We encourage stakeholders from across the built environment to conduct WLC assessments of their projects and openly publish the results to create a body of evidence and foster shared learning. The WBCSD Building System Carbon Framework¹¹ provides a consistent, globally applicable methodology based on existing standards that allows for transparency and comparability of results.

We also call on all stakeholders to set clear global targets across the buildings industry in line with the 2030 and 2050 reduction imperatives, including a valid approach to residual emissions based on a clear definition of ‘net zero’ that takes into account whole life cycle carbon.

The positive message from COP26 is that if we align our actions and focus on reducing emissions across the entire lifetime of buildings, we can set this important sector on a path to net zero. But we need to start today.

Roland Hunziker, Director, Built Environment, WBCSD (far left), participating in a panel discussion at COP26.



The Asian perspective

Jasper Hilkhuisen, East Asia SDG Taskforce Leader, Arup
Lauren Chan, Research Analyst, Civic Exchange

Asia is likely to be the key engine of global economic growth in the coming decades and the world's biggest CO₂ emitter. As such, it can and should play a leading role in the world's decarbonisation journey. However, commitments made by the region's major economies are mixed; without much-needed progress on the policy front, Asia's future growth still looks too reliant on fossil fuels, particularly coal.

In addition, experts have recognised that Asian countries are among the hardest hit by the impacts of climate change. Low-lying and crowded coastal cities, with populations of millions, are most at risk. To prepare our cities and communities for the unavoidable increasing impacts of climate change, we must make them more resilient.

	Net zero target date ^{12 13 14 15}	Glasgow Leaders Declaration on Forests and Land Use ¹⁶	Global Coal to Clean Power Transition ¹⁷	Global Methane Pledge ¹⁸	Other pledges and commitments
Cambodia	2050				Pledges to reduce emissions by 42% by 2030 ¹⁹
China	2060	⊙			Commitment to not build any more coal-fired power stations overseas ²⁰
Indonesia	2070	⊙	⊙	⊙	Plans to start decommissioning a quarter of its coal capacity by 2030 ²¹
Japan	2050	⊙		⊙	Announced an additional US\$10 billion over five years to help Asia as a whole transition towards zero emissions ²²
Malaysia	2050	⊙		⊙	Committed to maintain at least 50% of the country's landmass under forest cover ²³
Philippines	No target set	⊙	⊙	⊙	Pledged to step up protection of nature and overhaul farming to cut greenhouse gas (GHG) emissions ²⁴
Singapore	2050-2100	⊙	⊙	⊙	Aims to use low-carbon energy sources across its economy as part of its carbon transition and other initiatives under the Singapore Green Plan 2030 ²⁵
South Korea	2050	⊙	⊙	⊙	Aims to reduce GHG emissions by at least 40% by 2030 ²⁶
Thailand	2065				Drafted its first ever climate law last year, and is moving towards greater use of electric vehicles and renewable-energy sources ²⁷
Vietnam	2050	⊙	⊙	⊙	Aims to reduce GHG emissions by 9% with domestic resources and by 27% with international support by 2030 ²⁸

China's decarbonisation journey

China is the world's biggest emitter, so all eyes are on its plans to decarbonise. In 2020, the Chinese government committed to peak carbon emissions before 2030 and achieve carbon neutrality before 2060. To reach its mid-term goal, in October 2021 the Chinese government published the Action Plan for Carbon Dioxide Peaking Before 2030²⁹, which laid out specific initiatives in different sectors of the economy. Here are some highlights:

- Creating a green and low-carbon energy system. By 2030, the share of non-fossil fuels

in total energy consumption will reach around 25%. CO₂ emissions per unit of GDP will also drop by more than 65% over 2005 levels

- Prioritising the following aspects of creating a green and low-carbon society:
 1. Circular economy
 2. Green and low-carbon transportation
 3. Green and low-carbon technological innovation
 4. Carbon sinks
 5. Education



Hong Kong's Climate Action Plan 2050

Prof Robert Gibson, Fellow, Civic Exchange
Lauren Chan, Research Analyst, Civic Exchange

As part of China, Hong Kong contributes to fulfilling China's obligations under the Paris Agreement. In October 2021, the Hong Kong government launched the Climate Action Plan 2050 (CAP2050), setting targets to achieve 50% decarbonisation by 2035 and net zero by 2050.

CAP2050 targets are significantly more ambitious than Hong Kong's previous plans. However, much

more needs to be done. Clearer timetables are needed, together with policies and incentives to ensure compliance. Most importantly, the government needs to communicate how decarbonisation can be a positive opportunity to improve Hong Kong's economy, environment and society.

