SESSION 2 – CREATING SUSTAINABLE CITIES: WHAT CAN WE LEARN FROM EACH OTHER?

This session highlights similarities, commonalities and innovative ideas in finding sustainable solutions for locally and globally-produced problems associated with the intensified expansion, unparalleled changes and rapid urbanization of megacities in Asia and Australia. The megacities of Melbourne, Victoria, Guangzhou, China, Makasar, Indonesia to name just a few, were the cases in point put forward by the expert panellists. Issues that were discussed and that posed current and future challenges to cities in Asia and Australia include, but are not limited to: resourcing renewable and clean energy; sustaining clean potable water and attaining water security; and addressing environmental sustainability and ecological services. With the breakthrough in research and innovative practices conducted within the Asian and Australian cities (particularly in cities mentioned above) it was envisaged that creating sustainable and liveable cities could be achieved through a continuous sharing of ideas and active participation and collaboration of all stakeholders to appropriately and sustainably manage highly urbanized megacities in the Asian Century.

Mr Rob McGauran, the chair of the panel, puts forward six themes that he believes would constitute a sustainable and liveable modern city of the 21st Century. He endeavoured to fill in some gaps in the discussion from the position of city-making and his particular interest in urban design. He thought and talked about a number of things that he considered ought to be the case but are not central to policy makers and their thinking. A consequence is that this is undermining the ability of our cities to remain sustainable in the long term.

The first theme is that of the Inclusive City. Victoria needs to allow all citizens to participate in the social and economic activity of the city. An inclusive city is one that ensures that people who want to work are able to find and get to work. Victoria needs to think about how we can make our cities inclusive for all. That in part needs to consider how we create blended neighbourhoods, rather than neighbourhoods that are characterized by gentrification such as is occurring through the Western world and increasingly in Asian cities to Australia's north. Victoria and Asia can learn from the benefits that have been seen in Melbourne, including its ability to integrate people from all cultures over a long period of

time, and the economic and cultural benefits that such integrative practices have delivered to the city.

The second theme is that of the Connected City. Victoria is seeing changes to our workforce. The preference for the proximity of households to workplaces and key services in ways that provide convenience of access is now deemed essential. Most people know from our health leaders that personal mobility and active transport are necessary to preventative health outcomes into the future. Developing a 20-minute city that minimises congestion and gives people choices about how they access places rather than rely on the motor vehicle as the mode of movement is an important key sustainability message.

The third theme is that of the Shared City. Victoria needs in the 21st century to move the debate from me to us. The 21st century challenge, as the places become denser, is that cities have to think about how to share public spaces. Melbourne's Docklands has a ridiculous situation, for instance, where it has 16 private swimming pools yet there is a major public push for a public swimming pool because no one can go anywhere to learn to swim or do leisure activities. The market does not always know what is best and people have the right to modify their cities imbued with a public and civic purpose.

The fourth theme is the Flexible City. Our great warehouse buildings have become the contemporary workplaces. This is because they are robust buildings that enable those programs to be rewritten. Similarly, large and ambitious parks and places allow reprogramming for new events, new communities over time.

The fifth theme is that of the Smart City. This concerns the contribution that an engaged university and health precinct make to the economy and everyday life within cities and places. These engagements help to regenerate thinking and motive of doing work in assessing what is happening in the city and making that city more efficient and more responsive to the challenges facing it over time. In Melbourne, it is pleasing to see that the Metropolitan drafts strategy talk of the developed clusters of knowledge plus as an important component of how the city will develop its vision into the future. This is probably something that Victoria can share with its Asian neighbours. With the City of Maribyrnong in Footscray, a project is working on an integrated town and gown where elements of the

university's activities come into the centre of town and vice versa. The project is also inviting the community into the university.

The last theme is that of the Engaging City. Ultimately, cities have to be places for people; a place that speaks to them and their needs to live a full life. People ought to be active, socialize, learn, work, celebrate and participate and feel safe and be interested; a place that speaks to its climatic circumstances, its resource constraints, and a place that people use its natural and key institutional resources.

Fossil Fuel and Renewable Energy

Mr Tony Wood discussed challenges of contemporary fossil fuels usage and the imminent need to resource renewable and clean energy. He touched upon four issues from his own relatively recent work where sustainability, relationship and energy in the city are being challenged. He also illuminates the considerable link between clean energy and the creation of sustainable, competitive and liveable cities. He cited an example of Australia's relationship with China. He was struck by the report in China Daily that 80% of Chinese population has been taken out from poverty since 1990s. Roughly 75% of China's energy consumption comes from coal. During these period, life expectancy increased by about 5 years; access to water has increased dramatically and China now surpasses the global average score on Human Development Index. But, during that period coal-powered electricity has increased by 650%. Rural emissions, however, have relatively declined with relative intensity as old coal-powered fire stations have been shut down. They are trying to shut down more coal-powered fire stations and replaced them with bigger and cleaner alternatives.

The pollution caused by the emissions due to urbanization in China is not necessarily caused by what's happening in Beijing; they're coming from the broader province. This connectedness is important particularly when you think about the megacities that China has created. The lesson is that energy production will be remote but its impacts can be global. And, planning for city growth must be cognisant of these impacts. In Victoria, the state is in a fortunate situation because the brown coal that it depends upon for electricity, apart from this small problem with CO2 emissions, is actually pretty clean. Victoria has not had the

same concerns about mid-air emissions pollution. But, as Melbourne grows and world climate change issues becoming real, the question is somewhat that of its sustainability.

The second example comes with what is happening in the Republic of the Marshall Islands, in the Pacific, which is a country on average 2 meters above sea level. In recent months, the northern part of the country has been gripped by staggering and severe drought; crops are failing and coconuts are dishevelled, with the southern part of the country gripped by terrible floods. The country's water supply is under real threat and its people are in trouble. Marshall Islands share this reality with other countries such as Tuvalu, Kiribati and Palau. Yet for residence of these Pacific Island countries, climate change is neither something that's open to debate, nor something for their grandchildren: it is there now and it is a big problem. The lesson for Australia and Asia is that the link between clean energy and liveable cities goes beyond their shores that these small islands of developing states unable to control with any reasonable ethical basis. Australia and Asia must have some responsibility to this problem. But, is the region prepared to face up to that responsibility as global citizens?

The third example is closer to home. The world and Australia are currently witnessing a global revolution in energy. It's been driven by quite developments in technology. Within a few years, Australia is forecast to be the world's largest exporter of LNG and within that period of time, LNG will generate something like $53 Billion per year in export earnings. Primarily, for Asia, the east coast of Australia and the United States, the revolution is being driven by new technologies, including 3D seismic horizontal drilling and most controversially, ‘fracking’. This is actually a very clever set of technologies in which it forces out sand, water and other liquids from shale rocks to extract oil and gas. However, there are environmental, health and safety concerns that have been raised in Australia, in the US and Europe associated with using these technologies. The technology called fracking is currently banned in some European countries and there is a moratorium in Victoria. The NSW government is waiting on a report from its Chief Scientist on what the state government should do about this environmental and health concerns. The energy that powers Australian cities and its export earnings may have impact to the city's ecological limits. Hence, there is an imminent need to address questions such as: how much

responsibility would Australia want to take for these ecological limits and how should its competing interests develop both in time and space?

The fourth point touched upon by Mr. Wood was in regards to the very strong expectation that the world have reached or surpassed its peak point of oil production. It would be all downhill for now for the fossil fuel industry and the renewable energy will be there to pick up and run forward. This year the US would produce more crude oil domestically that it imports and its surging output from shale oil will boost output up to 7.5 million barrels a day which is the highest since 1991. The world now has by most estimates over 200 years' worth of gas given current usage. Burning 200 years' worth of gas in 50 years or less provides an interesting physical challenge. There's no plausible scenario in which carbon emissions continue unabated and the climate does not warm.

Sustaining Water Security

Dr Dewi Kirono talked about water security as one of the biggest issues faced by many cities across the globe in the 21st century. There is an increasing demand for water due to population growth, economic development and urbanization. However, the current water resources that can be used to supply those demands tend to be decreasing in many places due to factors such as land use change in the upper catchment of a river basin and the global climate issues. Urban communities need to better understand the risk of future change to better manage their water supply. How cities adapt to the regional climate change, population demand, and change in regulatory framework is crucial to achieving water security. Adaptation strategies are very important in many Asian developing countries because they often face financial and institutional constraints.

So, how can Australian researchers help address these challenges? Many countries in Asia have action plans for climate mitigation and adaptation. But, adaptation is a local activity and it has to be implemented at the local level. The problem lies in many local players who are ill-equipped to plan and make better decisions. One of the things that Australian researchers and universities can offer is with building the capacity of the local players of cities around Asia today. For example, the CSIRO research project in Makasar City, Indonesia was aimed towards informing policy formulation and to improve access to clean water and to manage the impacts of development and climate change. Makasar City is the

biggest city in eastern Indonesia and is already struggling to provide clean water supply. The city's millennium development goal for clean water supply developed strategies that were mostly infrastructure-based. The CSIRO research in that city actually shows that sustainable urban water provision is not only about building larger dams but also how much can be achieved by combining infrastructure and preventive measures (such as demand management and behavioural change).

Australia has experienced prolonged drought and as a result many of its cities have developed and implemented innovative water management solutions. These solutions follow the principles of an integrated urban water management where sustainable urban water provision is achieved through the integration of water supplies. One success story that was discussed was that of Sydney water strategy which implemented the Metropolitan Water Plan. Sydney was able to reduce water needs by 25% despite an increase of its population during the prolonged drought. The city's strategy was a combination of both 'soft tools' (human-related activities such as behavioural change towards reducing consumption and efficient recycling of water) and 'hard tools' (infrastructure-related such as constructing water recycling tanks). It involves initiatives such as leakage reduction in the distribution of clean water and the use of recycled water, the latter of which was able to account for 70 giga litres per year, accounting for about 12% of the city's demand. Sydney also employed water efficiency programs and regulatory measures. The adopted strategy was also a part of the state-wide initiative to reduce water consumption, including by mandating collaboration among government agencies, water utility researchers, and municipal governments. Cities need to implement long term initiatives including regular monitoring and review in order to provide more sustainable water provision.

Such sustainable water provision initiative is exemplified by another project located in a high rise residential building in Fitzroy which houses around 3,000 people in 800 units. Due to the prolonged drought and water restrictions in Melbourne, the Victorian Department of Human Services who managed the building implemented an alternative sustainable water management solution. The initiative included rain water harvesting and rain water attenuation by building a man-made landscape and treating communal waste water. There is a communal laundry for the washing machine and the project develops a technology that enables laundry water to be treated and used for irrigating the garden, including the use of

storm water run-off treatment. This technology saved 3,000 litres per week, enabled the irrigation of gardens during the dry season, and reduced surface water pollution. The cost-benefit analysis showed that while initial cost may be high, they are compensated by the long term benefit. However, it was noted that contractors would need to be educated on how to deal with and use this technology. It was also suggested that the legislative and policy framework is crucial to support this sort of initiative in order to get approval from the government to implement this strategy.

Environmental Sustainability and Ecological Services

Dr Brenda Lin talked about urban land use change and how it affects environmental sustainability. In 2010, urban dwellers exceeded 50% of the world's population. Cities are growing to unprecedented size because of this movement of population from rural to urban areas. Australia has a high urbanization rate with 89% living in cities and a 1.2% annual rate change. Melbourne is the fastest growing city in Australia; about 25% of Australians live here and a population of 4.25 million estimated in mid-2012. Some areas of Melbourne have a greater than 2% growth rate. Asia has had a huge rate of urbanization with the development of many Asian megacities (which are cities with a population greater than 10 million and are usually a combination of multiple areas that have come together to form a large city). Urbanization in Japan and Korea are quite well established so they have smaller rates of growth (less than 1%), but there are many countries like China that are becoming increasingly urbanized from a traditional rural-base.

China currently is about 50% urban with 2.85% annual rate of change. Cities like Beijing have experienced a 20% urbanization rate per decade since 1960. Guangzhou, which is the largest city in South China, saw a large scale expansion from 1979 thru to 2008. These cities employ infill measures but also have large takeovers of vegetation around the city. This has led to a very different city in 2008 compared to what it looked like in 1979.

As a consequence, urbanization has been researched as one of the major drivers of biodiversity loss. It impacts eco-regions, rare species and protected areas. Impacts are localized in and around cities, particularly on biodiversity. Vertebrate species are imperilled largely because of urban development. Research has shown that the median distance from a protected area to a city in Eastern Asia is predicted to fall from 43 km to 23km by 2030.

This is because many urban cities are growing outward and getting closer and affecting these protected areas. It also has similar effects to species here in Australia. The powerful owl, which requires trees as habitat but also hunts small mammals, decrease in number as urbanization occurs. The red-crowned toadlet requires specific drainage and ecological systems to survive in and near cities. As cities become impermeable and urbanized, all those water drainage systems are changing and forcing these amphibians further out.

There is another effect of urbanization called homogenization that has led to biodiversity loss. In a recent study of four Chinese cities, it was found that cities have a very convergent urban form in shape, size and growth rates despite different economic and political situations. In general, this is seen in cities all around the world and this leads to a shift in biodiversity that are urban-adapted and generalist. Therefore, we see a loss of a lot of native species that use to thrive in an area for species that can survive in cities. For example, we now see rats, cats and doves in every city that once housed native species. However, there are major motivations for urban biodiversity that concentrate on the benefits to nature by preserving local biodiversity areas that could house endangered species. There could be many benefits to humans as well. Having vegetation within an urban space actually allows people to connect and interact with nature. Vegetation within cities can also provide ecosystem services and these can have large impacts on human well-being. So, with decreasing vegetation in and around cities, there is a loss of potential ecosystem services. Ecosystem services are services provided by nature and vegetation that aid human well-being, such as micro-vegetation regulation.

Many cities are also dealing with urban heat islands resulting from the way cities are formed (such as through more concrete use and cemented roads that trap the heat). Cities tend to be a number of degrees higher than rural areas and this can lead to negative physical health effects for humans and animals as they are exposed to higher levels of heat over a longer period of time. Vegetation has been shown to be helpful in regulating this extreme temperature. Vegetation can be used for noise reduction as a natural way of protecting urban dwellers from the different types of noises. Vegetation has also been shown to help with rainwater drainage in reducing peak flooding events. Having vegetation within cities also has a lot of cultural values for many of its residents. It can be a place for leisure and rest; for example, people use parks in many different ways, and there are many physical

and mental health benefits associated with people using green spaces within cities. The micro-vegetation regulation work of CSIRO, which compares Melbourne's vegetation cover and corresponding temperatures, indicates that there are correlations between loss of vegetation and higher land surface temperatures. This work has been taken one step further to examine the groups of people most exposed to these high temperatures and more vulnerable to health effects. Similar research of ecosystem services is also occurring in many Asian cities. Shanghai, for example, saw its annual temperature increase from 1975 to 2005. It also showed that as urban land area increases, the temperature within the city also increases. Mountains of evidence showed that these changes, from native vegetation to urban system in general, lead to higher temperatures. But it is also important to note that researchers correlated mean annual temperature changes to changes in increased air and water pollution in Shanghai, loss of natural vegetation cover and even physical effects such as increased cholesterol-related diseases within the city. So, there is generally a lower quality of human well-being within cities with these patterns. Although the loss of vegetation and ecosystem services poses a lot of challenges for cities, there are opportunities for Australia to work with Asian cities in order to push for this research and figure out how to develop more sustainable cities. There is a huge range of different types of urbanization across the region from small Australian cities to these megacities that represent a very rapid change within the urban landscape. This allows us to study the effects of land use change to biodiversity ecosystem services and even on human health across this broad range of different types of cities. This also allows us to increase the amount of knowledge exchange that occurs between Australia and Asia within these types of research questions.

Key Questions from Attendants and Responses

Is there any possibility that the market will revert back the price of petrol to $1 to $1.30 a litre considering that the supply of fossil fuel is no longer an issue but against the backdrop of depreciating Australian dollar?

There is no doubt that the cost of extracting fossil fuels has gone up. However, Australia has very low petrol prices due to oversupply and at the same time being forced into more renewable energy usage. In this regard, the country is seeing a quite stable wholesale price and it is driving the cost up a combination of primarily increasing network cost and to some extent the impact of carbon pricing. The days the sort of petrol prices to go down to a dollar

per litre is well and truly behind us. In a relative sense, energy is still very affordable. In liquid fuels, the days of $100 per barrel will stay. A number of companies in Australia already are very aggressively looking at converting the large vehicles over into combinations of CNG and LNG because it is going to be cheaper, and it has some environmental benefit because burning gas is less environmentally damaging than burning diesel. Electric vehicle is still proven to be difficult.

Is the prospective growth of 3.2 billion people in Asia in the foreseeable future presumably does have ecological limits?

There are many ways where Australia and Asia can work together to research and develop their more secure food systems. For instance, Australia has enough experience how to farm under drought and how to farm under flooding. In Asia, there are good researches which look at diversity within agriculture and how that progress into a viable industry. Agricultural systems in Asian countries try to control the spread of fungus and pests and other crop diseases that actually limit food security.

In Melbourne, there was not any appraisal in areas within the 100 miles of the city to say which of the rich soils can it grow food to a high level. Which of the areas of Melbourne are well connected to logistics and services? Where is it going to put the infrastructure that the city needs, the airports, the sewerage, and water treatment, all of these sorts of things. None of them on those strategies and it is lamentable that at the moment Australia do not have a Ministry for Cities.

How does Victoria implement a water security strategy to protect the water resource and be able to maintain and grow Victoria's agriculture industry?

Water security entails not only fulfilling people's needs but also the need to provide for the agriculture industry. One of the strategies that Victoria can do is the participatory approach in water planning and implementation. In response to Victoria's increasing demand to irrigate agricultural lands including the need for supplying water in urban areas can be addressed through the Murray Darling River Basin Plan. The planning, regulation and management of the basin has to be discussed at the Federal level. The CSIRO research in Makasar City demonstrates that researchers can bridge the gap between the silos system

thinking of many government agencies and the more integrative thinking and participatory approach. Researchers have a role in creating and facilitating lessons learned for social learning that can promote dialogue among different stakeholders.

In Australia, there is a need for better participatory planning processes in order to achieve an integrated, equitable and inclusive city. It is possible to conduct a lot of participatory planning processes because people are intelligent and take a broader sense of the issue including the willingness to work together for the common good, especially when presented with the right information and challenges. The metropolitan strategy being undertaken at the moment is quite a positive shift as can be seen at the enormous amount of engagement in the panel of speakers. The government should follow through it and continue the dialogue.

The issue of translating research findings into actually creating sustainable and liveable cities with food and water security, environmental urban biodiversity and ecological services using expertise in Australia, will Asia be a key market and an opportunity for Australia in this regard?

There is a potential. Australia has a lot to learn from Asia and vice versa. There is no doubt that Australia have much to share and that the country have much lessons being learned particularly on how it create cities in which the new generations of workforce would live and where contemporary corporations want to be. It creates a nurturing environment for both big business and small. Yes, Asia is a market that Australia, particularly Victoria, is interested in. It is a market that we put our toe in the water but it is always a challenge about how to best weave into these markets.

One of the things that Victoria could learn from these megacities about food security is the development of urban agriculture now undergoing in many Asian cities. In Shanghai, something like 30% of people get all their eggs and poultry from a local market within the city. The urban agriculture system within the city was developed so that people do not have to farm out to far flung areas. It increases food security but also closes the loop within the ecological city limits because urbanization is growing in such a rapid rate. These are the areas that Australia could learn from Asian cities as Australian cities become bigger and more spread out.

Should Victoria be exporting in business terms some of these technologies? Which part of Asia would be more receptive to sustainable integrated systems within cities?

There are many opportunities for Victoria or other cities in Australia in terms of water resources provision because of their resilience and experience in managing 15 years of drought and also being the driest continent on earth. Australia is so innovative compared to others. It has developed both soft and hard technologies. When Australia exports these technologies to Asia, it has to be another step in such a way as it enables to assess the feasibility of these technologies. It would not be a threat and we see a lot of opportunities happening at least in Indonesia. For example, Jakarta already reached its maximum capacity in terms of population and taken its toll on the sustainability of the environment but people from rural areas is still coming. So, this sort of technology which integrates water supply, waste water and runoff water could be very useful for these cities.

Potential Questions for Future Research Focus

On Challenges of Burning Fossil Fuels: The Need For Renewable and Clean Energy

The lesson for Australia to think is that the link between clean energy and liveable cities goes beyond its shores and the planet that these small islands of developing states particularly in the Pacific Islands will be beyond their control with any reasonable ethical basis. Australia must have some responsibility to this problem but is it prepared to face up to that responsibility as global citizens? There is the problem of environmental health and safety concerns that have been raised in Australia, in US and Europe. The energy that powers Australian cities and its export earnings may have impact to the cities' ecological limits. How much responsibility would Australia want to take for these limits and how should its competing interests develop both in time and in space?

On Participatory Water Management Strategy

How can Australian researches help address the challenges of attaining water security and sustaining provision of clean potable water in urban areas? Many countries of Asia have action plans for climate mitigation and adaptation. But, adaptation is a local activity and it has to be implemented at the local level. The problem lies in many local players who are ill-equipped with the ability to plan and make better decisions. One of the things that Australian

researches or universities can offer is on building the capacity of the local players in many cities around Asia today.

On Environmental Management: Implementing Urban Biodiversity and Ecological Services

In Australian cities, there might be more research on how to maintain vegetation within the city to stop losing ecosystem services. In megacities, there might be more research trying to understand how to restore some of these vegetation's to acquire back ecosystem services. There is not much evidence to show that restoring the vegetation actually returns the ecosystem services well, maybe in some but not all. But there is a lot of room for knowledge exchange and share resources across the region to build ideas at the regional scale because these things are not happening in isolation. For example, the work of the Fuller Group from the University of Queensland looked at Asia Australia corridor for conservation with the area being huge flyway for a lot of endangered and near-threatened species. The Fuller Group research showed that urban sprawl in northern latitudes has a large effect on migratory pattern, and urbanization in the northern latitudes is seen as the reason for the decline of these species in Australia. One set of research that could be done in regional scale is how do we, as a region, protect this Asian Australian nation flyway as a group?