Submission on Regional Development

To Select Committee on Regional Australia

INTRODUCTION

It is becoming abundantly obvious that Australia's capital cities, especially Sydney, Melbourne, Brisbane and Perth are rapidly developing into mega cities, with all the attendant problems that mega cities bring – high congestion, high infrastructure costs, high operational costs, and high environmental degradation. Present populations of Sydney and Melbourne are around 5 million, increasing to about 8 million by 2050, and around 10 million by 2060, with no end in sight. With these indicators of liveability already problematic, it can only be imagined what magnitude of angst they will cause when the population is doubled, and then tripled. This all within the lifetime of a large proportion of the present population! What are we condemning our children and grand children to if no action is taken now, to avert this impending disturbing prospect?

One need only read daily newspapers to see the physical and financial discomfort being perpetrated on the inhabitants of major Australian cities. It seems that almost every day there are vociferous complaints of congestion, road works, an inadequacy of public transport with people being packed into rail carriages like sardines at peak times, inability to find parking spots at railway stations and scarcity of affordable parking in CBDs. In addition reports issued by government bodies such as Infrastructure Australia, inform us of the exorbitant infrastructure costs – over $200 billion over five years - required to maintain liveability to a barely acceptable level. Yet in spite of the public disgruntlement, and the bad omens for the future, there are few practical solutions being offered to solve the seemingly intractable problems of present day urbanisation. The cities are becoming increasingly unliveable, while the regions languish. Inertia and vested interests both financial and political, conspire to maintain the entrenchment of the urban sprawl, which is transforming Australia's present beautiful cities into the likeness of those in third world countries.

This submission presents a practical means of curtailing the population growth of Australia's capital cities, and at the same time developing the regions, an objective that has been pursued since federation, with limited success. The concept presented here has been promoted for over ten years to planning authorities (Plan Melbourne, Department of Planning and Community Development of Victoria, Planning Institute of Australia, Infrastructure Australia, Engineers Australia) and many politicians on both ends of the political spectrum. Whilst the planning authorities have been supportive of the concept, as shown by an article published by Engineers Australia which is attached to this submission, most of the politicians both at the state and federal level, have given only perfunctory responses, or no response at all to letters and descriptive literature sent to them. However, public outcry on the liveability of Australia's capital cities, the inability to utilise the

abundant resources of the regions, and a deteriorating economic outlook may combine to hopefully change the political response.

OPTIONS

What are the courses of action that can be taken to avert the painful prospect of Australia's cities developing into expensive, polluted, unliveable concrete jungles?

Option 1 – Increase present expenditure on infrastructure from the present 3% of GDP to around double.

Option 2 – Adopt a new mode of urbanisation which does not rely on high capacity transport systems, which uses water and energy resources efficiently, and which treats the environment with respect, not stressing it beyond its capabilities, and not polluting it with the bi-products of human habitation.

Option 1 is not only expensive, diverting funds from public good such as hospitals, schools, and social benefits, but also it offers no long term solution to acceptable liveability in a demographic of burgeoning population growth. And it offers no solution to developing and utilising the resources of the regions. On the other hand, Option2, though conceptually more challenging , requiring careful analysis and good planning, opens up the possibility of removing the nation from the urban quagmire, and setting it on to a course of economic prosperity and environmental harmony. It can offer a blueprint for sustainable urbanisation into the distant future, and avoid the impending darkness of Option 1.

One path for the implementation of Option 2 involves diverting the growth of capital cities into neighbouring satellite cities, located about 100km from the capital, and spaced in a fan formation with the capital at the centre. There would be an initial wave of these cities, each with a minimum population of 100,000, and a maximum of around one million. As the first wave of cities becomes fully inhabited, a second wave extending a further 100km into the regions would be initiated, and so on with successive waves into the regions and into the distant future. In this way cities would never become too large, yet they would be large enough to sustain modern basic services such as good hospitals and tertiary educational facilities, as well as cultural features such as museums, art galleries, theatres, and sporting stadiums. As the waves spread out, the regions would be developed. Thus the dual purpose of curtailing capital city growth and developing the regions can be accomplished. An appropriate name for this form of urbanisation is "Expanding Nodular Development" or END. END cities would be located adjacent existing "seed" towns in order to facilitate initial development with the provision of labour and other resources. They would be on greenfield sites because planning for compactness, transport and function are key requirements generally incompatible with existing developments.

