

Liveable Melbourne

A paper prepared for the City of Melbourne
Future Melbourne Project
by
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Table of contents

1	Melbourne's global challenge – no time like the present	1
1.1	Why do things need to change?.....	1
1.2	Environments and built habitats – species under threat	1
1.3	The form of cities.....	2
1.4	Liveability – secrets of our success.....	4
1.5	Sustainability – keys to our survival	5
2	Climate – a new carrying capacity	7
2.1	A changing context.....	7
2.2	Effects of cities and built environments.....	7
2.3	Possible initiatives.....	8
3	Energy – productive design and sustainability	9
3.1	Regenerative/productive technologies	9
3.2	Building-level power generation	9
3.3	City-level and regional power generation.....	11
3.4	Possible initiatives.....	11
4	Water and urban ecology – opportunities for reuse and new uses	13
4.1	Recycling and reuse of water.....	13
4.2	Greening the city	14
4.3	Possible initiatives.....	16
5	Morphologies – changing built form in Melbourne	19
5.1	Urban form, good design and population challenges.....	19
5.2	What can we change about built form in Melbourne?	20
5.3	Possible initiatives.....	21
6	Sustainable construction – building for life support.....	23
6.1	Possible initiatives.....	23
7	Liveable housing – turning the tide on Melbourne's sprawl	25
7.1	The 2030 challenge.....	25
7.2	Changing notions of density.....	26
7.3	Public housing/affordable housing	28
7.4	Possible initiatives.....	30
8	Food – learning to reharness our resources	31
8.1	Possible initiatives.....	32
9	Transport – moving with ease	34
9.1	Integrated transport design improves liveability	34
9.2	Densities to support public transportation	34
9.3	Making public transport an attractive option.....	35
9.4	New transport options for Melbourne	35
9.5	Streets.....	35
9.6	Possible initiatives.....	35
10	Implementing change – looking beyond a common deadline	36
10.1	Planning policies	36
10.2	Municipal strategic statement performance monitoring.....	36
10.3	Corporate social responsibility – what can business leaders teach us?	36

10.4	Community consultation – intra and intergenerational equity	37
10.5	Implementation tools	38
10.6	Possible initiatives.....	38

1 Melbourne's global challenge – no time like the present

1.1 Why do things need to change?

As a global community we are facing times of dwindling fossil fuels, active warming of the planet and uncertainty over the future supply of our most basic resources—water, clean air and productive soils. As warnings regarding resource depletion have more recently leapt from jaded vagaries to explicit fact, it is clear that our patterns of consumption must change. Reducing what we take from the Earth however is only half the challenge. The weightier issue is more likely to become a question of how we can exponentially regenerate what we use, in order to become self-sustaining. Practices we currently adopt for the provision of water and energy, the use of land and materials, and the layout of our cities and communities could well be obsolete within 10 to 15 years due to the unavailability (or sheer cost) of accessing these resources.

The continuing viability of the planet therefore depends not only on our ability to reduce and conserve the resources we extract, but also the development of common-place practices to ensure we replenish what we use, and produce our requirements in new ways. In essence, our future ability to move from a consumer economy to one of conservation and production is going to be critical to our success.

1.2 Environments and built habitats – species under threat

Twenty years ago, the Brundtland Report called for 'a global agenda for change'. The *Rio Declaration* followed close on its heels in 1992 and advocated the implementation of Local Agenda 21 initiatives. Effectively ground rules for local action, these were intended to ensure sustainable practices became part of local planning frameworks, community programs and ecological initiatives.

While sustainability is now part of our everyday lexicon, our progress towards the ideals of Local Agenda 21 is questionable. Author and sustainable cities consultant, Herbert Girardet suggests we are in danger of forgetting that the basis of a liveable city is its natural environment. Modern cities, he says, represent centres of human endeavour and, as such, have almost 'declared their independence from nature'. But they are still vitally dependant on the fundamental ecological 'services' which Earth provides. In 1997, the American economist Robert Constanza valued the world's 'ecosystem services' at \$33 trillion or twice the global GNP, exposing the costs of trying to synthetically produce these natural benefits ourselves.

Ten years later, half the world's population (an estimated 3.5 billion people) was living in cities rather than in rural areas. Girardet predicts this trend will continue and by 2030, 60 per cent of the population will be urbanised. The form of today's cities and planning decisions made now will determine how liveable they remain with continued and rapid growth.

The distance a city's inhabitants have to travel has a major impact on its sustainability and liveability. The further you have to travel for work, education and recreation, the bigger your "ecological footprint". A centrally-focused city surrounded by an urban sprawl demands ever greater investment in transport infrastructure, where, inevitably, the private car plays a major role. An alternative model *decentralises* the city's functions into multiple centres within the boundaries of the city, which, ideally, provide most or all a resident's requirements locally. Theoretically it cuts down the need to travel.

1.3 The form of cities

Zoning

Implemented in the USA and UK in various forms throughout the early twentieth century, zoning aimed to prevent the impacts of ad hoc construction and incompatible land use activities. Zoning inevitably enforces division of the city and a subsequent reliance on transit nodes and networks to specific destinations, to access facilities previously located within neighbourhoods. Though it has been accused of perpetuating outdated assumptions (separation of living and work locations, creation of social order through zoning residential areas by lot size and location, and manipulating the development market), zoning has also promoted enduring city-wide benefits in most locations. These include separating noxious activities from benign, and creating economically viable commercial and business districts through co-location.

Various land use planning systems have recently re-positioned the status of zoning in land management practices in order to create more flexibility in the application of zones for these reasons, and to apply environmental considerations more directly. Future benefits of eroding or reconfiguring rigid zones might include creating mosaics of land use, ensuring better mix, and less likelihood of residential sprawl by reducing land predominantly zoned for housing. Other efficiencies could be gained by amplifying the effects of a prescriptive planning regime to intensify existing areas, and through prohibiting activities which are clearly non-sustainable.

Garden cities

The 'Garden City Movement' pioneered by Howard (1899) and others (Mumford, Cadbury and Lever Bros) takes on a renewed relevance for current sustainability challenges. Perhaps ironically this grew from a desire at the turn of last century to address the wider problem of migration to the city, and halt the spread of urbanisation outwards from a central urban core. In order to achieve this, multiple smaller centres (cluster towns to a maximum population of 32 000) were envisaged to redistribute population. As in today's context, transport, quality open space and leasehold land conglomerations were seen as major harbingers of success.

