AECOM

THE FUTURE OF INFRASTRUCTURE

# Sustainable Legacies: COP26 Report

Delivering a better world

# FOREWORD

## Welcome to the special COP26 edition of our Future of Infrastructure report.

**The 'Conference of Parties' (COP) summits have been bringing together world leaders to discuss action on climate change for almost three decades. As we look to the COP26 conference in Glasgow, we're at a pivotal moment in dealing with this challenge. At AECOM, we understand both the urgency and our responsibility to help our clients adapt and improve resilience, reduce their carbon emissions and achieve net zero ambitions.**

At the same time, the recovery from the coronavirus pandemic presents an opportunity to invest in green infrastructure and bring about lasting change. To be a success, COP26 must clarify where investments and activities should be prioritized, transforming promises into funded and much-needed, widespread action. It is no longer enough for organizations to set ambitious net zero carbon targets without a clear pathway for how to achieve them.

For our part, we've adopted science-based emission reductions targets and were the first U.S.-based company in the engineering and construction sector to have our targets approved by the globally recognized Science Based Targets initiative (SBTi). Our Sustainable Legacies strategy, launched earlier this year to ensure that the work we do in partnership with our clients leaves a positive, lasting impact for communities and our planet, serves as a roadmap for our engagement.

COP26 is an opportunity for all of us to establish and cement the partnerships needed to make the transition to a carbon neutral economy work. At AECOM, we will be partnering with government departments and industry bodies, showcasing our work, contributing to panel discussions, and engaging with our clients to help them realize their own ambitious climate targets.

Implementing these efforts requires cooperation on many levels — between individuals, local communities, local government organizations, federal agencies, and nonprofit organizations. As the world's most trusted infrastructure consulting firm, we're best positioned to advise and execute for them — driving innovation in climate change, sustainable design and social value.

We're excited to play our part in this global conversation and moment of climate action.

**Troy Rudd**
Chief Executive Officer, AECOM

# EXECUTIVE SUMMARY

## What role should infrastructure play at COP26?

**The World Bank estimates that infrastructure construction and operations account for approximately 70 percent of global emissions. To win the battle on emissions reduction, the industry needs to change.**

Given that parts of the world have been living with climate change for some time, we know what needs to be done to adapt to climate change and protect ourselves and our communities from the worst impacts. The Intergovernmental Panel on Climate Change (IPCC)'s sixth report shows that there is no longer any time to wait. To ensure we are delivering a better world and a better future for us all, we must act now.

In this special edition of our Future of Infrastructure report, authored with clients and partners around the world, we've identified priority actions needed in the fight against climate change for each of the COP26 themes — finance, energy, nature, resilience, transport and cities. In each of these areas we highlight practical solutions that improve environmental and social outcomes while tackling climate mitigation and improving resilience.

We all know that the challenges of the climate crisis can only be overcome by working together. At AECOM, we're ready to play our part, collaborating with like-minded governments, organizations and businesses who want to leave a positive, lasting impact on communities and the planet.

**Lara Poloni**
President of AECOM

# CONTENTS



## Financing climate action

How embedding climate factors into financial and commercial decisions can help businesses adapt to a changing environment


## Energy

Decarbonizing energy: why a holistic and systems-based approach is needed


## Nature

Finding answers in nature: the lessons of rewilding


## Adaptation and resilience

Harnessing water technology for urban self-sufficiency


## Clean transport

Fleet of foot: how forward-looking organizations are leading the switch to EVs


## Cities and the built environment

Creating stronger, sustainable urban centers that serve post-pandemic models of living and working

AECOM

Financing climate action

# Financial and commercial decisions

## How embedding climate factors into these decisions can help businesses adapt to a changing environment

Accurate and benchmarked business risk reporting that properly accounts for climate change will be increasingly important as the drive to combat climate change broadens and accelerates. AECOM's **Sally Vivian** looks at the challenges of assessing climate risk — and the opportunities for businesses who forge the way forward.

—

As the United Nations Climate Change Conference (COP26) convenes, the financial dimensions of this century's most fundamental issue are coming into focus. The need to incorporate climate risk into financial decision-making and commercial strategy, as well as disclosing on these in a complete and transparent manner, is emerging as a central challenge for businesses the world over. A new kind of thinking is called for:

**1.5°C**

**Paris Agreement goal of limiting global average temperature rise to no more than this limit.**

one that can accurately frame the financials of climate risk and provide robust evidence bases to investors, employers, customers and supply partners, as well as to governments and regulators.

Financial impact and risk associated with climate change will be a fundamental part of the debate at COP26. Regardless of whether the Paris Agreement goal of limiting global average temperature rise to no more than 1.5°C above pre-industrial levels is met, climate change is here, and has the potential to disrupt every segment of the global economy. With the world already experiencing extreme impacts, climate risk has moved decisively from being an outlying concern to a crucial planning issue for business, with regard to both adaptation and the need to meet emissions reductions commitments.

Curbing carbon emissions and limiting global temperature rise will cost trillions in private finance, but the benefits will dramatically outweigh the initial costs.

> Every financial decision needs to take climate into account.
>
> COP 26 Goal

With some effects of climate change already irreversible, adapting and building resilience is crucial. "Every financial decision needs to take climate into account," the COP26 goals emphasize.

In response, we are seeing fundamental shifts in financial markets, with increased investor attention and the emergence of investor-led climate change reporting standards and legislation aimed at protecting and improving the stability of the global economy. In line with this, there is also an urgent need for effective assessment and disclosure of climate-specific risks, enabling businesses to properly factor them into decision-making as well as disclosing their progress.

Integrating climate risks into traditional business risk approaches demands a new kind of analytics. Many of the risks are long-term, uncertain, changing and difficult to quantify compared with other components of commercial risk management. There is a need for companies and their auditors to become fluent in this emerging risk landscape. Some are aware of the new and potentially decisive risk dimension associated with climate change, but have yet to codify it in disclosures or in corporate strategies. However, responding to this challenge means businesses are able to plan, adapt, and transition towards a net zero economy, while providing investors and insurers with greater clarity and therefore confidence, in their long term viability.

The 2021 report by the Intergovernmental Panel on Climate Change (IPCC) has shown that inaction isn't an option. With global temperature rises on course to far outstrip the main Paris Agreement target, climate change is already affecting every region on earth, evident in the increased frequency and severity of extreme weather events. In the face of this unique challenge, failure to take steps to ensure resilience will likely present a future liability.

We at AECOM advocate a three-tiered approach: ensuring that the outcomes of climate risk assessment are reflected in strategic thinking across all aspects of an organization; identifying and embracing the competitive opportunities that, for many businesses, this change in strategy can offer; and achieving accurate and meaningful climate assessment, monitoring and disclosure.

## A proactive investment stance

There is an opportunity to demonstrate proactive thinking and efforts to a world which increasingly values real climate action. The Pew Research Centre has been tracking attitudes to climate change since 2013, and the latest surveys indicate a huge growth worldwide in the view that climate change is a major threat. A study released in September spanning 17 advanced economies found that overall 72 percent of citizens were concerned that climate change would harm them personally, with significant upward trends in almost all countries surveyed. This deep shift in public sentiment parallels the changes we have noted in investor priorities, and makes a powerful case for climate proactivity as a competitive advantage.

