

Strategic Analysis Paper

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Responding to Urbanisation: Considerations for Low-Carbon Public Transportation in a Decentralised Australia

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Key Points

- The international attention on the effects of urbanisation, identifies simple and effective urban transportation systems as essential to successful outcomes.
- Transportation systems must be integrated, easily accessible and feature low-carbon and renewable energy.
- National policies are needed to inform and promote development and to encourage population growth away from capital cities, towards country centres and regional towns.
- In addition to building or augmenting public transport and internal freight systems in growing regional and country centres, attention must be given to linkages with Australia's rail freight network.

Summary

The Australian population now exceeds 25 million and data from the Bureau of Statistics suggests that figure will [more than double by 2075](#). Of increasing concern for current and future governments, at all levels, are questions of where all of those people are going to live and work. The current trend towards urbanisation will continue as people are drawn to employment and better prospects in Australian capital cities and larger regional centres. Nevertheless, opportunities will develop for country towns and smaller regional centres to entice people to take up jobs away from major urban centres.

To enable the necessary growth, policies and management strategies will need to consider a multitude of wide-ranging issues, such as: affordable housing, employment, business and commerce, health and welfare. There must also be a significant focus on attracting investment; the design and implementation of infrastructure; and development of transportation systems. There are no straightforward answers, but systems must be integrated and broad-ranging; they will need to provide shared and connected mobility options across all aspects of a community, where low-carbon is a fundamental feature of the design.

Analysis

Low-carbon is a term used to signify the minimal output of atmospheric carbon dioxide (CO²) produced by a system, process or procedure. In the broader context, low-carbon refers not only to CO², but to minimising or negating, the release of all greenhouse gases (GHG). In (urban) transportation systems, low-carbon terminology describes a range of available options, which could replace vehicles that produce carbon by burning fossil fuels. Options include: walking or bicycle-riding through inter-connected paths and trails; car-pooling; removal of parking options; and a broad range of [public transport](#) options utilising alternative fuel vehicles.

Responding to the introduction of low-carbon transportation systems in a decentralised Australia, will require social commitment to a change of attitude away from the single person use of motor-cars. This process will take time and effort. In some capital cities, options are being assessed and works are already under way to reduce reliance on cars and to increase the utilisation of public transport. Examples are the [Sydney Light Rail](#) and [Melbourne's Metro Tunnel](#) projects, which are intended to provide mass rapid transit services between those cities and their surrounding suburban areas. The demand for faster and more efficient public transport is also being addressed in [Brisbane](#), with work already underway to link the suburbs with the CBD. Similarly, in Perth concept plans emphasise a similar need for urban linkages to reduce the public's reliance on fossil fuel vehicles.

Rapid urbanisation in developing countries is resulting in high levels of energy consumption and increasing CO² emissions from urban transport. The [World Bank](#) has recognised that there is no easy solution to reducing GHG emissions from transport. Rather, countries need to take a comprehensive approach to managing atmospheric CO². This will require a number of simultaneous changes: a reduction in the overall demand for motorised transport activity; appropriately designed urban places; and the encouragement of "low-emission" transport modes, such as walking, cycling and public transport. Using the most efficient fuel-vehicle technology system possible would be a valuable complement to that strategy.

An increasing number of countries are planning to build, or transform, cities based on a low-carbon theme. The designs include enticements to reduce urbanisation and cope with population growth. Three Case Studies in point are Malaysia's Putrajaya Green City, Da Nang in Vietnam and Masdar City in Abu Dhabi.

Putrajaya Green City

The Government of Malaysia has committed to reducing GHG emissions through its [Low-Carbon Cities program](#), by creating a new environmentally friendly *Federal Government Administrative Centre* located at Putrajaya, south from the capital of Kuala Lumpur. The city has been designed for over 50,000 people using the principles of sustainable development. The emphasis is on walking and cycling as modes of low-carbon transportation, supported by energy-efficient hybrid or electric vehicles where motorised transport is required. Buildings and other structures can be traversed to reduce walking distances. They have also been designed to provide both easy access and public facilities, such as ample seating, mist sprays to cool the air and extensive gardens to provide shade trees.

Da Nang

In the Vietnamese city of Da Nang, a range of actions are planned in accordance with that country's [Green Growth Strategy](#), to reduce GHG emissions. Dan Nang's *Action No 4 - Smart Transport* plan, has the goal of changing the paradigm for passenger and freight transportation, both across the city and in regional areas. Strategies to achieve this include: energy-efficient vehicles, like electrified trucks and buses powered by

natural gas. Planners are also developing and promoting a water transportation system, where the first option for freight movement will be to use energy-efficient ships, in combination with barges. This plan will result in removing large numbers of diesel trucks from roads and highways, reducing traffic congestion, noise pollution and CO² emissions.



Figure 1: River freight in common use in Vietnam. Source: Flickr

Introducing electrically powered bicycles and motorcycles (e-motorbikes) is an ambitious strategy that will eventually result in significant cultural change in Vietnam, as well as meeting the national goal of reducing GHG emissions. [Motorcycle ownership in Vietnam](#), one of the largest markets in Asia, is estimated to exceed 37 million machines. For city travel, e-motorbikes will enable low-cost travel (in comparison to engines powered by fossil fuels), reduce noise levels and, importantly, reduce carbon emissions. While e-motorbikes have the potential to replace traditional motorcycles, policy changes will be needed to remove the remaining barriers to adopting all forms of electric vehicles in Vietnam. These include: tax policies, quality controls to ensure machines are safe to ride and operate, lack of information and limited data on performance and maintenance, lack of infrastructure (e.g. electrical charging stations) and the need for technical awareness on the part of consumers.

Masdar City

In 2008, Abu Dhabi commenced the development of [Masdar City](#). With a focus on using renewable energy and sustainable urban development, the city aims to address urbanisation in the United Arab Emirates. The key to the success of the project is the conservation of natural resources and support for sustainable living. The intention is that some 90,000 people will either live in Masdar City or will commute to it daily for work or study. Development will include office spaces, education facilities (including an Institute of Technology and schools), leisure facilities, hotels and private homes in community neighbourhoods. Like buildings in Putrajaya, the Masdar City planners have designed structures to be close together, to provide shade and

enable cooling breezes to flow between buildings. The city is designed to be ‘walkable’, with all areas easily accessible and with many parks and ‘green spaces’ available for use.

A significant and important feature of Masdar City is the way planners and architects have addressed the requirements for moving people and freight, using its integrated and technologically advanced *Smart Transport* urban transportation. This system can move people in its zero-emissions and driverless *Personal Rapid Transport* vehicles. Departing from and arriving at dedicated terminals, people are then able to access *Group Rapid Transport* buses and *Light Rail* assets as they require traveling to more distant locations within the city or its boundaries: the systems are shared and connected. The *Freight Rapid Transport* network uses designated transport routes to move goods to different areas, or in and out of the city. A significant characteristic of Masdar City is the almost total absence of cars, buses and trucks powered by fossil fuels.

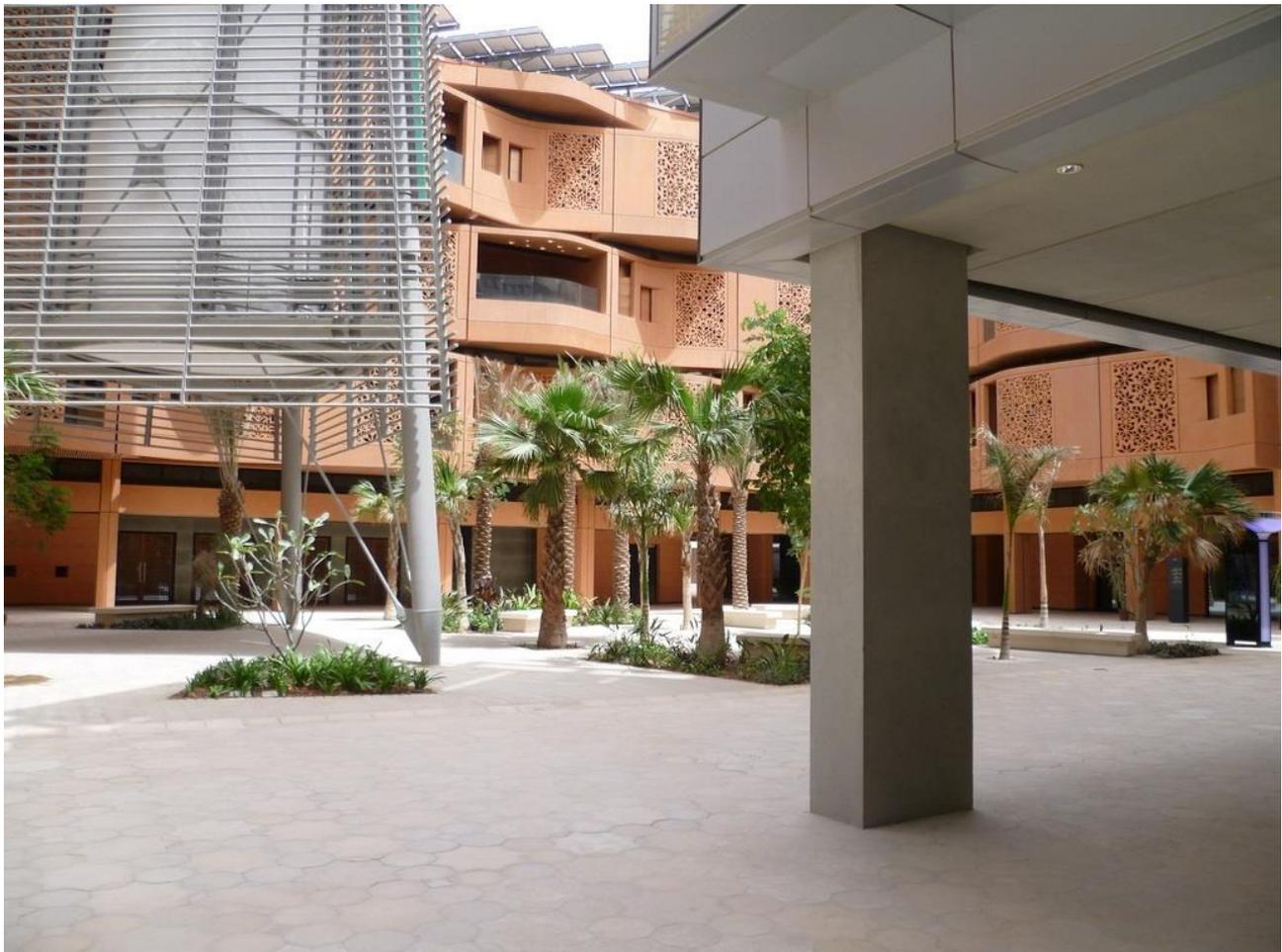


Figure 2: Masdar City street-scape. Source: Masdar City media.

Combatting Urbanisation in Australia

Planned urban decentralisation in Australia must actively promote walking and cycling as essential elements of urban transportation strategies over future generations. In the country, this shift will be difficult and economically costly as existing country towns were established and developed by pioneer settlers from European heritage. They were not used to travelling (comparatively) long distances and having substantial open space around them was an unfamiliar concept. With the new advantage of limited restrictions on land use, the development of Australian country centres and townships featured wide streets and frontages, big yards and space between houses. The abundant space and long distances

between centres mean that for a considerable time vehicle transport will continue to be an important component of any decentralised urban transportation system.

Social factors will also challenge future planning. Australians are used to distances between destinations and having space around their homes. In a future Australia, cycling and walking will become critical elements in an urban environment, as already demonstrated in many cities from both the sociological and environmental perspectives, walking and cycling trips are space efficient, require limited investment and offer mobility without imposing external costs of noise, pollution, congestion, or accidents. In dense city and urban environments, walking and cycling are often the most efficient modes of low-cost mobility, with the added potential of health and lifestyle benefits. These modes are the mainstay for short trips in cities and larger regional centres, and they are critical for providing last-mile access and connecting to public transport networks.

Significant change will be needed to shift transport usage towards cycling and walking, supported by low- or zero-emissions vehicles. A transition to low-carbon systems will be needed across a range of infrastructure assets. Centres will need to preserve and enhance, as far as possible, the facilities for journeys undertaken using non-motorized means. This will serve to encourage walking and cycling as valid transport choices. The process will also require improvements in the quality of cycling and walking infrastructure, such as: changing existing, or designing new, country centres and their road systems to better serve cyclists and pedestrians. This would involve: dedicated cycle paths; improving road quality and comfort for bicycle use; providing basic facilities and street furniture, including toilets, benches and bollards; planting trees for shade; adequate street lighting; and designing and operating arterial roads for motorised transport, to keep pedestrians and cyclists safe and away from vehicles.



Figure 3: Enhance and expand Australia's rail freight transport networks. Source: Flickr

Urban transportation systems relying on extensive walking or bicycle use for short trips will need to be supported with low-carbon modes of transport. These will move away from a reliance on private vehicles and enable the development of rapid public mass transit services, as well as the movement of freight. Demography, geography and size will dictate these changes as they become necessary for many years into the future. As described by the [World Bank](#), three essential requirements to reduce GHG emissions are: reducing the demand for motorised transport activity with appropriately designed and equipped urban

places; promoting walking and cycling; and the use of low-emission fuels or renewables in public and private transport modes; and using the most efficient fuel-vehicle technology system possible.

Expanding and enhancing our rail freight network is also a significant consideration in planning decentralisation of the population. Increasing the use of rail freight and establishing more railways, with their associated infrastructure, particularly in northern Australia, were identified as an area of study in the [White Paper](#) released in 2015. Further work will be required, however, with research directed toward linking and harmonising rail freight services with new *Freight Rail Transport* and ancillary services in expanding and growing regional centres.

Conclusion

As the population of Australia grows, decentralisation utilising the relative abundance of available space, will increasingly provide an attractive management strategy. Strong, coherent, policy is required at the [national, state and local levels](#) to enable and facilitate that cultural shift. Enabling people to easily move about safely and in comfort will be a key strategy to affecting the cultural change. This must support a shift to the use of renewables and adoption of low-carbon technology in urban transport, through encouraging walking, cycling and integrating the transportation systems. Supporting that requirement will be technological changes to the mode and delivery of transport to provide a system that is seamless, [shared](#), [connected](#) and that operates autonomously.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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