



SUBMISSION TO THE

**House of Representatives Standing
Committee on Infrastructure,
Transport and Cities
Inquiry into the Australian Government's
Role in the Development of Cities**

JULY 2017



SUBMISSION TO THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON INFRASTRUCTURE, TRANSPORT AND CITIES INQUIRY INTO THE AUSTRALIAN GOVERNMENT'S ROLE IN THE DEVELOPMENT OF CITIES

The Australian Academy of Technology and Engineering (ATSE)¹ welcomes the opportunity to provide input to the House of Representatives Standing Committee on Infrastructure, Transport and Cities Inquiry into the Australian Government's role in the development of cities.

Executive Summary

ATSE Recommends:

1. A collaborative systems thinking approach to urban development;
2. The use of citizen juries or other means to engage the community;
3. Building standards that require energy efficiency and demand side management of energy;
4. Regulating the use of electric vehicles in cities to minimise pollution;
5. Maximising the use of rooftop solar power;
6. Planning a shift to a fully autonomous, integrated multimodal transport system based on shared vehicles, traffic optimisation, and battery-powered vehicles;
7. Linking water resource management, flooding issues, water resource capture, stormwater management and environmental conservation issues to urban planning;
8. Enhancing and promoting existing green spaces and create new spaces, through urban planning.

ATSE proposes that these goals can be achieved through:

1. Investment in technology;
2. Flexible urban regulation that promotes the goals above;
3. Collaborative research and innovation to achieve global best practice;
4. Investing in improved public transport options for regional cities;
5. Ensuring NBN delivers best practice outcomes and encouraging the commercial development of 5G technology and beyond;
6. Improving walking options, especially in regional cities;
7. Investing in regional cluster initiatives.

¹ ATSE advocates for a future in which technological sciences, engineering and innovation contribute significantly to Australia's social, economic and environmental wellbeing. The Academy is empowered in its mission by some 800 Fellows drawn from industry, academia, research institutes and government, who represent the brightest and the best in technological sciences and engineering in Australia. The Academy provides robust, independent and trusted evidence-based advice on technological issues of national importance. ATSE fosters national and international collaboration and encourages technology transfer for economic, social and environmental benefit. www.atse.org.au



1) Sustainability transitions in existing cities

Identifying how the trajectories of existing cities can be directed towards a more sustainable urban form that enhances urban liveability and quality of life and reduces energy, water, and resource consumption

Australia is one of the most urbanised nations in the world, with almost two thirds of the population concentrated in five metropolitan areas². Projected urban expansion, and the residential expectations of many Australians, are raising acute questions relating to the planning and provision of social, economic and physical infrastructure, with accessibility—the ability to reach desired opportunities and needs (in the form of goods, services, activities and destinations)—at the centre.

The populations of Melbourne and Sydney are predicted to reach over 7 million people each by 2061³, causing a dramatic increase in pressure on infrastructure. Already, several cities have grown to extend well beyond the reach of public transport, and some aspects of transport systems in major cities are over one hundred years old. Australia has the opportunity now to rethink the growth and development of our major urban and regional cities before the problems associated with increased urbanisation become critical. Incremental changes are important and are happening, but often changes are on a piecemeal basis, rather than a planned and coordinated effort to improve cities for future generations. Collaborative systems thinking (i.e., fully understanding systems, predicting their behaviours, and devising modifications to produce desired effects⁴) will be required at all stages of urban infrastructure redevelopment to ensure a positive and sustainable urban form.

Community engagement

Community consultation and active local involvement is essential. Engaging communities widely in the development and delivery of land use and transport plans and policies is crucial for social sustainability. In modern liberal democracies, a measure of consultation is regarded as a right. A far-sighted, transparent planning process that includes extensive consultation builds individual and community trust. New models of community consultation, such as citizens' juries, are being trialled in several local government areas and may hold promise for providing improved, genuine and informed public engagement⁵.

Any sustainable urban mobility plan should prioritise the community's needs, and should allow all Australians to play an active role in the development phase. New urban mobility plans should be a component of a national urban planning framework.

Low carbon cities

In Australia, a 60 per cent growth in population by 2050 will significantly affect the way we consume energy⁶. The use of innovative new building and energy technologies to minimise energy consumption will be increasingly important during this period of population growth. Building standards and

2 Australian Bureau of Statistics, 3218.0 - Regional Population Growth, Australia, 2015-16. 2017: Canberra.

3 Australian Bureau of Statistics. 3222.0 - Population Projections, Australia, 2012 (base) to 2101. 2013 [cited 2017 13 February]; Available from: [http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3222.0Main%20Features32012%20\(base\)%20to%202101?opendocument&tabname=Summary&prodno=3222.0&issue=2012%20\(base\)%20to%202101&num=&view=](http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3222.0Main%20Features32012%20(base)%20to%202101?opendocument&tabname=Summary&prodno=3222.0&issue=2012%20(base)%20to%202101&num=&view=).

4 Arnold, R. and Wade, J. (2015), A Definition of Systems Thinking: A Systems Approach. *Procedia Computer Science* 44, pp. 669 – 678.

5 newDemocracy, Marrickville Infrastructure Jury, 2017. Available at: <https://www.newdemocracy.com.au/ndf-work/181-marrickville-infrastructure-jury>

6 Prasad, D., Low Carbon Cities: From Pipe Dreams to Reality, in Sourceable. 2017.



regulations should be used to ensure all new buildings are energy efficient, including incorporating demand side management using smart grid technologies, and as environmentally friendly as possible.

The Government should continue to implement low-carbon urban projects such as the Lochiel Park green village in South Australia, and should examine overseas initiatives when planning low carbon cities, including the UK's Peterborough Carbon Challenge and Sweden's Hammarby Sjostad. These are partnership projects between public and private sectors that successfully demonstrate low carbon housing.

In Australia, the Cooperative Research Centre (CRC) for Low Carbon Living is illustrating the impact and progress of reducing the carbon footprint in Australian cities through its Low Carbon Precincts Program. Such initiatives should be supported and built upon nationally. Reported leading solutions for reducing CO₂ in cities include: improving refrigerant management, reducing food waste, encouraging a plant-rich diet, increased rooftop solar, and greater uptake of electric vehicles⁷.

Australia has great potential for uptake of solar power due to high insolation. Rooftop solar is already relatively common in urban areas, but could be further encouraged in order to reduce the carbon footprint of cities. Methods to encourage the installation of solar power on rental properties for shared benefit of renters and owners should also be investigated.

Plan for sustainable urban mobility

Sustainable urban mobility planning contributes to movement of people and goods within a region that delivers environmental, economic and social sustainability. This integrative approach to mobility should minimise noise and air pollution, improve energy efficiency, promote economic development of the city and be affordable to users and taxpayers.

Urban mobility plans should encourage transport mode shifts from driving to public transport, cycling, or walking, in order to reduce road congestion, and should prioritise people rather than a particular mode of transport. Current urban transport in Australia needs significant planning reforms that are far-sighted and transparent. This will need to include planning for a shift to a fully autonomous, integrated multimodal transport system based on shared vehicles, traffic optimisation, and battery-powered vehicles.

To assist in addressing emissions reduction targets, drivers should be actively encouraged to adopt electric vehicles through incentives such as subsidies, lane priorities, and charging stations. The switch to electric vehicles will be a long process, so strong exhaust emission standards will need to be enforced to ensure environmental sustainability for private motor vehicles.

The Australian Council of Learned Academies (ACOLA) undertook a major study in 2015 of sustainable urban mobility as part of the *Securing Australia's Future* program. The report, *Delivering Sustainable Urban Mobility*⁸, covers many of the topics of interest to the inquiry and ATSE commends the report to the Committee.

Multi-modal transport options

A sustainable urban transportation system that optimises health and wellbeing encourages increased physical activity, reduced respiratory illness from decreased transport-related air pollution, and

⁷ Drawdown, Drawdown : the most comprehensive plan ever proposed to reverse global warming. 2017, New York: Penguin Books.

⁸ Armstrong, B., Davidson, G., de Vos Malan, J., Gleeson, B., Godfrey B., Delivering Sustainable Urban Mobility, in *Securing Australia's Future*, Australian Council of Learned Academies, Editor. 2015: Melbourne.



reduced mental and physical health problems associated with transport noise⁶. This transport system would prioritise active transport, such as walking and cycling, over motorised transport⁶.

In 2012, it was found that cars are typically parked 96 per cent of the time⁹, and a significant amount of ground area in cities is dedicated to car parking. Providing alternative and more sustainable modes of transport could assist in reducing car park space requirements, freeing up land in cities for other uses.

The predicted increase in uptake of electric and driverless vehicles in the coming decades will necessitate a change in road and parking infrastructure^{10,11}. In particular, uptake of driverless vehicles has the potential to reduce car park space requirements in cities, reduce infrastructure requirements, increase road safety, decrease road fatalities, increase mobility, and improve traffic flow. The space freed up from revision of the transport system to incorporate autonomous transport could be devoted to footpaths, bike paths, and increasing green spaces. Adapting to these changes in transport will require integrated land use and transportation planning through coherent and consistent policies.

Roads and transport facilitate mobility and access to jobs, both of which are social determinants of health. Land use and transportation planning should prioritise active modes of transport and create accessible communities.

Water Sensitive Urban Design

Water sensitive cities are sustainable, resilient, productive and liveable. They efficiently use the available water resources to protect the health of waterways and mitigate flood risk, and create attractive public spaces that are beneficial to the environment.

Water sensitive urban design is a worldwide trend to link water resource management, flooding issues, water resource capture, stormwater management and environmental conservation issues to urban planning¹². These issues in turn link to a wide range of other nexus issues, including agriculture and energy.

The CRC for Water Sensitive Cities takes a collaborative approach to researching the best use of available water in cities, and promotes the importance of water to economic development and growth, quality of life, and ecosystems. The research from this CRC should be used to inform decisions on the management of waterways, river basins, and water resources in the development of Australian cities.

Growing green spaces

As population density increases in our cities, there is ever-increasing competition for resources and increasing pressure on already limited green space. There are multiple benefits of green spaces, including improved physical and mental health and a range of positive social, environmental and equity outcomes¹³. Urban planning needs to preserve, enhance and promote existing green spaces and create new spaces. Fostering multidisciplinary and cross-sectoral collaborations during planning, implementation and evaluation is a key factor in creating a successful green space.

9 Bates, J., Leibling, D., Spaced Out: Perspectives on parking policy. 2012: London.

10 Dunstan, C., Usher, J., Ross, K., Christie, L., Paevere, P., Supporting Electric Vehicle Adoption in Australia: Barriers and Policy Solutions (An Electric Driveway Project Report). 2011, Prepared for Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) by the Institute for Sustainable Futures, UTS: Sydney.

11 McKinsey Global Institute, Disruptive technologies: Advances that will transform life, business, and the global economy. 2013.

12 Wong, T.H.F., Allen, R., Brown, R.R., Deletić, A., Gangadharan, L., Gernjak, W., Jakob, C., Johnstone, P., Reeder, M., Tapper, N., Vietz, G., Walsh, C.J., Blueprint 2013: Stormwater Management in a Water Sensitive City. 2013: Melbourne.

13 Barton, S., Pineo, R., Human Benefits of Green Spaces, in Sustainable Landscapes Series. 2009, University of Delaware College of Agriculture and Natural Resources.



It is important for planners and governments to understand that urban green-space interventions are long-term investments and need to be integrated within local development strategies and frameworks, such as urban masterplans, transport policies and sustainability and biodiversity strategies

Governments should investigate effective initiatives for enhancing green spaces, such as:

- Converting ineffective or unused transport infrastructure into green spaces to encourage people to come together and create a better environment to live in. Australia can gain insight from overseas projects such as the New York High Line, and South Korea's conversion of a 1970's highway into a park in Seoul.
- Encouraging the regeneration and transformation of median strips and front verges into green spaces.

Considering what regulation and barriers exist that the Commonwealth could influence, and opportunities to cut red tape

Investment in technology

Greater investment is needed in technologies that address traffic congestion, greenhouse gas emissions, health and public safety concerns and social inequality, including driverless vehicles, alternative fuels, high-speed internet, Internet of Things, and big data.

Future transport will be autonomous, battery-powered, and shared. Governments should take steps in this direction as soon as possible, including a holistic approach to urban planning that incorporates transport, environment, land use, and health and wellbeing.

Flexible and nimble regulation

Investment needs to work in conjunction with nimble and flexible policy development that can adapt to the changing face of our cities and to advancing technology. Planning guidelines need to be flexible to encourage innovation and design excellence.

Working with local councils

Local councils should enable more flexibility in zoning regulations to allow for more mixed-use areas, which will benefit social connectivity and physical and mental health. As future planning shifts towards public transport to allow greater mobility of a growing population, local councils should redefine development regulations on the need for parking spaces to encourage a cultural shift in the reliance of cars and to free up more space for urban development.

Many councils allow people to convert their footpaths or verges into gardens, however, in other councils there are unnecessary restrictions on this. Removing these restrictions and encouraging people to use these spaces will save councils money on maintenance, reduce the urban heat island effect, and create spaces that can provide food, shelter to wildlife, and encourage a community spirit.

Examining the national benefits of being a global 'best practice' leader in sustainable urban development

There are challenges in achieving global best practice and these need to be addressed by significant collaborative research and innovation. However, the benefits in not only collaborating nationally, but also developing the tools, technologies, systems, design and planning innovations and showcasing their application will lead to local industry development and export opportunities. Cities are a significant opportunity for carbon reduction, so Australian leadership can be directed to industry



engagement in urban environments. The Low Carbon Living CRC is contributing significantly in this area. It has a number of urban-scale 'Living Laboratories', which are trialling and testing products and behaviour models.

Sustainable urban development will be heavily dependent upon how well the existing built environments of cities can be regenerated. This requires new urban design and technology capable of radically reducing the ecological, carbon and urban footprints of Australian cities. Planning for regenerative urban infill, at precinct scale, is a focus of the nation's three CRCs that are city-oriented: Low Carbon Living, Water Sensitive Cities and Spatial Information. Important collaboration has occurred between these CRCs in relation to brownfield regeneration¹⁴ and the more ubiquitous greyfields¹⁵. New innovative software tools have been applied to the design of built environments that are carbon neutral, water sensitive, more resilient to climate change impacts (heat, stormwater, flooding, sea level rise) and more walkable with greater variety of housing types to meet the changing needs of rapidly changing demographics. These types of projects should be encouraged and implemented where possible.

2) Growing new and transitioning existing sustainable regional cities and towns

Promoting the development of regional centres, including promoting master planning of regional communities

Improve connectivity between and within regional centres through public transport infrastructure

Ensuring the connectivity of regional centres to the rest of the country is a particularly difficult issue in Australia, because regional centres are often separated from major cities by large distances. Most regional centres rely heavily on road transport for mobility, which is becoming increasingly inefficient, costly, and environmentally damaging.

With a growing need to reduce carbon emissions, the increased use of personal motorised vehicles is not a sustainable option for increasing the connectivity of regional centres. Instead, planning should focus on greater public transport options.

A high-speed rail project connecting major cities along Australia's east coast has been discussed for several years without significant action. The allocation of funds in the 2017-2018 federal budget to support the development of business cases for this project is a positive step, as the addition of such a train would improve connectivity of regional areas and reduce the reliance on road transport along the east coast¹⁶. This or any similar large-scale transport option needs to be connected in a national multi-modal transport system.

A key component of future infrastructure will be fast and reliable access to the internet. As the dependence of all aspects of society on the digital economy grows, the availability of high-speed

14 CRC for Water Sensitive Cities, C.f.L.C.L., CRCWSC Research Synthesis Discussion Paper: Ideas for Fishermans Bend. 2015: Melbourne.

15 Newton, P., Framing new retrofit models for regenerating Australia's fast growing cities, in *Retrofitting Cities for Tomorrow's World*, M. Eames, Dixon, T., Hunt, M., Lannon, S., Editor. 2017, Wiley-Blackwell: Oxford.

16 AECOM, High Speed Rail Study: Phase 2 Report. 2013.



broadband will become increasingly important. This is arguably even more important to improve connectivity in remote and regional areas than in cities, and potentially as vital as affordable transport.

High speed internet

Fast and reliable digital infrastructure is now a necessity across all industries and is especially important to Australia's large agriculture sector, with many businesses being located in remote or regional areas. Therefore, Australia needs an internationally competitive NBN.

ATSE's 2016 National Technology Challenges Dialogue, *Agribusiness 2030*, recognised the intrinsic link between connectivity and innovation and productivity. Advanced technology uptake will be crucial to maintain the competitiveness of the agriculture industry. However, the lack of high-speed internet is a barrier to maximising innovation in this and all sectors of the economy, and will hinder advanced technology uptake, particularly in regional and remote areas¹⁷. The planned increase in global low Earth orbit satellite solutions, cellular coverage, and NBN should assist in addressing these issues in the coming years.

Highly efficient and capable digital infrastructure is a necessity if Australia is to be a globally competitive innovator. Without a competitive digital infrastructure system, Australia's ability to attract and retain firms will be diminished and it will fall behind in the innovation frontier.

Adoption of 5G mobile technology is critical to provide Australia with the necessary digital infrastructure to embrace the economic opportunities enabled by emerging digital opportunities in areas like the Internet of Things, autonomous vehicles and digital supply chains. It is promising that Telstra, Optus, and the Gold Coast Commonwealth Games are running 5G trials. It is important that Australia is an early adopter of 5G technology to prevent the need for new and existing firms to relocate to other jurisdictions and to prevent the associated loss for the Australian economy. ATSE recommends significant investment and a long-term commitment to advancing Australia digital infrastructure, with government playing a key role in ensuring the availability of spectrum.

Making regional centres more attractive to people, by investing in creating amenities that large cities enjoy

Improving walkability

The Queensland North and West Remote Health (NWRH) Service's 2015 Walkability report found that access to walking paths and trails was important to the community¹⁸. Many regional and rural areas often lack footpaths, which has detrimental health and societal effects. Greater walkability increases the proportion of active people in an environment, leading to decreases in hospital admissions and costs¹⁹. Improved walkability can also improve the social connectedness in the community, which has a positive impact on life expectancy¹⁸.

17 ATSE, *Agribusiness 2030: 2016 ATSE National Technology Challenges Dialogue Summary*. 2016.

18 Margolis, Z., Tatham, H., Improved walking paths could improve rural and regional health, say experts, in ABC North West Qld. 2016.

19 Yu, Y., et al., Neighborhood walkability and hospital treatment costs: A first assessment. *Preventive Medicine*, 2017. 99: p. 134-139.



Promoting private investment in regional centres and regional infrastructure

Invest in regional cluster initiatives

Evidence shows that when firms and people are located near one another together in cities and industrial clusters, innovation grows^{20,21,22}. Clusters can succeed in both metropolitan and regional areas²³, which is especially valuable for Australia's large number of regional cities. Innovation intermediaries play an important role in facilitating knowledge spill-over and creating the regional knowledge capabilities needed for an innovation cluster²⁴.

There are a wide range of innovation intermediaries that enhance geographic interaction, including industry associations, technology precincts, business incubators and accelerators, science and technology parks and industry clusters. Co-location is one of the most effective mechanisms for enhancing collaboration and can result in creation of ideas, sharing of expertise, research translation and economic benefits.

ATSE would be pleased to recommend members of the Academy's Infrastructure Forum to provide the Standing Committee with further assistance. For further information, please contact Emily Finch, ATSE Research and Policy Officer, at emily.finch@atse.org.au or 03 9864 0920.

20 Brown, W.M. and D.L. Rigby, Urban Productivity: Who Benefits from Agglomeration Economies? 2013, Statistics Canada, Economic Analysis Division: Canada.

21 Bell, J., et al., Translating research for economic and social benefit: country comparisons. 2015, Australian Council of Learned Academies: Melbourne, VIC.

22 Bell, J., et al., The role of science, research and technology in lifting Australia's productivity. 2014, Australian Council of Learned Academies: Melbourne, VIC.

23 Lowe, J., et al. A case study of clustering in regional Australia: public policies and private action. in ANZRSAI 30th Annual Conference 2006 Refereed Proceedings. 2006.

24 Chia-Han, Y., C. Chih-Jen, and J.Z. Shyu. Innovation intermediary for creating regional knowledge capabilities in knowledge cluster. in 2008 IEEE International Conference on Industrial Engineering and Engineering Management. 2008.