

SUSTAINABLE CITIES AND REGIONS

10 year strategy to enable urban systems transformation

Realising sustainable development opportunities for all Australians



FUTURE EARTH AUSTRALIA ACKNOWLEDGES THE TRADITIONAL OWNERS OF COUNTRY THROUGHOUT AUSTRALIA AND RECOGNISES THEIR CONTINUING CONNECTION TO LAND, WATERS AND CULTURE.

WE PAY OUR RESPECTS TO THEIR ELDERS PAST, PRESENT AND EMERGING.

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10 year strategy to enable urban systems transformation

Realising sustainable development opportunities for all Australians

ACKNOWLEDGEMENTS

The Future Earth Australia secretariat is grateful to all the stakeholders who participated throughout this process. We are especially appreciative of the guidance of the Reference Group, and we extend our sincere gratitude to the larger community of urban researchers and practitioners who participated in the May 2018 scoping workshop and who trusted us to lead this process.

Particular individuals who contributed to this process from within the Future Earth network and from the Australian Academy of Science warrant specific mention: Sarah Crowe, Dr Taryn Laubenstein, Dr Jo Banks, Rebecca Palmer-Brodie, Anna-Maria Arabia, Robyn Diamond, Coco Liu, Andrew Berthold, Jana Phan, and Dan Wheelahan.

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FOREWORD



Future Earth Australia and its collaborators are to be congratulated on producing this *Sustainable cities and regions: 10 year strategy to enable urban systems transformation*. With the world having passed the threshold of over half its population living in urban areas, with this proportion steadily rising, and with Australia one of the most urbanised nations on earth, the Strategy sets out a needed pathway to creating urban settlements that are more environmentally, socially and economically desirable.

Too often, we deal with our cities in a fragmented fashion, across policy processes, plans, places and people. Few cities have truly integrated planning processes, genuine stakeholder dialogue is too often lacking, and the multiple bodies of needed expertise frequently too often do not work together. Different parts and processes of our settlements are the responsibility of different players: three levels of government, private and community sectors, and research groups. Many opportunities as a result fall through the cracks. Too many of the policy prescriptions that emerge in public debate – or, too often, slogans – that appear in public debate are singular, short-term responses to single issues, not comprehensive responses that consider the highly complex and interdependent nature of modern cities.

Future Earth Australia has taken the bigger, systems view, consulted widely in a rigorous fashion, drawn on multiple sources of expertise and perspective, and considered the evidence, all within the comprehensive framework of the universally endorsed Sustainable Development Goals. The resulting Strategy does not prescribe policy answers to a handful of topical issues, but much more helpfully charts pathways and mechanisms that will enable a surge in our abilities to envision, plan and build more sustainable urban systems. Very positively, it shows that we can do much better using and connecting together existing capacities and institutions, combining forces to drive ideas, innovation and joined-up solutions.

If Australia chooses to take the pathway guided by the core ideas presented in this Strategy, our cities will become more environmentally sustainable, liveable, socially equitable, and economically efficient. That's what sustainable development is. To elect to do otherwise would be a deliberate and unfortunate choice.

A handwritten signature in black ink, appearing to read 'Stephen Dovers'.

Emeritus Professor Stephen Dovers FASSA
The Australian National University

OUR EXPERT REFERENCE GROUP

The development of this strategy was overseen by a group of leading experts across urban research, practice and policy, representing cities from around Australia.

Professor Jago Dodson	Chair – Expert Reference Group Director – Centre for Urban Research, RMIT
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EXECUTIVE SUMMARY

Australian cities and regions are evolving

We know that cities and regions are complex, self-organising, and transitioning rapidly.

Recognising our cities and regions as interconnected systems presents Australia with immense opportunities for innovation, increased efficiencies, and transformative actions. These elements can and should underpin our sustainable development and associated future trajectories. The UN Sustainable Development Goals (SDGs) play an important role in framing these transitions to enable better human wellbeing and quality of life in our cities. We need policy development that is nimble enough to take advantage of these rapid transitions, and we need leaders from all sectors to play an active role in co-creating sustainable urban systems.

An opportunity exists for cross-sectoral leadership to enable transitions toward sustainability

For Australian cities and regions to thrive, we need to embed integrated approaches to all of the challenges of an urban system. Treating our cities and regions as connected parts of a whole mean that affordable, accessible and fit-for-purpose transport; economic innovation; health and wellbeing; the arts and cultural expression; protected water and food sources; and more are all-important components of sustainable cities and regions. Our natural environment, and the changes it is experiencing, will play a central role in forcing our transition towards sustainability.

A critical question is whether Australia will be reactive to these changes, or proactive. This strategy represents a bottom-up, sector-supported *proactive plan*. It responds in part to the CSIRO National Outlook 2019 report, which identified urban spaces as critical areas for change.

Innovation for sustainability comes in many guises

Now is the time for Australia to seize the opportunities presented by our changing world. As a nation of innovators, we are well placed to lead and to learn from global best practice and adapt these lessons. We are leaders; recent forays into circular economy, environmental resilience, and digital technology

demonstrate our scientific capabilities. A national framework, coordinated at all levels of government, would maximise these opportunities and create efficiencies. Complementing this, place-based innovation hubs, operating as partnerships, can draw on incredible local inventiveness to incubate future technologies, economies, and cultural activities yet to be imagined.

Training the next generation

A key component of this sustainability transition is capacity building for researchers, innovators, and practitioners. These future leaders work across all sectors related to city and regional life, but are currently stifled by institutional silos and disciplinary or sector-specific remits. We need to create ways of working within current institutional frameworks that still anticipate the rapid changes the next ten years will bring.

About this strategy

This strategy by Future Earth Australia hosted by the Australian Academy of Science, aims to develop widespread support for enabling a major sustainability transition for our cities and regions. Government, industry, the research sector, peak bodies, the philanthropic sector, and civil society all have parts to play in driving this change. Future Earth Australia, has undertaken an ambitious process of consultation (see Appendix) with Australian urban practitioners, researchers, stakeholders, and communities to produce this *10 year Strategy to Enable Urban Systems Transformation*. This strategy represents a bottom-up, cross-sectoral plan for achieving sustainable cities and communities across Australia by 2030.

Our consultation has garnered valuable insights on the state of Australian cities and regions and our collective desires for their future, and has helped us to identify what is preventing our cities and regions from fulfilling their potential. The way forward is presented here against a backdrop of the current state of play.

STRATEGIES AND RECOMMENDATIONS FOR URBAN SYSTEMS TRANSFORMATION

Based on what Australians desire from their cities and regions, these four strategies systematically address core barriers preventing urban and regional areas from achieving sustainable development. Implementing these strategies will enable a sustainability transition for our cities and regions: from neighbourhoods to the nation and from short- to long-term trajectories.

VISION FOR ACTION

Build coherent visions for our cities and regions to achieve the Sustainable Development Goals

RECOMMENDATION 1

Enable a national framework and process to achieve the SDGs in cities and regions

RECOMMENDATION 2

Embed stakeholder and civil society participation in urban knowledge, policy, and practice

ENABLE INNOVATION

Grow a national urban innovation system to achieve urban and regional visions

RECOMMENDATION 3

Create a national institutional framework to link urban and regional research, policy, and practice communities

RECOMMENDATION 4

Establish a national network of innovation hubs to empower local urban and regional innovation across Australia

CONNECT KNOWLEDGE

Invest in information and communication infrastructure to share urban and regional knowledge

RECOMMENDATION 5

Establish and sustain an integrated urban and regional knowledge platform for data analysis and exchange across the research, policy, and practice communities

RECOMMENDATION 6

Support new capability to connect diverse knowledge across sectors, disciplines, and professions to achieve urban and regional visions

BUILD CAPACITY

Train and employ a new cohort of urban and regional researchers and practitioners skilled in transdisciplinary visioning, knowledge, and implementation

RECOMMENDATION 7

Establish a national program to expand researcher and practitioner capability for knowledge exchange across urban and regional research, policy and practice communities

RECOMMENDATION 8

Fund a national program to embed researchers and practitioners within relevant organisations linked to knowledge production for the SDGs

THE INTERCONNECTED NATURE OF THE SUSTAINABLE DEVELOPMENT GOALS IS AN IMPORTANT FRAMEWORK TO ENABLE THINKING ABOUT OUR URBAN SUSTAINABILITY TRANSITION.





STATE OF PLAY: CHALLENGES AND OPPORTUNITIES FOR OUR URBAN AND REGIONAL SYSTEMS

Australia's sustainability transition will be won or lost in our cities and regions.

Harnessing the opportunities that this transition offers requires a systems approach. A systems approach considers urban problems like crowded transport networks, inflated housing markets, the loneliness crisis, inequity in access to opportunity, declining urban water health, and sluggish productivity to be behaviours and outputs of a connected system.

Each Australian city and region has a distinct character, as well as strengths and challenges when it comes to delivering wellbeing for its inhabitants. These distinct qualities are valuable in helping us learn what drives sustainable development in different contexts. High-level tensions must be addressed if we are to harness the opportunities available in cities, including maximising human and environmental wellbeing.

WHERE AUSTRALIANS LIVE: SETTLEMENT PLANNING FOR WELLBEING

Australia's cities and regions must do better in embodying a deliberate settlement strategy. Problematic settlement patterns manifest at city level in a variety of ways, including long daily commutes in private vehicles, a shortage in the variety of affordable homes, and the ever-expanding physical footprint of cities. At a macro level, cities like Darwin and Adelaide struggle to attract populations to support growth, while residents in Sydney, Melbourne and Brisbane battle congestion. Problems such as these are slowing our progress towards sustainability and are unnecessarily hindering progress on our Paris Agreement commitments.

Population distribution has wide-ranging implications for our health, environmental impact, productivity, and access to opportunity. In our workshops on the east coast of Australia, participants identified 'congestion', 'cars', and 'sprawl' as common descriptors of their home cities.¹ Combating traffic congestion has become a sharper area of policy focus in states with large capitals (Terrill, 2019), as Australia's largest cities grow

at a rate of 2 to 2.5 per cent per year (ABS, 2019). The growing urban footprint in Australian cities is often accompanied by high rates of car dependence; this results in flow-on effects such as increased emissions and air pollution, adverse health effects, and frustration over lost time (Perkins et al., 2009).

Meanwhile, some smaller cities are having trouble attracting enough population growth to be economically resilient or to have diverse economies to support a transition toward sustainability. Young adults are often looking for opportunities elsewhere, leaving behind a degraded tax base and an ageing population. Some cities also have a pronounced gender imbalance - for example in Darwin in 2016, there were 87 women for every 100 men (Taylor and Wilson, 2016).

Compounding these factors is evidence that many Australians see public and social housing support as poor (Infrastructure Australia, 2018a). An unaffordable housing market presents serious problems in terms of equal access to opportunity. When unaffordable housing is paired with uneven jobs distribution, transport infrastructure woes are exacerbated. This issue is particularly pronounced in Sydney and Melbourne. The Committee for Sydney (2017, p.6) found that the average house price in Sydney exceeds \$1 million, which is over 12 times the median annual household income, while the Rental Affordability Index rates large tracts of the Sydney metropolitan area as being outside standard affordability rates. Simultaneously, the physical development patterns of Australian cities affect their broader region and the ability of industry in our rural regions to support the cities. Business as usual approaches to housing development are undermining sustainable transitions for our cities and regions.

1. See our Outcomes Papers of the national stakeholder consultation at: <https://www.science.org.au/supporting-science/future-earth-australia/projects/sustainable-australian-cities-and-communities>

Our cities exist in places of high biodiversity, with studies showing that Australia cities contain substantially more threatened species per unit area than non-urban areas (Ives et al., 2016). The most recent *Australian State of the Environment* report listed urban development as a major driver of environmental change, particularly in the urban fringe (Department of Environment, 2016).

Encouraging a productive balance of our national population between major centres and the regions has proven difficult. In 2018, the Planning Institute of Australia released *Through the Lens: The Tipping Point*, which argues that without a coherent national strategy to manage our population distribution and development of urban areas, we will be at a distinct competitive disadvantage.