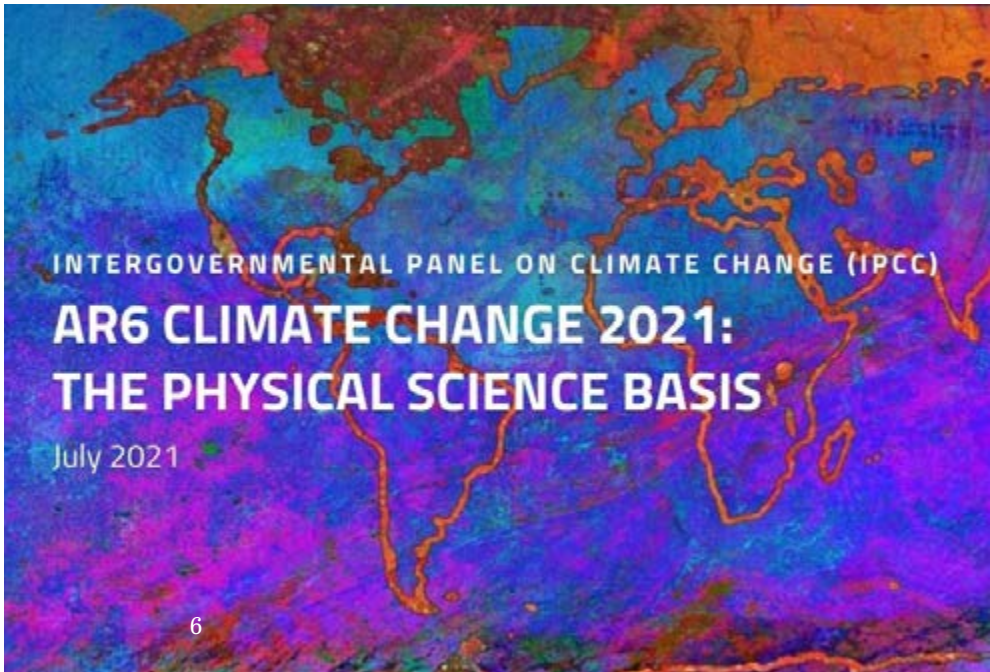
**72%**

**17 advanced economies found that overall percentage of citizens were concerned that climate change would harm them personally.**

There is no doubt that this decade is the one for accelerated climate response and action. The world's largest economies, including the U.S. and China, as well as the European Union, have set carbon reduction targets for 2030, targets that are increasingly being incorporated into the investment mandates of asset managers. Every demonstrable climate-positive action that companies take reduces the cost of capital and future financial risk.

## Applying emerging standards to disclose climate risk

Demand from investors increasingly requires companies to account on reporting and forecasting climate-related risks that lie outside traditional risk analysis.





6

Of the available climate reporting guidelines and initiatives to enhance disclosure and mitigation of climate- related financial risk, the Task Force on Climate-Related Financial Disclosures (TCFD), created by the G20's Financial Stability Board in 2015, has risen to the fore as a go-to framework for financial climate risk, becoming part of the regulatory framework in several countries, including the EU.

The TCFD offers extensive guidance on recommended disclosures in the areas of governance, strategy, risk management, metrics and targets, as well as principles for effective disclosure and advice on assessing resilience across a range of scenarios. While businesses can use such guidelines to understand the kind of things they need to report, deciding what is material and how to accomplish meaningful climate risk disclosure remain big challenges for individual organizations. However, this is where the real value lies. Understandably, many organizations have not yet met these challenges. The TCFD says that corporate disclosure of climate-related financial impacts remains low, despite a policy statement from the International Accounting Standards Board that climate risks should be treated as material financial risks, and moves by some governments to legislate reporting requirements. Investor-led groups such as the Principles for Responsible Investment initiative have responded enthusiastically to the emergence of new climate impact financial reporting guidelines, but the corporate response has not always matched this interest. A recent statement signed by 567 investors representing $46 trillion in assets urged governments to implement mandatory reporting requirements in line with TCFD recommendations to ensure disclosures that are "consistent, comparable and decision-useful." In June this year, G7 finance ministers also called for greater coordination on mandatory disclosures, and there are signals that an international agreement may be forthcoming.

> With the support of AECOM, we have not only developed a road map and action plan for improved alignment to TCFD, but also engaged our organisation in finding new and innovative solutions to the climate-related challenges we face.
>
> Rowan Adams, Executive Vice President of Corporate Affairs, Tate & Lyle

Our team at AECOM supported Tate & Lyle PLC, a global provider of ingredients and solutions for the food, beverage and industrial markets, to align its climate-related disclosures to the TCFD recommendations and to effectively disclose climate-related risks and opportunities through the company's annual reporting processes. We conducted a gap analysis of Tate & Lyle's corporate disclosures across the four TCFD thematic areas (governance, strategy, risk management and metrics and targets) to assess how well-aligned existing indicators were. Key stakeholders within Tate & Lyle, working in areas such as enterprise risk management, investor relations, sustainability programs and reporting, procurement, commercial and manufacturing, were interviewed to understand current processes and procedures across all aspects of the organization.

Part of the process was also undertaking a climate-change risk assessment for Tate & Lyle, considering the physical and transition risks and opportunities associated with its operations, as well as for key suppliers and markets. A review of climate-change projections and trends, relevant policy, legislation and industry progress informed the assessment. Workshops were conducted with key personnel from a range of functions to build capacity and understanding of these issues and explore the extent to which some of these may have already been experienced. A key outcome was to help Tate & Lyle to better integrate climate risks and opportunities into its current enterprise-wide risk management framework. We formed a road map and action plan for improved alignment to TCFD with the recommended next steps and suggested timelines for Tate & Lyle.

"The TCFDs are important to help businesses like Tate & Lyle improve their understanding of long-term climate-related risks and opportunities. But to take meaningful action, we needed to start with a better understanding of what matters most," said Rowan Adams, Executive Vice President of Corporate Affairs. "With the support of AECOM, we have not only developed a road map and action plan for improved alignment to TCFD, but also engaged our organization in finding new and innovative solutions to the climate-related challenges we face."

## Embedding climate-related financial risks into strategic thinking

The slow uptake of analysing and reporting on climate-related financial risk underlines the difficulty of the task. A key challenge is that climate risks do not fit the template of other financial risks.

The TCFD touches on this when it says that climate risks are "non-diversifiable." They are not amenable to conventional risk management, which works on the basis of risk isolation and mitigation on easily manageable timescales.

At AECOM, we recognize that it is difficult to align climate risk with traditional risk measures, and that is why it is so important to bring an enhanced risk awareness into a company, building engagement and understanding from the board level down.

The time for this change is now. The world has already been through a period where companies have had to respond very fast to risk scenarios that were once thought highly unlikely. Yet the speed and flexibility of response that organizations have shown through the coronavirus pandemic have readied them to meet other extreme risks.

Our experience is that many companies have the ambition to innovate around climate action. There are clear competitive opportunities in products, processes and at a deeper level in becoming different kinds of businesses. The challenge is converting the ambition into action.

Meeting that challenge means understanding and quantifying climate-related financial risks, mitigating them, and harnessing opportunities. This will be the road for successful firms to 2030 and beyond.

> In June this year, G7 finance ministers also called for greater coordination on mandatory disclosures, and there are signals that an international agreement may be forthcoming.

AECOM

Energy

# Decarbonizing energy

## why a holistic and systems-based approach is needed

Transitioning to a truly net-zero energy system is a hugely complex task. AECOM's **Toby Uppington** says a systems-based approach is essential — requiring an interlinked appraisal of infrastructure and how it interfaces with and uses energy, while also considering the ways in which energy is generated, transferred and utilized.

—

As part of the global push to decarbonize, policy-makers and the private sector are ramping up the electrification of infrastructure and the adoption of alternative fueling solutions to replace traditional carbon-based sources. This is driving demand for renewable forms of energy, and with it the increasing need to both develop suitable alternative power infrastructure and repurpose how energy is used within the built environment and by transportation systems.

To incentivize the transition to a lower-carbon world, targets have been set to reduce the net emissions associated with both the generation and use of energy. With the scale and urgency of the climate crisis becoming ever more apparent, there is growing pressure around these targets as the United Nations climate change summit, COP26, seeks to bring us on course to limit global warming in line with the Paris Agreement.

To meet these targets, we need a holistic appraisal of how energy is generated, transferred and utilized across all forms of infrastructure. At industry and government level, the energy transition is causing significant upheaval; the impacts of these systemic disruptions in terms of cost, timing and, potentially, social acceptance, require collaborative action from both public and private-sector infrastructure owners and operators.

> "To incentivize the transition to a lower-carbon world, targets have been set to reduce the net emissions associated with both the generation and use of energy.
>
> —

Governments and civil societies must also align on how to manage change acceptably. It is crucial to address such issues and bring all stakeholders on board; →


Solar energy.

> Reconfiguring the grid and rethinking how we match supply and demand involves a holistic view of the inter-relationship between how energy is sourced, transferred and utilized.

a successful energy transition will only be achieved if public and private sectors, governments and communities work together toward a common goal.

## A systemic reconfiguration

Much of the world's existing energy arrangement has been designed around discrete power plants feeding a grid distribution system configured according to the location of urban and industrial centers.

