11 Studios in Eleven Cities – Propositions for a Sustainable Future

Summary

HASSELL is an interdisciplinary design practice operating in 11 locations throughout Australia and Asia (Sydney, Melbourne, Brisbane, Perth, Adelaide, Darwin, Hong Kong, Bangkok, Shanghai, Chongqing, and Beijing). HASSELL has four core design disciplines: Architecture, Landscape Architecture, Planning and Interior Architecture

HASSELL has undertaken a design and research based project to compare and contrast the key issues facing each of these cities if they are to embrace a sustainable future.

Collated indicator data was obtained from published sources on economic and demographic statistics, private vehicle usage and the ecological footprint of each city to form the basis of the study. While the scope of the collated data is identical, large variations between the cities were immediately obvious.

The collated 'indicators' were then used as the basis for the preparation of planning and design propositions for each city. The design proposals have been developed collaboratively in a multidisciplinary environment to ensure holistic, visionary design responses emerge to the following question - What could each city do by 2030 to help address the impacts of climate change while creating vibrant 'liveable' urban environments? The design schemes are deliberately provocative to reinforce the notion that significant shifts in attitude are as important as appropriate infrastructure models. The project presents a variety of robust design propositions each suited to differing cultural contexts and climatic regions. The project has served not only as a vehicle to test leading edge design theory, but also celebrate the way in which a shared design culture can nurture a broad range of culturally appropriate responses.

1. Introduction

11 Studios in Eleven Cities Propositions for 2030

It is accepted that the consequences of human induced climate change will have planet wide, long lasting ramifications for the way human kind continues to inhabit Earth. While there is argument inside scientific circles about the degree of change, there is consensus that some change will occur across key parametres.

Residents of the world's cities are potentially highly exposed to the effects of climate change. Plans must be put in place to adapt their form and function to mitigate the effects of these impacts.

HASSELL is an Australian owned international planning and design firm of about 1000 people practicing in 11 cities located in China, Thailand and Australia. The firm is vitally interested in the successful future of its host communities.

HASSELL's personnel and their families were born, live and will probably die in the cities they currently work in. As part of their communities, our people are concerned for the legacy that can be left for future generations of inhabitants of their cities. As part of its commitment to the future of its urban communities, HASSELL has conceived the 11 Studios in Eleven Cities initiative. Its purpose is to research and promote design and planning propositions for each of the 11 cities it inhabits for the year 2030. The project is designed to raise discussion and debate within their communities so the cities are encouraged to address the consequences of climate change sooner rather than later.

The premise underpinning the project is that our cities will all be challenged to varying extents by a common range of climate induced changes. How each city addresses these in the context of its history, existing form, infrastructure, culture, economic and environmental attributes while retaining its unique qualities is central to the project. Common likely impacts

resulting from climate change likely to affect all cities to varying extents include potable water and oil shortages, pollution of air and water, simplification of ecosystem complexity and ecological services degradation. These changes are addressed in a variety of ways in the project to capitalise on the response to the individual cities circumstance and assets.

The project solutions are not underpinned by a planning and design manifesto, but by a democratic view of the future derived from the values explicit and implicit in HASSELL's Australian origin. Therefore, each solution will respond to the special qualities of place and time pertaining to the host city.

The project serves to unite the far flung studios in a common mission to help develop understanding of climate change issues and raise the company's skills in addressing them. The project is anticipated to continue for two years and will be regularly reported on to public forums. It is not intended to be a "final" solution or prescription for each city, but rather it is hoped the work will inform a positive direction or series of initiatives to address climate change. It is not expected that the perspectives proffered will all be of the same standard of thought, detail and execution. The solutions will vary in scale from local to city wide. They will be at different levels of insight and completeness so that there is always room for learning and refinement.

All of the projects share a common poster presentation style for the description of the city's underlying statistical indicators to enable direct comparison, understanding and a point of departure. Propositions are presented in a diversity of graphic styles to help capture the essence of the proposals and the character of the host city.

2. Methodology Overview

Cities across the globe currently consume vast quantities of resources and produce enormous amounts of waste that pay little heed to the ability of the planet's biosphere to sustain such practices. This is exacerbated by pressures associated with extraordinary migration from rural areas to cities as today's global population chooses to inhabit cities in proportions never seen in the history of our species.

