Six Million in Melbourne or a Network of Sustainable Midi-Cities? – a Thought Experiment

R.J. Fuller[1] and L. Trygg[2]

[1]School of Architecture and Built Environment, Deakin University, Geelong, Victoria 3217, Australia

[2]Division of Energy Systems, Department of Management and Engineering, University, Linköping SE-581 83 Linköping, Sweden

Abstract: By 2050, it is projected that Melbourne will have a population of between 5.6 and 6.4 million (DPCD, 2012), an increase of nearly 50% above its current level. Despite Melbourne's status as the world's most liveable city, a recent survey found that Australians in general found smaller cities are better places to live and bring up families (Perkins, 2013). The Grattan Institute's report entitled "The Cities We Need" was "an invitation to a conversation" about our future cities (Kelly, 2010:5). One idea not canvassed in the report was that of decentralization to accommodate Melbourne's projected growth. In its discussion paper, "Let's Talk about the Future", the Victorian State Government proposes that Melbourne become a 'polycentric city' linked to its regional cities (DPCD, 2012). While growth in the present regional cities is acknowledged, the possibility that these and other new regional cities could absorb the future population projected for Melbourne is not considered, nor that these regional cities could be transformed into 'sustainable cities'. This paper explores the idea that a network of smaller 'midi-cities, based on the sustainable city concept of Sweden, might provide a better alternative to concentrated growth in one city. Fifteen new cities of 150,000 would be required to absorb the projected extra 2.3 million Victorian residents. The paper analyses the energy, food, water and land requirements of a typical sustainable city. The new cities would require approximately 12% of the State's land area for food and energy supply, as well as the built environment.

Introduction

Despite its large land mass, Australia has a highly urbanised and concentrated population. By mid-2011, nearly two thirds of the country's population of 22.3 million lived in one of its eight capital cities (ABS, 2011a). Dominating these urban centres were Greater Sydney and Greater Melbourne, home to 4.6 and 4.2 million people respectively. Over the previous decade, Greater Melbourne recorded the fastest growth rate of any of the cities and increased on average by 1200 people every week. Late in 2012, the Victorian Government released a discussion paper about the future growth of its capital city. Entitled "Melbourne, Let's Talk about the Future", the paper presented projections of future population growth (DPCD, 2012; Figure 1, p.5). By 2050, the paper suggested that Melbourne's population was likely to be between 5.6 and 6.4 million.

The reaction to these projections has been varied. Monash University demographer Bob Birrell, for example, does not believe the figures or that Melbournians will stand for such rapid levels of growth and the likely overcrowding (Masanauskas, 2009). Carolyn Whitzman, associate professor in urban planning at Melbourne University, argues that whatever the figure, the problem is about properly managing the growth and ensuring social equity and environmental sustainability (Dowling and Perkins, 2012). Brown and Hartwich (2010: vii) argue that population projections are unreliable and that we cannot plan our demography. The best thing we can do is be flexible and focus on "how we can make a growing Australia work and how we can make it a prosperous and liveable place for us all".

In the report entitled "The Cities We Need", Kelly (2010) argues that we must have a conversation about what our future cities might look like. This paper is a contribution to that conversation; it is a thought-experiment to explore an alternative to the projected vision of 6.4 million people living in Melbourne. In doing so, the paper raises the question of decentralization, but within a different framework to that proposed in the 1970s: the framework of sustainability. The paper draws on the exemplar of Sweden, which is arguably a leader in global actions to create more sustainable cities. The paper also attempts to

quantify the key resource demands of energy, food and water, and the land they would require to meet the needs of such a network of cities.

The Decentralization Debate

Decentralization was a policy of the Whitlam Government in the 1970s. The idea was to avoid the uncontrolled growth of Australia's coastal cities. In arguing for decentralization, White (1973:75) describes Sydney at that time as a "sprawling metropolis of 2.8 million people", "growing at a rate of 1000 per week" and "beginning to burst at the seams". He also predicted that despite decentralization, Sydney would continue to grow and "will probably reach the projected population of five millions by the year 2000". In 2001, Greater Sydney, in fact, had a population of 4.1 million, lending weight to the unreliability of projections.

The town of Albury-Wodonga was established as the example of the implementation of the Whitlam Government's policy. The present twin-town has a population of just over 100,000, only one third of its original projected size of 300,000 by the end of last century. Following the dismantling of the policy by the Fraser Government, decentralization has not figured greatly in the debate about the future of urban development in Australia. For example, the Grattan Institute Report, cited above, does not canvass the idea, and although the current federal Government wants to encourage people to move to regional centres, it distances itself from the Albury-Wodonga experiment (ABC Rural, 2010). There are opposing opinions whether Albury-Wodonga should be seen as a success or failure of federal government regional policy (Budge and Chesterfield, 2011). Of relevance to the proposition of this paper, however, is that the city was ranked fourth in a survey of 30 cities in Australia analysed for their family-friendliness (Suncorp, 2012). In fact, half of the top ten cities were regional, not capital cities.

Why Sweden?

To conduct this thought experiment, Sweden has been chosen as an exemplar for several reasons. Firstly, the population density of Sweden is almost identical to Victoria. Although Sweden has a land area of 450,000 km^2, it has a population almost double that of Victoria. As a result, the population densities of Sweden and Victoria are 21.1 and 24.2 persons per km^2 respectively. Thus it is difficult to argue that what has been achieved in Sweden is not possible in Victoria because of a shortage of land. A second reason for choosing Sweden is that the per capita GDP of Sweden is very similar to the Gross State Product (GSP) of Victoria. In Sweden, the GDP per capita was US$57,114 in 2012, while in Victoria in 2011-12 the GSP was US$61,011 (World Bank, 2013; ABS, 2012a). It cannot, therefore, be argued that Victoria cannot follow a similar path to Sweden because we are too poor. Finally, Sweden has an international reputation for sustainable and climate-friendly cities. It is a leader in this field and therefore countries like Australia have much to learn from the way sustainability, particularly with respect to cities, has been approached.

Swedish Cities and Sustainability

The concept of a 'Sustainable City' was originally developed by SWECO, a large international consultancy, on behalf of the Swedish Government for the World Summit on Sustainable Development in Johannesburg, 2002. In essence, it is a holistic approach to planning with social, economic, ecological and spatial dimensions. In their Sustainable City model, "the use of renewable resources is emphasized, resource consumption is minimized and resources are managed in a way that maximises recovery and reuse" (SWECO, 2013: 2). Furthermore, the model is applicable to both new cities and existing urban areas. The Hammarby Sjöstad Project in Stockholm, a city district for 20,000 residents, is described as a "starting point for the Sustainable City Concept" (SWECO, 2013: 4). Since 2008, the concept has been renamed and is now known as the SymbioCity Concept. A regional example of where the concept has been applied is the town of Ulricehamn in southeast of Sweden (SKL International, 2012).

The Swedish Government's programme for sustainable development at the local level is its Sustainable Municipalities initiative. The objective is to promote sustainable development initiatives at the municipality level through cooperation between the two levels of government, the promotion of networking and provision of expertise, but not funding, The programme started in 2002 with an energy system analysis of five Swedish municipalities. The analysis showed how energy use and energy supply measures could redirect the energy systems towards sustainability with reduced global emissions of carbon dioxide and reduced energy costs. Now, in the third phase of the programme, 38 out of Sweden's 290 municipalities

are involved. Two of the largest networks of environmental municipalities are the National Association of Eco Municipalities (SEKOM) and Klimat Kommunerna (KK).

SEKOM, as a network of eco-municipalities, was formally established in 1995. Its "guiding principle is to encourage development towards a more sustainable society". SEKOM provides " a forum and a meeting place where politicians and municipal employees can exchange information and learn from each other's successes and failures" (SEKOM, 2013:1). Four principles of sustainability, developed by the Natural Step Framework (2013), are the basis for SEKOM membership. In broad terms, these principles state that to become a sustainable society, we must eliminate: (i) our reliance on non-renewable resources; (ii) our production of toxic waste; (iii) our destruction of bio-diversity; and (iv) those conditions that undermine a fair and equitable society. Currently 86 municipalities (29% of Sweden's total) are part of this network. KK (Climate Municipalities in English) is another network of environmental municipalities but has specifically focused on the reduction of greenhouse gas emissions in Sweden. This network was established at the beginning of 2003. Its members represent two million Swedish residents or 21% of the population.

A well-known example of the outcome of the above support and networking is the City of Växjö, which won the Sustainable Energy Europe Award in 2007 and was named by the BBC as the 'greenest city in Europe'. Their vision is that they will become fossil-fuel free by 2030. By 2011, 60% of their energy came from renewable resources and per capita carbon emissions had been reduced by 41% compared to 1993 levels. By 2015, the target is a 55% reduction.

Imagining a Sustainable Cities Network in Victoria

Table 1 shows the current population size of the top 13 Cities and Rural Cities in Victoria, excluding Melbourne. These classifications are two of the four types of Local Government Area (LGA) in Australia. An LGA is a geographical area under the responsibility of an incorporated local government council. An Urban Centre or Locality (UCL) is defined as a population cluster of 1000 people or more (ABS, 2011b). Where applicable, the populations of the major urban centres are also shown. Table 1 shows that in land area, the UCL can range from 36% to less than one per cent of the LGA. The locations of seven of these cities are shown in Figure 1, giving some indication of their distribution.

Table 1 Population of the top thirteen Victorian cities and towns (excluding Melbourne)

Rank	City/Rural City	Total Population	[a]Urban Centre or Locality Population	Total Land Area (km^2)	Urban Centre Land Area (km^2)	Total Population Density ($p.km^{-2}$)	Urban Centre Population Density ($p.km^{-2}$)
1	Greater Geelong	215,151	143,921	1247	114.8	173	1254
2	Greater Bendigo	95,007	82,794	2999	146	34	567
3	Ballarat	93,501	85,935	740	113.7	13	756
4	Latrobe	73,564	[b]n.a	1425	[b]n.a	52	[b]n.a
5	Greater Shepparton	61,367	42,741	2421	69.5	25	615
6	[a]Mildura	50,979	31,361	22083	41.2	2	761
7	Wodonga	36,043	31,605	433	52.0	83	608
8	Warrnambool	32,592	29,284	121	43.4	270	675
9	Wangaratta	27,110	17,377	3644	38.6	7	450
10	Swan Hill	20,830	9,894	6116	15.8	3	626
11	[a]Horsham	19,279	15,262	4267	40.8	5	374
12	Benalla	13,754	9,328	2352	25.5	6	366
13	Ararat	11,297	7,024	4210	13.6	3	516

(source: profile_id, 2013 unless otherwise noted. [a] indicates data taken from ABS, 2011a)
Note – [b] The City of Latrobe has more than one UCL

Table 1 also indicates that only one urban centre (Greater Geelong) in the State has a population greater than 100,000 and over half have total and urban centre populations of less than 50,000. It also shows considerable variation in land area and population density. Apart from the largest (Mildura) and the two smallest (Wodonga and Warrnambool), however, the average land area of existing cities is approximately 3000 km^2. The population density of the urban centres is in the range of 350-800 $p.km^{-2}$ reflecting Australia's low population density, characterised by large houses with a small household size.

Figure 1 Location of some of Victoria's main cities (source: GMT, 2013)

By contrast, the population of the top 12 Swedish municipalities (excluding Stockholm) is shown in Table 2. In Sweden, a municipality is the lowest level of government entity, and the 290 of these are organized into 21 counties. For the purposes of this paper, a municipality is assumed to be equivalent to an LGA in Victoria, and each municipality has its main urban centre, known in Sweden as a 'Locality'. As in Victoria, the urban centre land area can range from approximately one percent to nearly 50% of the land area of the municipality. With the exception of the top three, all of these municipalities have populations between 100,000 and 150,000, and their urban centre populations are approximately 3-9 times larger than the equivalently-ranked city in Victoria. The average urban density is 2550 $p.km^{-2}$, approximately five times higher than the Victorian urban centres. The mismatch between the population sizes of the regional cities of Sweden and Victoria is also evident in the countries' capital cities. In this case, however, the mismatch is in the opposite direction. In Stockholm City (or Municipality of Stockholm), the population is 2.1 million, i.e. only half the size of Greater Melbourne.

Table 2 Population of the top thirteen Swedish municipalities, their cities and respective land areas and population densities (excluding Stockholm) (source: Statistics Sweden, 2013)

Rank	Municipality	Total Population	Total Land Area (km^2)	[b]Urban Centre (Locality) Population	Urban Centre Land Area (km^2)	Total Population Density ($p.km^{-2}$)	Urban Centre Population Density ($p.km^{-2}$)
1	Göteborg	549,839	448	549,839	204	1175	2700
2	Malmö	307,758	157	280,415	77	1962	3651
3	Uppsala	202,625	2183	140,454	29	93	2880
4	Linköping	148,521	1427	104,232	42	104	2472
5	Västerås	140,499	958	110,877	53	147	2094

6	Örebro	138,952	1373	107,038	49	101	2172
7	Norrköping	132,134	1495	87,247	36	88	2446
8	Helsingborg	132,011	344	97,122	38	384	2529
9	Jönköping	129,478	1480	89,396	45	87	1995
10	Umeå	117,294	2317	79,594	34	51	2331
11	Lund	112,950	427	82,800	26	264	3215
12	Borås	104,867	771	66,273	31	131	2111

Key Resource Demands

In an exploratory paper on urban density in Australia, Roberts (2007:725) suggests that "the sustainable city of the future will be very different to the cities of today". How might they look and function? The starting point is that a sustainable city must be able to meet the key demands of energy, food and water for its population. The land required to support these demands is also critical. This section of the paper discusses each of these in relation to the general opportunities and limitations that are likely to apply to the establishment of cities of 100-150,000 residents in regional Victoria

Energy Requirements

Victorians used 1406 PJ of energy in 2009-10 (DRET, 2012). Total annual energy and per capita energy use of the five top sectors is shown in Table 3.

Table 3 Annual and per capita energy use in Victoria in 2009-10
(source: ABS, 2012b)

Sector	Total (PJ)	Per capita (GJ)
Electricity generation	550.4	99.4
Transport	319.6	57.7
Manufacturing	222.3	40.1
Residential	159.3	28.8
Commercial	88.4	16.0

Meeting these energy requirements for each new sustainable city will prove challenging. The figures reflect old ways of doing things and therefore can be greatly reduced by better planning and energy conservation. Beyond Zero Emissions (BZE, 2011), in their landmark Stationary Energy Plan, believe that over a 12-year timeframe, overall energy use for Australia as a whole could be reduced by over half (58%) through a combination of measures, yet retain the same level of energy services in transport, heating and cooling, and industrial usage. However, electricity demand in their scenario increases beyond the 'business-as-usual' level because of fuel switching and energy efficiency measures; for example, electricity for transportation and heat pumps for heating. Excluding the transport sector, and assuming the same level of reduction, this means that Victoria would use approximately 456 PJ per annum (126.7 TWh). Each sustainable city of 150,000 would require 3.4 TWh per annum and the 15 new cities would require an additional 51.5 TWh of energy.

The BZE Report also proposes renewable technologies (principally solar thermal and wind) to supply the (reduced) demand for Australia in the year 2020 (BZE 2011). The BZE analysis includes the electricity output from one 3700 MW solar thermal plant in Mildura and wind farms sited in four Victorian locations: Port Fairy, Ballarat, Mount Gellibrand and Wonthaggi. The CST plant consists of modules of a scaled-up commercially available technology Solar 220 MW. The wind farm projections are based on the 7.5 MW Enercon turbine. On average, each wind power plant would have 278 turbines operating with a 30% capacity factor. Annually each solar thermal plant and wind farm is predicted to generate 16.3 TWh and 5.5 TWh respectively. In total, therefore, the five energy systems would annually produce 38.3 TWh or nearly 75% of the demand of the new cities. The addition of one new solar thermal plant in a comparable high radiation location like Mildura would be sufficient to cover the shortfall.

Our new sustainable cities will have the opportunity to use other energy efficient and renewable energy technologies. For example, district heating systems could be installed to deliver heating and cooling to offices, multi-household dwellings and to industries for industrial processes, as in Sweden. These are more efficient than individual heating and cooling systems if a combined heat and power plant is used. The extra electricity produced in an energy system with biomass-fuelled combined heat and power plants will also replace marginally-produced electricity with higher external costs and as a consequent contribute to more sustainable energy systems with lower global emissions of carbon dioxide. Currently, there are no such systems in Australia, in part due to our low dwelling density. In Sweden, district heating systems have been the basis for a successful transition from heating oil and electricity to other energy sources such as biomass. Disposal of rubbish as landfill will not be permitted in our sustainable cities, and unrecyclable material will be incinerated, as is the case in Sweden, to produce both electricity and heat. Reducing dependence on petroleum products for transportation is probably the biggest challenge for a sustainable city of the future. Even in Sweden, despite taxes, subsidies and other incentives, oil products still supplied 91% of the country's energy for transport in 2010 and continue to rise. Ethanol and biogas have been encouraged and by the end of 2010, nearly 6% of Sweden's 4.4 million passenger vehicles were able to use predominantly renewable fuels. Importantly, most buses in Sweden run on biogas, biodiesel or ethanol, and our sustainable cities will be designed to maximize public transport and minimize car use (Swedish Energy Agency, 2012).

Food requirements

One of the problems associated with the outward development of cities like Melbourne and Sydney is that the sprawl has encroached on agricultural and horticultural land on the edges of these cities. Half of Victoria's vegetable production, for example, comes from the Melbourne region (Business Victoria, 2013). The protection of this resource was highlighted in the now-abandoned Melbourne 2030 plan for sustainable growth (DPCD, 2002). Despite these concerns, Victoria is a significant exporter of all basic food commodities: dairy, fruit and vegetables and meat. In terms of national value, 86% of dairy, 30% of horticulture and 20% of meat exports comes from Victoria (Business Victoria, 2013). There are thousands of these industries geographically spread across the State. In theory, therefore, supplying food to the new cities should not be a problem, although minimizing the movement of this food across a network of sustainable cities should be a priority. Sustainability, however, does not necessarily mean self-sufficiency. The various climates, soils, land and water availability across the State will mean that different areas will be more suitable than others for various forms of food production. A network implies cooperation, connection and exchange, not competition.

Water Requirements

Providing sufficient water for Victorians now and into the future has been the subject of much debate and in 2012 resulted in the construction of a desalination plant in Wonthaggi, approximately 135 km southeast of Melbourne. The objective of this plant is to secure Melbourne's water supply into the future. In 2010-11, Victorian households used 311 GL of water i.e. almost 400 litres per day per household or just over 150 litres per person per day (ABS, 2012c). At this level of consumption, an additional 2.3 million residents will require an extra 126 GL of water per annum, an increase of over 40%. The estimated output of the desalination plant is 410 ML per day or 150 GL per annum. Theoretically, this means that the desalination plant will cover the increase in household water requirements of the projected population. The problem (and expense) could be in distributing this water if that additional population is not in Melbourne, but rather in smaller cities around the state.

The sustainable cities proposed, however, would not use water in the same way as we have done traditionally. Water conservation would be practised at all levels. Water reuse and/or recycling, and stormwater capture would all be features of the new cities. A 'blueprint' for storm water management for 'Water Sensitive Cities" highlighting the multiple benefits of stormwater capture and use has been suggested (Wong, 2012). This vision for a water-sensitive city rested on three pillars: viewing cities as water catchments; providing benefit to ecosystems; and inhabited by water-sensitive communities. Some conceptual modeling of a new proposed 340 ha development for 28,500 residents in Victoria indicated that up to 30% of its demand for non-potable water could be met by stormwater, and, if appropriately treated, up to 70% of potable and non-potable demand could be met (Wong, 2012). Water reuse in 2010-11 in Victoria represents only 3% of total consumption and actually declined from the previous year, indicating a significant potential for reducing freshwater demand (ABS, 2012c).

The biggest user of water in the State, however, is agriculture which uses 1248 GL i.e. four times that of households (ABS, 2012c). Potential evidently exists here to reduce demand because the distribution losses were estimated to be 204 GL or 16% of usage. There were other sectors which used significant quantities of water were: manufacturing (144 GL); the electricity and gas industry (117 GL); water supply incl. sewage and drainage (310 GL); and other (220 GL) (ABS, 2012c). Clearly, supplying enough water for the indirect demands of the projected population increase will be challenging, but this will occur wherever this increase is located.

Land Requirements

Additional land will be required for the 15 new cities. In order to make the cities as sustainable as possible, land will be required for the built environment, energy and food production. The land area for the actual built-up area of the new cities can be estimated by assuming a level of dwellings per unit area and the household size in each dwelling. Current dwelling density in Australian cities is 5.56 dwelling per hectare (Roberts, 2007). Assuming 2.5 persons per dwelling, then at current levels, each new city would require approximately 108 km^2. Sustainable cities will not have this level of dwelling density. Previous Victorian plans have sought to establish levels of 15 dwellings per hectare and, assuming this figure, the land area for the built environment would be reduced to 40 km^2 i.e. 3750 $p.km^{-2}$. Although this figure is approximately 50% higher than the Swedish average, it is similar to the urban density range of Malmö and Lund.

Estimates of how much land is required to supply the food for a city vary considerably. Grewal and Grewal (2012) analysed land availability in Cleveland, Ohio and estimated that various levels of self-sufficiency in vegetable and fruit were possible using different agricultural practices. These ranged from conventional to intensive urban gardening and included commercial rural farming. The average of three levels of annual yield achieved in the latter was 2.42 kg m^{-2}. The recommended annual dietary intake of fruits and vegetables in Australia is 110 kg and 137 kg (ABS, 2012d). Assuming 25% wastage, a land area of 127 m^2 would be required for each person to supply their annual fruit and vegetable requirements. Additional areas would be required for meat and grain production. Using footprint analysis, Doughty and Hammond (2004) calculated a much higher figure to sustain the population of Bath, UK in food (vegetable and animal products). These authors suggest 9200 m^2 per capita is required i.e. an order of magnitude higher. Using the larger figure, a sustainable city of 150,000, would require a land area of 1380 km^2 for food production.

The land area requirement for two CST plants is 460 km^2 (BZE 2011). The land requirements for a modern wind power plant can be calculated using estimates from a study of 172 wind power projects in the US (Denholm et al. 2009). On average, the authors found that 0.3 ha of land was permanently impacted for each MW of capacity installed. Temporary impact was approximately 0.7 ha MW^{-1}. For the wind power plant overall, 34.5 ha MW^{-1} was required. Using the NREL figures the total permanently impacted land for the wind power plants is 6.25 km^2 and the total site area for the turbines is 719 km^2. The total land area therefore for the built environment, energy and food for each sustainable city is therefore 1886 km^2 and for the 15 new cities a total of 28,294 km^2 would be required. This area represents 12.4% or approximately one eighth of the total of the State.

Conclusions

This paper does not propose a blueprint for a future sustainable cities network, rather it is a thought experiment to pose an alternative development vision for Victoria, one that does not appear to have been considered to date. It uses the exemplar of Sweden to demonstrate what leadership in sustainable development in urban planning can achieve. The Swedish Government's initiative in 2002 has translated into a Sustainable City Concept and a network of Sustainable Municipalities, both of which have produced tangible results. An analysis of Swedish cities (localities) shows that the country's population is more evenly distributed, rather than concentrated in the capital city. There are similarities between the municipalities of Sweden and the regional/rural cities of Victoria. The key differences are their population size and urban density. The existing regional/rural cities in Victoria are reasonably well-distributed and of a size to absorb much of the projected population increase for Melbourne and form the basis of a network of sustainable cities. It is beyond the scope of the paper to provide detailed analysis of key resource demands, but approximate calculations indicate that they have sufficient land area to support the increased populations.

References

ABC Rural (2010). *Regional population plan not a new idea*. Australian Broadcasting Corporation, 20th July.

ABS (2011a) 3218.0 - *Regional Population Growth, Australia, 2011*. Australian Bureau of Statistics, Canberra.

ABS (2011b) 1217.0.55.001 - *Glossary of Statistical Geography Terminology.* Australian Bureau of Statistics, Canberra.

ABS (2012a) 5220.0 – *Australia National Accounts: State Accounts 2011-12*. Australian Bureau of Statistics, Canberra.

ABS (2012b). 1367.0 - *State and Territory Statistical Indicators, 2012*. Australian Bureau of Statistics, Canberra.

ABS (2012c) 4610.0 – *Water Account*, *Australia, 2010-11.* Australian Bureau of Statistics, Canberra.

ABS (2012d). 4338.0 - *Profiles of Public Health, 2011-13*. Australian Bureau of Statistics, Canberra.

Brown, J. and Hartwich, O.M (2010). Populate and Perish? Modelling Australia's demographic future. *Policy Monograph 112, Population and Growth Series 1*, Centre for Independent Studies, St Leonards, NSW.

Budge, T. and Chesterfield, M. (2011). Australia's regional centres: are they part of the nation's network of cities or only when it matters politically? *State of Australian Cities (SOAC 5) Conference*, Melbourne, November.

Business Victoria (2013). Available at: http://www.business.vic.gov.au/industries/food-and-beverage/home Accessed: 18/4/2013

BZE (2011). Zero Carbon Australia. Stationary Energy Plan. Beyond Zero Emissions and the Energy Research Institute, University of Melbourne.

Denholm, P., Hand, M,, Jackson, M. and Ong, S. (2009). Land-Use Requirements of Modern Wind Power Plants in the United States. *Technical Report, NREL/TP-6A2-45834*. National Renewable Energy Laboratory Report, Colorado, US.

Doughty, M.R.C. and Hammond, J.P. (2004). Sustainability and the built environment at and beyond the city scale. *Building and Environment* 39, 10, 1223–1233.

Dowling and Perkins (2012). Still liveable? *Focus feature of the Age Newspaper*, 22nd Nov., p.28

DPCD (2002). *Melbourne 2030. Planning for Sustainable Growth*. Department of Planning and Community Development, Victorian Government, Melbourne.

DPCD (2012). *Melbourne, let's talk about the future*. Department of Planning and Community Development, Victorian Government, Melbourne.

DRET (2012). Energy in Australia 2012. Dept. of Energy, Resources and Tourism, Canberra, ACT, 2601.

GMT (2013). Map of State of Victoria. Available at: http://wwp.greenwichmeantime.com/time-zone/australia/victoria/map-victoria/index.htm Accessed: 2/27/2013.

Grewal, S.S. and Grewal, P.S. (2012). Can cities become self-reliant in food? *Cities*, 29, 1-11.

profile_id (2013). See Victorian cities. Available at: http://home.id.com.au/id-community/client-list Accessed: 18/4/2013

Kelly, J-F (2010). *The Cities We Need. Report No 38*, The Grattan Institute, Melbourne, June.

Masanauskas, J. (2009). *Latest projections say Melbourne to grow to 6.4 million by 2050*. Herald Sun, 24th September.

Natural Step (2013). The Four System Conditions. Available at http://www.naturalstep.org/the-system-conditions Accessed: 7/2/2013

Perkins, M (2013). *Smaller cities most liveable for families*. Age Newspaper, 16th Jan.

Roberts, B.H. (2007). Changes in Urban Density: Its Implications on the Sustainable Development of Australian Cities. *Proc. State of Australian Cities (SOAC 4) Conference*, Adelaide, 720-739

SEKOM (2013). Sverige Ekokommuner. Swedish Association of Eco-communities website. Available at: http://www.sekom.nu/index.php/in-english Accessed 7/2/2013

SKL International (2012). *The SymbioCity Approach: a Conceptual Framework for Sustainable Urban Development*.SKL International, Stockholm, Sweden.

Statistics Sweden (2013). Population statistics Available at: http://www.scb.se/Pages/ProductTables____25809.aspx Accessed 18/4/2013

Suncorp (2012). *Suncorp Bank Family Friendly City Report*. Available at: http://www.suncorpbank.com.au/sites/default/files/Suncorp%20Bank%20Family%20Friendly%20City%20Report_FINAL3.PDF Accessed: 18/4/2013

Swedish Energy Agency (2012). Energy in Sweden 2012. Available at: http://www.energimyndigheten.se/Global/Engelska/Facts%20and%20figures/Energy_in_sweden_2012.pdf

SWECO (2103). *The Sustainable City Approach*. Available at: http://www.swecogroup.com/en/Sweco-group/Search/?q=sustainable+city+approach&uaid=963E54F568F4173555316B5C4FD202D0:3133302E3233362E33372E313539:524669889308732988O&bn=2 Accessed: 11/4/2013

White, P. (1973). Decentralization. *World Development*, Vol. 1 No. 5 May, 74-75.

Wong, T.H.F. (ed.) (2012). Stormwater Management in a Water Sensitive City. *Blueprint 2012*. The Centre for Water Sensitive Cities, Monash University, Clayton, Victoria.

World Bank (2013). *GDP per capita*. World Bank, NY. Available at: http://data.worldbank.org/indicator/NY.GDP.PCAP.CD?order=wbapi_data_value_2011+wbapi_data_value+wbapi_data_value-last&sort=asc Accessed: 18/4/2013