Garden Cities and the subsequent Greenbelt movement lead by Roosevelt in the 1930s have laid the groundwork for more modern and sustainable interpretations around the world. London curtailed outward growth through Abercrombie's 1945 Greenbelt retention policies and Portland Oregon introduced 'Metropolitan Greenspaces' in 1989 for the preservation of open spaces, greenways and trails. Greenbelt ideology also underlies Melbourne's 2030 approach to land conservation through the 'Green wedges'. In each of these regimes however, the greenbelt areas are under ongoing pressure, with

containment of urban development often resting on political will and state-wide policies which are widely susceptible to dilution. In 1994, only 10% of Portland's land inventoried for greenspace and wildlife protection was actually in public ownership.

Eco-cities

Register expanded on the ethos of adopting an ecological approach to city development and encouraged cities in the US to pursue the reversal of domination by the built form and car dependence. His 'Shadow Planning' approach seeks to progressively retro-fit existing urban cores with sustainable urban agriculture, green roofs, city water features, linked greenways, and wildlife (or ecological) corridors.

Dong Tan is the largest new city project in the world which aims to incorporate similar but considerably more advanced principles of sustainable development. It is expected to set a timely new global benchmark in constructing high density, energy efficient and self-sustaining cities for the future. In many ways it represents a combined approach of the highly industrial and populated cities of the turn of the century with the ecologically based green city aspirations which followed. It also has the potential to chart a means for sustainably retro-fitting the mega-cities of the future which could be adapted to multiple scales.

Transit cities and new urbanism

In the last twenty years the modern city has become increasingly complex. It has varied in function, morphologies, population structure and densities, in accordance with location and context.

Spatial organisation both within the urban core and towards the fringe of cities has been altered throughout post-industrialised cities to absorb additional transport and housing infrastructure (for example Melbourne's Burnley tunnel, Eastern Freeway linkage, Docklands extension to the CBD, new communities at Aurora, Officer and Werribee). The combination of these critical elements within areas of urbanisation and peri-urbanisation has not always been co-ordinated by local and state authorities, leaving room for the concept of transit cities to arise.

The general principles of transit cities are similar to those of New Urbanism—high density housing development and mixed use activity revolving around a centralised rail station. The resulting compact form and automobile independence are perhaps the main strength of transit cities in terms of addressing the future sustainability of areas with low intensity development. The transit city movement (and the use of principal activity centres in Melbourne's case) is significant in terms of its potential to retro-fit lower density greenfields sites or locations within the urban core, and should be replicated with urgency.

Edge cities, edgeless cities and urban villages

Forster defines edge cities as 'new urban structure(s)' or 'largely independent urban realms' within a particular part of a metropolitan area where people are able to satisfy their work and living needs (recreation, schooling, entertainment) within a definable core area. Sometimes these are defined by a particular local economy (such as Melbourne characterised by the

information economy, or may comprise suburban centres incorporating a number of neighbourhoods.

By contrast edgeless cities are non-defined commercial and industrial areas located on the periphery of cities, and equivalent to residential sprawl in terms of a lack of other amenities (for example the technopark business sector in Croydon, Melbourne). These areas are suggestive of comparatively easy retrofit as the buildings are often large in scale and not specialised in terms of function or layout (for example warehousing or open plan office areas). These present significant options for densification and intensification into the future, as explored in section 7.

Lang describes urban villages as an 'agglomeration of uses in an suburban setting' for example a low rise retail and light industrial area which is compatible with residential and suburban uses such as community facilities. The urban village is essentially a more structured edgeless city, but with the addition of all the elements of a downtown city (facilities, mixed uses) but in new low density form, or 'decentralised metropolis'..

Compact cities

The compact city approach to sustainability is perhaps one of the most applicable urban morphologies to many existing cities, and adopts similar features as the transit cities and new urbanist centres, but on larger urban scale. Rogers explains that this approach organises the city by nodes, which incorporate mixed uses within a 'neighbourhood' scale. Neighbourhoods are then networked in a polycentric or nodal fabric.

The idea could be further expanded in the current sustainability context to ensure that the scales of development are set by the measurable parameters of sustainability (that is water supply efficiencies, energy renewal, short-range transport options and the like), with social and economic facilities located around these. It could also be possible to extend this arrangement to ensure that the green spaces necessary to support alternative production of food and energy would be integrally part of each node.

Breheny critiques the compact city proposal, focusing on the European Commission's green paper on the Urban Environment (CEC) 1990. This aims to promote high density compact cities throughout Europe due to environmental desirability, reduced travel distances and higher quality of life. All future development shall take place within established urban boundaries - through mixed use which will 'recreate intensive, innovative, culturally rich, urban milieux'. Breheny raises potential issues which may in fact falter or diminish with compaction, such as quality of life in suburbia, regional development, large scale energy options (wind farms, hydro power), and access to green spaces. These will be further explored in the discussion of alternative energies and urban morphology in sections 3 and 5.

1.4 Liveability – secrets of our success

The terms 'liveability' and 'sustainability' so often appear together that they begin to appear interchangeable. In fact, the concepts can be in conflict with each other. The challenge in planning a liveable and sustainable city lies in reconciling that potential conflict.

Liveability is a factor of cultural and historically-specific perceptions. Sustainability is the ability of natural or ecological systems and physical systems such as economic infrastructure to keep operating under the demands placed on them by human activity.

Liveability is not necessarily sustainable. Green parklands, playing fields and golf courses certainly make a city liveable, but water must be managed and allocated carefully because it is one of our most scarce resources. On the other hand, initiatives that make a city more sustainable can also improve its liveability. 'Rich and diverse webs of wildlife areas, parks and gardens naturally supported by local water regimes' bring multiple benefits to a city. Temperature regulation, shade, pollution control, water purification, flood and erosion control, food production, carbon dioxide absorption and moisture conditioning all in their turn make a city more liveable.

Liveability and sustainability will come into conflict when changes to the city's form demanded by a need to make it more sustainable run into long-established perceptions of liveability. Low housing density and the prevalence of private cars are viewed as key to our quality of life. Yet higher density living and communal spaces and transport have the potential to foster a better sense of connectedness within communities.

1.5 Sustainability – keys to our survival

Australian cities like Melbourne are not burdened by overpopulation or the sort of socio-economic crises that face many cities around the world. The challenges in many ways are less and should be easier to meet. The sustainability of our cities rests on change in the way we use and manage our resources from a personal to a societal level. So what can we expect to happen in Melbourne?