CAP2050 – extract

Overall ambition

- Reducing emissions by 50% from 2005 levels by 2035 and to net zero by 2050

Reflections

This commitment is a significant improvement on previous plans, but to align with scientific advice, Hong Kong needs to:

- Bring its 50% reduction commitment forward to 2030 in line with IPCC recommendations and present this heightened ambition by the end of 2022
- Bring its net-zero target forward. This is appropriate because Hong Kong is easier to decarbonise than most other jurisdictions, as less of its economy is in the hard-to-abate industrial and agricultural sectors.

Electricity generation (65.7% of emissions)

- Coal only kept as back-up capacity by 2035
- Natural gas rising to between 30% and 40% by 2035, and then phased out by 2050
- Expansion of in-Hong Kong renewable energy as far as practical – estimated at 7.5% to 10% by 2035 and 15% by 2050
- Balance of 52.5% – 60% in 2035 and 85% in 2050 to come from a mixture of imported renewable energy, nuclear and green hydrogen.

The elements of this plan are sound. As the government notes, it is important to pursue all zero-carbon electricity options given uncertainties as to which will be available to Hong Kong.



Pathways to Net Zero Carbon Emissions

In 2020, the report Pathways to Net Zero Carbon Emissions by 2050, presented by Civic Exchange and the World Resources Institute, demonstrated that Hong Kong can reduce its carbon emissions by 90% by 2050³⁰ relative to 2005 levels and offset the remaining 10%, which comes from hard-to-abate sectors.

[Read more](#)

Rooftop solar panels at Kai Tak, Hong Kong



Energy saving and green buildings (buildings use 90% of electricity)

- Reducing energy consumption in buildings from a 2015 baseline, including:
 - *Commercial buildings: 15-20% reduction by 2035, 30-40% reduction by 2050*
 - *Residential buildings: 10-15% reduction by 2035, 10-30% reduction by 2050*
- Actions to achieve this reduction include:
 - *Tightening regulations*
 - *Government taking the lead*
 - *More district cooling systems*
 - *Greater transparency*

The baseline used by the government for its buildings target is 2015. However, between 2015 and 2019, energy consumed in commercial buildings increased. To reach the energy reduction target, the actual reduction needed is 17.7% to 22.5% (rather than 15% to 20%). This differential is similar for residential buildings.

A major cause of the past increase in energy consumption was the construction of more buildings. Although Hong Kong is expected to continue to expand in the coming years, the list of actions the government is adopting sounds very similar to the energy efficiency plans it published in 2015 and 2017.

While embodied carbon is briefly mentioned in the plan, a more comprehensive strategy to measure and reduce it should be provided for both buildings and infrastructure.

Green transport (18% of emissions)

- The government does not provide an emissions reduction target for transport, but lists actions, including:
 - *Promoting electric and hydrogen vehicles*
 - *Improving traffic management including through congestion charging*

A clear policy direction is crucial for the development of infrastructure and for transport providers to conduct trials and investment. CAP2050 does not have a zero-emissions mobility roadmap for heavy-duty vehicles with clear objectives and realistic timelines.

Greater attention should be paid to city planning to minimise the need to travel. C40 Cities Climate Leadership Group, of which Hong Kong is a member, advocates for the ‘15-minute city’, where everything a person requires for his/her daily needs is within 15 minutes of where he/she lives.

Waste reduction (7.3% of emissions)

- The government does not provide an emissions reduction target for waste, but lists actions, including:
 - *More waste-to-energy facilities*
 - *Reducing waste through municipal waste collection charges and greater use of recycling*
 - *Greater capture and use of landfill gas.*

Commitments for emissions reduction should be published for each source of emissions.

A site for a second waste-to-energy facility is reserved next to Black Point Power Station. Construction of this facility should be fast-tracked.