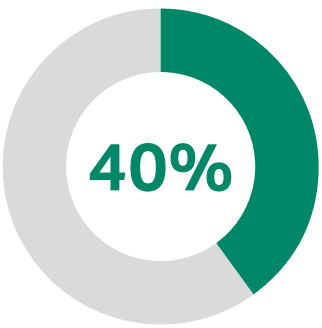
In a renewables-rich world, energy is generated where the sun shines or the wind blows, and these are rarely in the same locations as power plants might once have been, nor in the areas of highest demand. What that means for the grid is that it's much more diffuse, distributed and interconnected — quite different from the current set-up, particularly in mature economies.

For renewable energy, it's not just generation that matters; it's how that power can be connected to the grid in the right way. On the east coast of the UK, our team at AECOM is working with energy supplier SSE to resolve some of the issues involved in bringing offshore wind power onshore. In the case of offshore wind or wave power, for example, subsea connections must be designed and built to ensure that energy can be brought onshore and fed into the system efficiently. That requires assessment of additional risks and logistics, and grid reinforcement may be needed in areas that have not historically experienced such a significant flow of power.

As the energy network becomes ever more electrified, the old networks of tankers, pipelines and heavy rail are replaced by wires and transformers, enabling the instantaneous trading of green energy as a commodity. All of this is forcing a major reconfiguration — particularly of transmission lines, but also of new interconnector cables between countries such as the transnational interconnector between Iceland and the UK which enables the supply of renewable geothermal energy on which AECOM acted as the owner's engineer to ensure safe, compliant cost effective delivery.

One of the challenges these new grid connections have to contend with is the aging infrastructure that forms the existing system, leading to the need to replace, upgrade and maintain the network. Working out where and how to place these connections, while minimizing environmental and social impacts, sustainably and affordably, is another big piece of the puzzle.

**Sales of electric vehicles grew by more than 40 percent in 2020**




> Our work is enabling the modernization of a network of aging and disparate power systems both above and below ground, and includes the integration of renewable supplies to provide decarbonized energy to millions of customers.

In the south-west of Scotland, AECOM is working with Scottish Power and the National Grid to design and permit new routing solutions for a suite of major new high-voltage interconnectors across the region.

Our work is enabling the modernization of a network of aging and disparate power systems both above and below ground, and includes the integration of renewable supplies to provide decarbonized energy to millions of customers.

Infrastructure needs to be repurposed at the consumer end, too. For example, sales of electric vehicles grew by more than 40 percent in 2020, yet there are considerable issues around charging to be addressed, particularly in cities where few users are able to house their own charging points. The local grid also needs to be able to cope with the increased demand arising from the volume of new EV connections.

To mitigate this risk, we at AECOM are working with JOLT, a new entrant charge point operator with an innovative technological solution inclusive of battery storage that both reduces the demand on the grid and can also support smart grid technologies providing power back to the grid at periods of peak demand.

## Rethinking supply and demand

The traditional energy system has evolved to meet demand at any given time by flexing supply accordingly. Carbon-based power generation is scaled up or down by burning more or less coal or gas. Renewable energy sources, however, are intermittent in nature and so do not typically allow for such operator control. The supply and demand equation can however be inverted, so that power is generated when the supply is abundant and stored for later use as demand occurs. While this is not a new idea, technology is now enabling such a transition at scale in an integrated manner with renewable generation.

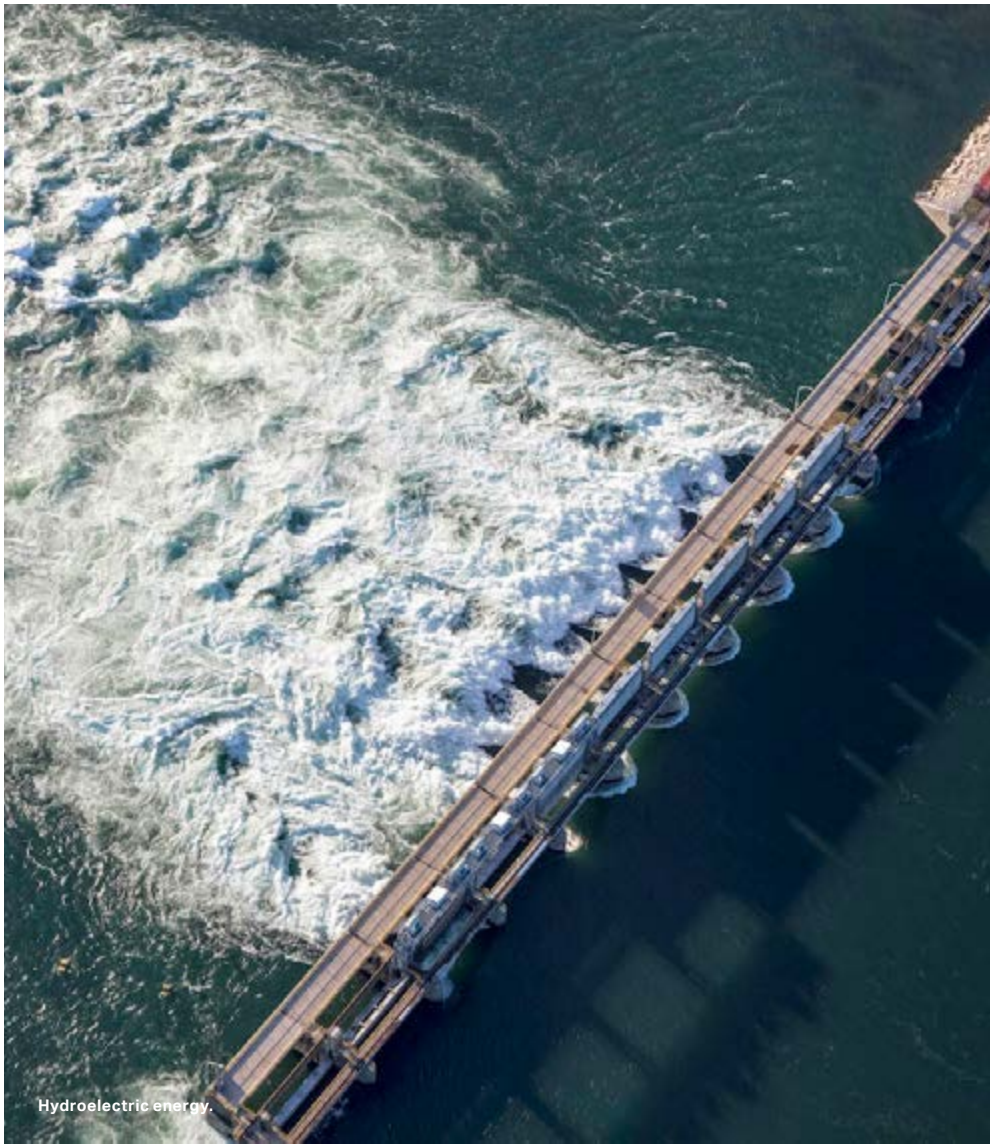
One traditional example is pumped storage hydroelectricity (PSH), which can overcome the intermittency of many renewable sources by powering water pumps during periods of excess energy supply to fill reservoirs. When the sun stops shining or wind stops blowing, water is released to power electricity turbines and substations lower down, ensuring a stable, dependable flow of energy.

PSH also provides a range of other services that are valuable to the grid, including voltage regulation. Because of the historic lack of energy surplus, PSH has been largely under-deployed in Ireland and the UK, but with the pivot to major renewable generation capacity, AECOM is assisting in the development of three new schemes in Scotland, including one on the shores of Loch Ness.

A whole range of other energy storage solutions are coming to market, with exponential improvements in battery storage technologies. There are innovations, too, in alternative fuel storage media such as ammonia, which can be produced during times of peak generation and then stabilized as a source of energy for on-demand future use and transportation. New techniques are emerging to convert ammonia into clean hydrogen, at scale, ready for use in fuel cells for transportation solutions.

On the demand side, technology and systems analysis can help people to reduce and control usage, tackling the energy challenge from all angles. AECOM is a co-author of CP1, the Heat Networks Code of Practice for the UK, and is part of the consortium acting as delivery partner for the UK government's £320m Heat Networks Investment Project (HNIP). We design sustainable hybrid site-wide district heating networks that generate and distribute low-carbon heat to campuses and communities. Improvements in building sustainability and industrial energy efficiency are similarly reducing the burden on the system. ➔

> New technologies are becoming available that help store, transport or recover energy, transforming how infrastructure systems are designed, built and operated.