At worst the planet's natural systems will be gradually or exponentially destroyed. The rapidity of changes in natural, physical and human systems, only partly understood, might surprise us and impose a new world view within a matter of decades.

At best our current daily practices will be curtailed as we become ever more conscious of resource depletion. This may evolve from ever-increasing micro-management of our natural resources on a household level (collecting shower water to fill toilet cisterns for example), to a series of incremental limitations (car-less days, or car sharing), and finally to neighbourhood or community 'prohibitions' (a car-less street, or zero-emissions suburb). Many initiatives might be self-imposed for economic reasons.

Inevitably the decisions we currently regard as personal—about waste disposal and modes of travel for example—may no longer be ours to make. Further state control and/or privatisation of resources, increased taxes and other economic instruments will likely be imposed as we have seen in other countries facing depletion and scarcity of resources.

Education programs and diffuse imposition of resource control will likely continue to alter behaviour, using similar methods to the ways in which social norms have been challenged in the past (for example use of seat-belts and cycle helmets, drink-driving, smoking in public places). There will be the inevitable public outrage, civil libertarian comment and ground-breaking cases

to test the legislation, all of which over time will bring the new reality to the door of the 'average citizen'.

Despite the perils that we may now face, society seems to have adopted an awkward detachment from the ecological and economic imprint we continue, collectively, to have. While we understand that temporal realities are subject to change, *Earth* itself will surely always be a constant, and any potential failure of life sources and resources will either not occur, or will occur 'after my time'.

One singular difference however between past issues of public health and safety, and the challenges we face in 'normalising' sustainable living, is that the timeframes to achieve major change may not now be inter-generational, or even stretch across a decade. We may have less than ten years to convince ourselves and each other that major changes are needed *now*, in many aspects of our current lives.

2 Climate – a new carrying capacity

2.1 A changing context

Although scientists and environmentalists have been talking about the human impact on the world's climate for a long time, it was only in 2007 that public understanding of the threat of climate change really gathered momentum. Built environments have always created micro-climates. So choices made about the form of our cities can either exacerbate or mitigate the effects of climate change.

2.2 Effects of cities and built environments

Cities are generally 1-2°C warmer than their hinterlands because of the urban 'heat island' effect. Buildings and pavements made of dark materials absorb the sun's rays rather than reflecting them. There are fewer trees and other plants to shade buildings and cool the air by evapotranspiration.

The rewards of adding climate expertise to an urban design team's skills are many. It starts with choosing the site of new subdivisions to lessen danger from natural hazards. The full potential of solar energy can be realised, air draining patterns can carry pollution away from residential areas and city dwellers will enjoy improved levels of climatic comfort.

In order to design with climate a thorough understanding of the local climatic conditions is vital and the climate 'zone' is a good place to start. Four variables affect human comfort: temperature, humidity, heat radiated from the sun and surroundings, and wind speed. Because radiated heat and wind speed vary greatly over small distance, climate zones are defined using only temperature and humidity.

The temperate climate has mild to warm summers and cool winters. The need for winter home heating is greater than the need for summer cooling. It is a relatively comfortable climate, especially near the coast, where summers are cooler and winters warmer than further inland. In the mountains of the Great Dividing Range, winters are cold and summers are pleasantly mild.

In a hot dry climate, summers are hot to very hot and it seldom rains. Winter days may be cool or warm, and winter nights can be very cold. The air is dry, there is little cloud; sunshine is intense and glare can be a problem. There is a big temperature difference between day and night.

In a warm humid climate, summers are warm and very humid. In most parts of the zone, summer will be rainy. Winters are warm, dry and sunny. Coastal areas are subject to tropical cyclones. The summer climate is stressful. It is the least comfortable Australian climate. The body's natural cooling system (the evaporation of perspiration) does not work well because the air is *already* so full of water vapour that it cannot hold much more.

Planning rules need to be integrated with an understanding of climate zone and the effects of built environments on climate. Tools such as ENVI-met for modelling the potential urban heat island effect of a new suburb can be used to ameliorate that effect. Pavement design and materials to counter radiant heat contribute to creating a more comfortable micro-climate.

2.3 Possible initiatives

- Put neighbourhood microclimate as a key performance metric in planning and building regulations
- Integrate planning rules and climate planning
- Ensure integrated neighbourhood planning is undertaken on a performance basis, not by prescription or proscription.

3 Energy – productive design and sustainability

3.1 Regenerative/productive technologies

A productive rather than consumption approach to city design opens the possibility of micro-generation from building level through to city block or neighbourhood and city level. Such approaches have already been adopted in Sweden.

The technology certainly exists to generate ‘clean’ power at building level in Melbourne using wind and solar.

3.2 Building-level power generation

Solar

Cities have multiple options to convert solar power into ‘real time’ and stored energy due to the thousands of surfaces which capture solar energy. The photo-voltaic principle makes use of mono-crystalline or poly-crystalline cells to convert sunlight to energy through photon activity. It consumes no other product and produces no emissions. No longer large inflexible panels, thin-film technology and more recently screen-printed dye solar cells significantly expand the possibilities for application through an infinite range of architectural and design variations within Melbourne. It is now possible for an entire city to be powered by solar energy using today’s technology, but potential barriers to their general infusion into built form lies in continued support for the use of fossil fuels.

The City of Melbourne has demonstrated its commitment to producing sustainable solar energy through the installation of 1,328 solar panels covering one third of the Queen Victoria market roof, which will generate power until at least 2030 equivalent to the requirements of 46 homes each year.



Figure 1 Endless possibilities: Melbourne’s facades could shape up for productive technologies. Solar panels might replace glazing, building might be retrofitted to capture water and grow plants. (Photo credits: Craig Abraham, Plain Jane Creations.)

There are multiple other major roofs, building facades and other structures, within the city which could be used in a similar way: Southern Cross railway

station, Eureka Tower, and Melbourne Central's glass dome structure for example. Such major landmarks can be used by the City of Melbourne to showcase sustainable technologies in highly public, attractive and well utilised locations. Recent projects within the city such as Ballarat Campus and Australia's first solar noise barrier on a freeway illustrate how the technology can be applied to almost any structural surface.

These concepts could be extended to encompass buildings within a designated land agglomeration such as Melbourne University, RMIT, Monash Campus and the like, where single ownership may simplify the administration, construction and maintenance processes for major PV processes. Clean and efficient technologies such as solar power can be retro-fitted into residential precincts, retail, business, and open space networks in new and interesting ways. The city retains and gains sustainable, productive spaces and structures without compromising liveability.