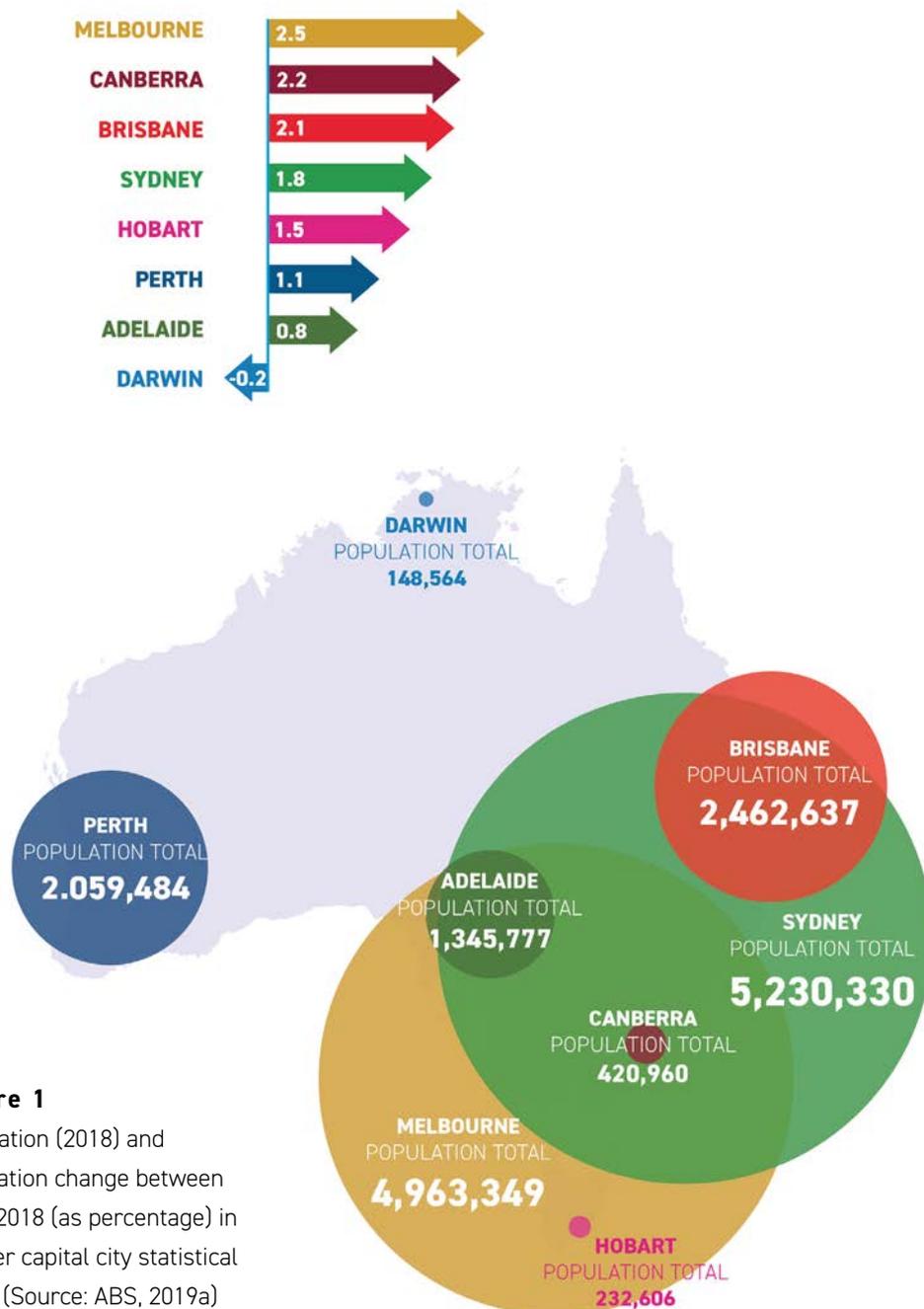


Figure 1
Population (2018) and population change between 2017-2018 (as percentage) in greater capital city statistical areas (Source: ABS, 2019a)



“Australia can only develop a nationally coherent plan for sustainable growth if we have the right tools and share knowledge. The 10 Year Strategy to Enable Urban Systems Transformation is a means for urban decision-makers to share information in ways that build off each other. It will enable the complex interdependencies of cities to be appreciated by a wider set of stakeholders and enable their collaboration. The Planning Institute of Australia sees this work as an enabler for the development of a shared vision behind a National Settlement Strategy.”

David Williams
CEO, Planning Institute of Australia

WHAT CITIES USE

Australian cities are responsible for a large proportion of the country's demand for resources. Through their urban metabolism (Kennedy, Pincetl & Bunje, 2011), cities control massive flows of water, energy, food, materials, waste, and greenhouse gases. Cities rely heavily on their surrounding regions for resources like food, primary materials for building, and energy resources. Additionally, Australian cities rely on international networks for energy resources such as petroleum, as well as many manufactured goods, with global consequences.

There is good evidence that policy choices about how cities are structured - their 'urban fabric' - has a big impact on their levels of resource use, waste production, and sustainability. For example, Perth's old city centre with its walkable configuration uses less raw materials, fuel, land space, and water than the more recent tram- and train-based suburbs or car-based outer suburbs (Table 1). The challenge is in converting these findings into workable policy and practice, which will require long-lived, systems-based, collaborative structures to analyse the trade-offs and synergies among interventions. Australia needs this kind of work to be the norm for our cities, from knowledge building through to decision-making.

There is a growing number of examples of systems approaches to cities, where the relationships between different elements in a policy problem are the focus, such as connections between food, water, and energy (Venghaus & Hake, 2018). While various cooperative research centres help address these challenges, such as Low Carbon Living, Innovative Manufacturing,

Future Fuels, Digital Health, Food Agility, and Fighting Food Waste, we need to align with the Sustainable Development Goals (SDGs).²

Future Earth Australia's Urban Systems Transformation Our workshops saw the desire for collaborative research, practice, and policy models emerge in multiple cities and regions.

- In **Western Sydney**, excitement and growth from initiatives such as the Aerotropolis³ were accompanied by a desire to use growth opportunities to collaborate across scale and sectors to address dominant concerns such as urban heat.
- In **Darwin**, a better working knowledge of circular economy and the food-water-energy nexus in the Northern Territory was a predominant desire, given that the North's remoteness makes it difficult to establish sustainable supply and access to resources.
- In **Adelaide**, the goal of a healthy, green city was linked to local production, consumption, and reuse of food and other goods. Participants saw that one-way industries and products such as fast fashion and single-use plastics were changing due to consumer sentiment, but remained concerned about 'green-washing'. The interwoven relationship between Adelaide and its hinterland arose, with participants seeking a sustainable vision for the city that factored in its effects on the broader region.
- In **South East Queensland**, regenerative business models were emphasised as a key pathway towards sustainability into the cities' future.

Table 1

Variation in resource inputs and waste outputs between urban forms in Perth, demonstrating how the values decline from the outer, car-dependent suburbs, to the closer suburbs that use public transport, to the old centre that is walkable. (Source: adapted from Thomson and Newman, 2018).

		INPUT (Per Person Per Year)	Automobile City	Transit City	Walking City
Resource	Total energy use (fuel, power, gas) (GJ)		64.1	47.2	32.2
	Water (Kl)		70	42	35
	Land (m²)		547	214	133
	Total building raw materials (T)		288	189	147
Waste	Greenhouse gas emissions (T CO₂eq)		8.01	5.89	4.03
	Waste heat (GJ)		64.1	47.2	32.2
	Household waste (T)		0.63	0.56	0.49

2. See the full list of CRCs at: <https://www.business.gov.au/Assistance/Cooperative-Research-Centres-Programme/Cooperative-Research-Centres-CRCs-Grants/Current-CRCs>

3. Western Sydney's Aerotropolis: <https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Western-Sydney-Aerotropolis>



"All resilience is place-based, and the context of how city systems work is best understood by the people who are the users of the city – the residents. Engagement with residents for the development of the Resilient Sydney strategy provided vital understanding of the lived experiences of the city and insights into how the city works."

Beck Dawson
Sydney Resilience Officer, City of Sydney

GOVERNANCE ACROSS JURISDICTIONS: EMPOWERING COLLABORATION AND INCLUSION

As cities are home for most Australians, they are the primary places where people live their culture, access nature, work, and raise families. It follows that communities desire a genuine and effective way to have their vision for their homes properly incorporated into planning and decisions. There is a reasonable expectation that governance settings be designed to empower citizen engagement.

In research gauging community views on infrastructure in Australia, 80 per cent of people say that consideration of community views in infrastructure planning and spending is of utmost importance to them (Infrastructure Australia 2018a, p.12). It is particularly important to consider the views of those living close to infrastructure change, and those most impacted, yet numerous participants in our workshops were sceptical of the sincerity of consultation by planners and decision-makers.

Collaboration, consultation, and coordinated community ownership of sustainable futures arose in many of our workshops.

- In **Sydney**, discussion coalesced around the need for people to be able to decide their own future, through involvement in planning decisions and genuine consultation, in order to achieve their vision for sustainability.
- There is an ongoing debate about how citizens can have their desires met at a metropolitan or regional level, and how we can make advances in productivity and environmental protection in a fragmented governance landscape (Spiller and Schmahmann, 2018). The disconnect between bottom-up and top-down strategies is also pronounced. This dilemma emerged in the *Building Up & Moving Out* cities inquiry, which acknowledged the critical coordinating and visioning role that the Australian Government plays in urban development from local to national levels (HoR SCITC 2018, p. 342). These factors point to a clear role for a coordinated effort in enabling Australia's transition to sustainable development.
- In **Perth**, participants lamented the bewildering complexity of sustainability problems but wanted to be part of understanding, supporting, and owning the solutions. They believed that the role of leaders is to empower communities to drive governance directions from the bottom-up. Collaboration between government, community, and other actors was seen as essential. 'Connected', 'inclusive', 'respectful', 'transformative', and 'collaborative' emerged as the core facets of participants' vision of a sustainable future for the nation.
 - In **Melbourne**, a sustainable future was most strongly associated with inclusiveness and liveability. Inclusiveness involves people being connected to opportunity and jobs, sharing prosperity, learning, and democratising access to services that improve health and wellbeing. In practice, this extends to an enthusiasm for including those usually excluded from decision-making and design of solutions, including Indigenous people.



"Poor collaboration, communication, or coordination, stemming from the different roles and responsibilities of government across national, state, and local levels, will hinder national progress towards the 2030 Agenda."

Australian Urban Research Infrastructure Network (AURIN)
Submission to our stakeholder consultation

There have been some institutional advances for improving coordination across cities and regions in land use, infrastructure, and transport planning on the part of state governments. The Greater Sydney Commission (GSC), for example, was established in 2015 by the New South Wales Government to coordinate and align planning across Greater Sydney in the context of rapid population growth (GSC, 2019). It has thematic Commissioners (the Chief Commissioner, and social, economic, and environmental commissioners) and regional Commissioners to represent geo-spatial perspectives. Local governments submit local environment plans to feed into the five district plans that make up the *Greater Sydney Region Plan*, presided over by the GSC. Contributors such as the Committee for Sydney and the Bus Industry Confederation to the *Building Up & Moving Out* inquiry stated that this model constituted a significant improvement in city governance.

City Deals have emerged as a predominant structure for local, state, and federal governments to coordinate their investments in solutions to strategic problems in some cities. While City Deals were largely welcomed by workshop participants as a vehicle for a bipartisan approach to coordination in cities, some participants expressed concern about the lack of evaluation of their effectiveness.

Non-government initiatives for coordination and knowledge sharing have also risen in popularity. Networks such as ICLEI and C40 for Cities, designed to connect local governments to share and cross-incubate information and ideas, have existed for many years. More recently, the Rockefeller Foundation's 100 Resilient Cities initiative funded a Resilience Officer in both Sydney and Melbourne to construct collaborative, cross-sectoral plans to make the cities more resilient to shocks. These networks are excellent, but there is more we can do to build on these disparate initiatives in collaboration.

We can enable innovation, sustainability, and transformation for Australian society, using our cities and regions as central drivers.



"Engagement with community and stakeholders is an important listening exercise, as communities in growth areas, for example, must be given the opportunity to have their ideas and appetites for innovation in neighbourhood and housing design, sustainability, and transport integrated into projects."

Bronwen Clark
Executive Officer, National Growth Areas Alliance

"Regions (or regional leaders) keep telling us they are willing and able to play a significant role in Australia's population growth, but they know they are not quite ready. They need a shift in infrastructure planning towards enabling regional towns and cities for larger scale growth."

Kim Houghton
CEO, Regional Australia Institute

BARRIERS AND ENABLERS OF SUSTAINABLE URBAN SYSTEMS

Australia is a diverse nation. Our urban knowledge and practices are not guided by a clear, long-term agenda. We need a clear long-term agenda that enables a coherent vision and action for sustainable development across our cities and regions, that accommodates and empowers pathways to prosperity.

Cities often pursue their goals in isolation. Without a national vision that connects their efforts, shares their knowledge, builds capacity, and creates innovation, change proceeds slowly. Australia is creating excellent knowledge to support decision-making, but the systems to link knowledge production with policymaking are fragmented and underdeveloped. There is limited sharing, accessibility, and translation of knowledge and solutions, exacerbated by excessive fragmentation of urban data holdings, which are often hard to access. This undermines innovation and collaboration.

In order to fully realise the potential of the SDGs, we need to harness innovation and disruption more effectively. We also need to have communities of practice actively engaged throughout, and in doing so, enable societal transformation across Australia so people get the best from their cities.

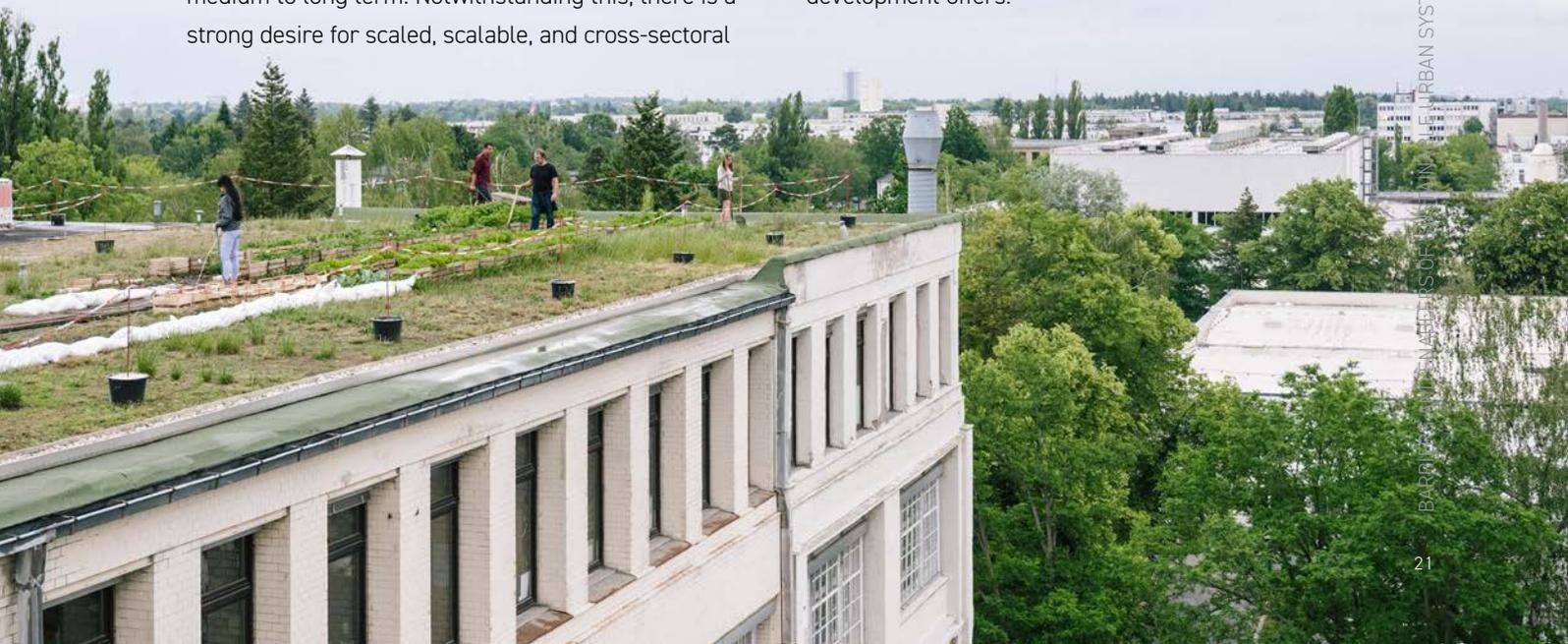
Our capacity to provide relevant, timely, and useful information to decision-makers is underdeveloped due to narrowly scoped projects, a dearth of sustained urban policy-practice-research relationships, and a lack of incentive to work collaboratively in the medium to long term. Notwithstanding this, there is a strong desire for scaled, scalable, and cross-sectoral

collaboration to co-design and then implement place-sensitive solutions.

We don't need to reinvent the wheel. Rather, we can draw from and build on our current institutions that have been creating valuable knowledge for specific stakeholders and sectors. These include, for example:

- cooperative research centres for Low Carbon Living and for Water Sensitive Cities, which break down silos across sectors and disciplines to address issues systemically, create highly practical tools and outputs, and make their work accessible to all
- the Australian Housing and Urban Research Institute (AHURI), which is an exemplary organised network model for housing and urban research
- CSIRO Urban Living Labs, which provide a space for government, researchers, communities, and industry to innovate together in locally relevant ways
- the Australian Urban Research Infrastructure Network (AURIN), which provides data and modelling for evidence-based decision making in cities.

But there is more to do. All have a role to play to achieve the vision and implementation of urban systems transformation in Australia. It is important that we continue to co-produce actions and mechanisms to harness the opportunities that sustainable development offers.



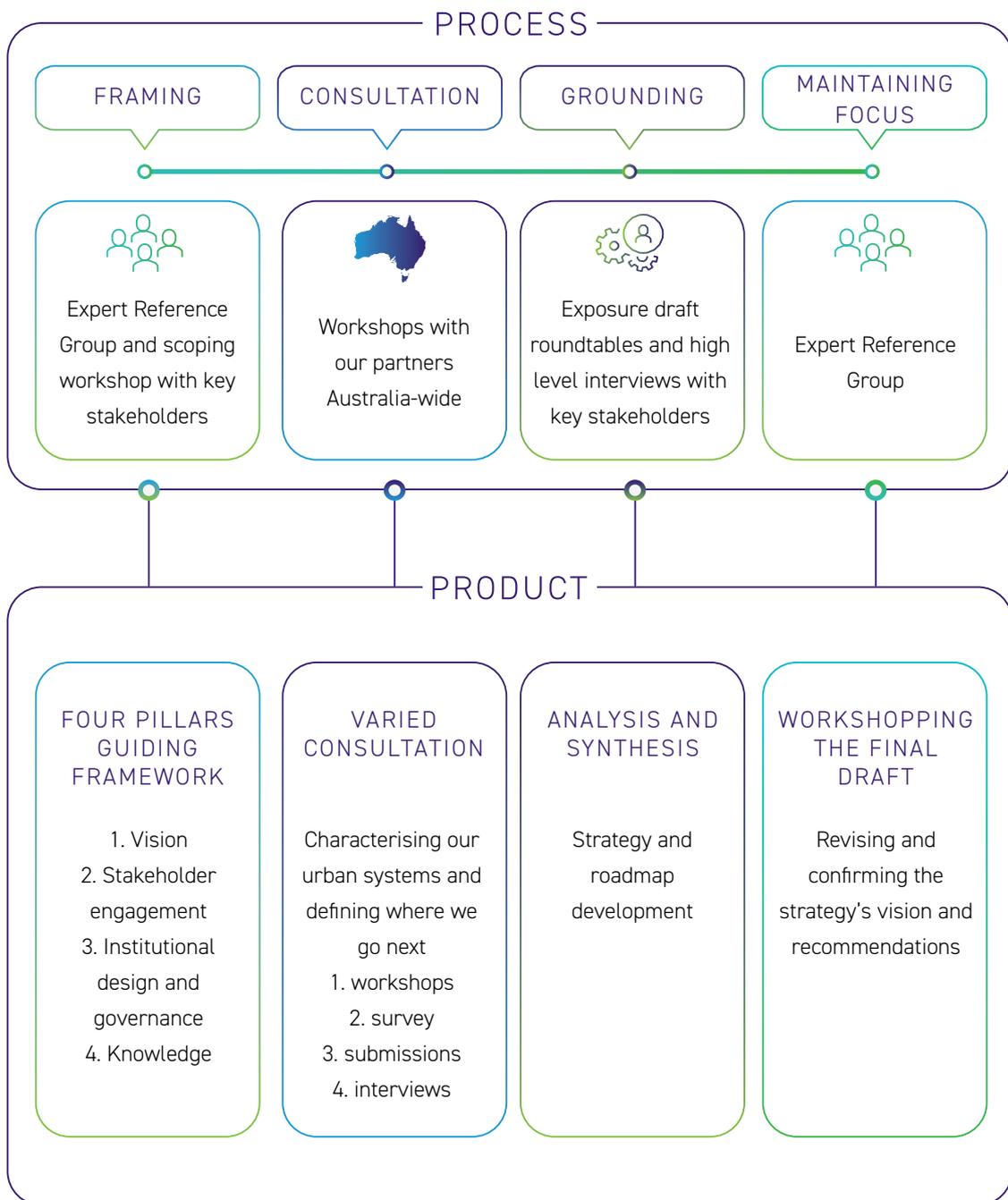
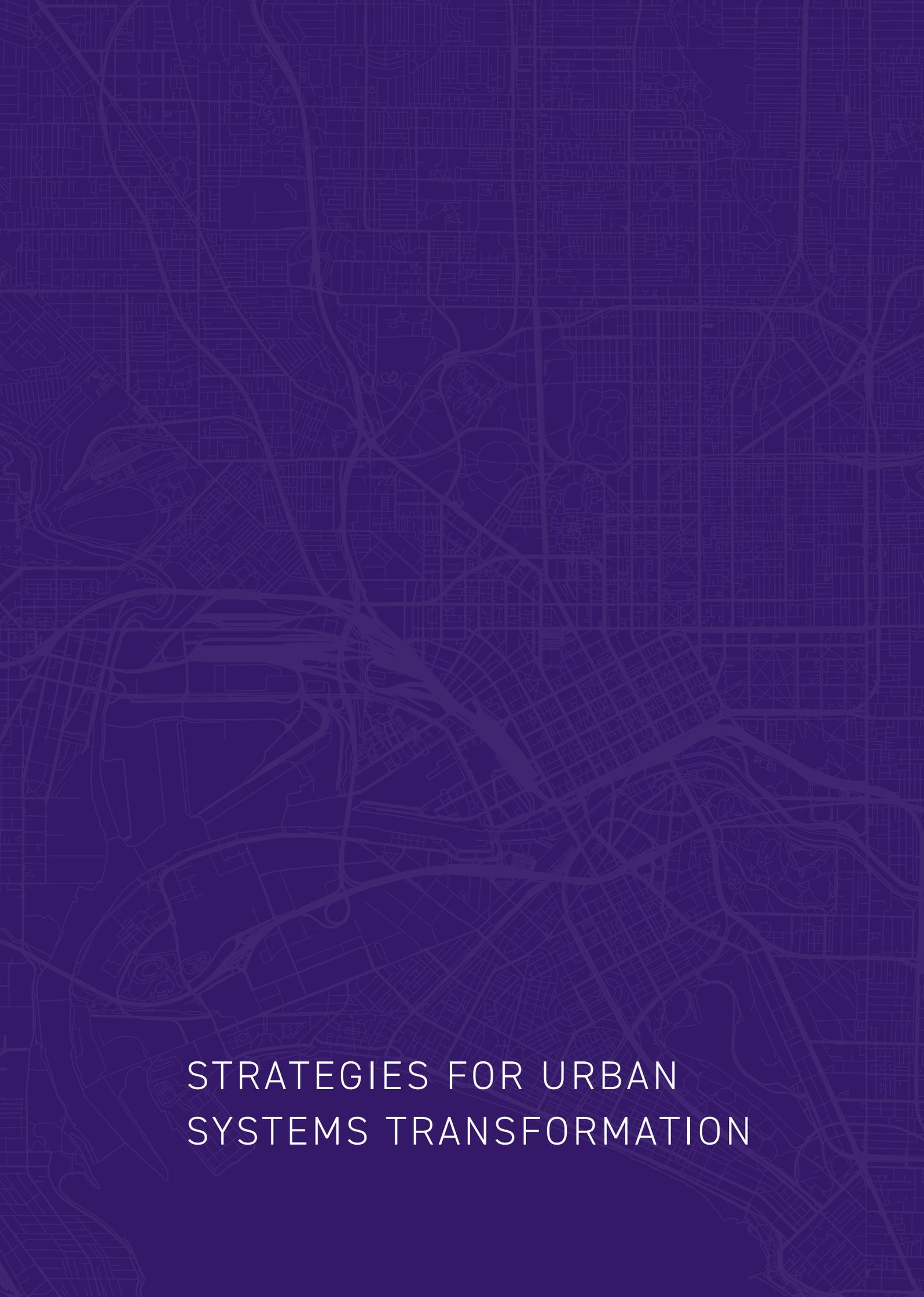


Figure 2
The Future Earth Australia Secretariat co-production process

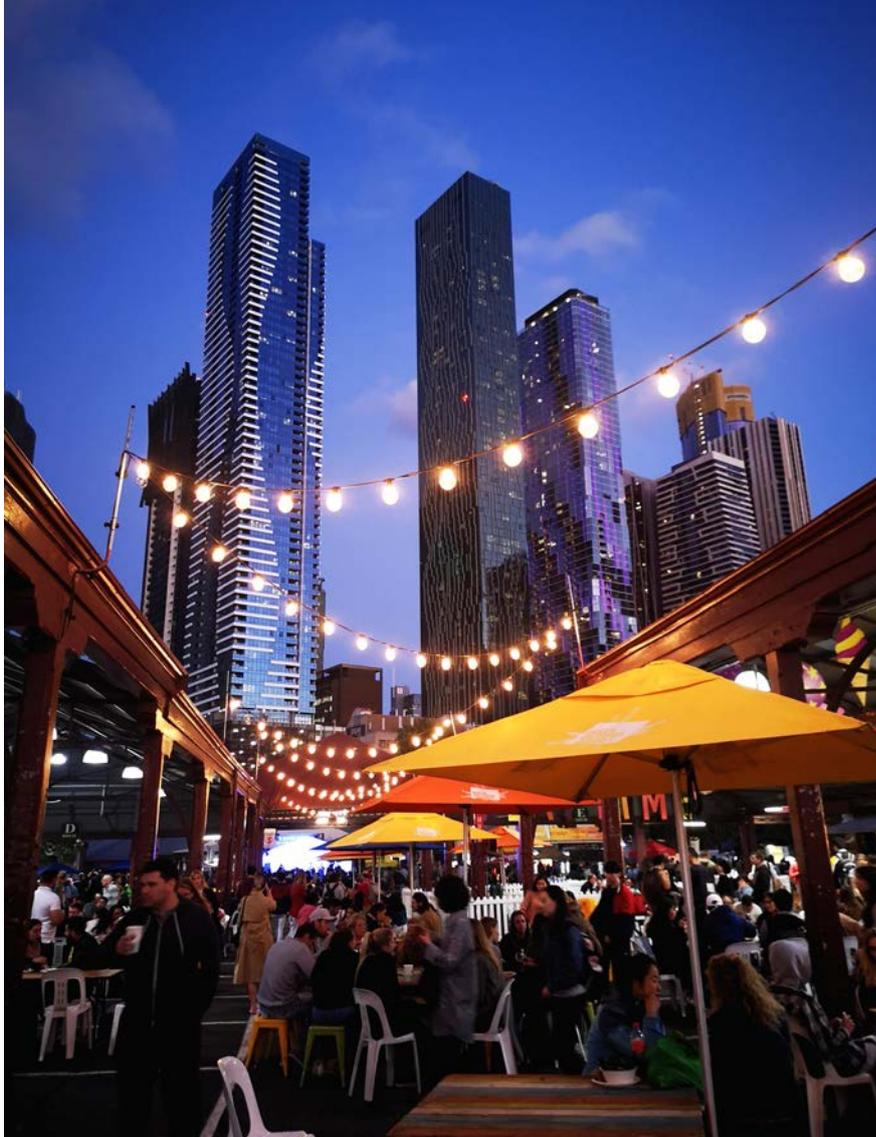
This strategy recommends that the science of cities and regions becomes a national priority to 2030, with an explicit focus on knowledge systems to better support sustainable development and human wellbeing in cities, and Australia's ability to implement the SDGs. Doing so recognises the centrality of our urban and regional environments for wellbeing and future prosperity. This also recognises the challenges for cities and regions as dynamic, individually distinct, and rapidly transitioning places. Leadership, partnerships, and innovative uses of resources are required to embed, monitor, and evaluate current and future urban systems knowledge and practice.

Investments in innovation hubs and in capacity building are needed. Both should extend far beyond the business-as-usual models and embed transformative foundations. These include genuine cross-sectoral and cross-disciplinary expertise, engagement, and innovation; a focus on bottom-up economies feeding into national and state- or territory-led initiatives; and conditions that enable better practitioner and researcher collaboration, both within Australia and with international partners. The four strategies outlined on the following pages will implement this intent.





STRATEGIES FOR URBAN
SYSTEMS TRANSFORMATION



STRATEGY 1: VISION FOR ACTION

BUILD COHERENT VISIONS FOR OUR CITIES AND REGIONS TO ACHIEVE THE SUSTAINABLE DEVELOPMENT GOALS

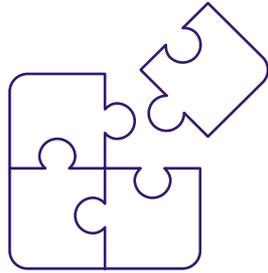
Our cities and our regions work to underpin and drive health, prosperity, wellbeing, and environmental impacts and outcomes. Sustainable development plays a large role in shaping Australia's prosperous future. An explicit national vision for Australia's cities as a driver for our fulfilment of the SDGs must underpin our efforts to pursue this pathway.

Cities are living complex social and institutional systems, shaped by an enormous number of variables. Governance responsibilities are divided across three tiers of government. No single stakeholder group or sector, professional discipline, institution, or tier of government can identify and respond alone to the challenges facing Australia's cities. We must collaboratively create the knowledge we need from a number of different perspectives and specialisations, including the perspectives of citizens and communities.

Just as Australia must have a coherent and explicit national vision for cities, each city and region needs its own tailored vision and plan. These visions need to be nested across scale; that is, they need to be connected from the local to the national. The SDGs are a frame on which to hang these connections. The design process must be inclusive, collaborative and contextually relevant, and be supported by excellent transdisciplinary, cross-sector systems research, while including and structurally empowering Indigenous Australian worldviews and knowledge. There are very significant knowledge gaps in understanding interdependencies across sectors, relationships across spatial and temporal scales, and implications of certain choices contributing to Australia's progress, or backsliding, on the SDGs.

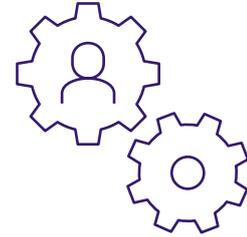
RECOMMENDATION 1

Enable a national framework and process to achieve the SDGs in cities and regions



RECOMMENDATION 2

Embed stakeholder and civil society participation in urban knowledge, policy and practice



Setting a vision with accompanying goals, targets, and measurable indicators of success is important as both an objective and as a process.

As an objective, visions, goals, and pathways create an action-oriented framework that can viably stand up to the test of time. This framework lends consistency and integrity to the medium- and long-term work associated with urban practice and governance.

As a process, arriving at an agreed vision and framework can improve the prospects of community and sectoral buy-in, generating greater stability for investment and the potential for greater trust within the community, so long as engagement is genuine in its capacity to shape decision-making at early stages. While the process of setting long-term visions, goals, and objectives is messy and often fraught, it is an important component of navigating the disparate values and communities in a city or region and aligning with other strategic goals for short- and longer-term benefit.

Conflicting values, power imbalances, marginalised people, growing inequities, and analysis of winners and losers are too often downplayed at the strategic stages. This early oversight results in implementation plans missing the mark, or otherwise straying from their strategic underpinnings. To measure success, we must compare our goals, targets, and indicators against the actual performance of our cities, accounting for spatial scales and jurisdictions.

A national framework would be implemented early on and then operated over the next decade to set up new norms for the future beyond 2030. It would be co-designed with multiple stakeholders representing all governance levels of urban decision-making, and it would inform sustainable development pathways that bring visioning processes to life. It is important to model urban systems interdependencies both immediately and into the long term to align with the vision that underpins the framework. There needs to be an agreed implementation plan between local, state, and federal governments. This agreement is fundamental to the multiple jurisdictional challenges in Australia's federated government system. Operational plans should be tailored to for individual cities and regions.

Collaborative and participatory engagement with stakeholders and communities should be a guiding principle in design and practice for all urban policy whether at national, state, or local levels. It should underpin fundamental visioning and goal-setting that guides research and practice, including the knowledge building and innovation agenda and its implementation, and in building capacity of the sector to engage across research, policy, practice, and the community.

Issues	Actions	Performance indicators	Who is responsible
Australia lacks a national strategy and vision for the role that cities and regional urban areas play in our economic, social, and environmental future	Action 1.1 Establish a collaborative visioning framework to prepare a National Urban Strategy that guides decision-making for Australian cities and regions	Performance indicator 1.1.1 National Urban Strategy released by end of 2020 Performance indicator 1.1.2 Implementation plan agreed by COAG by 2021 Performance indicator 1.1.3 Cities greater than 50,000 population to establish metropolitan plans by 2022, reflecting the national strategy	Who is responsible 1.1.1 Federal government to lead in collaboration with state and territory governments via COAG Who is responsible 1.1.2 COAG Who is responsible 1.1.3 Local governments and/or regional development organisations including Regional Development Australia, working in consultation with relevant state departments and the private sector
The role that individual cities play in fulfilling such a strategy is unclear and incoherent	Action 1.2 Embed the Sustainable Development Goals across all actions and related policy activity within this 10 Year Strategy for Urban Systems Transformation and the National Urban Strategy	Performance indicator 1.2.1 The National Urban Strategy reflects the Sustainable Development Goals including the UN Habitat Program principles for National Urban Policy	Who is responsible 1.2.1 Federal government to lead in cooperation with State and Territory governments and urban stakeholders.
Stakeholder and civil society inclusion in urban strategy and planning is regarded as a tick-box exercise, as opposed to an opportunity to contribute to the design of high-level strategy and implementation	Action 1.3 Align the existing National Cities Performance Framework with the National Urban Strategy	Performance indicator 1.3.1 Goals and targets for all cities aligned with the National Urban Strategy to be established by 2022 Performance indicator 1.3.2 Undertake performance audit for all cities aligned with the National Urban Strategy and aligned with the State of the Environment five yearly reporting mechanisms	Who is responsible 1.3.1 State and Territory and local governments and/or regional development organisations, including with national urban stakeholder groups and peak bodies. Who is responsible 1.3.2 An independent science body appointed and resourced by federal and state governments supplemented by ongoing assessment by the scientific community
Some existing tools, such as the National Cities Performance Framework, are useful yet could be developed to be more powerful in informing urban visioning, experimentation, plans, and evaluation	Action 1.4 Build knowledge of interactions and trade-offs within urban and regional systems to support national strategy implementation	Performance indicator 1.4.1 National urban systems research program established by 2021 Performance indicator 1.4.2 Fund and deliver State of Australian Cities and Regions assessment framework to report on conditions and dynamics in Australian cities and regions, led by the scientific community in consultation with urban stakeholders by 2021, and three-yearly thereafter Performance indicator 1.4.3 Provide a national information platform to link knowledge to cross-sectoral urban systems innovation	Who is responsible 1.4.1 Federal government to lead in collaboration with state and territory governments Who is responsible 1.4.2 Federal government, with support from the states and territories via COAG Who is responsible 1.4.3 Hosted by an appropriate third party, to be determined by the relevant sponsor
Governments, businesses, civil society, and researchers do not have a consistent framework to which they can orient their effort and investment. The role of their efforts in contributing to a coherent system is unclear without a guiding national strategy that puts everyone on the same page	Action 1.5 Embed participation, engagement, and co-design between researchers, policy makers, business, and communities in development and implementation of the National Urban Strategy Action 1.6 Build a platform and supporting processes to enhance, curate, and disseminate knowledge of how to undertake and apply effective engagement, co-design, and participation practices	Performance indicator 1.5.1 Establish new practice guidelines for inclusion of diverse stakeholders in urban policy formulation Performance indicator 1.5.2 Institute national arrangements to enable engaged and participatory urban policy formulation Performance indicator 1.6.1 Platform established by 2021 Performance indicator 1.6.2 Platform to apply principles of open access Performance indicator 1.6.3 Wide dissemination and uptake of platform Performance indicator 1.6.4 Monitor and evaluate platform uptake annually	Who is responsible 1.5.1 A partnership between the scientific community, federal and state and territory governments, and peak bodies Who is responsible 1.5.2 All levels of government, with emphasis at state and territory level Who is responsible 1.6.1 Federal government to lead, in concert with the state and territory governments Who is responsible 1.6.2 Dissemination, monitoring, and evaluation to occur via the scientific and research communities, with additional simultaneous evaluation procured by governments



INTERNATIONAL CASE STUDY:

Project Ireland 2040: National Planning Framework

Project Ireland 2040: National Planning Framework (Government of Ireland, 2018) sets out a high-level strategic vision for urban and regional settlement and development over the next 20 years in the context of rapid population growth. Twenty-year goals are laid out as national strategic outcomes, designed to be adaptable as circumstances change, which are deliberately aligned with the Sustainable Development Goals. The framework works within and responds to Ireland's commitment to the SDGs.

National strategic outcomes are mobilised by key priorities for investment as systemic drivers of sustainability. Included are housing and sustainable urban development, rural development, environmentally sustainable public transport, climate action, education, health, and childcare (Government of Ireland, 2018).

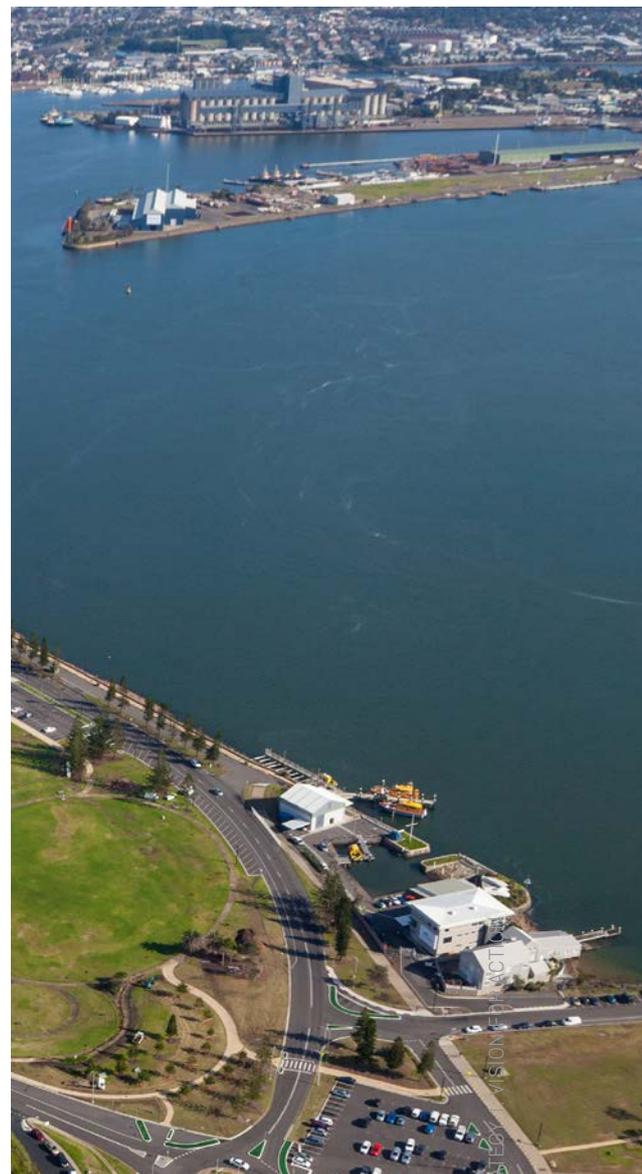
With an emphasis on putting forward shared goals which are relevant from local to regional and national scales, the national strategic outcomes set the goalposts for those researching, practising, and making decisions across jurisdictional scales. The framework introduces regional assemblies, which are responsible for the regional and spatial economic strategies, to support implementation of the National Planning Framework. Each region has a set of planning priorities specific to their contexts. This emphasis on scalar-sensitive implementation and two-way communication between regions, cities, and the national framework is a key strength (Government of Ireland, 2018).

METROPOLITAN CASE STUDY:

Newcastle 2030 Community Strategic Plan

The Newcastle 2030 Community Strategic Plan defines the strategic vision for Newcastle to transform into a 'smart, liveable, and sustainable global city', based deeply in community values and engagement (City of Newcastle, 2018). Along with reliance on data and research, Newcastle Council undertook a multi-modal community engagement process, collecting information from 2700 people, to inform the vision and directions of this plan. It employs the SDGs as its orienting framework and grounds implementation through seven strategic directions. Their plan to deliver this vision is set out with community indicators to measure success, a stakeholder map, and an explicit outline of the role the Council plays in the broader system of actors. Monitoring of progress takes place continuously and is reported in the end of term report every four years.

The Newcastle 2030 Community Strategic Plan demonstrates the viability of creating a high-level strategy for the city as a driver of human wellbeing, environmental health, and economic resilience. It is made possible by seeing the city as a system, as opposed to a place where separate elements meet. The plan is underpinned by community engagement, which sees the community's vision translated into understandable strategies, and an action plan to achieve it. This is monitored by both data and community indicators in an integrated fashion.





STRATEGY 2: ENABLE INNOVATION

GROW A NATIONAL URBAN INNOVATION SYSTEM TO ACHIEVE URBAN AND REGIONAL VISIONS

True innovation has been stifled by fragmentation across three main challenges. The first is the urban governance arrangements across sectors and the federated levels of government across Australia. This fragmentation affects the commissioning of knowledge and is aggravated by a lack of deeper and more sustained urban policy-practice-research relationships to facilitate ongoing collaboration, learning, and action. The second challenge is limited sharing, accessibility, and communication of knowledge and data and other information. These limitations aggravate poor uptake of existing knowledge and limit acceleration of learning and action across communities and stakeholder groups. The third challenge is that urban data holdings have been subject to excessive fragmentation and limited accessibility across both the public and private sectors. This fragmentation costs Australia in

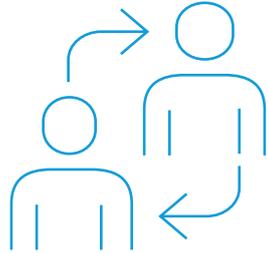
terms of opportunities to make the most of analytical and modelling tools, and opportunities to develop significant technological innovation.

Future Earth Australia's national consultations demonstrated that there is a rich variety of local experimentation and innovation taking place in cities around Australia that is driven by individuals, small businesses, community groups, and local governments in diverse areas. Globally, there is an enthusiasm to reframe urban problems and fund solutions through action, as demonstrated by the abundance of innovation platforms, precincts, labs, accelerators, and pilots.

The research and knowledge sector can partner with local innovators to accelerate and generalise context-specific solutions and help embed them at a city and

RECOMMENDATION 3

Create a national institutional framework to link urban and regional research, policy, and practice communities



RECOMMENDATION 4

Establish a national network of innovation hubs to empower local urban and regional innovation across Australia



regional levels. Such approaches will improve flexibility in a rapidly changing world. Feeding into the National Urban Strategy, this activity will require a systems approach; that is, for a variety of parties to be involved from the beginning. In the past, a systems approach has been limited due to incremental funding and disconnected priorities, along with an emphasis on short-term outcomes. Transforming our urban and regional futures demands a nested scalar approach, one that fosters and enables innovation and supports the necessary growth of local multi-sectoral partnerships.

Australia needs a nationally coherent research and practice agenda, accompanied by enabling platforms, that is supported by a consortium of local and state governments, led by the federal government, and brings all other stakeholders along from the beginning. The establishment of a National Urban Forum can underpin this transformation and serve not only as a knowledge sharing forum, but a mechanism for hub reporting, monitoring, and evaluation.

The network of connected innovation hubs around Australia can provide a structure for urban knowledge and policy transfer. These hubs need to be place-based and operationalised according to their local or regional context. These should report activities to the National Urban Forum and inform the continual agenda-setting process.

A networked collection of innovation hubs can facilitate learning between cities that remains contextually relevant, reduces duplication, inspires creative approaches, and shares both successes and failures. These will be deeply embedded in local community initiatives and stakeholder values to establish innovation activities that combine local ideas and skills with global knowledge and practice. Both technological and social innovations should be explored. Policy innovations, including participatory urban policy processes at all scales, should be pursued with decision-makers at local, metropolitan, state, and national levels.

Issues	Actions	Performance indicators	Who is responsible
<p>Those working on issues related to sustainable cities and regions ('Urban Systems') are disconnected from each other, across sectors and disciplines</p> <p>There is no formalised common ground or structure to facilitate knowledge transfer and learning</p> <p>Network building between different parts of the urban community of practice lacks consistency and common purpose</p>	<p>Action 2.1</p> <p>Establish a National Urban Forum alongside the biennial State of Australian Cities conference to drive a national agenda-setting process</p>	<p>Performance indicator 2.1.1</p> <p>A National Urban Forum established by 2021 which operates as a multi-sector, multi-stakeholder event to coordinate knowledge co-production and exchange, every two years</p> <p>Performance indicator 2.1.2</p> <p>Existing scientific institutional arrangements leveraged to drive the National Urban Forum agenda-setting process</p> <p>Performance indicator 2.1.3</p> <p>National Urban Forum aligned with the Australasian Cities Research Network (ACRN) as the premier national urban studies research network in Australia</p>	<p>Who is responsible 2.1.1</p> <p>The university and research sector, including CSIRO and other publicly funded research organisations</p> <p>Who is responsible 2.1.2</p> <p>National scientific bodies and funding agencies</p> <p>Who is responsible 2.1.3</p> <p>Federal government and ACRN</p>
<p>Wide adoption of useful research and innovation is obstructed by this lack of structure for collaboration</p> <p>Civil society and government-led innovation in community engagement may not reach practice and research sectors, and vice-versa</p> <p>Silos are further entrenched by geography, culture, and jurisdictional scale</p> <p>Disconnect slows progress to achieving the Sustainable Development Goals</p>	<p>Action 2.2</p> <p>Establish a network of cross-sector local innovation hubs at city and regional scales across Australia</p>	<p>Performance indicator 2.2.1</p> <p>First set of innovation hubs piloted in selected cities by 2022</p> <p>Performance indicator 2.2.2</p> <p>Innovation hubs established in all cities and regions by 2025</p> <p>Performance indicator 2.2.3</p> <p>Innovation hubs formally linked via the National Urban Forum and knowledge sharing platforms</p> <p>Performance indicator 2.2.4</p> <p>Innovation hubs demonstrate wide stakeholder involvement including private sector, innovators and start-ups, communities and civil society, industry, governments, and the research sector</p> <p>Performance indicator 2.2.5</p> <p>Evaluation and impact reviews every two years after 2025</p>	<p>Who is responsible 2.2.1</p> <p>Led by the philanthropic sector, with innovative partnerships to be developed with federal, state and territory governments, universities, and business, and stakeholder groups.</p>



INTERNATIONAL CASE STUDY:

European Creative Hubs Network and associated Fora

The European Creative Hubs Network was a two-year project co-funded by the European Union until April 2018. At the conclusion of the funding period, creative hubs were established in 38 countries, incorporated 1613 staff and 215 network members (European Commission, 2018). Many of the hubs established by the program continue to operate.

Creative hubs are places, either physical or virtual, that are designed to bring together creative people across disciplines and sectors to work on collaborative projects (European Creative Hubs Network, 2017). Creative hubs maximise the value of disparate parts of the creative industry by connecting, communicating, and collaborating, and by providing space for networking, business development, and community engagement. The hubs are particularly useful for small and micro-enterprises and freelancers to connect with opportunities, and have their knowledge and business offering enhanced for a broader market, which may be looking for it.

One output of the network was to connect the disparate community of creatives across national boundaries, much like across state and city boundaries for urban systems in Australia. The network has given critical mass and a voice to the sector. Another outcome was creating a community of experienced hub leaders across Europe, connected to one another to enhance the community's resilience. Through valorisation activities and resourcing, the network of hubs advocated for creative industries and what they needed to thrive (European Commission, 2018).

Learning from the hubs, both on best practice for operating and expanding them, and on the substantive insights from the creative industry in different countries, was shared at three annual fora during the funding period of the hubs network. By convening consistent meetings for hub staff and leaders, dissemination of lessons to the broader network was a key output for hubs.

Such a network of contextually responsive, collaborative, and experimental innovation hubs could provide similar coherence and structure for those working on urban and regional issues, while also generating lessons across the country on what works in progressing urban sustainability.



NATIONAL CASE STUDY:

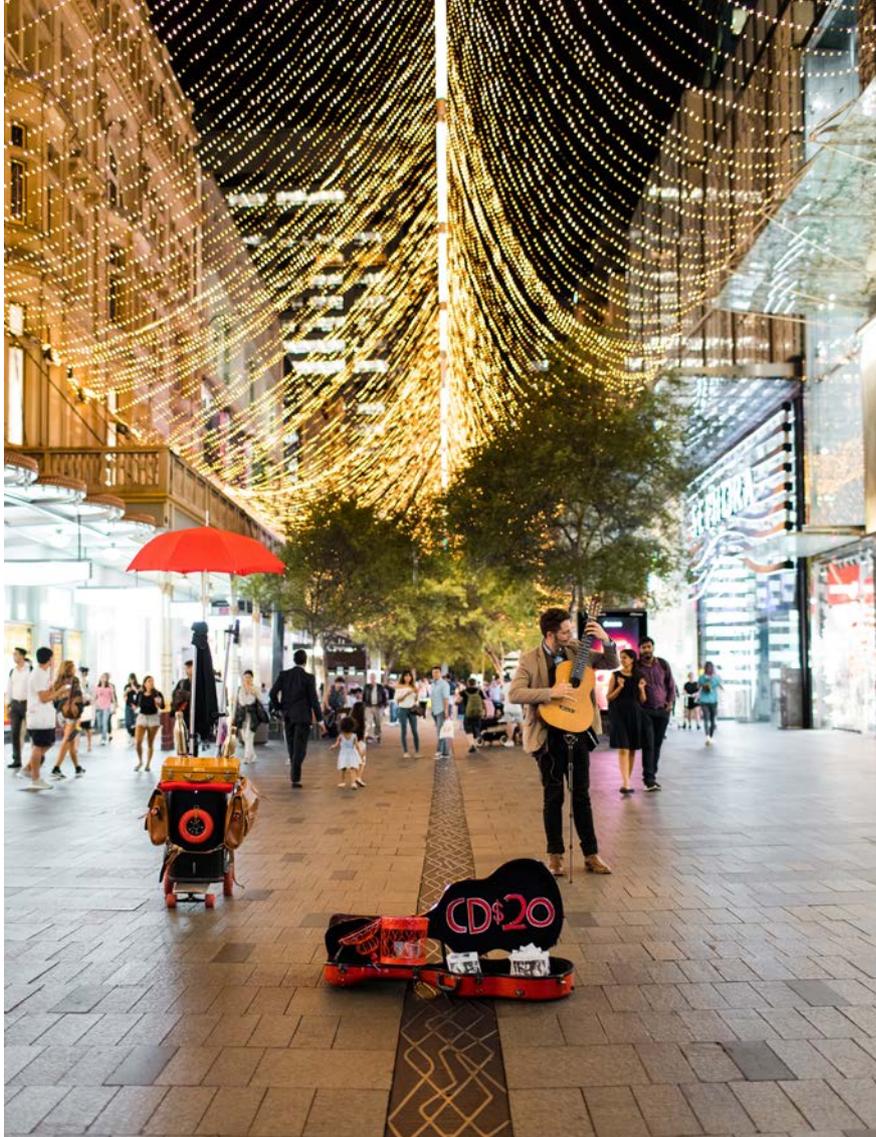
The creative economy driving sustainability of smaller Australian cities

An often overlooked component of designing sustainable cities is the creative economy, which employs around 600,000 Australians and is set to increase dramatically (University of Queensland, 2018). Yet some recognition has occurred, such as through the SDG Fund, an initiative of the United Nations that promotes the importance of the creative economy in advancing the Sustainable Development Goals, as well as its power in terms of income generation, job creation, and export earnings (UNDP, 2019).

In Australia, Adelaide has become a hub for creative industries. The numerous grassroots arts festivals in Adelaide injected \$109 million into the local economy in 2018. The South Australian Government has created a Creative Industries Cluster in recognition of the importance of creativity and innovation in driving Adelaide's future. The Arts Industry Council of South Australia, an independent member organisation of artists, released a *40-Year Vision for the Arts* to boost creative industries by improving training opportunities and investing in cultural infrastructure like museums, galleries, and theatres. In the context of difficulty in attracting jobs and younger residents, these initiatives represent a promising economic frontier to support sustainable urban development.

Hobart has also benefited from innovation and creativity. Since the Museum of Old and New Art (MONA) opened in 2011, the small city has become internationally renowned for its arts scene. Dark Mofo, a festival launched by MONA, drew an international crowd and netted \$4 million in ticket sales in 2018, with 65 per cent of sales coming from interstate visitors (MacDonald, 2019). The City of Hobart released the *Creative Hobart Strategy* in 2013 and hosts programs targeted at specific creative industries, such as its *Film Friendly City* initiative. By providing opportunities for meaningful community participation in cultural activities and serving as a hub for information on cultural organisations, creative industry businesses, and cultural events and activities, Hobart has found a way to grow its economy sustainably and without relying on finite resources.

With some regional cities like Newcastle and Townsville expanding their creative offerings, the promotion of a creative economy is an increasingly popular way to invigorate cities and their regions sustainably in Australia.



STRATEGY 3: CONNECT KNOWLEDGE

Australia has long-operating data and analytic infrastructure principally comprising the Australian Urban Research and Infrastructure Network (AURIN), supported by the Australian Research Data Commons (ARDC) which formed in 2018 from the Australian National Data Service (ANDS), National eResearch Collaboration Tools and Resources (Nectar), and the Research Data Services (RDS). Beyond this centralised infrastructure, various labs and centres operate across the urban research sector, including within universities and CSIRO. Data holdings and types modelling approaches are numerous and often of high quality but are also often difficult to access or interpret.

The pressing need for a coherent national research infrastructure framework to support Australia's future was documented in the Chief Scientist's

INVEST IN INFORMATION AND COMMUNICATION INFRASTRUCTURE TO SHARE URBAN AND REGIONAL KNOWLEDGE

National Research Infrastructure Roadmap (Australian Government, 2016b). This roadmap incorporates key challenges that the urban research sector must address.

The systemic challenges we face in our cities require an effective and coherent evidence base to balance trade-offs and capitalise on synergies across sectors, scales, and interests. Fragmentation of knowledge is a dominant barrier to researchers, practitioners, communities, and decision-makers being able to use information and work across the knowledge-practice landscape. This has been documented as a barrier to better research, policy, and decision-making in the Productivity Commission's 2017 *Inquiry into Data Availability and Use*.

RECOMMENDATION 5

Establish and sustain an integrated urban and regional knowledge platform for data analysis and exchange across the research, policy, and practice communities



RECOMMENDATION 6

Support new capability to connect diverse knowledge across sectors, disciplines, and professions to achieve urban and regional visions



There are many causes for fragmented information. In the research space, short-term funding priorities with a narrow scope of interest are undertaken by dispersed teams defined by sector or discipline and in a culture of competition between bidders, making knowledge sharing and collaboration an existential threat. Similarly, the private sector is cautious in guarding its data, ideas, and information in order to retain some competitive advantages.

Existing efforts to present a more integrated approach to some urban issues, such as that of recent cooperative research centres, are a useful step but still tend to have a sectoral focus. While competition is essential in driving innovation in knowledge creation, it also creates a distinctly chilling effect on collaboration. There needs to be a balance between competition and collaboration, with the latter a necessary component for delivering systemic understanding and advice about complex issues such as the future of cities.

An urban knowledge platform would be tasked with improving the coherence of the urban systems research community. An urban modelling and data integration system should support the platform by establishing and maintaining an information and data exchange that stakeholders, data owners, and users can trust. It would comprise four core elements, including: being a searchable repository of all current material across the private, public, and community sectors across Australia; collecting all knowledge generated by the innovation hubs; being open access and freely available; and underpinning the monitoring,

evaluation, and learning that is an essential feature for cities to adapt effectively to a changing world.

These recommendations are couched in the context of broader calls for reform to data availability and use by the Productivity Commission (2017, p.2), not only in a technical sense, but in the sense that a cultural shift toward trust and common standards of stewardship is required to maximise the data and knowledge landscape. Developing this would also necessitate the identification of data knowledge gaps. Such gaps in data may be addressed by the innovation hubs, or other means as determined by relevant funders.

There are also lessons to be learned from international best practice. The research and practitioner community need to be supported in a national to international knowledge exchange, where these usefully inform knowledge gaps or can otherwise inform societal transformation for the implementation of the SDGs.

Issues	Actions	Performance indicators	Who is responsible
<p>Data and knowledge created across Australian research, industry, government, and civil society communities are not generally available and accessible. Connected data and knowledge is requisite for scientific productivity</p> <p>Data, modelling, and other critical knowledge sets are not easily accessible or discoverable for those working in urban systems, particularly between sectors</p>	<p>Action 3.1 Integrate and expand an open access data sharing and analytics platform supported by governments and industry or sector partners for a minimum of 10 years</p>	<p>Performance indicator 3.1.1 Launch of national open access digital platform for collating, indexing, hosting, and disseminating Australian urban research and policy material, by 2021</p> <p>Performance indicator 3.1.2 Platform linked to stakeholders via National Urban Forum and National Urban Strategy processes</p> <p>Performance indicator 3.1.3 Track and report publicly the use of the platform by number of site visits, length of stay, and modes of digital sharing, annually</p>	<p>Who is responsible 3.1.1 Federal government, in partnership with existing platforms including: GeoScience Australia's Digital Earth and Future of the Earth initiatives, AURIN, the Australian Bureau of Statistics and others</p> <p>Who is responsible 3.1.2 Tracking and public reporting to be the responsibility of the hosting platform</p>
<p>Australian researchers and practitioners are not systemically and consistently engaged with international knowledge networks to bring best practice to the country</p> <p>Barriers to information sharing can have a significant negative effect on collaboration and mainstreaming of integrated work on urban systems</p>	<p>Action 3.2 Link Australian researchers and institutions into global urban research networks</p>	<p>Performance indicator 3.2.1 New arrangements established for collaboration on urban research between Australian and overseas researchers and institutions</p> <p>Performance indicator 3.2.2 Australian urban researchers and institutions supported and enabled to participate in overseas research and policy collaborations, including via dedicated funding</p> <p>Performance indicator 3.2.3 Researcher and practitioner fellowships funded for short-term travel and study activities linked to globally significant urban research and training hubs</p> <p>Performance indicator 3.2.4 Urban researchers and policy institutions supported to collaborate with major international urban research and policy agencies, Forums, and networks</p>	<p>Who is responsible 3.2.1-3 Federal and state and territory governments, national scientific peak and disciplinary bodies, and universities in partnership</p> <p>Who is responsible 3.2.4 Drawing on the innovation hubs detailed at Action 2.2, and a dedicated partnership funding pool between federal government and universities</p>

“As with any endeavour, transforming the urban environment in a sustainable way needs advocates (even champions) who are both well-informed and adept at communicating key knowledge. Without these individuals, the transformation pathway will be significantly harder to navigate and the goals much less attainable.”

Paul Davies
General Manager – Market Capability, Infrastructure Sustainability Council of Australia



INTERNATIONAL CASE STUDY:

UN Habitat Global Urban Observatory

The Global Urban Observatory (GUO) is a critical piece of infrastructure underpinning UN Habitat and implementation of the New Urban Agenda around the world. Through data collection, hosting, and analysis on urban systems worldwide, the GUO is responsible for filling the gaps for global monitoring of urbanisation and providing guidance to national governments setting up their own urban observatories. Collecting statistics and data on urban and related elements, the GUO supports national government decision-making with information, helps build capacity for regional and local monitoring, and collects and analyses data to populate urban indicators, designed on a systems basis, speaking to the design of the New Urban Agenda. The information it garners assists to contextualise high-level goals, such as in the refinement of metadata of SDG 11 (Sustainable Cities and Communities) indicators.



NATIONAL CASE STUDY:

Circular economy drives sustainability of primary industry cities

Cities like Perth and Newcastle that have historically relied on mining are feeling significant impacts as traditional mining decreases. As their economies shift, these cities are finding different ways to diversify by turning to principles of a regenerative economy - stabilising their economies and improving their long-term sustainability.

Traditionally based in coal mining and steel making, Newcastle's economy has diversified dramatically as a result of concerted effort by government and industry working collaboratively to ensure resilience in the face of changing primary resource markets. Newcastle has shown strong growth in industries such as health, higher education, research centres, Defence industries, and professional and technical services. The Hunter Joint Organisation of Councils (2018) developed a plan dedicated to economic diversification across the region, in collaboration with the University of Newcastle and the New South Wales Government. Targeted sectors for growth are renewable energy, advanced manufacturing, and professional services, underpinned by the need to adopt circular bioeconomy principles. In the *Newcastle 2030 Community Strategic Plan*, Newcastle City Council named a 'vibrant, diverse, and resilient green economy' as a key strategic area to promote (City of Newcastle, 2018). These plans have helped to fund initiatives such as the Circular Hub Forum, an event held in 2018 that brought together over 85 organisations across industry, government, and academia to help the Hunter region rethink waste and move towards a more circular economy.

Changing markets have also catalysed change in Perth. Perth has sought to transition the mining industry towards newer technology, such as a move towards lithium mining. Lithium is fundamental for the production of batteries in electric vehicles and for renewable energy, driving a mining boom in the state (Government of Western Australia, 2019). While raw extraction and shipping of lithium can be profitable, Perth is also seeking to add value by hosting a new Cooperative Research Centre for Battery Future Industries to find the gaps in the battery value chain. This transition towards lithium mining and a greater knowledge economy will help Perth to become key to our renewable energy market nationwide.

These cities demonstrate that historic ties to traditional mining do not dictate their future, and that well-supported transitions in the city can drive diversification across the region. Coordinated planning across industry, government, and community has encouraged adaptiveness, and principles of circular economy can drive their economies forward into a future defined by sustainability, of local and regional economies, jobs, and the environment.

NATIONAL CASE STUDY:

Urban heat, health, and patchy planning

Urban heat is a serious health risk in our hot cities, particularly for children and the elderly. Concrete and asphalt used commonly in the urban landscape absorb heat, and without enough trees and vegetation to provide shade and evaporation, there is little cooling to offset the heat. Tall buildings trap heat and block wind, and waste heat from cars, air conditioners, and industrial activities add to the effect. In people, extreme heat events can cause dehydration and heat stroke, as well as worsen chronic conditions such as cardiovascular, respiratory, and cerebrovascular disease. It is critical to find a way to mitigate the urban heat island effect.

Darwin is particularly vulnerable to urban heat due to a combination of high temperatures and high humidity year-round. When the temperature tops 32°C and humidity is over 80 per cent, each 1°C increase in maximum temperature sees hospital admissions in Darwin more than double (Nazaroff, 2018). This heat not only has detrimental effects on health, but also leads to a depreciation of outdoor areas such as the city centre, where shops close in droves as shoppers seek out cooler spaces in shopping malls. Such are the systemic impacts on Darwin that urban heat mitigation has been made a core strategic problem to solve in Darwin's City Deal (Australian Government, 2018). Solutions devised in Darwin as part of the heat mitigation trials being run by The University of New South Wales, such as climate appropriate urban design, can be scaled up and applied to cities facing similar challenges.

Greater Western Sydney faces many of the same issues in regard to urban heat. Temperatures can be up to 10 degrees higher than in eastern Sydney during extreme events, and there can be up to three times as many heat-related deaths (WSROC, 2018). Western Sydney uses twice as much energy for cooling purposes as eastern Sydney (Sydney Water Corporation, 2017). This heat is a major stressor for residents; at the Urban Systems Transformation Workshop Future Earth Australia held in Western Sydney, participants' top descriptor of the current state of Greater Western Sydney was 'hot'.

While the importance of heat to residents is clear, the Western Sydney City Deal contains no mention of urban heat or the need for cooling measures (Australian Government, 2016a). By contrast, the Western Sydney Regional Organisation of Councils (WSROC) in 2018 released *Turn Down the Heat: Strategy and Action Plan*, which explicitly outlines the threat of urban heat in Western Sydney and makes suggestions on how to better coordinate the fragmented landscape of organisations working towards managing urban heat.

Efforts to combat urban heat are promising, but there needs to be a coordinated effort across multiple levels of government, business, and community to succeed. Actors with influence over the future of our cities must collaborate not only with each other, but with organisations and citizens who understand local pressures and opportunities first-hand. Connecting grassroots innovation to each other represents a powerful mode of working through complex urban problems like heat.



STRATEGY 4: BUILD CAPACITY

There is a need to support and enable new professional and practice capability for cross-sector urban knowledge engagement, dissemination, transfer, translation, and collaboration. Building this capability will deliver many benefits beyond the current state of play (Taylor and Hurley, 2016).

Australian urban policy practices must bring a science-based approach to crafting policy for the manifold challenges facing cities, and in order to enable effective integration of evidence, access to research must be improved. Research is commonly firewalled behind expensive pay-for-access journal websites or via poorly designed and fragmented university research repositories that are marginally accessible and quickly outmoded.

TRAIN AND EMPLOY A NEW COHORT OF URBAN AND REGIONAL RESEARCHERS AND PRACTITIONERS SKILLED IN TRANS-DISCIPLINARY VISIONING, KNOWLEDGE, AND IMPLEMENTATION

There are few institutions that are purposefully dedicated to dissemination and translation of urban research into policy. The institutional terrain is highly uneven; a mix of university research centres and institutes undertake some dissemination with limited resourcing, some disciplinary or cross-institutional entities such as the Australian Cities Research Network contribute to dissemination, and rare bodies such as the Australian Housing and Urban Research Institute undertake dedicated urban science-to-policy translation.

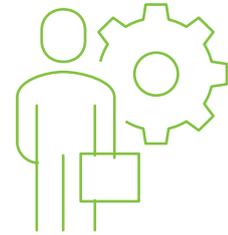
RECOMMENDATION 7

Establish a national program to expand researcher and practitioner capability for knowledge exchange across urban and regional research, policy, and practice communities



RECOMMENDATION 8

Fund a national program to embed researchers and practitioners within relevant organisations linked to knowledge production for the SDGs



Across the research sector, staff and students must be trained in direct policy engagement as standard practice and be encouraged to build their relationships with urban industry professionals and stakeholders. Currently, this type of support and training is the exception rather than the rule.

In the urban practice sector, policy and practice organisations must systematically undertake professional development to ensure staff are up to date with the best knowledge and innovation and know how to engage effectively with researchers.

Training a new generation of research- and policy-engaged professionals who can capably shape research agendas and procure and guide research efforts through collaborative engagement is required. To be transformative, there needs to be transdisciplinary and cross-sectoral focus. This type of capacity building is a critical component for drivers of progress on the Sustainable Development Goals, which brings together researchers, policy agencies, governments, the private sector, and NGOs as a system. This will produce researchers and practitioners who are skilled in urban systems and who operate as a community.

A sustained approach to capacity building will also enable these actors to assess the training needs for future cities knowledge. A central aspect of this is in identifying key skill gaps and developing a training regime to respond to these gaps. Training for researchers and urban professionals across universities and professional organisations must be the norm, in order to elevate research and policy skills for the knowledge needed to effectively respond to Australia's urban challenges.

Issues	Actions	Performance indicators	Who is responsible
<p>Work in urban systems is often siloed between researchers and practitioners as well as policy, and across locations; this impedes implementation of a National Urban Strategy</p> <p>Many actors lack the deep understanding of diverse expertise, methodologies, applications, and strategies needed for networked collaboration</p>	<p>Action 4.1</p> <p>Build the capacity of urban researchers to engage with policymakers to deliver practicable knowledge linked to the National Urban Strategy and the SDGs, and to connect them to the Innovation hubs</p>	<p>Performance indicator 4.1.1</p> <p>Policy engagement skills incorporated into university teaching programs to improve policy relevance of research and its applicability</p> <p>Performance indicator 4.1.2</p> <p>A national program of PhD scholarships for a new trans-disciplinary cross-institutional PhD program linked to the National Urban Strategy, with 50 funded annually by 2022 and 100 annually by 2025</p> <p>Performance indicator 4.1.3</p> <p>A national program of funded secondments across early, mid, and senior career levels established for urban researchers to embed within policy and practice organisations, by 2022, to occur annually, and evaluated every two years</p> <p>Performance indicator 4.1.4</p> <p>Fellowship program established for researchers to undertake policy-related research in collaboration with policy and practice organisations, by 2022, to occur annually, and evaluated every two years</p> <p>Performance indicator 4.1.5</p> <p>Establish and fund a national PhD network via residential training in urban theory methodology and research-to-policy translation, by 2022, to occur annually, and evaluated every two years</p>	<p>Who is responsible 4.1.1</p> <p>Universities, in coordination with peak professional bodies, supported by relevant governments</p> <p>Who is responsible 4.1.2</p> <p>Federal and state and territory governments, coordinated with APA scheme</p> <p>Who is responsible 4.1.3</p> <p>Federal and state and territory governments and universities</p> <p>Who is responsible 4.1.4</p> <p>Federal and state and territory governments and universities</p> <p>Who is responsible 4.1.5</p> <p>Federal and state and territory governments and universities</p>
<p>Current research and professional institutions are mostly not equipped or resourced to undertake this training and apply these learnings in practice</p>	<p>Action 4.2</p> <p>Build the capacity of urban practitioners to engage with researchers to apply research in policy and practice linked to the National Urban Strategy and the SDGs</p>	<p>Performance indicator 4.2.1</p> <p>Dedicated scholarships funded for policy and practice professionals to undertake research masters and PhD programs aligned to the National Urban Strategy</p> <p>Performance indicator 4.2.2</p> <p>Dedicated secondments and fellowships funded for policy and practice professionals within urban research sector institutions</p> <p>Performance indicator 4.2.3</p> <p>Professional bodies supported to strengthen practitioner capability in procuring, guiding, and appraising research in policy and practice formulation, implementation, and review</p> <p>Performance indicator 4.2.4</p> <p>Urban professional accreditation bodies to require a research component within professional degree qualifications and continuing professional development</p>	<p>Who is responsible 4.2.1</p> <p>Incorporated into graduate and professional development programs throughout relevant government departments and the private sector</p> <p>Who is responsible 4.2.2</p> <p>A state and territory government led initiative</p> <p>Who is responsible 4.2.3</p> <p>Federal and state and territory governments, professional peak bodies, and universities</p> <p>Who is responsible 4.2.4</p> <p>Professional peak bodies</p>



INTERNATIONAL CASE STUDY:

The Asia-Pacific Network for Global Change Research's CAPaBLE Program

The Asia-Pacific Network (APN) for Global Change Research has a mission to enable sustainable development in the Asia-Pacific region through supporting evidence-based response strategies and measures, effectively linking researchers and policy makers, and developing the region's scientific capacity.

Two core programs have been established to achieve this: the Collaborative Regional Research Programme and Capacity Development (CAPaBLE) (Asia-Pacific Network for Global Change Research, 2019). CAPaBLE was established in 2003 to enhance the APN's scientists, policy makers, and other relevant stakeholders' capacity to better assess and address local, national, and regional sustainability issues. In approaching sustainability at different spatial scales, APN similarly enables capacity building through three levels of intervention: at individual, group or organisation and society-level. Emphasising the effectiveness of a partnership approach, CAPaBLE has funded over 150 projects which bring researchers, practitioners and decision makers together to build their skills and collaborate through the lens of a specific problem or topic area relevant to the major thematic priority areas for APN. Projects include convening national dialogues to address specific issues, strengthening the capacity of education institutes to deliver relevant programs, and holding skills workshops to upskill the technical capabilities of people working on the ground. Out of the cross-sectoral, interdisciplinary capacity-building activities across the Pacific, the APN's Strategic Plan has listed evaluation of capacity development activities and subsequent information sharing about these activities to broader networks and initiatives such as the International Panel on Climate Change, the UN Sustainable Development Goals and Future Earth (Asia-Pacific Network for Global Change Research, 2019).



NATIONAL CASE STUDY:

Collaborative networks and transdisciplinary capacity building

Many research-practice networks exist to improve collaboration and knowledge transfer between people working in sustainability. These include Future Earth Australia, ICLEI Oceania, and the Urban Climate Change Research Network (UCCRN), for example. Other inter- and cross-disciplinary efforts include the contributions made by the National Climate Change Adaptation Research Facility (NCCARF), a federally funded initiative collaborating with CSIRO initiatives, aimed at increasing adaptation knowledge across Australia (2010 to 2018). NCCARF operated via eight thematic networks, within which were early-career research programs designed to mentor researchers and practitioners and enable long-term professional connections and relationships.

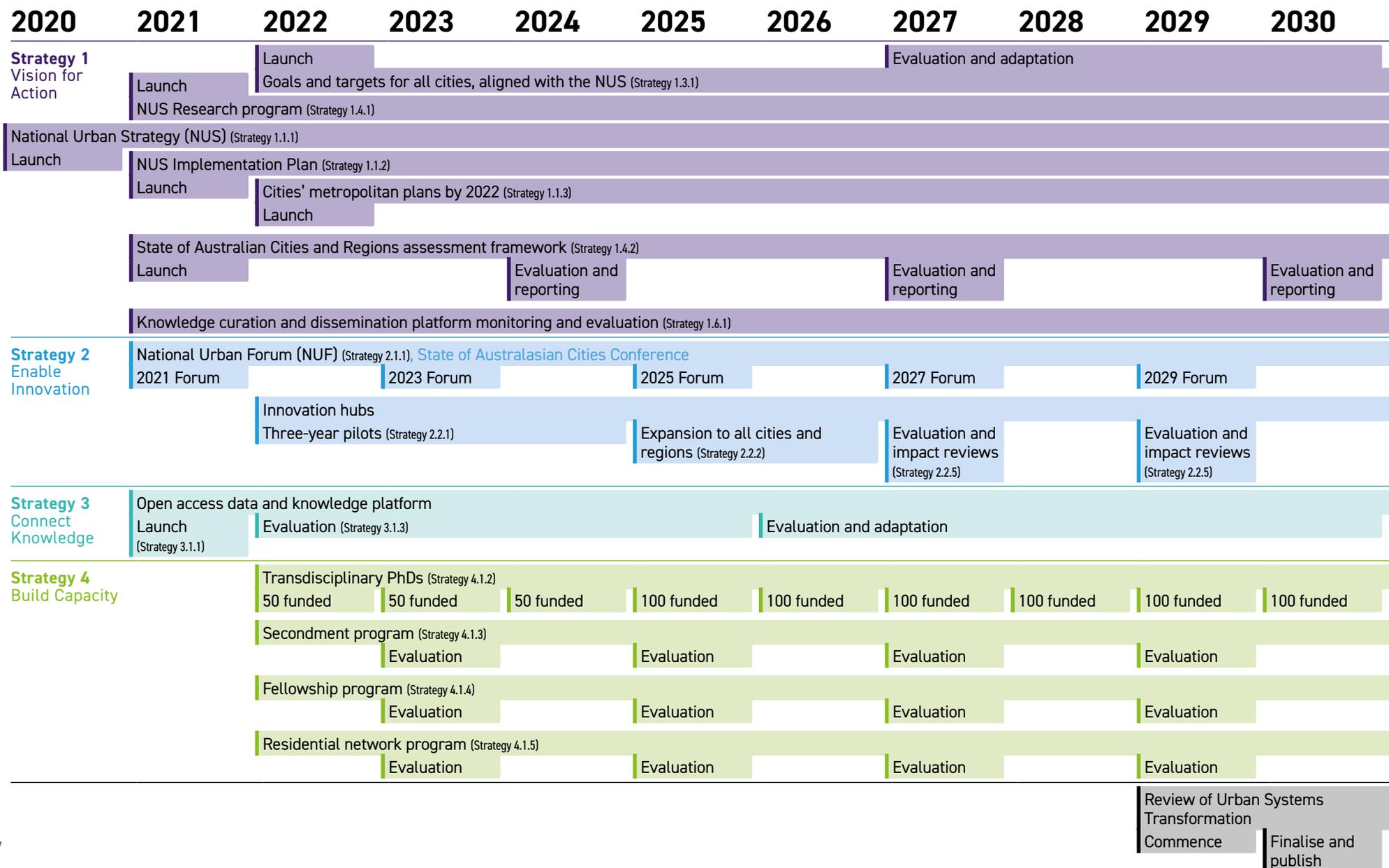
ROADMAP FOR IMPLEMENTATION

To maximise the efficiency and transformative potential of this document, the four strategies and their recommendations need to be implemented in a coordinated manner.

They have been deliberately designed so that multiple entities and communities can 'own' various parts of the coordinated whole. Each part can exist in isolation, but benefits will increase exponentially if all are undertaken as a package.



ROADMAP FOR IMPLEMENTATION



CONCLUSION

Our consultation process, coupled with deep working knowledge brought by our Expert Reference Group, revealed the weaknesses that are holding our cities back, and the opportunities to transform our cities into drivers of sustainable development.

An urban systems transformation is viable and doable, and brings with it immense opportunities and efficiencies for Australians. Putting sustainable development at the centre of a nationally coherent vision and framework will see our cities and regions drive the implementation of the SDGs and thrive as a result.

The federal, state, and territory governments have recognised the importance of cities to Australia's future. The *Building Up & Moving Out* cities inquiry undertaken by the House of Representatives Standing Committee on Infrastructure, Transport and Cities in 2018 detailed a range of barriers to our cities becoming drivers of economic and environmental gains and social inclusion. These pertained to settlement planning, infrastructure, emerging transformative technologies, and weak coordination between levels of government.

At the state and territory level, there has been a greater attempt at creating integrated urban plans over the medium term, such as Greater Adelaide's *30-Year Plan*, the *Perth and Peel @ 3.5 Million Plan*, the *Plan Melbourne 2017-2050*, and the *Greater Sydney Region Plan*. A few cities, including Darwin and Hobart, have agreed on City Deals with the federal and state or territory government to identify strategic levers for systemic improvement.⁴

Future Earth Australia will continue to use its convening power to drive action. This Strategy provides the foundation for action to transform our urban futures, deliver better outcomes to their inhabitants, and meet the goals of sustainable development.

4. See our outcomes papers of the national stakeholder consultation at: <https://www.science.org.au/supporting-science/future-earth-australia/projects/sustainable-australian-cities-and-communities>

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REFERENCE LIST

- Asia Pacific Network for Global Change Research, 2019. *CAPaBLE*. [online] Available at: <http://www.apn-gcr.org/programmes-and-activities/capable/> [Accessed 14 November 2019]
- Australian Bureau of Statistics (ABS), 2019a. Regional Population Growth, Australia, 2017-2018. [online] Available at: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/3218.0?OpenDocument> [Accessed 10 July 2019]
- Australian Bureau of Statistics (ABS), 2019b. *6202.0 - Labour Force, Australia Jan 2019*. [online] Available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/6202.0Main%20Features2Jan%202019?opendocument&tab-name=Summary&prodno=6202.0&issue=Jan%202019&num=&view=> [Accessed 16 May 2019]
- Australian Government, 2016a. *Western Sydney City Deal*. [online] Available at: https://citydeals.infrastructure.gov.au/sites/default/files/2018-06/western_sydney_city_deal_pdf.pdf [Accessed 19 August 2019]
- Australian Government, 2016b. *2016 National Research Infrastructure Roadmap*. Office of the Chief Scientist of Australia: Canberra. [online] Available at: https://docs.education.gov.au/system/files/doc/other/ed16-0269_national_research_infrastructure_roadmap_report_internals_acc.pdf [Accessed 21 August 2019]
- Australian Government, 2018. *Darwin City Deal*. [online] Available at: <https://citydeals.infrastructure.gov.au/sites/default/files/2018-12/Darwin%20City%20Deal%20final%20-%20Accessible%20PDF.pdf> [Accessed 19 August 2019]
- City of Newcastle, 2018. *Newcastle 2030: Community Strategic Plan*. [online] Available at: <http://www.newcastle.nsw.gov.au/getmedia/c642bf2e-74df-4eaa-8931-526df94598dc/3119-CSP-Strategy-FINAL-WEB.aspx> [Accessed 19 August 2019]
- Committee for Sydney, 2017. *Adding to the Dividend, Ending the Divide #3: Issues Paper 14*. [online] Available at: <http://www.sydney.org.au/wp-content/uploads/2015/10/CfS-Issues-Paper-14-Adding-to-the-Dividend-Ending-the-Divide-3-1.pdf> [Accessed 3 July 2019]
- Department of Environment, 2016. *Australia State of the Environment 2016: Urban development and biodiversity*. [online] Available at: <https://soe.environment.gov.au/theme/biodiversity/topic/2016/urban-development> [Accessed 5 July 2019]
- European Commission, 2018. *European Creative Hubs Network: Summary Report*. [online] Available at: <http://project.creativehubs.net/wp-content/uploads/2018/08/ECHN-final-external-evaluation-SUMMARY.pdf> [Accessed 6 November 2019]
- European Creative Hubs Network, 2017. *How to set up a creative hub*. [online] Available at: http://project.creativehubs.net/wp-content/uploads/2017/12/Creative-Hubs-Madrid-Toolkit_Final.pdf [Accessed 6 November 2019]
- Government of Ireland, 2018. *Project Ireland 2040: National Planning Framework*. [online] Available at: <http://npi.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf> [Accessed 15 November 2019]
- Government of Western Australia, 2019. *Future Battery Industry Strategy Western Australia*. [online] Available at: https://www.itsi.wa.gov.au/docs/default-source/default-document-library/future-battery-industry-strategy-wa-0119.pdf?sfvrsn=ccc7731c_6 [Accessed 22 August 2019]
- Greater Sydney Commission, 2019. *Who we are*. [online] Available at: <https://www.greater.sydney/who-we-are> [Accessed 19 July 2019]
- Hammer, K., Rogers, B.C. & C. Chesterfield, 2018. *Vision and Transition Strategy for a Water Sensitive Greater Perth*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities. [online] Available at: <https://watersensitvecities.org.au/wp-content/uploads/2018/08/Transition-Report-Perth-V6.pdf> [Accessed 15 November 2019]
- House of Representatives Standing Committee on Infrastructure, Transport and Cities (HoR SCITC), Parliament of Australia, 2018. *Building Up & Moving Out: Inquiry into the Australian Government's role in the development of cities*. [online] Available at: https://www.aph.gov.au/Parliamentary_Business/Committees/House/ITC/DevelopmentofCities/Report [Accessed 19 July 2019]
- Hunter Joint Organisation of Councils, 2018. *Upper Hunter Economic Diversification Action Plan: Implementation Priorities*. [online] Available at: <https://strategicservicesaustralia.com.au/wp-content/uploads/2018/07/20180719-UH-Economic-Diversification-Action-Plan-Implementation-Priorities-FINAL.pdf> [Accessed 19 August 2019]
- Infrastructure Australia, 2018a. *Community Perceptions of Australia's Infrastructure*. [online] Available at: <https://www.infrastructureaustralia.gov.au/sites/default/files/2019-08/Community%20Perceptions%20of%20Australia%27s%20Infrastructure.pdf> [Accessed 13 August 2019]

- Infrastructure Australia, 2018b. *Future Cities: Planning for our growing population*. [online] Available at: <https://www.infrastructureaustralia.gov.au/sites/default/files/2019-06/future-cities-paper-web.pdf> [Accessed 12 August 2019]
- Ives, C.D., Lentini, P.E., Threlfall, C.G., Ikin, K., Shanahan, D.F., Garrard, G.E., Bekessy, S.A., Fuller, R.A., Mummaw, L., Rayner, L., Rowe, R., Valentine, L.E. & D. Kendal, 2016. Cities are hotspots for threatened species, *Global Ecology and Biogeography*, vol. 25, no.1, pp.117-126.
- Kennedy, C., Pincett, S. & P. Bunje, 2011. The Study of Urban Metabolism and its applications to urban planning and design. *Environmental Pollution*, vol. 159, pp. 1965-1973.
- MacDonald, L., 2019. *Dark Mofo numbers break records, as thousands brave Hobart's wintery weather*. Australian Broadcasting Corporation News. [online] Available at: <https://www.abc.net.au/news/2019-06-24/dark-mofo-wraps-up-record-breaking-crowds-for-hobart/11239196> [Accessed 16 August 2019]
- Nazaroff, D., 2018. *Cooling Darwin: UNSW plan to fight climate change*. [online] Available at: <https://newsroom.unsw.edu.au/news/art-architecture-design/cooling-darwin-unsw-plan-fight-climate-change> [Accessed 19 August 2019]
- Perkins, A., Hamnett, S., Pullen, S., Zito, R. and D. Trebilcock, 2009. Transport, housing and urban form: the life cycle energy consumption and emissions of city centre apartments compared with suburban dwellings. *Urban Policy and Research*, vol. 27, no. 4, pp.377-396.
- Productivity Commission, 2017. *Data Availability and Use: Inquiry Report*. Productivity Commission: Canberra. [online] Available at: <https://www.pc.gov.au/inquiries/completed/data-access/report/data-access-overview.pdf> [Accessed 19 August 2019]
- Planning Institute of Australia, 2018. *Through the lens: the Tipping Point*. [online] Available at: <https://www.planning.org.au/policy/national-settlement-strategy> [Accessed 10 July 2019]
- Spiller, M. & L. Schmahmann, in Tomlinson, R. & M. Spiller, 2018. *Australia's Metropolitan Imperative: An Agenda for Governance Reform*. CSIRO Publishing: Canberra.
- Sydney Water Corporation, 2017. *Cooling Western Sydney: A strategic study on the role of water in mitigating urban heat in Western Sydney*. [online] Available at: https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mty4/~edisp/dd_168965.pdf [Accessed 19 August 2019]
- Taylor, A. & T. Wilson, 2016. *A Snapshot of Current Population Issues in the Northern Territory*. Darwin: Charles Darwin University Northern Institute [online] Available at: <https://www.cdu.edu.au/sites/default/files/research-brief-2016-06.pdf> [Accessed 10 July 2019]
- Taylor, E.J. & J. Hurley, 2016. Not a Lot of People Read the Stuff: Australian Urban Research in Planning Practice. *Australian Urban Research in Planning Practice, Urban Policy and Research*, vol. 34, no.2, pp.116-131.
- Terrill, M, 2019. 'Congestion-busting' election pledges won't solve Sydney's problems. Sydney Morning Herald. [online] Available at: <https://www.smh.com.au/politics/nsw/congestion-busting-election-pledges-won-t-solve-sydney-s-problems-20190312-p513jp.html> [Accessed 10 July 2019]
- Thomson, G., & P. Newman, 2018. Urban fabrics and urban metabolism—from sustainable to regenerative cities. *Resources, Conservation and Recycling*, vol.132, pp.218-229.
- University of Queensland, 2018. *Innovation driving Australia's Creative Economy boom*. [online] Available at: <https://www.qut.edu.au/news?id=128711> [Accessed 16 August 2019]
- United Nations Development Programme (UNDP), 2019. *Creative Industries and Sustainable Development*. [online] Available at: <https://www.sdgfund.org/creative-industries-and-sustainable-development> [Accessed 16 August 2019]
- Venghaus, S. & J.F. Hake, 2018. Nexus thinking in current EU policies—The interdependencies among food, energy and water resources. *Environmental Science & Policy*, vol.90, pp.183-192.
- Western Sydney Regional Organisation of Councils (WSROC), 2018. *Turn Down the Heat: Strategy and Action Plan*. [online] Available at: <https://wsroc.com.au/media-a-resources/reports/send/3-reports/286-turn-down-the-heat-strategy-and-action-plan-2018> [Accessed 19 August 2019]

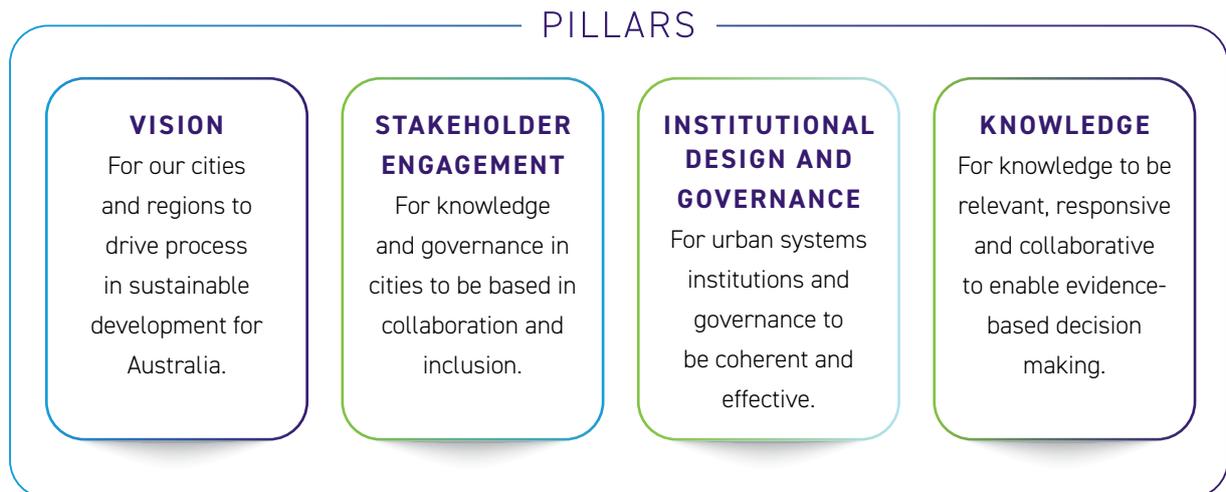
APPENDIX

OUR CONSULTATION PROCESS

This strategy is a product of deep and thorough consultation and valorisation across Australia, involving senior bureaucrats, industry and business, scientists and researchers, civil society, national peak bodies, and the not-for-profit sector.

We then undertook full-day workshops around the country. Participants at these workshops were carefully selected to ensure a wide cross-section of perspectives. In plenary and in small breakout groups, we explored interactively the four pillars underpinning our methodology:

In May 2018, we hosted a scoping workshop in Canberra.



We facilitated connections between theory and practice, visions and implementable and achievable strategies, and recommendations. For each workshop, we published individual outcomes papers.⁵ In doing so, we visited:



5. <https://www.futureearth.org.au/initiatives/sustainable-australian-cities-and-communities>

We asked participants how well they think our cities are performing currently, what cities and regions could be in 10 years (and beyond), how cities and their people

can drive sustainable development, and what is needed to bridge gaps in knowledge, policy, and practice. Over 350 people participated nationwide.

WORKSHOP QUESTIONS AND PROMPTS:

1. WHAT DO WE ALREADY KNOW ABOUT THE CHALLENGES AND OPPORTUNITIES FACING OUR CITY?
2. WHAT DO WE WANT FOR OUR CITY AND REGION IN THE FUTURE?
3. WHAT DO WE NEED TO KNOW IN ORDER TO ACHIEVE OUR VISION THAT WE NEED TO BUILD?
4. WHAT ARE THE CONNECTIONS BETWEEN THESE GAPS?
5. WHAT ARE THE OPPORTUNITIES TO DEVELOP CO-PRODUCED SOLUTIONS?
6. WHAT ARE THE POTENTIAL OPPORTUNITIES AND BARRIERS IN MAKING THESE SOLUTIONS HAPPEN?
7. WHAT ARE THE TOP STRATEGIC ACTIONS THAT WOULD ALLOW OUR SOLUTIONS TO SUCCEED?

To supplement this, a total of 39 long-form interviews with key government, industry, research, and community actors driving the urban agenda in Australia were undertaken, for two primary purposes: to identify key trends, challenges, and opportunities for sustainable development in Australia, and to valorise this strategy's processes.

We also developed an open civil society survey, which received over 250 self-selected responses and over 500 random responses. Finally, we undertook a deep dive into the relevant literature. The Future Earth Australia secretariat analysed and synthesised this data than now underpins this strategy.

As Future Earth Australia worked, we communicated our process with our Expert Reference Group, and through mainstream media.⁶ We finalised an exposure draft in September 2018 and then undertook a second round of valorisation via two high-level roundtables

comprising senior experts from all sectors (in Canberra and Sydney) to assess and improve the exposure draft.

The entire process of consultation and collaboration was driven by our Expert Reference Group comprised of leading urban researchers and practitioners across the country, from which a small writing group was drawn. The writing group worked with the Future Earth Australia secretariat to finalise this strategy.

We reference group contributed to the elaboration of our strategies and recommendations, and was consulted to ensure the accuracy of the findings. Submissions from all those who engaged in our process, and from the wider public, were welcomed through Future Earth Australia's website.

6. <https://theconversation.com/if-we-want-liveable-cities-in-2060-well-have-to-work-together-to-transform-urban-systems-119235>

ABOUT FUTURE EARTH AUSTRALIA

FUTURE EARTH AUSTRALIA IS A NATIONAL INITIATIVE THAT ENABLES AUSTRALIAN SCIENTISTS, GOVERNMENTS, INDUSTRY, PEAK BODIES, AND CIVIL SOCIETY TO CONNECT AND COLLABORATE ON SUSTAINABILITY TRANSITIONS.

WE PARTNER WITH ANYONE RESEARCHING OR IMPLEMENTING SUSTAINABILITY KNOWLEDGE AND ACTION AND PARTICULARLY THOSE WORKING ON SYSTEMIC CO-DESIGNED AND CO-PRODUCED OUTCOMES FOR THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS.

WE AIM TO INITIATE AND DEVELOP RELATIONSHIPS THAT ENABLE COLLABORATIVE ACTION FOR SOCIETAL TRANSFORMATION.

OUR VISION

We envision Australia and its people thriving in, and contributing to, a sustainable and equitable world. Future Earth Australia works to advance sustainability by enabling and translating the Sustainable Development Goals from research to practice, in partnership with all stakeholders: this means you!

The United Nations Sustainable Development Goals are a call for action by all to promote prosperity and sustainable development, while protecting planet Earth. The Goals recognise the interdependencies of all living things – how we work, play, and interact with each other and with our planet’s resources – and work to ensure maximum benefits for all, with minimal negative trade-offs, as we enable a sustainable world.

OUR MISSION

Future Earth Australia connects, convenes, and coproduces solutions to the sustainability challenges facing Australia, our region, and the globe. We achieve this by coordinating, enabling, performing, and promoting research and practice to address our most pressing sustainability challenges.

OUR STRATEGIC GOALS

Four main objectives drive our strategic plans and the day-to-day activities of our Secretariat:

1. to inspire and connect interdisciplinary and cross-sectoral initiatives
2. to establish open source products and services to build connections and access expertise
3. to provide opportunities for global and national knowledge sharing that builds innovation for sustainable futures
4. to mobilise capacities to co-produce knowledge across socio-cultural, generational, and geographic boundaries

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