Hydroelectric energy.

**40%**

Electric vehicles growth in 2020.

Wind turbine energy.

## Sequential solutions for a successful transition

Reconfiguring the grid and rethinking how we match supply and demand involves a holistic view of the inter-relationship between how energy is sourced, transferred and utilized. Recognizing that it will be impossible to switch instantaneously to a zero-carbon world, we must also craft interim solutions to take us sequentially toward a net-zero future.

Carbon capture and storage technologies are a perfect example of such a sequential solution. Emissions from gas-fired power stations and industrial sources can be collected and treated, with carbon dioxide being sequestered underground, enabling the continuity of power generation and manufacture of materials such as steel, glass and cement. These technologies are already being diversified to capture carbon from the industrial production of 'blue' hydrogen — which itself is now entering the supply chain as an alternative to hydrocarbon fuels.

The development of hydrogen as an alternative fuel is in turn creating a market for its production from renewable sources like electrolysis, rather than from fossil fuels. Over time, this 'green' hydrogen could eventually replace the natural gas used by gas-fired power stations. Right across this transition, the end user sees no appreciable difference in their supply of electricity within their home, while the carbon in the system is at first captured and ultimately removed altogether from the system.

> AECOM is enabling Net Zero Teesside, a carbon capture, utilization and storage (CCUS) scheme in the north-east of England, led by BP alongside four other major international energy firms.
> —

AECOM is enabling Net Zero Teesside, a carbon capture, utilization and storage (CCUS) scheme in the north-east of England, led by BP alongside four other major international energy firms, providing an integrated solution for a network to capture carbon emissions from power generation and industrial sources. Our team is facilitating this milestone project from its foundations, from preparing environmental and technical assessments to designing and delivering the ground investigation using a variety of advanced techniques. In Scotland, we are managing consent applications and engineering concept design for the carbon capture and storage project at Peterhead Power Station, the country's biggest carbon emitter. Our experience on both has demonstrated the potential of carbon capture, a technology the UK's Climate Change Committee has described as critical to the drive to net zero.

All of this shows that when we think of the energy transition, it is not as simple as flicking a switch. But the tools and methodologies are there to help a phased transition and to manage the complexities involved.

New technologies are becoming available that help store, transport or recover energy, transforming how infrastructure systems are designed, built and operated. Such technical solutions, alongside other considerations such as policies, environmental effects and stakeholder engagement, are essential — enabling infrastructure to be developed in a holistic manner to achieve the desired outcome of a net-zero future.

AECOM

Nature

# Finding answers in nature

## The lessons of rewilding

Restoring what has been lost in the natural world holds answers to tackling the dual challenge of climate change and biodiversity loss. AECOM's **Chris White** looks at the lessons being learnt from rewilding projects in the Scottish Highlands and San Diego's backcountry in southern California.

—

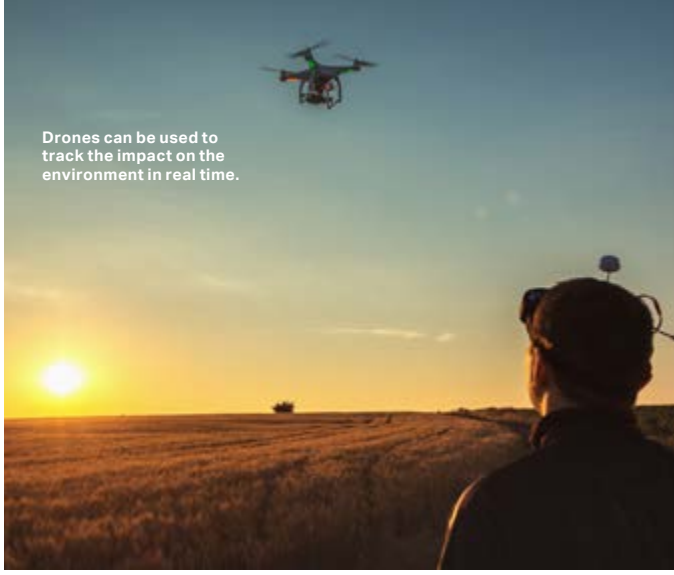
The impact of climate change has been felt in the number of extreme weather events around the world that many of us have experienced — from record heatwaves resulting in destructive and sometimes deadly wildfires to severe floods. These are not one-offs: a landmark study released this summer by the United Nations' Intergovernmental Panel on Climate Change (IPCC) said hotter temperatures are here to stay. This means severe weather events will happen more frequently, its scientists predict.

Exacerbating these impacts, manmade damage to natural habitat is causing a biodiversity crisis. The Living Planet Report 2020, by the World Wide Fund for Nature and Zoological Society of London, warned that biodiversity was "crashing," with a 68 percent decline globally in population sizes across all species between 1970 and 2016.

According to data from the United Nations Development Programme, worldwide natural

**68%**

Biodiversity decline globally in population sizes across all species between 1970 and 2016.


Drones can be used to track the impact on the environment in real time.

> We know that rewilding the land and allowing nature to take back control is an inherently good thing to do, but what is exciting about this work is that it arms us with quantitative and financial metrics with which we can demonstrate the practical value to society of restoring ecological processes.
>
> Adam Eagle, CEO, The Lifescape Project

—

capital — our stock of renewable or non-renewable natural resources — has declined by almost 40 percent per person since the early 1990s. But it's hard to put a value on our natural habitats until they become damaged or degraded, when it suddenly becomes clear that their contribution — the natural capital they hold — is priceless.

Part of the answer to these twin crises may already exist — in nature. If we look to rainforests and peat bogs, for example, they draw carbon dioxide out of the atmosphere and store it. Getting the mix of vegetation right has been shown to keep wildfires manageable. Importantly, such nature-based solutions tackle both climate change and loss of biodiversity at the same time.

## Services provided by nature

To help organizations with land stewardship responsibilities who want to make a positive contribution to tackling these global crises, we have developed approaches that will allow them to take better decisions on how they interact with and invest in their land.

We are working on significant rewilding projects in two very different habitats — the Highlands of Scotland and San Diego's backcountry in southern California — with similar aims. Both will restore biodiversity, start to address the impact of manmade climate change and build resilience. A third project is also getting underway in southwestern Australia. Restoring habitats in each of these places is achieving the multiple benefits of capturing and storing carbon dioxide, halting biodiversity loss and making operations more resilient.

> Producing tangible metrics is a key aspect of the project: using technology such as drones, artificial intelligence, robot rovers and thermal imaging to track the impact on the environment in real time.
>
> —

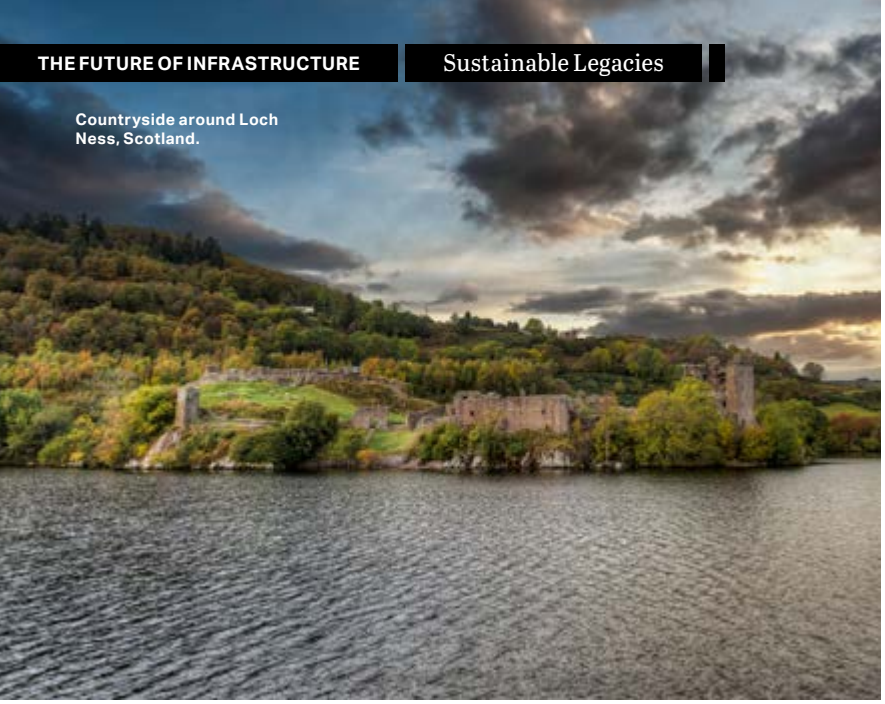
The approaches we have developed on these and other projects can be replicated to allow landowners to be better stewards of their land. The first step is to rigorously assess the natural capital — what it is, how much of it you have and how you can build it up or restore it if damaged. To reduce the cost of the repetitive processes needed to acquire and analyze data on natural assets, technology is key. Such tools measure progress in a scalable and verifiable way, which is crucial for giving investors and shareholders the confidence to support this new, quantifiable and commercially valuable relationship with nature.

In Scotland, we set up the Natural Capital Laboratory (NCL) in partnership with the Lifescape Project, landowners Roger and Emilia Leese, and the University of Cumbria at a site near Loch Ness.

Here the team are using principles from the Commission on Ecosystem Management established by the International Union for Conservation of Nature to restore 100 acres of forest, connect communities and reintroduce lost species. Producing tangible metrics is a key aspect of the project: using technology such as drones, artificial intelligence, robot rovers and to track the impact on the environment in real time, and assigning financial values to the services provided by nature, such as the amount of carbon captured on site and the changes in biodiversity.

Over five years between 2019 and 2024, the project will capture data about environmental conditions at the site, such as soil and water quality, using our digital natural capital accounting tool.


San Diego's backcountry.



Countryside around Loch Ness, Scotland.

> Recognizing and effectively communicating the true value of the world's natural landscapes and biodiversity is a major challenge that needs to be overcome if we are to see rapid and large-scale change in the way we manage and restore our ecosystems.
>
> Dr. Renee Young, Research director for biodiversity conservation and restoration

It will also act as a live experiment to develop, test and commercialize new tools and approaches for better managing the environment. The work has attracted the interest of prominent conservationists, including Charles, Prince of Wales, whose TV company has made a documentary about the project — as has the BBC's Countryfile series — and the results are being closely watched.

From the outset, our aim was to establish a flagship project to show other companies and organizations how they could set up their own rewilding initiatives, providing tools and approaches that can reduce the costs of such projects and allow organizations to undertake them at scale. As part of this we developed a virtual-reality tool which will enable people to put on a headset and see what the ecology of the area will look like in a future rewilded landscape.

The broader aim of NCL is to build a connected series of sites across the world, creating a global laboratory designed to develop new approaches to tackling the climate and biodiversity crises.

"We know that rewilding the land and allowing nature to take back control is an inherently good thing to do, but what is exciting about this work is that it arms us with quantitative and financial metrics with which we can demonstrate the practical value to society of restoring ecological processes," says Adam Eagle, CEO of the Lifescape Project.

To this end, the team are now beginning the launch of NCL South in southwestern Australia, to restore biodiversity to an area damaged by forest fires and intensive agriculture, using the model developed in Scotland. We are working with the Western Australia Biodiversity Science Institute (WABSI) to help rehabilitate hundreds of acres of degraded land. The wider region is home to one-third of all Australian plant species and is one of most biodiverse places in the world. The NCL South site will demonstrate what can be achieved through restoration, and how rewilded sites can also provide important value within a farming or other commercial landscape.

"Recognizing and effectively communicating the true value of the world's natural landscapes and biodiversity is a major challenge that needs to be overcome if we are to see rapid and large-scale change in the way we manage and restore our ecosystems," says Dr. Renee Young, research director for biodiversity conservation and restoration at WABSI. "The Natural Capital Laboratory is a prime example of leading-practice ecological restoration; it provides detailed Natural Capital Accounting for the ecosystem services and connects to a global audience through an interactive and visually engaging digital platform. The NCL's design and principles have the potential to become a major contributor to solving the global biodiversity crisis."

While some changes will happen relatively quickly, others are a far more long-term commitment. A wetland habitat or grassland can be restored in a short time, but for a forest habitat it may take hundreds of years to have a fully-functioning woodland system with species diversity. The good news is that intermediary habitats during the restoration period form important ecosystems, too.

We are now fully aware of the extent of the climate and biodiversity crises, and there is growing recognition of the critical need for companies to play a positive role in tackling these dilemmas. In order for organizations to remain relevant in future, they will have to adopt bold new approaches to demonstrate how all of us as a society can tackle the two most far-reaching challenges of our times.

> The broader aim of NCL is to build a connected series of sites across the world, creating a global laboratory designed to develop new approaches to tackling the climate and biodiversity crises.

AECOM

Adaptation and resilience

# Harnessing water technology

## for urban self-sufficiency

Desalination can offer a solution to water stress. In Singapore, the Keppel Marina East Desalination Plant (KMEDP) has shown how cities can implement it sustainably as efforts ramp up beyond COP26, write Keppel's **Eng Kwang Goh** and **Scott Dunn** of AECOM.

—

As the effects of climate change intensify, water scarcity is becoming an acute concern for cities around the globe, with many relying on resources imported from beyond their boundaries. Just three percent of the world's water is fresh water, and at current consumption rates, the World Wide Fund for Nature estimates that by 2025, two-thirds of the population may face shortages. As the United Nations Climate Change Conference (COP26) seeks to reboot our response to the climate crisis, adaptation and resilience to protect communities from its inevitable impacts are high on the agenda.

The island nation of Singapore, comparable in size at 729 square kilometers to the small Gulf state of Bahrain, is well-acquainted with water stress. Lacking a hinterland, it relies on neighboring Malaysia for part of its water supply.

Singapore has therefore applied considerable foresight and effort over recent decades to build water resilience. Under its "Four National Taps" policy, its domestic supply draws on water piped from Malaysia, water collected from local catchments, a massive reuse program implemented in 2003 called NEWater, and desalinated seawater.

**2025**

The World Wide Fund for Nature estimates that two-thirds of the population may face shortages.

Now, the government of Singapore, in partnership with one of the country's largest sustainable infrastructure companies, has taken this a step further. With Keppel Infrastructure — part of the Keppel Group — in charge of implementation and operations, it has found a way not only to

> Last year, the C40 Cities network, which works to address climate change in urban centers, published an agenda for a "green and just recovery" to rebuild and simultaneously improve public health, reduce inequality and address the climate crisis.
>
> —

create the world's first large scale dual-mode water desalination plant — which switches between desalinating seawater and treating reservoir water — but also to integrate it into an urban setting with minimal environmental and social impacts. The innovative nature of the project won it the title of Desalination Plant of the Year at the Global Water Awards 2021; it also provides a model for others to follow.

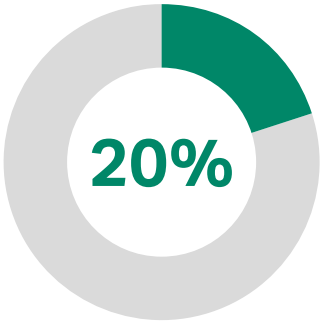
In addition, the engineering phase of the plant's construction involved some highly complex techniques to overcome issues such as thick marine clay, and underground construction adjacent to a busy expressway tunnel, while leaving undisturbed adjacent park connectors, which form an island-wide network of green corridors. At every stage, the plant has been designed and built with environmental considerations in mind, with the use of innovative technologies minimizing impacts on the public and occupants of the locality.

The groundbreaking development comes as efforts are underway to embed sustainability and resilience into strategies to tackle recovery and climate adaptation in cities around the world. Last year, for instance, the C40 Cities network, which works to address climate change in urban centers, published an agenda for a "green and just recovery" to rebuild and simultaneously improve public health, reduce inequality and address the climate crisis.

## A technological world first for efficiency and resilience

Climate change is bringing ever-more erratic weather to Singapore and the new desalination facility, opened in February and known as the Keppel Marina East Desalination Plant, is the first and only one of the country's four desalination plants to be located next to the central business district and surrounding residential areas, rather than areas further away from the city center. This means it is close to the source of demand, saving money on pumping water over distance.

The plant's high level of automation has also boosted efficiency; overall, the Keppel plant is 15-20 percent more energy efficient than the typical desalination plant.