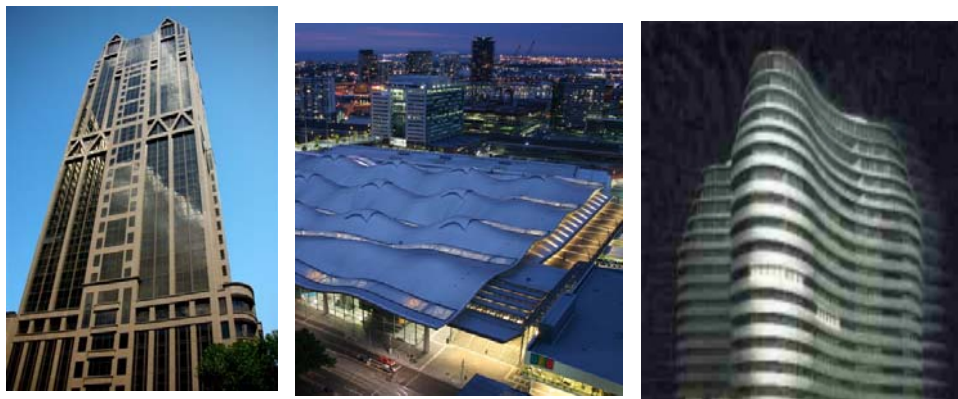


Figure 2 Potential for treatment with Solar PV 'skins'? (from left) Melbourne's ANZ Tower, Southern Cross Railway Station and Yves Apartments, St Kilda Road. (Photo credits from left: www.walkingmelbourne.com, Mark Ruff & Shannon McGrath and primevisions.com/properties_for_sale)



Figure 3 Left: the largest vertical north-facing BIPV façade in Australia, covering 200m², commissioned in 2006 at Ballarat University (Going Solar and McIldowie Partners Architect); and (right) the pioneer use of PV panels to create a noise barrier wall at Tullamarine Airport (Going Solar, Melbourne). (Photo credit: www.goingsolar.com)

Wind

Wind power generally requires commitment and infrastructure on a far greater scale than local government can provide. Within the City of Melbourne however, potential exists for smaller scale wind generation in the CBD and Activity Centres. Melbourne's demonstration building CH2 incorporates wind

capture on a building scale. Other building typologies might be retro-fitted to harness wind tunnels which already exist between the towers at both street level and higher. Purpose-built wind-frames could be expanded to block level, and potentially networked between blocks as well, expanding to a webbed city network.

3.3 City-level and regional power generation

There are many options for energy production at a scale greater than the City of Melbourne alone could support.

Wave/tidal

If wind generation on a large scale is unavailable to the City of Melbourne, wave and tidal power could be a major generator since Melbourne enjoys a considerable length of coastline, multiple river and creeks systems flowing towards the bay, and areas of comprehensive medium density development in close proximity to the water's edge which could pilot projects of energy storage and release.

The City of Toronto has successfully started using Lake Ontario as a mass water storage device to naturally cool city buildings, and Melbourne could explore options for similar uses. Such projects could be showcased or revealed through eco-revelatory design principles in a way that could generate ongoing public interest further promoting the city's liveability principles but in an interesting, innovative way.

Ocean energy is the 'largest untapped resource on the Planet, and could well provide clean, reliable electricity on a truly giant scale' according to Girardet and, in contrast to other energy forms, is highly predictable. He and Droege list the potential methods by which this could be tapped: ocean currents (and associated thermal activity); tidal motion; and harnessing off-shore winds.

Bio fuels

Bio fuels are produced through dedicated agricultural cropping, conversion of timber and industrial wastes, or forestry crops. Organic by-products can also be used such as animal wastes, food wastes, municipal solid waste, sewage products, algae production and landfill gas. These options are clearly outside the scope of the City of Melbourne alone. Such initiatives would have to be entered into in combination with other authorities and regional partners.

3.4 Possible initiatives

Positive energy program

- Require larger developments to be energy positive in their development – encourage microgeneration and energy recovery
- Commit to a solar city program, which 'defin[es] urban communities committed to embracing a path of integrating a range of renewable energy technologies as well as efficiency measures into a broad community-wide planning strategy'. It is not limited to solar energy per se, but major urban renewable energy sources which are related to the agency of the sun.

- Commit to harnessing wind energy by microenergy systems as well as larger devices.

Planning regulations to encourage/enforce productivity

- Include in planning permit approval processes a requirement for the developer to show how they have worked alternative energy production into their new building or other development concepts.
- Attach conditions to planning approvals that require a targeted percentage of energy savings to be achieved over the life of the building in a manner to be chosen by the developer and endorsed by the Council.
- Offer reduced development levies for buildings which are harnessing a set percentage of their own energy. This could be commensurate with the measurably reduced consumption from the grid.
- Require larger developments to be energy positive in their contribution.

4 Water and urban ecology – opportunities for reuse and new uses

4.1 Recycling and reuse of water

Melbourne's water reservoirs have steadily dwindled over the last 10 years. Capturing and recycling water are going to play a major part in meeting the city's ongoing needs. The Department of Sustainability and Environment set a target of recycling at least 20 per cent of the state's waste water by 2012. By late February 2008 it reported that 22.5 per cent had been recycled over the previous year. With such early success, the City of Melbourne is well-placed to champion water recycling at city, neighbourhood and site-specific levels.

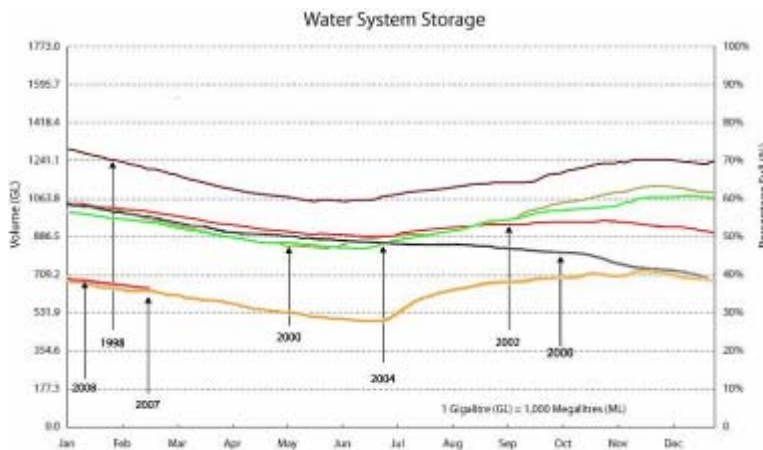


Figure 4 Greater Melbourne's Water Reservoir capacity over last 10 years (Source: www.melbournewater.com.au) City-lead initiatives such as water restrictions, education regarding water savings, and hourly monitoring of reservoirs, have lead to significant reductions in consumption (refer Figure 5).