In most cities current development patterns follow a highly inefficient 'western' model based on a presumption that resources are infinite and the Earth's ability to absorb waste streams unlimited. This issue needs to be addressed by finding ways in which city development can be based on a more holistic 'metabolic' type model where resources and waste streams are integrated in a cyclical symbiotic system.

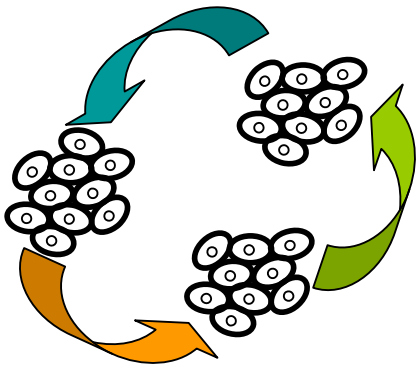

Figure 1 – A metabolic model for city design. Source: HASSELL

Given this premise, a set of key indicators were established for each studio location to explore and allow immediate comparison across locations. This served to highlight differences between studios and geographic regions and allow a platform from which design responses could be developed.

The research deliberately represents collated data as 'indicators' because this allowed the teams to look at general comparators rather than striving for precise statistical data. The wide spread of statistical data sources often meant specific comparison was difficult. This issue was accentuated by the difficulties faced by our China studios in gaining meaningful data to allow detailed comparison. This impediment was mitigated by using "indicators' as the basis for the planning and design proposals. The overriding purpose of the research was to inform design work that was aspirational in nature. In addition to allowing robust design responses, the indicators also permitted individual studios to focus on specific issues pertinent to each location. This approach has allowed different studios to better understand the context in which each design office operates and thus look to different regions for ideas and solutions to ongoing city evolution.

Where possible, the collated data was organised on a per capita basis to acknowledge the fact that the impact of climate change is a challenge to be equally borne by all the citizens of the planet. While the impacts of climate change differ from region to region, responsibility to act to mitigate damaging trends is best recognised when data is presented in a per capita manner. This is especially relevant to city design as cities are by their very nature a reflection of the collaborative industry of their citizens over any given period. Changes in individual behaviour are as important as major alterations to infrastructure and development patterns.

3. Indicator Comparisons

The indicators selected for this study to provide the uniform starting point for each city were:

- CO_2 emitted per capita
- Transport – Private car use per capita
- Population density
- Average Income
- Water use per capita
- Ecological Footprint per city

The tabulated results for each of these categories follow below. Note: The information was obtained from a variety of sources. The data is being reviewed to resolve some apparent inconsistencies (refer: 8. References).

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
CO_2 tons/ person/ year	18	12.6	5.8	24	4.8	6.5	15	20	7.6	14

Table 1 – CO_2 per person per year. Key Issue – developed cities produce unacceptably high levels of CO_2 per capita.

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
Car Ownership /1000	475	165	40 (approx)	458	40 (approx)	42	446	478	40 (approx)	412

Table 2 – Transport, private vehicle ownership. Key Issue – China has the highest aspiration index for car ownership in the world. Western vehicle ownership rates are unacceptable on a global scale.

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
Population Density per km2	1,350	6,450	11,500	950	14,400	104,000	1,500	1,200	13,400	2,100

Table 3 – Population Density. Key issue – low Australian population densities are matched with sprawling suburbs and transport networks dominated by the private motor vehicle.

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
Average Income $US	44,500	10,000	3,202	48,250	1,796	30,000	54,500	53,700	3,258	62,000

Table 5 – Average incomes, Key Issue – the benefits of higher income are tempered by greater resource use and CO_2 emissions.

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
Water Use kL/person	90	215	158	130	27	140	75	180	170	80

Table 6 – Water use per capita, Key Issue – differing locations receive different amounts of rainfall that don't necessarily reflect annual scarcity.

	Adelaide	Bangkok	Beijing	Brisbane	Chongqing	Hong Kong	Melbourne	Perth	Shanghai	Sydney
Ecological footprint	7	3.4	3.1	7.7	1.3	4.9	6.2	9	3.4	7

Table 7 – Ecological Footprint. Key Issues – developing nations footprints are escalating as incomes increase. Australian cities must find ways to start reducing total footprint areas.

4. Indicator Conclusions

The indicators allowed our studios to compare each city in general terms. This assisted in the selection of specific areas for the individual designs to focus. The ecological footprint indicator allows a range differing issues to be directly correlated. It provides an overall indicator of the total sustainable performance of each city.