BASIC CHARACTERISTICS OF END CITIES

An uncompromised ability to be self sufficient economically and culturally is an essential characteristic of an END city. They cannot be dormitory cities in which inhabitants sleep, but do not work. A basic principle of operation of END cities is that people generally must live where they work, i.e. within an approximate 20 minute travel time from residence to work. These requirements call for compact design and transport systems integrated into the basic layout for ease of access to housing, commercial, industrial and agricultural areas.

The real problem with developing the regions is that there is presently little incentive for people to leave an environment with relatively abundant employment opportunities as in the major cities to one where employment is uncertain. The challenge is to create industry in the regions, industry which capitalise on the resources of the regions, adding value to them, to make products which can be exported to other parts of Australia and overseas.

INDUSTRY IN THE REGIONS

(a) Primary Industry

The free and low cost resources which abound in much of rural Australia are sunshine, pure air, and space - ideal resources for agriculture.

With efficient intensive agricultural and animal husbandry practices, agriculture can be the first stepping stone to developing the regions. With a fast growing middle class on Australia's doorstep, China and SE Asia, and with competitive costs, Australia could become a food bowl for our neighbours. In Europe intensive horticulture in countries such as Holland and Spain has achieved spectacular success, and with the potentially huge markets available to our north, the same can happen here. Intensive farming in the case of horticulture involves the use of greenhouses in which temperature, humidity, nutrients and pathogen and carbon dioxide levels can be controlled. With their use, productivity per hectare over field grown vegetables can be increased many times over, as can water use efficiency. For example with tomatoes, effective production can be increased by a factor of 9, and water consumption in grams of fruit/litre of water can be reduced by a factor of 5. In addition the cropping period can be increased from about 7 months to nearly a full year, with the use of herbicides and insecticides being greatly reduced. In most of Australia, because of the mild climate, greenhouses with plastic retractable tops and roll-up external walls can be used. These are much less capital intensive than the fully glazed type generally used in northern Europe, and allow crops to grow faster because they admit more sunlight. They also reduce the need for cooling in summer, because they can be easily opened up to the outdoors for ventilation. This feature also facilitates mechanical harvesting.

Since 1990, the world production of wild fish has plateaued out to about 85 million tonnes per year, and is now in slight decline. The deficit, increasing rapidly because of population growth and higher demands for protein, is being made up with aquaculture products.

Aquaculture therefore is a growth industry, and eminently suited to END cities and regional growth. The use of greenhouses for horticulture can be used symbiotically with aquaculture through the process of aquaponics. Here waste polluted water from fish tanks is fed to the plants in the greenhouses. The plants utilise the waste as nutrient, and the purified water is pumped back into the fish tanks. Other forms of intensive types of high protein farming are piggeries and chicken farms.

(b) Secondary and Service Industry

Manufacturing industry can be generated through the processing of horticultural and animal products. Produce will need to be harvested, packaged, refrigerated, or processed and canned and transported to market. All of these require labour, and are sources of job creation. Australian statistics show that for every primary plus secondary job generated, about 6.5 services jobs are produced in sectors such as retailing, education, health, finance and law – refer to article attached to this submission. Thus there is a multiplier effect of about 6.5. Therefore by creating say 1000 primary plus secondary jobs, a total of 7500 jobs will result, and population will increase by over 15,000.

Regional Australia is blessed with sunlight and in many areas wind, which are suitable for the production of renewable energy in the form of electricity. The rate of renewable energy uptake in Australia has been high by world standards, but is limited by the need to store it, since renewable energy production by nature is very variable. Storage of electricity in large quantities has been done effectively only with pumped hydro schemes such as Snowy2. Pumped hydro schemes however are very expensive and take a long time to design and build - Snowy2 is estimated to cost over $5 billion and will take 8 years to complete. This however opens a window of opportunity for END cities.