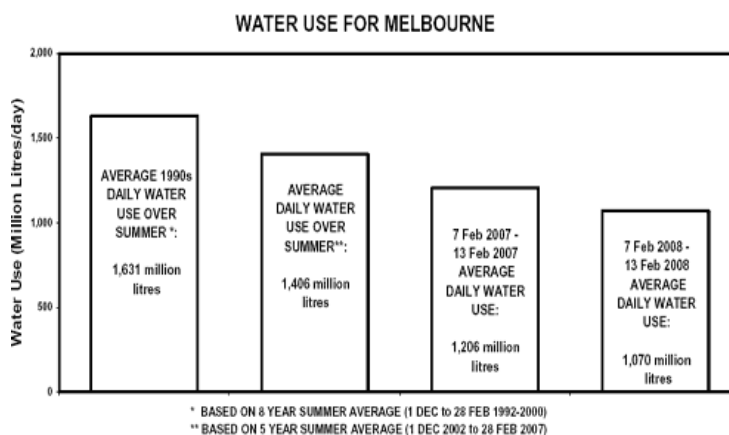


Figure 5 reduced consumption is already occurring. (Source: www.melbournewater.com.au)

Sewer mining

Sewer mining is one of the options. Sewer mining extracts wastewater from the sewer system, treats it to a very high standard for reuse 'in a site-specific location in a decentralised manner'. It is the critical *decentralised* mode of delivery that prevents sewer mining from being implemented or enforced by local government authorities. They do not have legislative control over their specific locations in the most relevant documents. In Melbourne's case, neither *Melbourne 2030* nor local planning controls require the inclusion of recycled water mechanisms, nor feasibility studies into alternatives during development pre-approval phases.

The City Plan includes a 'Reused and recycled water objective'. The accompanying Standard C23 of the Victorian Planning Principle framework require that through subdivision, developers must 'provide for the substitution of drinking water for non-drinking purposes with reused and recycled water' in greenfields and single site subdivision.

Hurlimann et al note the potential for increased corrosion on existing infrastructure if sewage is discharged back into the system following the extraction of the water. Here there is potential for bladders to be inserted into existing failing infrastructure to make purpose-built reservoirs for collected water or to ensure longer life of reticulation if methods for recycling water like sewer mining involves a discharge back into the sewer system.

Social acceptability

While the technical aspects of water recycling and sewer mining are well understood and feasible, the social acceptability and life cycle assessments need to be considered before wide-spread provision of recycled water.

Despite these factors, greater opportunities exist for capture and re-use on significant scales in the City of Melbourne. Potential water savings from sewer mining and other initiatives such as rainwater harvesting, storm-water reuse and grey water recycling should not be overlooked.

4.2 Greening the city

Any planting in the urban environment brings multiple benefits. Even small changes have the potential to make large differences, for example adding vegetation to hard surfacing at ground level increases amenity within the city, contributes pathways through the city fabric for insects, birds and invertebrates, and helps mitigate the heat island effect.



Figure 6 Green potential Left - tram lines in Flinders St, Melbourne (Photo credit: www-personal.umich.edu) Right - tram lines in a European City with sedum vegetation mats laid as groundcover for amenity and water retention purposes.

Greening the roofs of inner city buildings in Melbourne would create opportunities for local food production as discussed in section 8. It would also combat the urban island effects and evapo-transpiration of water in Melbourne's summer months, and insulate buildings in winter thereby reducing energy usage and costs. Pilot projects have been underway in the

city over several years and would benefit from a conscious direction to expand and diversify.

Growth potential associated with roof gardens is in some cases limited by the structural integrity of the buildings, particularly for the establishment of weighty gardens including trees or large areas of landscaping. Such 'intensive' green roofs, can be opened to public access thus increasing the amount of open public space. Some of the older buildings in the CBD of Melbourne could support these without alteration, and combine these with bars and restaurants as one does currently on Flinders Street.

There are however also multiple opportunities on smaller buildings for a variety of 'extensive' roof gardens, (those with a productive rationale) to be constructed successfully within Melbourne. In various conditions these could support the growth of dry meadow grasses, vegetables, mosses, cacti, and fungi. With Melbourne's ongoing drought conditions, dry garden beds (sedum and succulents) could be appropriate, and would involve less weight across a roof structure as substrate materials negate the need for intensive irrigation.

There are numerous species for inclusion in both intensive roof gardens and extensive roof gardens in the Australian context, including perennials, small low shrubs and herbs grasses and tussocks and ground creepers. Many of these could suit Melbourne's climate, and in addition to providing biodiversity and habitat, could supply urban nurseries, or retailers and residential customers in the immediate vicinity. Extensive roof gardens could continue to be implemented in areas of high density such as the Principal Activity Centres, or in the CBD.



Figure 7 Conceptual greening of a city through roof gardens. Photo credit: www.gardenvisit.com



Figure 8 Green roof tops.
Top left :Toyota roof garden, Japan (Photo credit: www.images.businessweek.com).
Top right: ACROS Fukuoka Prefectural Hall (Photo credit: www.topristfiles.wordpress.com)
Left - Roppongi roofscape, Tokyo (Photo credit: www.conradandpartners.com)

4.3 Possible initiatives

Water recycling and economic incentives

- Explore or showcase local examples of water and sewage recycling when upgrading or providing new facilities for greenfields and single site subdivisions. These are opportune times for the City of Melbourne to demonstrate sustainable water design practices on a variety of scales and intensity through consistently codified requirements in the local planning framework.
- Couple economic incentives with (revised) legal parameters to ensure the market also plays a creative role in developing new sources of water. Financial incentives could include reduced headworks fees applicable to new development when innovative technologies are involved.
- Conversely, elevate development levies and/or ongoing rate demands for infill developments which rely wholly on extended or upgraded public infrastructure.

Neither of these last two options would necessarily cost the Council over the long term. Reduced demand on existing utilities would either substantially delay upgrades inevitably required over time in all areas on the grid, or ultimately ensure that these are not required.