The collated indicators reinforced a well understood premise – that 'developed' Australian cities have evolved in a manner that sees high average incomes directly correlate to high CO_2 outputs based on having lower population densities and greater average travel distances by private car. Water use varies from city to city and tends to be correlated to the amount of rainfall the city receives. The need for a development model that decouples wealth generation and the opportunities associated with first world 'western' cities from environmental degradation is evident.

The design solutions seek to explore the individual issues facing each city and allow responses that are situation and site specific to emerge.

5. Questions to be addressed in Design Propositions

The planning design responses have evolved in response to the following provocateur, "What could each city do by 2030 to help address the impacts of climate change while creating vibrant 'liveable' urban environments?

In the quest to apply a metabolic city design model, it became immediately clear that resilient cities will need to develop holistically in a manner that allows for substantial sharing of opportunity and resources across the traditional statutory boundaries that have been one of the core attributes of contemporary city development. Key questions to help inform the planning and design response were as follows.

- Integrated landscape – making landscape a 'participatory' element within city scapes. Moving beyond landscape driven solely by visual amenity to landscape that can act to filter air, water and waste. How will landscape and design support substantial energy generation systems and food production while providing opportunity for recreation and visual amenity?
- How can the ideals of industrial ecology be integrated into new city design? What city infrastructure needs to evolve around decentralised models to allow for better efficiencies and distribution networks? What systems could be better centralised for the same reasons? Key utilities require consideration – electricity generation, sewer networks, storm water control and collection, carbon minimisation.
- Healing damaged natural systems – what natural systems have been disrupted and simplified by the existing city model? Can these systems be identified and reintegrated to assist in nutrient filtration, waste management and visual amenity?
- Transport systems for minimum carbon waste. How could drastically reducing private car use positively benefit new city design? Design teams were cognisant of the many negative spatial impacts cars have on urban form and city spaces –exhaust pollution and greenhouse gas contribution are not the only issues associated with high private car ownership and usage rates.
- How can city design contribute to a sense of place and community? Diversity, equity, opportunity for employment, access to services, affordable housing and 'delightful' spaces all contribute to making up the matrix of a great city. Design solutions seek to be cognisant of these issues and ensure monoculture single zone approaches are avoided.
- Efficiency / density – there are many efficiencies to be gained by increased population densities in contemporary city centers. These include high quality transport options, efficient distribution of resources and collection and redistribution of waste streams. However, the adverse impacts of extreme density matched with inadequate accommodation, sanitation and inequity need to be acknowledged.
- Integrated technology – it is recognised that industrial ecology and integrated design will be able to resolve many of the problems associated with resource and waste cycles within cities. However, integrated technological solutions are going to be required to assist and support natural systems are re-established and given sufficient complexity to ensure local biological networks are not overwhelmed and have greater resilience.
- Policy frameworks – design solutions must have the potential to be supported and encouraged by appropriate policy structures. Developing cities in a 'metabolic' manner will require adjustments to the jurisdictions of traditional city planning and development control to ensure an integrated approach to design and infrastructure provision.

While the above helped to shape the plans, our basic premise is that a collaborative approach that encompasses all the traditional urban design disciplines is going to need to be supplemented by a range of skills not commonly utilised by traditional linear city development models. Information from ecologists, sociologists, psychologists, agricultural scientists,

futurists and many others is going to be required to build robust sustainable cities. It is the role of design to evaluate the inputs from all these sources and develop outcomes suited to a sustainable future.

6. Planning and Design Responses Progress Reports

The following contains an overview of the planning and design responses for each of the cities at Stage 2 of the project. Each response was summarised on an individual poster in Stage 1. The posters were circulated throughout the HASSELL studios for information and critical comment. These responses were used to refine the proposals in Stage 2. It was apparent that some studios had grasped the challenge better than others and the feedback was used to help improve the plans.

Adelaide

The studio defined "transport" and "water cycle management" as the key issues because of the high dependency on private transport and only 20% of waste water is reused in this "dry city".

- Transport - introduction of private transport tolls and removal of peak hour public transport changes.
- Water - reduce reliance on Murray River water through reuse of black and grey water.

Other initiatives included:

- Relaxation of building height controls and increased density in CBD area to promote greater water efficiencies and reduce travel related impacts.
- Greater support for satellite hub cities at Marion, Port Adelaide, Elizabeth and Noarlunga.