Another method of storing electrical energy is to convert it to hydrogen gas. Electricity generated by renewables can be converted to hydrogen through the simple process of electrolysis. Hydrogen can be burned directly, without carbon dioxide emissions, to generate electricity or for heating. It can also be used as an industrial feedstock, or it can be stored. The availability of gas storage, in the form of existing natural gas pipelines, at practically no cost, is of critical importance as it overcomes the capital cost and time delays involved with pumped storage.

The use of hydrogen as an industrial feedstock is probably the main support pillar for the economic sustainability of the END model. It is the basic element required for the manufacture of plastics, PVC, and a host of industrial, commercial and household chemicals. Hydrogen can also be used in fuel cells to power motor vehicles such as cars, trucks and busses, and as such has vast potential to replace oil based fuels, without emissions. The nationally strategic by-product of this is less dependency on imported petroleum – future transport fuel security in a troubled world. Hydrogen is also used in the manufacture of ammonia, which can be converted to a fertiliser, the world demand for which is growing

exponentially in response to population growth. Ammonia is easily liquefied and thus can be economically exported overseas in ships, opening up a massive avenue for trade. Other uses for hydrogen are in steel making and in the glass industry. Oxygen, the other product of electrolysis, is also used in steel making, welding, metal cutting and as a medical gas.

A HOLISTIC APPROACH

From the above, it is seen that an industrial base for developing the regions is available with proper planning, development of markets, and attracting investment capital. All of these are of vital importance, requiring a holistic approach, with cooperation of the federal, state and local governments, and international sources of capital. With the high international demand of agricultural and industrial products mentioned above, and with the efficient production afforded by compact END cities, all in a politically and economically stable nation such as Australia, the latter should not be difficult. The main obstacle to the concept would lie largely within our own ability to develop a strategy blueprint and the organisation needed to establish governance, control and planning. Hopefully, the Committee on Regional Development will promote and help develop these.

THE SHAPE OF END CITIES

What would a compact END city look like? It should be kept in mind that with population growing from 5 million to 10 million for Sydney and Melbourne by about 2060, there will be a need to build five satellite cities each of about one million to prevent the growth of these capitals into megacities. The accompanying schematic diagram shows how such a city could be planned. It is composed of nine segments, or development stages, each of about 111,000 people. The stages are arranged as modules, each attached to the other progressively as the city grows. Staging is arranged as shown in the diagram, such that infrastructure cost is progressive over the full time of development of 20 to 30 years, thereby minimising initial costs. Stage 1 would consist of a main area, plus two service areas, plus a central CBD area which is developed throughout the full city development time of 20-30 years. In addition to a commercial CBD, the central area would accommodate major hospitals, tertiary and TAFE educational facilities and cultural buildings such as museums art galleries and theatres. The outer service area shown as Stage 1/5 would accommodate large sewerage and waste treatment plants for internal Stages 1-4 and external Stage 5, and a future Stage 5 power plant. The internal service areas would contain Stages 1 and 2 power and storm water treatment plants. Each stage or module is self sufficient economically with local employment opportunities within a 20 minute travel time from residence to work. Each module has an area of about 4,000 ha or 40 square kilometres, giving an overall population density of 2,800 per sq, km. This compares with a density of about 5,000 for the city of Port Phillip, 300 for Ballarat and 500 for metropolitan Melbourne. In accordance with modern household structures of which about 50% are couples with no children, single parent, and lone person households, about 30% of housing has a housing density of 15/ha, 45% has 30/ha and 25% in apartment buildings of 4 stories and over. In all, about 2000ha are

reserved for housing, 1,000 ha for industrial and agricultural use and 1,000 ha for commercial, educational, sporting, pondage and parklands use. Land outside of the city boundary can be used for crops such as wheat, fruit orchards, and grazing land.

The city is serviced with internal and intermediate ring roads, and radial roads from the periphery to the centre, enabling easy travel from anywhere to the centre or to any other module within 30 minutes or less. Light rail and/or metro rail runs alongside the major roads for public transport. Service corridors are provided alongside these major roads to accommodate water, sewerage, gas, electricity and communication services. The complete city has a diameter of about 22 km, with 5 outer service areas which house power plants, water treatment and waste treatment plants and some heavy industry, for the outer modules. Stage 5/1 service area also accommodates sewerage and waste treatment for the inner Stages 1- 4. Each Stage is connected to a railway line for the movement of freight and people to and from external cities. The city also has an airport for transport of peoples and freight.