Feasibility studies

Conduct a series of feasibility studies in order to rationalise the spaces which may be available for productive technologies. Factors that will need to be taken into account include:

- Natural and climatic factors
 - Access to sunlight and rainwater
 - Access to materials
 - Harvest potential of recycled water (grey and black water)
 - Availability of energy within an efficient radius
 - Seasonal limitations

- Physical factors (roof spaces, underground spaces, vertical facades)
 - Dimensions of the space
 - Prevalence of flat surfaces (vertical and horizontal)
 - Construction Strength of buildings (additional weight bearing)
 - Working and packaging areas
 - Access to transport
 - Security of telecommunications

- Legal factors
 - Implications of zoning (and implications for future zoning and land use)
 - Land tenure
 - Tenancy agreements and business obligations
 - Role of the city as a producer

- Market factors
 - Availability of markets
 - Cost efficiencies involved in the production
 - Transfer and sale of goods
 - Supply and demand
 - Competition

Phasing in productive technology

There is no prescribed way in which the Council could move into a role of pioneering urban productive technology. The steps below are posited as a means of kick-starting the process, given that it must start somewhere. Initially the Council needs to complete its assessment of morphologies and future possibilities for densification, in order to reveal the potential 'land' available for productive use.

- Investigate the nature and type of production which could occur given Melbourne's changeable climate, access to raw materials and the available expertise in the city.

- Conduct a pilot study into several typologies of production using sites which may not be optimal, but which should identify key areas where urban agriculture and production of energy can be trialled
- Set up in a public space accessible at least for viewing by the public a demonstration project incorporating the most successful aspects of the pilot study. This is necessary in order to broaden the scope of the technologies being tested, but also in order to promote public acceptability of the potential use of space in this way.
- Incorporate aspects of liveability throughout new production areas; understanding the need for production technologies is one factor in the success of these projects but parallel utility is also paramount.

5 Morphologies – changing built form in Melbourne

Melbourne is a city of public space. This space is fragmented by road systems. Current planning policy forces a choice between public space and development. If public space can be integrated within developments and the potential public space increased by removing the choice between a footprint for a building and public space, greater flexibility will be offered to provide more for public enjoyment. The initiatives already exist, such as the roof top cinema on Swanson Street.

5.1 Urban form, good design and population challenges

Good design embodies all facets of sustainability combining natural and physical environments in a harmonious and functional way, promoting positive equity, and minimising effects on the environment.

It is a design philosophy that underlies initiatives such as the New Zealand Urban Design Protocol. Central and local government, the property sector, design professionals, professional institutions and other groups voluntarily commit to specific urban design initiatives. By promoting quality urban design, the Protocol aims to create towns and cities that are:

- competitive places that thrive economically and facilitate creativity and innovation
- liveable places that provide a choice of housing, work and lifestyle options
- inclusive places that offer opportunities for all citizens
- distinctive places that have a strong identity and sense of place
- well-governed places that have a shared vision and sense of direction
- healthy environments that sustain people and nature.

The Office of the Victorian Government Architect (OVGA) promotes the same all-embracing approach to good design that creates great living places and urban environments. The Office also believes that good design by its very nature takes social and environmental, as well as economic, factors into account. A series of design guide brochures is being produced by the Office. The first *What is Good Design* is available on its web site.

‘The scarcity of essential resources like water, and the possibility of environmental implosion, with global warming and climate change, challenges and alarms our personal and collective conscious,’ says John Denton, Victorian Government Architect. ‘It is unlikely that there has ever been a mandate to facilitate “demand changes” in how we live.’

It is an imperative that calls for better urban and rural environmental management; better education, health and transport facilities; greater choice and longer life—in short the growth of sustainable cities. That in turn brings a need for an integrated approach that does a better job of managing sprawl and explaining the value of density and mixed use environments, and engages all the stakeholders involved in its implementation.

Perhaps the biggest issue affecting Melbourne’s response to sustainability is population growth. Immigration and increasing life expectancies continue to

place pressure on land, natural resources and infrastructure. In spite of growing awareness of the scarcity of natural resources—water in particular—limiting sprawl and the use of the private car through densification is still seen by many as inequitable

So urban design, architecture, planning, bio-engineering and so on must all address common anxieties about these issues in practical, systematic, parallel and longitudinal ways.

5.2 What can we change about built form in Melbourne?

Several under-utilised ‘spaces’ within the city lend themselves to change to create a denser, but more liveable city.

Public open spaces

The city is privileged to have considerable open space yet there is demand for more. Open spaces act as lungs for the city and places of respite from the demands of daily life. There are few things better than lying on the ground in the shade on a warm day. This open space can be found where roads, rail or buildings have not been constructed and it is difficult to find more such space but there is considerable opportunity within the city. We could require roofs and podium tops to be turned in to public open space, freely accessible for large parts of the day. Planned in to new developments from the beginning, such spaces could be linked together above ground and a carpet of open space laid across sections of the city.

Street life

Streets can carry life as well as traffic. In Montreal, a city with a population comparable to Melbourne, the footpath cafes enliven the city during the summer months. ‘Streets and sidewalks become even more convivial as people sit outside, watching the street or chatting with friends. It’s a great way to extend street life into the evening. Even the most forlorn neighbourhood dive bar has a well-populated terrasse (sic) at midnight on a summer evening.’

The City of Melbourne manages an extensive network of roads, laneways and footpaths, which gives the Council the scope to redesignate some of these spaces for extended use by pedestrian traffic.

Underground

Going underground provides other options for extending the city. Cities such as Montreal have developed an extensive underground system which mirrors the central city area beneath the greater downtown area. The cold climate rather than pressure to densify drove ‘undergrounding’ here, but the result is an underground system which is permeable, walkable, safe, well used, and frequently punctuated by the metro train system. Retail hubs and other uses (Dawson College at Dawson Station in Westmount, Queen Elizabeth Hotel and centre above Bon Aventure, business towers directly over stations in Old Montreal) have proliferated above the train stations to ensure highly connected access. Recent urban design initiatives in Copenhagen even bring refracted natural light into underground spaces through prisms.

Melbourne has limited underground networks available to the business sector or for public use. Melbourne Central Station (which successfully combines a

transit hub with limited underground food outlets and retail) and the QV Centre are among the few retail areas which utilise space underground. A small section under Flinders Street near the station is another area where undergrounding has occurred and may have potential to expand in a northerly direction.

There are significant disused tunnel networks which have not been opened or explored for many decades. They represent all kinds of possibilities: underground transit corridors throughout the City Loop area; or water storage reservoirs, alternative energy generators or storage units of some kind for productive technologies in the future.

Signs create precincts

Good signage can create amenity and precincts, but it does need active design and management. Co-locating and reducing the size and ubiquity of bill boards and sandwich boards in itself creates more open space for pedestrians and street life. Creating a family of signs for distinct precincts contributes to creating the precincts themselves. They can also create amenity and a sense of the character of a place.

Heritage

In any discussion about changing the built form of Melbourne is a concern to preserve its heritage. How to achieve that depends on how 'heritage' is defined and one's purpose in preserving it. Some suggest that '[m]aking museums of our cities ossifies Society.' Others that retaining heritage brings the past and the foundations of the city into present memory and provides modern experiences connected with eras gone by.

Eclectic mixes of remnant buildings through history have provided for complementary redevelopment of land, each exposing and highlighting past eras through their very juxtaposition. Think of the Uffizi gallery and the Palazzo Vecchio, while in Venice the Byzantine cathedral is framed by the classical arcades of the Piazza San Marco.

The *Environment and Planning Act 1987* (Vic) Melbourne strengthened the heritage provisions and many buildings have been added to the Heritage Register. While we need to preserve true heritage, slavishly adopting preservation can restrict progress.

5.3 Possible initiatives

Policies, rules and standards can be used to create and maintain liveable public space rather than simply functional space.

Focus of public space

- Designate public space not only on ground plane but also mid building or at rooftop.
- Allow buildings to make connections at higher levels between public spaces, creating an access network above the ground plane
- Require all commercial developments in the city to provide public space equivalent to minimum 50% of their footprint while maintaining continuity of the street

- Adjust planning rules to accommodate the difference eg: 1.5m footpaths to 2.5 – 3m for seating, disabled access and planting/street furniture.
- Reassign lanes from car parking to discourage the use of cars in CBD, and also maximise pedestrian and outdoor usage.
- Give the public realm precedence, by elevating it beyond the utilitarian and industrial uses of the colonial cities of Australia's past. Melbourne has successfully started this with the Bluestone pavement initiative to mark space, create identity and note common purpose.
- Regulate infrastructure in the streets to avoid deconstructing street and pavement fabrics and disrupting the indoor-outdoor flow and utility of a 'café-style' area by the public. For example choose smart locations for drain covers and telephone wiring.

Signage to create and recreate spaces

- Avoid bulky encumbered signage for example, sandwich boards which further clutter the pavement, or bill boards. Instead, use overhead attachments, lighting, façade design on buildings to reinforce and advertise, preserve character and establish amenity 'ground-rules'. Use City Plan 2020 to achieve these things through design guidelines, colour palettes and so on.
- Rationalise signage to preserve the amenity of a specific area.
- Use signage to create precincts and sense of place through branding/re-imaging.
- Embellish and complement heritage precincts with signage, engage landscape architects to design and complement the architecture and the planning imperatives.

6 Sustainable construction – building for life support

‘Sustainable building’ is a concept that has grown from the idea of ‘green’ or ‘environmentally friendly’ building techniques. It brings together a concern for the environmental impacts, economic considerations and the social implications of the ways in which we design and manage our buildings over their lifetime. It applies the principles of sustainable development to help people make better decisions about the buildings we live and work in.

Some suggest that new ideas need new forms. ‘Inflexible buildings hinder the evolution of society by inhibiting new ideas.’ Rogers laments that new buildings are little more than entries in a company balance sheet. Profit alone determines their form, quality and performance. ‘Our bottom-line economics... offer no incentive to invest in ecological technologies that will pay off on the long term.’ ‘This strategy is the anti-thesis to (sic) sustainable thinking...”

Inherent in the concept of sustainability is the notion of productiveness at the building level. A self-sustaining building incarnates all the principles of ‘environmentally friendly’ design. Such buildings are not just fancies on an architect’s drawing board, they already exist.

6.1 Possible initiatives

Any initiatives adopted by the City of Melbourne can be enforced through revised building codes and/or other policy guideline booklets. Residential customers and developers must then refer to them when designing a home or commercial building. Information and, if possible, enforcement of newly created standards is key.

Natural light and windows

- Slimmer/composite buildings to allow better access to daylight.
- Use multiple glazing options and shutters on windows which will allow buildings to be open during the day and breathe at night.
- Use ‘smart glass’ which when opaque screens direct light and polarises to become transparent on cloudy days.

Natural cooling and heating

- Exploit the thermal mass potential of buildings.
- Design aerodynamic roofs that allow circulation of air, capture wind, collect contaminated air and funnel it to other places (see Southern Cross Railway Station as an example).
- Exploit the ‘stack effect’ for ventilation. Floors are connected to an open atrium where air collects in the empty space. Warm air is drawn to the top of the building. Cooler air collects in the space left at the base of the building.
- Use water in courtyards or rills to aid convection of cool air.
- Site buildings to take advantage of passive solar heating and cooling.
- Circulate cool water/groundwater.

Power generation

- Produce on-site electricity using turbines on the roof or walls.

- Penalise non-conformance with the requirement to connect to the grid.
- Offer financial incentives to disconnect from the grid.

Water recycling

- Recycle water on a city block or micro-neighbourhood scale

7 Liveable housing – turning the tide on Melbourne’s sprawl

7.1 The 2030 challenge

Melbourne 2030 is, fundamentally, a conservation regime to ensure the city’s ‘green wedges’ remain available for agricultural and other rural purposes—at least for the foreseeable needs of future generations. However it continues to point developers towards constructing land-intensive communities along lineal growth corridors within the urban growth boundary (UGB). The more we allow sprawl, the more important the wedges become in terms of non-prescribed future uses, to mitigate the effects of sprawl and other impacts of increasing urbanisation. In addition the UGB needs to become increasingly rigid to ensure that these non-built areas remain. Yet the pressure on the UGB and green wedges continues.

According to the Melbourne Urban Development Program, the city will need an additional 634,500 dwelling units by 2031. Couple that with the trend to bigger houses and smaller households over recent decades and the extent of the challenge to *Melbourne 2030*’s precepts becomes clear. Buxton and Scheurer suggest Melbourne’s development needs could be met through three scenarios:

- greenfield sites (by definition in the outer city fringe)
- infill areas such as activity centres and ‘land bank’ sites where major development is anticipated or in fact already built, and
- within existing built up areas.

These areas are currently zoned according to either historical land use patterns, activities currently permitted on site or future uses determined by the VPP and/or *Melbourne 2030*. This does correctly indicate the land available to achieve the physical densities of Melbourne’s projected population growth. But it does not represent the range of possible solutions which could be employed to mitigate and even reverse the sprawl. In fact, the very notion of ‘density’ may be under-utilised.



Figure 9 Densities in Australia: (left to right) 8 dwellings per hectare; 19 dwellings per hectare (white) and 25 dwellings per hectare (orange).

Photo source: www.Googleearth.com



Figure 10 Densities in Eastern Docklands, Amsterdam: left - 130 dwellings per hectare, and right - 528 dwellings per hectare Photo source: www.Googleearth.com



Figure 11 Densities in Catalan District, Barcelona, Spain. Photo source: www.Googleearth.com

7.2 Changing notions of density

'To persuade people to give up suburbs and their quasi-rural ambience, they have to be offered urban qualities that are absent in sprawling cities: vitality, diversity, options for a wide mix of activities, social amenities and cultural facilities,' says Girardet. Sustainable cities are a matter of density and high density delivers two major benefits: conservation of resources, and greater social interaction by virtue of the city's compactness.

Neighbourhoods and community

New estates are often promoted as 'instant communities' (RJ find ref – Caroline Springs, Waterways Estate etc) but they are often devoid of the 'nooks and crannies' that older neighbourhoods offer. The character of a neighbourhood was once created through varied street widths and topography, mature trees and diverse vegetation, and variations in the age and styles of housing. Neighbourhoods which grow and intensify in an organic and less prescribed manner are rich with these attributes, and by their very

make-up can be easily defined as 'communities', 'neighbourhoods', 'localities' and 'environs'.

The intangible qualities which people who live there understand, recognise and enjoy on a daily basis are equally difficult to quantify and represent in a city plan. Nonetheless they are the very factors which create a neighbourhood's uniqueness and continued desirability. Property values support the fact that 'desirability' (or indeed liveability) of areas increases due to socially connecting factors, such as strong interaction between neighbours, service providers and strangers.

Critics of urban 'intensification'

Agreement on the benefits of high density cities is not universal. Breheny questions whether a more compact city really delivers more than the quality of life in suburbia, regional development, a green city and telecommunications rich dispersal. With urban intensification comes the risk of 'town cramming' where so much is happening in such a small space that other problems arise. Air and noise pollution, lack of greenery, congestion and environmental degradation as communities go beyond the land's carrying capacity. He argues that a UGB is naïve because of the extent to which we have already decentralised.

Seeking a balance

Much of the argument centres on travel and quality of life. Energy consumption and sprawl are presumed to be inextricably entwined, but densification may not change people's need to travel away from the city. Specialist services and recreational pursuits that need space cannot be located in every area. Perhaps specialising these amenities into clusters is the solution, a mediburb for example. That would allow people to combine trips and travel only once to meet a number of needs. The disincentive to create such clusters is that no one lives in these areas. Do they workers then live there? Do we end up zoning residential areas by profession?

Others suggest pockets of high density amid medium density rather than abject densification. That would not increase the average density, simply reinforce the variation where it can best be absorbed. Such an approach would see intensification of land uses around existing transit corridors or creation of towers interspersed with green strips—urban forests, urban ecology and wildlife habitat. Section 9.1 discusses one proposal already posited for inner-Melbourne suburbs.

In all this one must take care with heritage. Oxford demonstrates how amenity can suffer due densification and the market eventually reflects this. Market controls have also been suggested as more effective instruments to control sprawl than planning controls. The ever-increasing price of petrol may eventually exert its own influence.



Figure 12 Amsterdam: variable densities and morphologies and extensive green areas Photo source: www.Googleearth.com



Figure 13 Hong Kong: variable densities and morphologies with extensive green areas Photo source: www.Googleearth.com

7.3 Public housing/affordable housing

Public housing offers an opportunity to showcase and celebrate sustainable design in what are traditionally neglected projects. A forward-thinking public sector can take the initiative and provide a non-market led example to raise the profile of cutting-edge, sustainable design. Such initiative challenges the perception within the industry that low-income, migrant, elderly, unemployed or otherwise 'low priority clients' are simply grateful to have a basic roof over their heads rather than seeking exciting, stimulating, functional, practical and purpose-built developments for their families.

One of the best ways to get fresh ideas into the sector is a design competition, which is the path taken recently by the Office of the Victorian

Government Architect and Office of Housing with the support of the Royal Australian Institute of Architects. Living Places is a design competition for suburban housing in Dandenong seeking innovative proposals for new low to medium density housing. Tower Turnaround focuses on innovative proposals for existing high-rise housing in Footscray. Proposition 3047 is an urban design competition to revitalise six locations in Broadmeadows. The competition sought creative responses to redevelop the railway station precinct, which included offices, shops, community facilities and housing.

A number of factors must be considered in designing sustainable housing developments.

- It must be sited strategically within walking radius of community infrastructure, public transport and existing town centres rather than located in socially/economically undesirable areas. Space for engagement must be redesignated from vehicles and include green space.
- Lot to building footprint ratios must be revised through better designed spaces such as co-locating and centralising facilities within courtyard spaces or shared facilities.
- Its energy usage must be reduced through passive solar gain and natural cooling.
- Building materials must be used to better advantage. Brick and solid wood frames are no longer required for strength. The thermal mass of masonry must be considered before use—it should be centralised within the structure to maximise radiant heat benefits.
- Communal needs such as prayer and home occupations must be identified and catered for.
- A building's identity should be based on the actual performance of the building and be site-responsive rather than badged with the same 'look'.

As well as public sector constructed housing, there are community-based housing options.

Community housing is rental housing for low to moderate income or special needs households. It is managed by not-for-profit community based organisations whose activities are subsidised by government. Community housing aims to provide housing that is affordable and secure, and invites tenant participation in its management.

The LOTS (Living Over the Shop) initiative makes use of empty and abandoned spaces above commercial and retail properties in London to provide housing for homeless people. The government-sponsored program was developed by the Living Over the Shop Charity in response to a growth in homelessness while some 800,000 homes owned by large (and cautious) private and institutional landlords remain empty.

Habitat for Humanity is an international organisation that helps people in need of housing build it themselves. The state government subsidised Group Self Build projects in regional Victoria operate along similar lines.

7.4 Possible initiatives

- Require affordable housing to be a portion of all housing development in the city
- Require all parking developments to provide affordable habitable space for use as workshops and incubator spaces for industries
- