



Shock-resistant communities

↳ Making the next 10 years count to underpin resilient, adaptable communities





Introduction

Where we live and how we move around will mean dramatically different priorities for urban planning and infrastructure investment. Planners and placemakers will shift their thinking this decade to underpin resilient, adaptive, low-carbon communities.

COVID has caused people to recast and rethink what's important to them, reshaping our values as a society. Many of us have discovered that we can work from home, anywhere. This realisation has triggered a shift in mobility patterns away from near-city suburbs, with peri-urban areas now some of the fastest growing regions in many countries. This in turn is changing traditional settlement patterns and future demand for housing. As a result, we see a window of opportunity to address urban sprawl and switch-up investment priorities to strengthen our communities against climate change.

Inevitably, urban environments will have to respond to these changing demographics and our heightened social and environmental conscience post-pandemic, including an increased awareness of the carbon intensity of our consumer habits and built environments. The fundamentals of how cities, regional centres and towns are experienced and how we interact with urban life have forever shifted.

Putting the S back in ESG

Over the next 10 years the 'S' in ESG (environment, social and governance) will be increasingly understood and considered in how we respond to our changing climate, and what that means for our natural and built environments. How businesses behave, their impact on society, awareness of their carbon footprint and response to issues that impact equality will become more prevalent in public discourse and decision-

making. Likewise, political attitudes and consumer behaviours will reflect a new, climate responsible perspective.

This decade, planners and placemakers will need to reinforce resiliency and adaptation strategies to tackle future demands on resources. For example, we could see some big swings towards localism and national production of goods and products to avoid carbon-intensive transportation. Walkable and cycleable neighbourhoods will become the new norm. Our lockdown-induced habits of staying and shopping locally will (hopefully) carry over into our new post-pandemic lives. Designing smaller, smarter density communities, less reliant on cars, will be key.

Sophisticated, climate-sensitive design strategies

Meanwhile, the value of biodiversity is coming to the fore with more efforts to restore natural ecosystems, build green corridors and establish carbon sinks to help meet emission reduction targets. The way we think about the environment – to increasingly recognise that we are embedded within nature and not external to it – is continuing to shift the way policymakers and investors think and act to prevent further degradation of our natural capital.

Elegant responses like the reclamation of old waterways and the regeneration of ecological value (as demonstrated by the Cheonggyecheon Stream in downtown Seoul), to the overt acceptance that groundwater flow dictates urban function (as seen at The Water Square Bentheimplein in Rotterdam), are just two examples of contemporary design practices in action. We are also seeing new and innovative products being developed that through their materiality, process carbon dioxide from the air – an exciting, science-led response to truly regenerative design.

Through the 2020s, social values and their influence will orient new climate-sensitive streams of investment opportunity for municipalities, government and businesses. This much-needed paradigm shift takes us back to the fundamental changes we expect to see in respect to the economic relationship between places and people this decade.

AMBITION 01

Regenerative design principles will deliver 'net positive' built environments

This decade, we believe a deeper understanding of 'natural capital' – the economic value we place on our ecosystems – will shape new strategies to deliver sustainable, regenerative built environments that factor in material and water flows, as well as whole-of-life carbon costs.

Regenerative design is a framework of 'thinking and doing' that enables our interventions in nature to add biocapacity. It provides a foundation for a net positive outcome for the environment, health and society, while helping us to live within one planet's worth of resources. Embracing this restorative, regenerative philosophy will be imperative if we are to meet the challenges of climate change, while respecting the natural environment.

The framework of regenerative design is also about total system thinking, at building and precinct scale. It prompts us to ask: can nutrient and waste flows support a local ecosystem? Are surrounding buildings and roadways the material bank for future projects? How do we neutralise the carbon cost of the building at its end of life? By addressing these questions, we link economic value to ecosystems and enable 'natural capital' to be a stimulus for change.

Borrowing from nature to restore our natural balance

The bewildering scale of our great oceans and how they function in a cyclical system is one of almost infinite examples of nature showing us how powerful and rational regenerative design is. Coral grows into a complex, adaptive and inclusive structure while absorbing carbon dioxide in the process. Can we borrow from coral when we build our structures in concrete and glass? How do we close the loop on the carbon dioxide that is released when humans produce cement and steel? These are simple but important questions to ask of complex, multi-stakeholder building projects this decade and into the next. But like nature, the industry is getting on with finding the answers.

Unlocking biocapacity through connected thinking

In many parts of the world, where the effects of climate change are already being hard felt (Californian outer suburbs and towns along the Australian east coast being just two examples of communities recently devastated by wildfires), regenerative design is doing its part to guide the vision of important urban renewal and climate-resilient initiatives.

Regenerative design is a multidisciplinary story that needs a diverse team to tell it successfully. Thinking together, extending collaborative branches into the construction supply chain and creating the finance mechanisms to capture return on investment – in both economic and environment terms – are needed to make it work. Green steel, green cement, green bitumen – all of these construction materials must be fast-tracked this decade to leverage their potential to make a difference.

As the tide of global carbon emission intensity lowers to the levels being discussed at COP26, cities that do not adapt will be stranded. Regenerative design is a powerful mechanism that can empower designers, incentivise the right behaviour and set a path forward for climate-smart communities.

AMBITION 02

We'll reimagine our cities and suburbs to achieve 'smarter density'

Post-COVID, we will have a window of time to capitalise on changing settlement patterns and behaviours to plan smarter central business districts, satellite centres, peri-urban areas and suburban neighbourhoods that are both population-responsive and climate-adaptive.

Carbon considerations are shifting in our communities. COVID-19 has normalised remote working, with many workers choosing to relocate to low-density areas. In contrast to the long-term trend of suburbanisation, this decade a new focus on making our suburbs 'smaller and smarter' will emerge.

Early signs suggest that peri-urban areas are growing in popularity, as some turn their back on living in densely populated city centres in favour of 'living local'. Less sprawl means a reduced carbon footprint, but we'll have to work hard to preserve key considerations, such as housing choice and equity, if we are to deliver low-carbon communities this decade.

Future resilience for our cities lies in managing balanced change on multiple fronts simultaneously. New planning approaches to more climate-adaptive land uses will need to recalibrate car-centred living environments to be more pedestrian-friendly. There must also be a greater focus on providing public amenity at our doorstep, to reduce the need to travel by car. Housing design will change and respond to offer more energy-efficient, lower-carbon floorplans. Even providing access to reasonably priced, healthy and culturally relevant food will require a revisit of system design, to curb food insecurity in communities experiencing 'food deserts'. All are examples of building community resilience by tailoring solutions at the district or neighbourhood level.

Healthy density through adaptation

The car has dominated city planning for decades, perpetuating the demand for passenger vehicles – it's time to flip that paradigm and incentivise change. The pendulum is swinging back to returning streets to people, car parking

to green spaces and to substitute motorised transport for walking or cycling. Reimagining how our streets are used will be a positive move for city workers and residents alike. Quality public open space in close proximity to homes will be highly prized post-COVID.

In cities too, the conversion or refurbishment of existing buildings will be preferred over building new; with a growing realisation that the greenest possible building is the one that isn't built. We're already seeing the clever adaptive re-use of less-relevant assets, such as multi-storey carparks into recreation facilities, or suburban shopping malls into community centres and business incubators. It will take creative thinking, applied through the lens of climate adaptation, to keep pushing the envelope of what's possible as we reimagine our urban places.

Creating adaptation plans to reprioritise how people live and move will have far-reaching effects on carbon footprints. For communities to flourish, our populations need access to infrastructure including transport, energy and waste systems, water and communications. Sophisticated, collaborative digital systems that enable real-time monitoring and optimisation will help reduce fragmentation and speed up design choices, delivering better operational efficiency to reduce climate risk.

Addressing inter-related carbon considerations

One of the primary challenges for urban design decision-makers this decade is reframing unsustainable behaviours to raise awareness and accountability for every decision – individual and collective. Local government resource management, neighbourhood-level health and safety, through to our personal environmental consciousness; all are interrelated and important in creating climate-resilient communities.

Making people aware of the impact of their choices and embedded carbon in our communities matters. Rethinking our commute, doing more outdoor recreation activities and supporting local are the sorts of COVID-induced habits that will need to continue, to help us adopt low-carbon lifestyles. Collective action and political consensus, now, will help reduce the need for drastic measures later. Our cities and suburbs can be the engine rooms of change. Corporates, governments, architects, engineers and planners all need to play their part in building a climate adaptive future.

Using data to predict, plan and adapt to change

Global warming will require closer observation and forecasting of severe weather patterns that pose risk. Location intelligence, visualisation and other data-driven predicative analytics will be wielded as part of a sophisticated defence system against the impacts of climate change.

Prolonged droughts, wildfires, flooding and environmental degradation are having a devastating impact on affected communities, in increasing numbers. With growing climate uncertainty, pressure to strengthen infrastructure for climate-resistance is at an all-time high. Fast and intuitive access to high quality geographic data and information will become increasingly critical for decision-makers in every industry.

By identifying future climate events and mitigating factors, risks can be better understood. As the decade progresses, we will get even better at using digital tools to create a cohesive, interconnected understanding of the effects of climate change on local environments. With technology such as aerial lidar, photogrammetry and other methods, we can create a 'digital twin' of the earth to model structures, land, water levels, forests and predict changes. This will enable us to pull the right levers to tailor our climate resiliency responses accordingly.

Keeping tabs on an ever-changing environment

Using predictive analytics based on large volumes and multiple sources of data helps manage the complexity and uncertainty of climate change in a variety of ways. For example, GHD teams have recently mapped wildfire activity encroaching on rail assets, drawing on a mix of network-wide and hyper-local Geographical Information Systems (GIS) data to provide railway operators with comprehensive situational awareness of new or emerging threats.

Our preparedness for climate threats can be vastly improved through quality data. Movement Strategies, a leading people movement and crowd dynamics consultancy and subsidiary of GHD, applies privacy-compliant analytics of movement

data to understand pedestrian and traffic dynamics. This provides an holistic understanding of routine traffic conditions and evacuation performance that can impact the effectiveness of emergency planning.

Movement Strategies is developing research tools to assess community vulnerability – taking into consideration local wildfire risk, the physical environment, the population and the traffic response that might inform disaster preparedness strategies. Integrating tools, based on contemporary data, can better capture and interpret underlying dynamics, to better support complex, climate emergency planning.

Unlocking data to deliver zero emission solutions

Advanced analytics including Machine Learning and Artificial Intelligence can also be leveraged to help assess and reduce carbon emissions, particularly in greenhouse gas-intensive industries such as transportation. Multiple factors must be orchestrated: transportation planning based on future needs, transitioning aging fleets to zero emission vehicles (ZEVs), planning optimized routes to adapt to ZEVs and the placement of new charging and fuelling infrastructure. Applying data in this way also shortens traditional planning timeframes to drive carbon savings, quickly.

As part of the ZEV revolution, GHD's digital teams have developed a tool to help transform rural and metropolitan bus fleets. It sheds light on transition pathways, and the associated financial, environmental, utility, operational and energy criteria for each scenario. With this tool, fleet owners are empowered to pragmatically execute their ZEV strategy, confident that they have the right data-driven roadmap to get them to their end, zero emission goal.

Data in all its forms can be used to bring about important change. In the next decade, as both individuals and organisations seek to operate differently, data can provide the clear and compelling evidence needed to motivate a new climate-conscious mindset. Every decision – from personal consumption choices to multi-million-dollar investments – will need to be based on an accurate understanding of the real environmental cost of that decision. In this way, data analytics and intelligent interpretation will help 'lift the veil' on the climate and carbon impacts of all our choices, large and small.

It's a complicated path to net zero, but knowledge is power. Building our capacity to model, analyse, interpret and predict will be a welcome development this decade in the fight against climate change.

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- [Simon Babes](#), Market Development Leader – GHD Advisory
- [Jeffrey Berk](#), Business Development Lead – US West Region
- [Jane Cassidy](#), Director – GHDWoodhead, President of the Australian Institute of Architects ACT
- [Steve Gwynne](#), Research Lead – Movement Strategies
- [Tai Hollingsbee](#), National Building Engineering Leader
- [Michala Lander](#), Technical Director – New Zealand Planning
- [Leone Lorrimer](#), National Practice Leader – GHDWoodhead
- [Noam Maitless](#), Design Director – Architecture, GHDWoodhead
- [Jo Metcalfe](#), Strategy Development Lead
- [Steve Scott](#), Business Group Manager – GHD Advisory
- [Suna Taymaz](#), Market Development Leader – GHD Digital

About GHD

GHD recognises and understands the world is constantly changing. We are committed to solving the world's biggest challenges in the areas of water, energy and urbanisation.

We are a global professional services company that leads through engineering, construction and architectural expertise. Our forward-looking, innovative approaches connect and sustain communities around the world. Delivering extraordinary social and economic outcomes, we are focused on building lasting relationships with our partners and clients.

Established in 1928, we remain wholly owned by our people. We are 10,000+ diverse and skilled individuals connected by over 200 offices, across five continents – Asia, Australia, Europe, North and South America, and the Pacific region.

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