ELECTRIC POWER

Electric power is generated for each of the modules in the service areas using high efficiency combined cycle gas turbines with waste heat recovery for heating adjacent industrial and agricultural precincts. These generators can react to load changes rapidly in response to renewable energy fluctuations, and city demand. If required they can export excess capacity to other cities via the interconnecting high voltage grid. The generators are cooled with cooling ponds which double as storm water retention ponds to partially treat storm water before it is processed for Class A and/or potable use. Emissions from these highly efficient generators, when combined with heat recovery for industrial and agricultural use can reduce carbon dioxide emissions to less than one third when compared with the emissions of conventional thermal power and industrial heating plants. Greenhouses and industrial precincts would be located fairly closely within about three kilometres of the power plants to enable thermal energy distribution in the form of hot water.

WATER

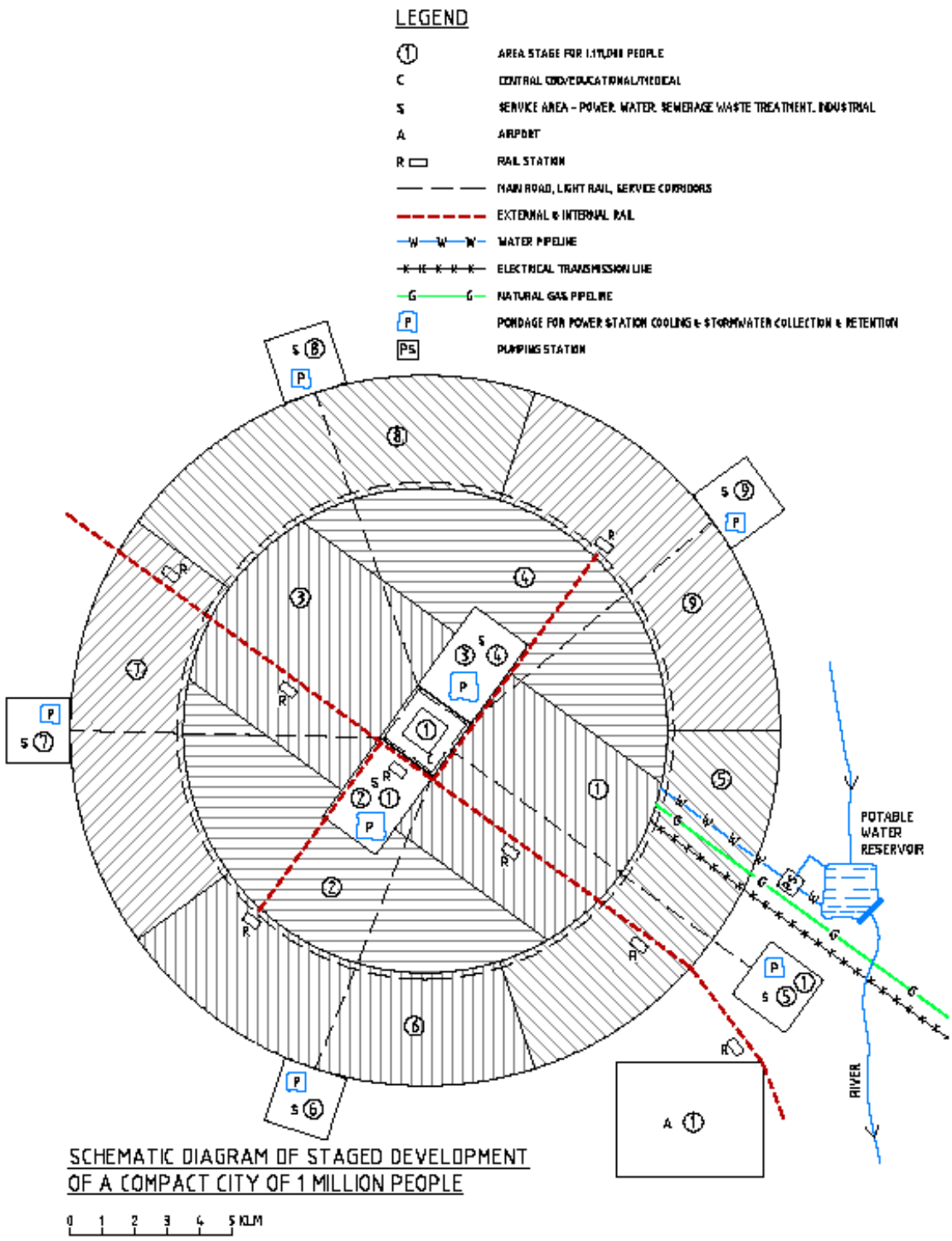
A significant limitation to regional development in many parts of Australia is scarcity of water. Urban development relies heavily on natural streams and rivers, and in low rainfall areas can severely stress these natural flows. END cities can be designed to eliminate this limitation in all but desert regions, with recycled Class A water for uses such as toilet flushing, wash down, irrigation and some industrial processes. All storm water can be collected by a city wide storm water system to power plant cooling ponds for preliminary sedimentation treatment. It can then be either purified to potable water standards using microfiltration plants, or used for irrigation or discharged to a stream. It is estimated that for a city of one million with an annual rainfall of 500mm, an excess of about 20,000 Ml per year of Class A water can be discharged downstream. If all the storm water is processed to

potable standard, END cities could be built virtually anywhere in Australia except for desert regions with an annual rainfall below 350mm. Mildura in the far north west of Victoria, with an annual rainfall of 267mm could meet only 75% of requirements, and would need to import from the Murray, but Kerang with an annual rainfall of 373mm would have a slight excess. The installed cost of a microfiltration plant to convert storm water to potable standard, including a chlorination component, is about $5 million in 2019 for each module of 111,000 people. An additional benefit of harvesting storm water is that the size of water reservoirs can be drastically reduced to allow for droughts. If all water is recycled, only water which is lost in the system due to leakages and transpiration needs to be made up from a reservoir, and the cost of the storm water system could in most cases be compensated by the reduced requirements of storage reservoirs, dams and associated piping and pumping stations.

THE COST OF INACTION

The price of inaction is high – population is galloping , and continuing infrastructure and inefficiency costs are mounting, all sapping the strength of the economy and the disposable wealth needed to maintain Australia's high standards of living in an uncertain world. Systems need to be set in place to develop a blueprint for rational, sustainable urbanisation. The lead should come from the Federal government, but as stated earlier, cooperation must occur with all levels of government. At the same time, markets must be established and sources of capital investment investigated.

The END model offers such a blueprint, allowing the population to grow while simultaneously containing congestion and providing commensurate growth in employment to maintain present living standards. With a slowing world economy, employment opportunities can be greatly reduced. Youth unemployment is already unacceptably high, standing at about 27% for 15-19 year olds on average, and higher in the regions. An aging population exacerbates the ratio of worker to non-worker, requiring a greater productivity per worker. Immigration of refugees further increases the unemployment potential. The END model which requires more workers in an industrial high efficiency environment alleviates both problems – more jobs with higher productivity per job. The concept, though novel, does not require great innovation, just good planning and integration of existing technologies, which Australia as a nation is good at. It is essential that bipartisan policy be adopted in order for political election cycles of three and four years not to interfere with long term undertakings such as this. What is needed is the political will to make this vision happen. Now is the time for national leaders to look beyond the next election, and take up big ideas to enable a sustainable future for our nation to be realised.


LEGEND
AREA STAGE FOR 1 MILLION PEOPLE
C CENTRAL CIVIC/EDUCATIONAL/MEDICAL
S SERVICE AREA - POWER, WATER, SEWERAGE WASTE TREATMENT, INDUSTRIAL
A AIRPORT
R RAIL STATION
MAIN ROAD, LIGHT RAIL, SERVICE CORRIDORS
EXTERNAL & INTERNAL RAIL
WATER PIPELINE
ELECTRICAL TRANSMISSION LINE
NATURAL GAS PIPELINE
P PONDAGE FOR POWER STATION COOLING & STORMWATER COLLECTION & RETENTION
PS PUMPING STATION
POTABLE WATER RESERVOIR
RIVER
SCHEMATIC DIAGRAM OF STAGED DEVELOPMENT OF A COMPACT CITY OF 1 MILLION PEOPLE
0 1 2 3 4 5 KLM