Bangkok

Key issues the team wished to address by 2030 included:

- CO_2 emissions from private vehicles
- lack of public parks/spaces
- air and water quality
- increased flood potential from climate change induced sea level rises.

Novel propositions included:

- klong and river reclaiming for public use and to provide flood management
- integrated public transport system extended to the suburbs
- extensive tree planting along existing streets and in new parks to reduce urban temperatures and improve air quality.

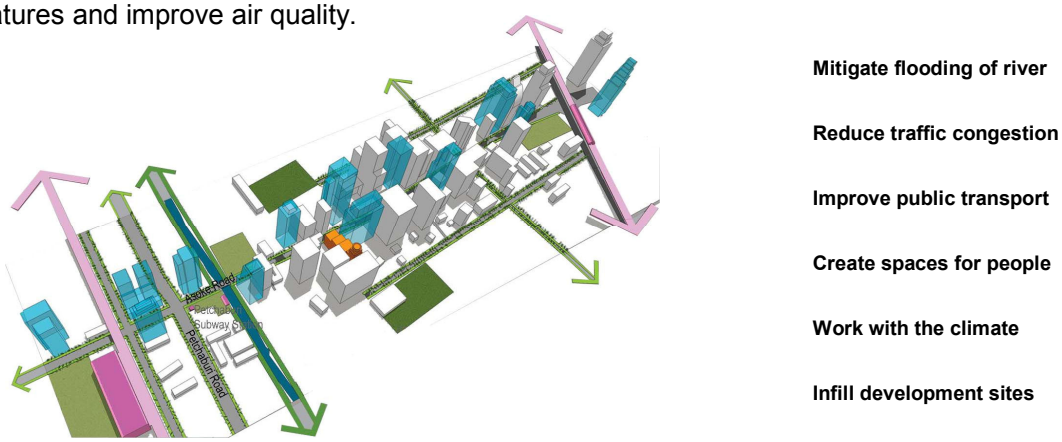

Figure 2 - Bangkok - a "permeable city" to address potential flooding. Source: HASSELL

Beijing

The focus of propositions for Beijing concentrated on addressing air and water quality by building upon the foundation policies recently adopted by the Central Party Policy Committee. A combination of programmatic and physical initiatives is proposed for discussion. Selected initiatives include:

- air quality - clean energy generation technologies plus emission control mechanisms to tackle ozone concentration and improve inhalable air quality
- water supply and waste water - controls and improvements for surface and ground waters. Waste water treatment capacity increased to 5m cubic metres/day
- green space - greatly increased via new local parks and widened road verges
- rural ecological regeneration - 12 new wetland nature reserves defined. Increase per capita green area to 40-45m^2.

Brisbane

"Going back to move forward" was the slogan adopted by the Brisbane team for its propositions. Brisbane in 2030 promoted a village model with a focus on a number of polycentric centres. The team envisaged that people in 2030 in Brisbane would be happier and have benefited from sustained economic prosperity based on a carbon conscious urban form. The team prepared a scenario for a part of the city known as Fortitude Valley to demonstrate its new ideas. Key elements of the proposal included:

- green boulevards
- cars prohibited and roads provide public realm
- solar panels on all buildings
- retention of heritage facades
- roof gardens
- bicycle network that sustainably connects the Valley with a Brisbane-wide system;
- light rail provided down the middle of the streets
- water recycling measures connected to all elements of the built form.

Chongqing

Chongqing is the most populous city in China. Located in the upper reaches of the Yangtze River, it is highly industrialised and as a result is known for its smoggy and mostly sunless environment. The team struggled with the enormity of the challenges that needed to be addressed in the face of likely population growth of the core city area from 10m to 20m over the next decade.

Ideas canvassed included:

- focussing on the abundant potential of the hydro and other electricity sources as an alternative to coal derived energy
- examples of public transport to reduce private vehicle derived air pollution
- adopting policies that rewarded developers for investing in more renewable sources of energy and reducing emissions into recovering air and water.

Darwin

Darwin is Australia's tropical capital city. The team's objective was to take a part of the city and use this as an example of what a sustainable tropical city could be in 2030 as well as addressing specific city needs.

The site selected is the former port area and the proposal was to convert it to be the focus of city activity in 2030. Key components of the plan include:

- multi storey residential precinct pioneering new methods of passive cooling
- a large water front park with swimming areas where users would be protected from stingers and crocodiles
- extensive tree planting for shade and air cooling; and
- a new convention centre.

Hong Kong

At first glance, Hong Kong as a city is a high achiever in terms of dense urban development, but closer examination reveals that it fails to take advantage of opportunities to become a more sustainable city. There are few projects and developments which adopt a sustainable approach. As a city, Hong Kong needs to value its built environment as a “real” asset because unless the built environment is in “good shape”, its future generations can not prosper. The valuing of buildings only as a commodity has meant that new developments are disconnected from the existing urban fabric and offer little to enhance urban and sustainable values.

Key elements of the team's propositions included:

- encouraging diversity and breaking recent orthodox of singular and massive solutions to create vibrancy and innovative outcomes
- changes in planning policies and enforcing sustainable rating schemes for new developments can provide a focus on the end users and the environment rather than just profit
- addressing occupational costs throughout the life cycle of buildings
- encouraging new and existing buildings to install 'green roofs'
- helping natural ventilation within apartments by improved planning
- integrating large developments into the existing fabric of the city rather than them being isolated.

Melbourne

The team felt that in order for Melbourne to become a sustainable, liveable city, a number of broad scale initiatives were required. These are the provision of more equitable and affordable housing, better public transport and creation of local, community amenities. This must be supported by renewable resource supply, generation and reuse in other words, the creation of a "closed" loop. This will enable the community to be fit and prosperous and exist within a healthy and regenerative environment. Specific changes suggested by the team include:

- improved public transport and cycling facilities. Place a hold on the development of more freeways/motorways; create an affordable accessible and equitable public transport; encourage more bicycle use and better pedestrian linkages
- energy – reduce energy requirements by 50% and increase on site generation of renewable energy by 50% through mandatory 1kw solar energy generation and solar hot water on all housing; and introduce mandatory 50% onsite generation for industry/commercial developments
- water – reduce potable water use by 50% and increase onsite stormwater retention (grey water) systems and rain water collection through mandatory requirements for all buildings
- limit urban growth to within existing urban boundaries as existing and create low cost housing surrounding activity centres and public transport networks.

Perth

Perth is the fastest growing local government area in Australia with a current population of 1.5 million that is forecast to double in number by 2030. Much of this forecast growth is proposed for the coastal fringe resulting in a conurbation that stretches for almost 100kms. In addition the sea level at Fremantle has risen 150mm over the past 100 years while average winter rainfall in the South West has decreased by 15% over the past 30 years.
In order to meet these challenges the team felt that new models of urban development were required that properly integrate existing natural systems to create a type of overall 'metabolic system'. This system could be within an individual developments or spread across broader scale districts or regions.

Specific elements of the system proposed by the team include:

- district or precinct renewable power generation
- natural water filtration and grey water storage and reuse
- local based food production
- use of river water for natural cooling
- the harnessing of underutilised urban land such a car parking for housing and community uses.

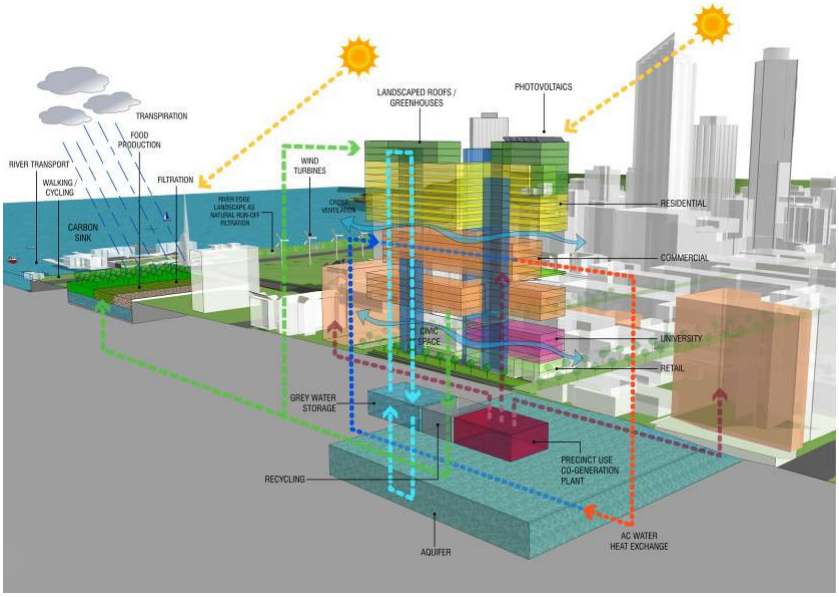

Figure 3 - Perth – An integrated approach to resource sharing and waste stream management. Source: HASSELL

Shanghai

Shanghai is an independent province and the central city is the largest commercial and financial centre in China. Traditionally Shanghai has been developed as a trade and commerce centre, with good connections to the Yangtze River and East China Ocean. Land based transport between the different sections of Shanghai has traditionally been reliant on diesel powered trucks and trains. The land is flat and fertile and rainfall levels are relatively high. Greenhouse emissions have increased dramatically during the past 15 years due to industrialisation and urban sprawl on the outskirts of the cities is increasing as more people are able to afford cars and larger houses. Shanghai's surrounding environment has many available resources including wind and tidal power as well as connection to fresh water and ocean fishing.

Surrounding the central city the government has established eleven associated metropolitan focus cities within the Shanghai Province boundaries. The majority of these eleven new cities have been planned by different international planning companies. With intelligent planning and infrastructure development over the next 22 years Shanghai could potentially become self sufficient by the year 2030.
The team's proposition took as its point of departure the idea that each of the proposed new cities could be developed for different kinds of industry based on their specific physical and/or cultural characteristics. This built upon the notion of the traditional village, which often developed its industries around its resources and became known and valued for these specialities well beyond its boundaries.

Sydney

The team's proposal for the site it selected in Sydney is for a single, artificial ecosystem, a Constructed Metabolism, on the western edge of Sydney's CBD which could serve as a laboratory for the future of all cities.
The Constructed Metabolism is created by uniting landscape and built form in a symbiotic relationship to create an artificial organism whose metabolic processes synthesise and store energy, minimise waste, recycle resources and purify water and air to reduce each inhabitant's ecological footprint. Excesses are retained on site for future use.
The landscape comprises a flexible combination of 'cells' that fit together in a sequence:

- the harbour - a heat exchange resource, a producer of wave and tidal energy
- the forest - for biodiversity and habitat, seed collection, food and medicine, and as a carbon sink as a purifier of air
- the hub - a place to store and process resources, waste, compost and recyclables, for reuse onsite
- the park - to harness solar energy, to stimulate the natural processes of transpiration and filtration, and generate electricity.

Figure 4 – Sydney - a new high density precinct for the city. Source: HASSELL

7. Progressive Conclusion

The design outcomes of this project have focused on central city areas as this tends to be the crucible of opportunity and where HASSELL have the most ability to encourage debate about new development models based on the 11 Studios in Eleven Cities propositions. This is not to say that there are not many issues at the fringes of rapidly expanding cities that are worthy of careful consideration.

This exercise has illustrated that the issues facing our 'northern' studios tend to be related to extraordinary population growth in very short time frames. (Chongqing is experiencing approximately 10% population growth per annum). Putting plans in place to manage this type of growth is problematic as often no clear development framework is in existence. The growth of Australian cities appears to be deceptively manageable. But, old development models still control growth and encourage wasteful, ecologically damaging pursuits to continue. The opportunity exists in Australia to start incrementally changing city development control systems to set up a sustainable future. A key initiative will be to increase density and improve public transport. Lessons learnt can be quickly shared to ensure a wide audience can be the beneficiaries of this experience.

Sharing experiences and articulating lessons learnt was a key project driver. The planning and design propositions are merely a first step on a journey to share knowledge across our studios and ensure our people better understand the issues facing our different locations. By sharing this knowledge we hope a holistic integrated design approach will help lead to more sustainable and resilient city outcomes.

Real change in city development is going to require new thinking and skills from across the design spectrum. For cities to aspire to development along 'metabolic' lines, policy and development controls are going to have to be modified to allow for decentralised access to services and resource flows. Sustainable cities will embrace the opportunities these new relationships offer. New cities will offer the opportunity for built form, open space, landscape, utility infrastructure and transport networks to act in a 'participatory' and restorative manner where each element helps to enhance the liveability and ability to respond to climate change. We believe this project has presented the type of approach necessary to achieve such outcomes across a range of different regions. Further to this, the design solutions have demonstrated the manner in which a shared design approach can foster a broad range of culturally diverse solutions suited to a specific local context.

8. References

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