> More frequent dry seasons with low rainfall are increasing reliance on seawater desalination, which consumes more energy than other water treatment methods.
>
> —

More frequent dry seasons with low rainfall are increasing reliance on seawater desalination, which consumes more energy than other water treatment methods. Even during seasons of heavy rainfall, the amount of rainwater and stormwater that can be collected and treated into potable water is limited by the availability of containments within Singapore's land area.

During wet periods, therefore, the plant's dual-mode technology allows the option of switching to treating reservoir water, resulting in more effective water use, operational flexibility and optimized operational costs, because reservoir water treatment consumes only one-third of the energy required for seawater desalination.

As a result, the Keppel Marina East Desalination Plant can produce up to 137,000 cubic meters — equivalent to 54 Olympic-size swimming pools — of drinking water per day, regardless of weather conditions, ensuring a resilient and stable supply.

The Keppel Marina East plant can produce up to 137,000 cubic meters of drinking water per day.

Around 80% of the Keppel Marina East plant footprint is accessible to the public.

## Making infrastructure work harder for urban sustainability

Not only is the Keppel plant efficient, but it blends neatly into the local environment, thanks to its structure being mostly situated underground. Meanwhile a 20,000 square meter green roof — with rainwater harvesting for irrigation — provides space for bike and walking trails for community recreation. In fact, seen with a satellite view, the plant looks like a park, rather than a desalination plant. Around 80 percent of its footprint is accessible to the public.

This dovetails with one of the key objectives in the C40 agenda to prioritize the building of "nature-based solutions," to help reduce the risks of extreme heat, drought and flooding, and to improve livability as well as physical and mental health. Instead of a traditional industrial design that would become a barrier to community access, the Keppel Marina East Desalination Plant forms part of Singapore's public park system and has become a place for people to gather to enjoy the green space and views. Ultimately, maintaining such green space in cities contributes to efforts to combat climate change by absorbing carbon and lowering urban temperatures.

> "The combination of resilience and sustainability will increasingly be a key feature of how cities must approach climate adaptation as they seek to confront the effects of climate change on the most population-dense zones on the planet."

The combination of resilience and sustainability — carried out in a cost-efficient manner — will increasingly be a key feature of how cities must approach climate adaptation as they seek to confront the effects of climate change on the most population-dense zones on the planet.

The art of partnership

A new framework for water resilience launched at World Water Week in August 2021 emphasized the importance of building partnerships between local and global, civil society and science and, crucially, public and private participants. Indeed, a public-private partnership was a vital aspect to the success of the Keppel Marina East project. The plant is a partnership between Keppel Infrastructure and Singapore's national water agency PUB, with Keppel building and operating the facility under a Design Build Own Operate model and a 25-year water purchase agreement.

Such arrangements involving developer and operator are a highly effective way of approaching urban sustainability projects, because more effort tends to be invested in analyzing lifecycle costs and using the most efficient equipment possible. To Keppel, the partnership has yielded a number of good practices that could be replicated elsewhere, from detailed consideration of the construction sequence and environmental issues to its high level of automation. The outcome is a plant uniquely located among the population it serves, working efficiently and sustainably in a tight urban setting.

As COP26 assembles, cities are on an accelerating quest for solutions as they build out urban resilience and resource sustainability in a bid to combat the effects of climate change. The award-winning Keppel Marina East Desalination Plant can offer lessons as to how land-scarce authorities can make their urban infrastructure work harder for sustainable solutions to water stress in key locations around the world.

AECOM

Clean transport

# Fleet of foot

## How forward-looking organizations are leading the switch to EVs

As the transition to electric vehicles reaches a tipping point, barriers to mass-transit electrification remain. **Andrew Bui,** AECOM's global transportation electrification lead, and **Ben Prochazka,** director of the Electrification Coalition, say fleet owners have an opportunity to lead the way in overcoming these obstacles and accelerate the transition to decarbonized mobility.

—

Electric vehicle (EV) sales have surged over the past year, driven by a combination of government incentives and greater public awareness of the urgent need to lower carbon emissions to sustainable levels. In the first quarter of 2021, sales of battery electric (BEV) and plug-in hybrid (PHEV) cars increased by 80 percent and 184 percent respectively in the top five European markets, compared with the same period a year earlier. In the U.S., sales increased by 63 percent and 60 percent respectively.

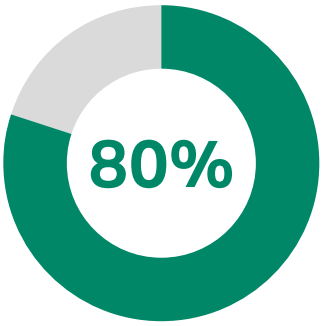
**ULEZ**

Government subsidies and incentives — including tariffs for Ultra Low Emission Zones (ULEZ) and the provision of free charging infrastructure — are starting to make operating costs comparable.

Over the past 10 years, the range of choice and performance of EVs available to customers have improved considerably. Charging networks are starting to expand, and in some areas charging points are almost as conveniently accessible as traditional gas stations. Government subsidies and incentives — including tariffs for Ultra Low Emission Zones (ULEZ) and the provision of free charging infrastructure — are starting to make operating costs comparable.

Yet there is a long road to travel to achieve the net zero goals countries are committing to. The U.K., for example, has pledged to end sales of new vehicles with diesel and petrol engines by 2030, but the market share of battery electric vehicles in the country is currently just 7.5 percent. In the U.S. it is 2.1 percent, while in China — the global leader — BEVs still only account for 8.5 percent of the market.

In the first quarter of 2021, sales of battery electric (BEV) cars increased by 80 percent in the top five European markets.




Scaling up the electrification of transport means accelerating consumer acceptance and uptake of this new technology. It also requires connected nationwide networks of charging points, grids taking enough power to the right places, powered by renewable energy sources, and a transformation of the automobile industry. These are complex challenges, but ones that offer huge rewards for those who take the lead.

Governments, transportation authorities and private industry have a significant opportunity to help society over the tipping point of transport electrification. As operators of fleets of hydrocarbon-consuming buses, trucks, vans, company cars and construction vehicles, these operators contribute a considerable proportion of the carbon emissions associated with mobility. Importantly, the operation of these vehicles is often more structured, predictable and consistent compared with personal vehicle usage, making the transition to charging easier and less reliant on a diffuse public network. In addition, electrifying them will yield a disproportionately large payoff for public health, the climate and fleet running costs.

The scale of these fleets provides an attractive opportunity for vehicle manufacturers and inventive new entrants to improve the total cost of ownership of electrical vehicles, so that electrification becomes more economical than operating a traditional platform.

## Leading the transition: the opportunity for fleet owners

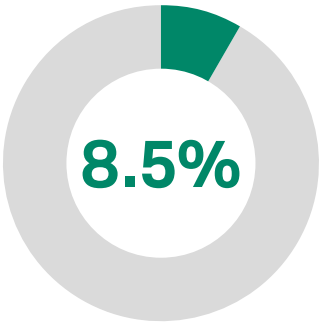
When fleets transition, they act as a highly visible real-world demonstration of the benefits of EVs that will influence the consumer market, helping to accelerate electrification at scale. It will also spur investment in charging infrastructure, including grid modernization, and will accelerate the development of an expanded range of EVs and investment in battery technology. In turn, this will push down costs.

Electrification confers operational benefits, too: local authorities in cities and states exploring the opportunity to reduce the operating costs of transit and their wider vehicle fleets, from police cars to refuse haulers, have seen substantial economic returns. Fuel costs for EVs are typically 50 to 60 percent lower than for comparable gasoline-powered vehicles and electric engines require less maintenance. Governments seeking to encourage adoption have provided incentives to give up diesel-powered vehicles in favor of EVs — including, in some cases, for charging provision.

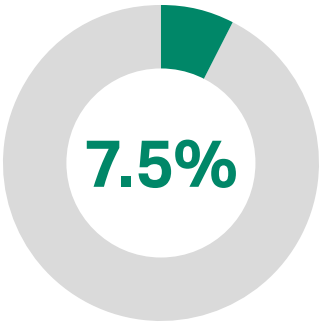
At the city level, electrification can make the streets a better place for citizens. Immediate benefits to underserved areas include cleaner, quieter services and improved air quality. As an integrated part of decentralized urban energy infrastructure, fleet charging points can help accelerate the wider drive to decarbonize. They form part of a more resilient, greener energy network that includes power storage capability, smart management systems, and aligned demand for renewable energy.

In the U.S., cities and states are partnering with not-for-profits such as the Electrification Coalition (EC) to help them scale up the use of EVs. The EC is working with 25 city governments to put in place policies that will speed the electrification of public fleets, transit and school buses, as well as consumer vehicles. The cities of Los Angeles and Charlotte, North Carolina, for example,

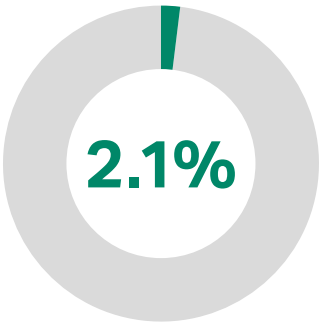
China is the global leader where battery electric vehicles still only account for 8.5% of the market




The market share of battery electric vehicles in the UK is currently just 7.5%




The market share of battery electric vehicles in the U.S. is just 2.1%




> The EC is working with 25 city governments to put in place policies that will speed the electrification of public fleets, transit and school buses, as well as consumer vehicles.
>
> —

have committed to electrifying 100 percent of their transit bus fleets. Albuquerque has developed a vehicle acquisition policy that prioritizes zero-emission vehicles, while Pittsburgh is aiming to transition its whole fleet away from fossil fuels by 2030, powering it entirely by renewable energy. The EC also has a program in five states — Michigan, Nevada, North Carolina, Pennsylvania and Virginia — to develop a replicable model that speeds up EV adoption by state-owned fleets.

> Internal combustion engine-based transport has a 100-year head start, but today electrification is no longer a question of if, but when.

## Making the choice to electrify

Fleets can be the most critical part of an organization's infrastructure, either to move customers around, deliver its products to market or to get employees to their place of work. There is a complexity of choice in front of fleet managers about how and when to electrify. This includes considerations of the platform to transition to, the availability of capital and existing financial commitments, the cost of change, confused incentives, sourcing of renewable energy and grid capacity, on-site versus off-site charging requirements, and user training considerations.

AECOM is working with fleet owners to help them understand these choices and the benefits of transition, before providing them with a route map to put change into action. Our work may start with fleet modeling to develop business cases, advances to infrastructure development and, in some instances, retrofitting. Electrification infrastructure required for a standard bus fleet with an existing depot is quite different from that used for a logistics operator whose employees store vans at home overnight or operate their own vehicles as a franchise, for example.

Transitioning from traditional fuels to electrical charging can also require a cultural change as users grow accustomed to operating new equipment. It is essential to ensure that users understand the benefit of the transition and how these new vehicles can make it easier to do their jobs. This means the EVs adopted by the fleet must work as well, or better, than existing models, with the ability to recharge efficiently as part of an organized rota, either at the depot, on the go or at home overnight.

**£1.8b**

Government pledge for charging infrastructure and grants to widen access to zero-emissions vehicles.

## Powerful partnerships

Political support for scaling up the electrification of transport is vital for meeting climate-change commitments. It is important, too, for ensuring that electrification benefits are widespread — city areas with the worst air quality are often the most overlooked when it comes to investment in transportation infrastructure.

Support is certainly growing: the $1 trillion bi-partisan infrastructure bill agreed in the U.S. in August includes $7.5 billion for EV charging stations, although that is only half the amount called for by President Joe Biden. This will be a key element of scaling up electrification: for EVs to become the norm, every driver needs to have convenient access to a charging point when they require it. To make this happen, charging infrastructure has to become part of the planning process, with local governments, utilities and private companies working in partnership.

In Europe, France has stated its intention to end the sale of fossil fuel-powered cars and light commercial vehicles by 2030, offering vehicle-tax incentives for taking a high-emissions vehicle off the road and replacing it with low-emissions one. In the UK, which aims to end the sale of new petrol and diesel cars by 2030, the government has pledged £1.8 billion for charging infrastructure and grants to widen access to zero-emissions vehicles.

In the public sector in the U.S., the Electrification Coalition (EC) has formed the Climate Mayors EV Purchasing Collaborative, involving more than 450 U.S. mayors who have committed to take meaningful action against climate change, and Sourcewell, a public procurement agency.

The group helps cities lease EVs on favorable terms, using its collective buying power and structuring leases in a way that enables leasing companies to apply for the federal EV tax credit, passing the savings along to the cities.

In the private sector, the EC is currently collaborating with Nestlé in Ohio on plans to electrify its fleet of trucks, a project that requires the consumer goods giant to transform its freight infrastructure. Having made a commitment to electrification, the company is now planning for the charging infrastructure, so the local utility can build both connection and supply. Until now, facilities managers have not had to think about how their electricity supply connects to their transportation system, but going forward these will need to be conceived and constructed in tandem.

## Building up the supply chain

In addition to public bodies, automakers, their suppliers, and energy companies have a key role to play in scaling up the electrification of transportation. While EVs are cheaper to operate over the life of the vehicle, they are currently more expensive upfront because they are not yet being manufactured at sufficient scale. The Electrification Coalition Business Council (ECBC), which includes companies involved in every part of the EV landscape, from charging equipment manufacturers to Ford and GM, aims to ensure U.S. carmakers remain competitive globally during the transition away from internal combustion engine (ICE)-based transport.

While reorganizing entire supply chains is not a simple task for auto manufacturers, it's a truly exciting opportunity for countries who want to demonstrate leadership in the future of transportation — which is electric. This is also providing fertile ground for innovation and new entrants into the market. The rapid rise of Tesla to become the largest car manufacturer in the world — in concert with its investment in battery technology and gigafactories — is well documented. At AECOM, we are supporting the British EV manufacturer Arrival in fast scaling up the provision of its commercial bus and van fleet platform, including both incorporation of this fleet into existing transit and logistical infrastructure and the adoption of vertically integrated production at the local micro-factory scale.

> At AECOM, we recognize that society and our customers are at a tipping point. We are working with companies to help them prepare for the transition, understand the potential of new partnerships with utilities, and support them in accelerating electrification.
> —

It's not only automakers that have a transformative opportunity. For utilities, too, supplying power to electric vehicles will become one of the biggest elements of their business. Providing certainty of green energy for charging is fundamental to enabling the decarbonization potential of vehicle electrification. How EV customers engage with energy providers is ripe for disruption, not only in how they locate and pay for charge-point provision, but in the integration of all their power needs at the brand level.

## The future is electric

Internal combustion engine-based transport has a 100-year head start, but today electrification is no longer a question of if, but when. At AECOM, we recognize that society and our customers are at a tipping point. We are working with companies to help them prepare for the transition, understand the potential of new partnerships with utilities, and support them in accelerating electrification.

All parts of society stand to benefit if fleet owners and policy-makers at local and state level seize the moment to bring about the benefits of an electric future faster, joining their forward-looking peers in taking advantage of the disruption to automakers, utilities and infrastructure companies. Waiting longer is a missed opportunity.

All parts of society stand to benefit if fleet owners and policy-makers at local and state level seize the moment to bring about the benefits of an electric future faster, joining their forward-looking peers in taking advantage of the disruption to automakers, utilities and infrastructure companies. Waiting longer is a missed opportunity.

AECOM

Cities and the built environment

# Creating sustainable urban centers

## Stronger centers that serve post-pandemic models of living and working

Changes accelerated by the pandemic offer an opportunity to address long-standing social and environmental inequities, carving out a new role for town centers as civic hubs at the heart of communities, where transport and digital connectivity enable citizens to thrive, argue **Andrew Jones** and **Stephen Engblom.**

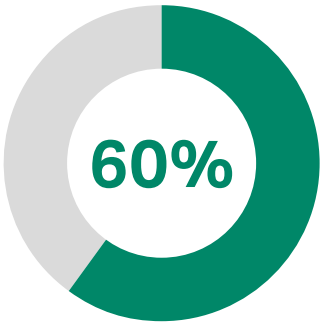
—

Cities are humanity's greatest invention, believes Edward Glaeser, a Harvard University professor of urban and social economics. They make us "richer, smarter, greener, healthier and happier," he writes in Triumph of the City, published in 2011. Yet a decade later, the pandemic has uprooted how we live and work and accelerated an exodus from city centers to the suburbs and regional towns. As central business districts gradually reopen and recover, the future of urban life is likely to remain split between the core and suburban towns, paving the way for cities that are polycentric, with more than one center. So, now there is an urgent need to revamp and recalibrate town centers as well as community high streets on the peripheries of cities to ensure they have the facilities and connectivity to make them a focus of everyday life. Innovative, sustainable solutions to create resurgent urban centers are required today to create a brighter tomorrow.

**57%**

of the global population — live in towns or cities today, and the United Nations predicts this will grow to 60 percent by 2030.

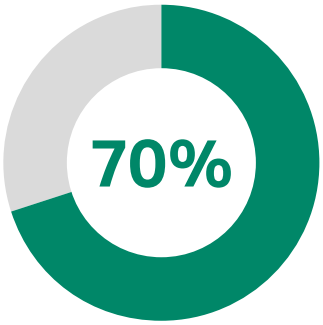
**The United Nations predicts 60 percent of the global population will live in towns or cities by 2030.**



Belfast City Centre public realm.

More than 4.5 billion people — 57 percent of the global population — live in towns or cities today, and the United Nations predicts this will grow to 60 percent by 2030. However, rapid urbanization and unchecked city sprawl have often overwhelmed inadequate services and infrastructure such as roads and waste systems, and increased pollution. And while cities contribute approximately 60 percent of global GDP, they also account for 70 percent of carbon emissions and 60 percent of resource use.

**Cities account for 70 percent of global carbon emissions.**




More frequent dry seasons with low rainfall are increasing reliance on seawater desalination, which consumes more energy than other water treatment methods. Even during seasons of heavy rainfall, the amount of rainwater and stormwater that can be collected and treated into potable water is limited by the availability of containments within Singapore's land area.

Cities are often also hotspots of poverty. For instance, 27 percent of people live below the poverty line in London, compared with 21 percent across the rest of England.Now, after 18 months of being locked down, minds have been opened and determination to tackle the effects of inequities on physical and mental health has been galvanized. Building back for a more balanced future must cause us to reflect on how we have developed our urban areas over the last century or so.

As the continued acceleration of digital working enables us to live our lives more locally, we must focus on how to help urban centers evolve to become smarter and more connected, better serving all citizens. To truly fit with post-pandemic realities, a new vision, bold thinking and a concerted, multi-stakeholder approach are required. A balance must be struck between traditional central business district (CBDs) and suburban centers to accommodate hybrid-working lifestyles, allowing a wide variety to thrive.

> As the continued acceleration of digital working enables us to live our lives more locally, we must focus on how to help urban centers evolve to become smarter and more connected, better serving all citizens.

## Sustainable living: reimagining urban centers

The answer to this complex challenge won't be found overnight. At AECOM, we believe the best way to attempt to solve it is to look deep into the future. Imagine how urban centers and the surrounding regions should look, feel and connect — and work back from that point to understand the steps we must take today to be prepared for the future.

For example, in recent white papers — including London 2070 and the SPUR Regional Strategy's Model Places for the San Francisco Bay Area — we have deliberately thought well beyond the horizon of most policymakers. The idea is to show the art of the possible and highlight opportunities that could (and should) form part of a long-term collaborative project to improve quality of life and open up opportunities for economic growth with a lower impact on natural resources, allowing all place types to mature into better versions of themselves.

AECOM believes that by 2070, with careful planning, the heart of urban centers as well as neighborhood high streets and suburban corners could evolve to become what we label "civic hubs" and act as destinations and focal points for communities to interact face-to-face and digitally. This would provide a more inclusive and equitable way of living, working and learning, and be catalysts for balanced growth within the wider region.

## Civic hubs

Our idea of civic hubs emerged from the concept of the 20-minute neighbourhood as we sought to re-imagine town centers as catalysts for growth that is balanced environmentally and socially. Anchoring a range of activities — from childcare to healthcare to co-working spaces — and ranging in size from a corner-shop-cum-café on a suburban parade to a landmark building in the metropolitan center or market town, they will be connected digitally and physically to their appropriate economic and social networks.

“As a central, cohesive force, civic hubs could offer smaller but diverse shopping cores compared with 2021, featuring local produce as well as specialty retail and “try before you click” shopping.

—

To better understand our concept of civic hubs, consider the Roman Forum, the celebrated meeting place of ancient Rome and a center for trade and exchange. Or town halls and how they have evolved over the years, from a base for administration or merchant trade into community hubs hosting a variety of activities. As well as workplaces, they house a variety of social infrastructure functions. from child care to skills and training facilities.

In the civic hubs of the future, data-driven healthcare will enable the provision of proactive public services and happier citizens. The civic hubs would house what we call “wellbeing hives,” which would complement at-home remote diagnosis and treatment through telemedicine, wearables and artificial intelligence (AI), drawing together healthcare professionals and community workers to assist in keeping the vulnerable, isolated, old and young both healthy and connected with society.

Furthermore, residents of all ages, abilities and backgrounds will be able to collaborate and connect with colleagues or interact socially. Lower real-estate costs and shared workspaces can accommodate corporate workers who have relocated due to the surge in hybrid working. Housing will be varied, affordable and climate-positive, featuring heat recovery, solar energy and water recovery systems as standard, and with access to local sustainable transport nodes.
Moreover, these civic hubs will be vibrant places, rather than hollowed-out areas where shops and offices sit empty. The decline of retail on the high street is well documented, but these localized hubs will bring new life to town centers by expending their offer beyond the commercial experience of a shopping center.

As a central, cohesive force, civic hubs could offer smaller but diverse shopping cores compared with 2021, featuring local produce as well as specialty retail and “try before you click” shopping. In addition, they will create opportunities for communities to come alive, and host a range of services such as local co-working and development spaces, bars, cafés and entertainment spaces at the heart of 20-minute neighborhoods — complete, compact and connected areas where citizens can meet their everyday needs within a short radius. These are also greener, as they feature more public parks along with urban greening projects.

In the civic hubs of the future, data-driven healthcare will enable the provision of proactive public services and happier citizens.

—

## Connectivity boost: integrated mobility centers

We see civic hubs as a key stage in the move towards more sustainable living. With the convenience of having almost everything people require to live and work a mere bicycle ride or walk away, at the core of 20-minute neighborhoods. $CO_2$ emissions will be reduced, resulting in cleaner air and healthier citizens.

Westfield Shopping Centre Landscape & Public Realm Design



25

Additionally, civic hubs will be super-transit nodes: integrated mobility stations at the center of local, sustainable transport networks that comprise walking, cycling and mass transit systems. The rise of Mobility-as-a-Service, which integrates various transport modes into an accessible, on-demand service, contactless ticketing and autonomous vehicles, plus the prospect of high-speed trains and even futuristic mass-transit solutions, such as the air-resistant hyperloop pods currently being piloted, should all be considered in the design phase of civic hubs to ensure maximum accessibility and flexibility as the way we move inside and outside urban centers changes drastically.

Crucially, civic hubs will function as integrated and connected mobility centers for local, city and regional transport networks. Investment in interconnected mobility systems will supercharge cities, towns and suburbs, empowering local citizens to take advantage of the broader cultural agglomeration. It's important to stress that while you can create an ideal civic hub, it will not flourish and realize its potential unless it, in turn, connects to the larger world.

> There is now a unique opportunity to rethink how we live, work and learn. In the coming decades, the most successful urban areas will seek to better serve all citizens.
>
> —

## A rapidly changing world: overcoming challenges for a brighter tomorrow

The pandemic has necessitated the acceleration of digital transformation and other trends, but these have left large cohorts of people behind, especially in ill-served suburbs and towns now absorbed into our larger cities, and deepened inequities globally. Moreover, the unrelenting pace of change means the disconnect between the haves and the have-nots will only expand.

There is now a unique opportunity to rethink how we live, work and learn. In the coming decades, the most successful urban areas will seek to better serve all citizens.

Civic hubs can be at the heart of tomorrow's communities — but urgent action is required to realize their potential. A long-term, multi-stakeholder approach is vital to achieving these civic hubs of the future. Several bold steps must be taken today to collaborate, coordinate and align objectives between investors, agencies and — last but certainly not least — the communities they will serve.

Such civic hubs have the potential to be more sustainable and significantly more equitable. But the bold choices that will enable them must be made today.

## Action points include:

- Creating the conditions for all citizens access to value-added jobs
- Investing in schools and lifelong
- Creatively repurposing former retail and commercial real estate
- Designing and funding better travel connections between civic hubs across a region and beyond

**About AECOM**

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of $13.2 billion in fiscal year 2020. See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.