Others

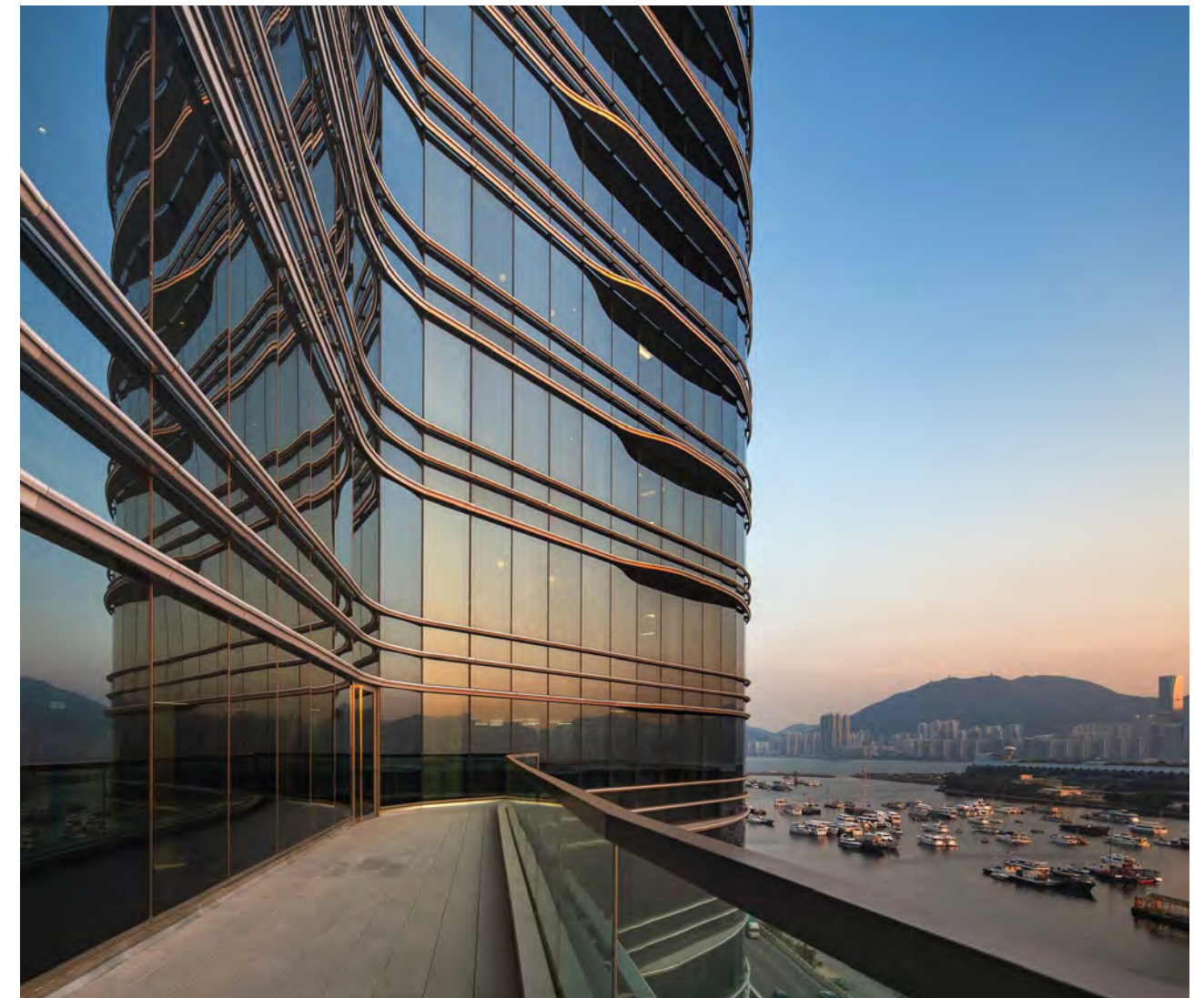
- *Town gas and liquefied petroleum gas (LPG) usage (4.6% of emissions)*
- *Industry (4.3% of emissions)*
- *Agriculture (0.1% of emissions)*

These sources of emissions are not mentioned in the government’s plan. They should have specific reduction targets and plans.

Infrastructure resilience

- *The plan acknowledges that infrastructure can play an important role in combatting climate change and extreme weather events, but focuses on Hong Kong’s territory alone.*

Climate resilience should also be considered at a regional scale, covering the Greater Bay Area for example, to address instances such as the risk of droughts and their impact on Hong Kong’s water supply.



High performance façade of the Quayside, Hong Kong, China

Recommended climate actions for Hong Kong

Jasper Hilkhuijsen, East Asia SDG Taskforce Leader, Arup
 Lawrence Iu, Climate Change & Partnerships Lead, Civic Exchange
 Ken Ho, Council Representative for Hong Kong, Institution of Civil Engineers

Our collective response to climate change must aim to accelerate decarbonisation and include a greater focus on building resilience to the climate impacts we cannot prevent. Due to its geographic location, Hong Kong is susceptible to climate impacts such as storm surges, sea level rise, rainstorms, tropical cyclones, droughts and heatwaves. The frequency and intensity of these extreme weather events are expected to further increase in the future.

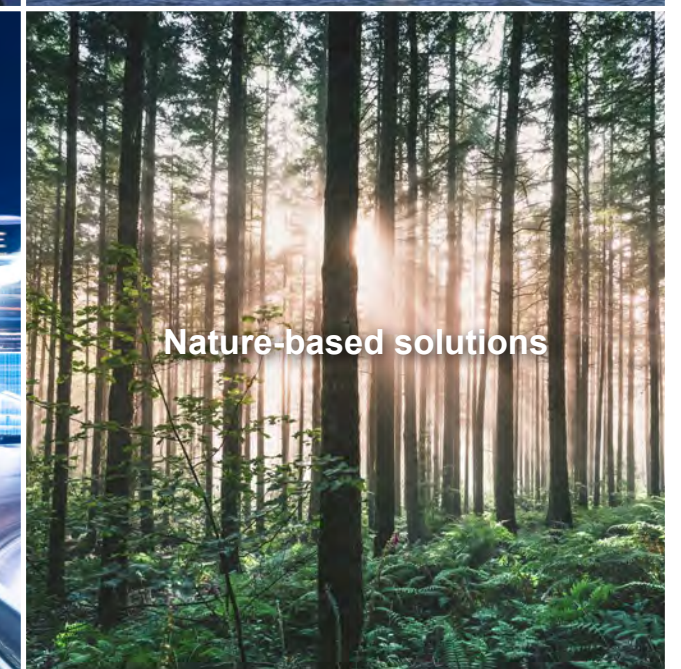
Suitable adaptation and resilience measures are essential to reduce or contain the potential loss and damage. In addition, we need to consider how our climate efforts can optimise wider positive outcomes such as liveability, environmental protection and economic prosperity.



Arup's Smart Green Resilient planning approach addresses both mitigation and adaptation of the built environment

Recommendations and essential immediate actions to mitigate and adapt to climate change are categorised according to four overarching themes:

- Decarbonisation and adaptation of the built environment
- Towards clean energy
- Low- and zero-carbon transport systems
- Nature-based solutions



Decarbonisation and adaptation of the built environment

Our recommendations

Transparency is the key to reducing both operating energy consumption and embodied carbon in buildings. We believe Hong Kong needs policies that:

- Mandate asset owners and developers to conduct whole life cycle carbon assessments for their buildings and infrastructure and report outcomes annually (e.g., by uploading results to the Buildings Department’s or other relevant websites). This can create transparency, demonstrate best practice and create market pressure for better performance
- An initial step is for the government to ‘get the ball rolling’ by introducing performance reporting for its buildings and infrastructure
- The government can make performance reporting a prerequisite for new developments to obtain GFA concessions and encourage voluntary adoption among leading private-sector companies.

The government should play a leading role in encouraging and enabling the private sector to increase climate resilience by:

- Publicly disclosing climate risk assessments, forecasts and design guidelines
- Demonstrating best practices through adequate design and retrofit of public infrastructure and government buildings.

Key actions to take now

- Conduct a whole life cycle carbon assessment for all projects — and act upon the findings. Demonstrating leadership, Arup will undertake whole life cycle carbon assessments for all its building projects from April 2022
- Optimise the energy efficiency performance of buildings
- Conduct assessments to determine whether repurposing existing buildings, structures and foundations rather than constructing new ones is justified by the resulting reduction in embodied carbon emissions. Advocate the business case for this based on both monetary value and carbon appraisal
- Step up R&D work on low-carbon concrete and low-carbon steel and commercialise the products at affordable costs
- Enhance the climate resilience of buildings and critical infrastructure now and in the future through robust climate modelling and comprehensive design strategies
- Enhance early-warning systems and emergency preparedness and response, strengthen public education and awareness, and promote community-based, locally led adaptation approaches and resilience measures.



Read more

- [Net zero carbon buildings – three steps to take now](#)
- [Green and thriving neighbourhoods](#)
- [Decarbonising Hong Kong buildings – policy recommendations and next steps](#)
- [Green building rating systems – benchmarking study](#)
- [PAS 2080: Carbon Management in Infrastructure](#)



Watch more

- [Race to Zero webinar series: Decarbonising the built environment – Hong Kong](#)

Project showcase



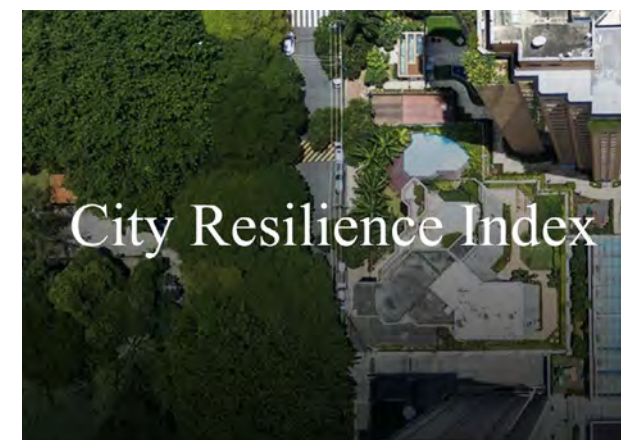
CIC Zero Carbon Building Hong Kong, China

The Construction Industry Council’s (CIC) Zero Carbon Building is a pioneering project to showcase state-of-the-art zero-carbon building technologies and raise community awareness of sustainable living. [Read more](#)

Neuron – the digital brain of smart buildings

Developed in-house at Arup, Neuron is a smart building app that uses 5G and BIM to collect and display real-time data and AI technology to analyse, automate and optimise building performance. It has been successfully implemented at One Taikoo Place in Hong Kong.

[Read more](#)



Cities Resilience Index

Developed in collaboration with the Rockefeller Foundation, this Index provides a comprehensive and technically robust basis for measuring city resilience that is globally applicable.

[Read more](#)

Towards clean energy

Our recommendations

To ensure a reliable supply of energy, good long-term planning is needed. Design standards should cater for possible contingency, and a diversified portfolio of different energy sources should be kept. We recommend a five-step approach:

- Continue the ongoing transition from coal to natural gas while exploring cleaner energy sources, including as imports from neighbouring regions
- Optimise renewable-energy generation while acknowledging Hong Kong's geographical constraints
- Reduce demand-side requirements by increasing energy efficiency, smart buildings and a smart grid
- Foster electrification, including electric vehicles and the conversion of gas-fuelled devices in buildings
- Pursue the adoption of hydrogen and biofuels. Hydrogen has great potential in Hong Kong: the gas pipe network can transport it, there is government support, and the city's energy providers are already exploring it.

Key actions to take now

- Optimise and accelerate renewable-energy production
- Improve energy storage and reduce energy demand, especially of buildings
- Apply cross-scale solutions, from territory-wide energy generation to solar panels in buildings
- Explore and accelerate the use of hydrogen for both buildings and transport systems.



Read more

[Towards sustainable solar energy](#)

[Catalysing hydrogen investment](#)

[Powering a carbon-free Hong Kong: Pathways towards a net-zero emissions power system for Hong Kong](#)



Watch more

[Race to Zero webinar series: Towards clean energy – Hong Kong](#)

Project showcase



GIP renewable energy transaction advice

- Japan, Philippines, India, Indonesia, Australia, Taiwan and Thailand

Arup worked on behalf of Global Infrastructure Partners (GIP) on the company's successful bid to acquire Equis' portfolio of 11GW of renewable assets for a record-breaking US\$5 billion. Dealing with restricted timescales, Arup's global and regional business investor advisory teams ensured a successful deal.

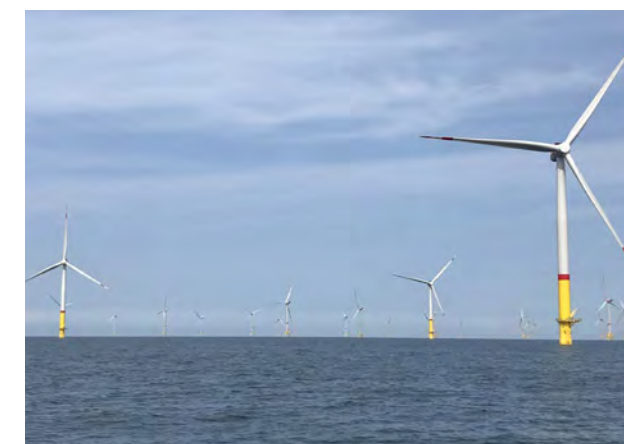
[Read more](#)

Kai Tak district cooling system

Hong Kong, China

To reduce the overall energy consumption of this new 320-hectare urban development, a seawater district cooling system was implemented, resulting in a 35% reduction in electricity consumption.

[Read more](#)



Akita-Noshiro wind farm project

Japan

Arup advises clients around the world on implementing offshore wind capacity to facilitate countries to meet net-zero goals, including Akita-Noshiro, Japan's first large-scale commercial offshore wind farm.

[Read more](#)

Low- and zero-carbon transport systems

Our recommendations

While Hong Kong's public transport system is considered to be one of the most successful in the world, we have identified several areas where improvements can be made, in a three-step strategy:

- Minimise the need for travel through better land-use planning that improves the balance between population and jobs across the territory
- Encourage a shift from private vehicles to public transport through a carrot (subsidies, comfort and service levels, etc.) and stick (congestion charging, taxes, etc.) approach
- Promote green modes of transport for both private and public vehicles (e-bikes, electric and hydrogen propelled cars, buses, lorries, etc.).

Key actions to take now

- Better integration of transport and land-use planning through mixed use and transit-oriented development strategies
- Prioritise pedestrians and optimise the walkability of neighbourhoods and streets. Integrate and promote cycling where feasible
- Implement strategies to discourage motorised journeys and make public transport, active travel and low-emission modes more attractive
- Promote and facilitate green modes of transport, for example by providing electric vehicle charging facilities
- Develop electric and hydrogen fuel cell buses, while considering Hong Kong's operating conditions.

Project showcase



Kwun Tong pedestrian environment improvement Hong Kong, China

Arup is enabling the transformation of this industrial district into a walkable and pleasant pedestrian-oriented business area that hinges on its public transport system.

[Read more](#)

Shatin-to-Central Link Hong Kong, China

This 17km-long strategic railway extension significantly improves the connectivity, coverage and convenience of the entire rail network.

[Read more](#)



E-mobility roadmap Vietnam

Arup is developing an electric mobility roadmap for Vietnam to scale up its electric vehicle deployment while facilitating the uptake of renewable energy and supporting the development of industries in the e-mobility ecosystem.

[Read more](#)



Read more

[Cities Alive: Towards a walking world](#)
[Tomorrow's public transport system](#)



Watch more

[Race to Zero webinar series: Low and zero carbon transport systems – Hong Kong](#)

Nature-based solutions

Our recommendations

Nature-based solutions use the power of functioning ecosystems as infrastructure to provide services that benefit the environment and society.

- Optimise the role of nature-based solutions in decarbonising to combat future climate change and create greater resilience
- Restore degraded habitats and systems, and provide new habitats where possible
- Assess and act upon the negative impacts of climate change on Hong Kong's ecological assets, such as the Mai Po Nature Reserve
- Protect and further enhance mangroves as they absorb GHG emissions and protect coastal areas from surges and swells.

Key actions to take now

- Enhance quality of life by providing a holistic approach to water management in every development, addressing water supply, flooding and wastewater
- Integrate water and nature in our cities at every scale, from buildings to infrastructure, to better mitigate and adapt to climate risks
- Adopt a nature-first approach to restore and preserve ecologically valuable areas.

Project showcase



Shanghai urban drainage master plan China

This visionary 'blue, green and grey' approach supports an integrated water cycle within the city, while providing additional benefits across Shanghai, including to its ecology, economy and public health.

[Read more](#)

Tung Chung New Town Extension (West) Hong Kong, China

Arup is implementing a comprehensive regional sustainable urban drainage system at Tung Chung Valley, alongside the ecologically sensitive Tung Chung Stream, to preserve and enhance the local natural environment. Included is the proposal of a River Park with a visitor centre.

[Read more](#)



Sustainable slope design Hong Kong, China

Arup pioneered the use of soil bioengineering approaches, a self-sustaining, natural and aesthetically unobstructive method of catchment management, to provide landslide hazard mitigation and rehabilitate a hillside catchment in West Lantau.

[Read more](#)



Read more

[Cities Alive – Rethinking green infrastructure](#)

[Arup Explores Regenerative design](#)



Watch more

[Race to Zero webinar series: Nature-based solutions – Hong Kong](#)

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About Arup

Dedicated to sustainable development, Arup is a collective of over 16,000 designers, advisors, and experts working across 140 countries. Founded to be both humane and excellent, we collaborate with our clients and partners using imagination, technology, and rigour to shape a better world.

About Civic Exchange

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.

About ICE Hong Kong Association

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 region outside of the UK. ICE's vision is to place civil engineering at the heart of society, delivering sustainable development through knowledge, skills and professional expertise.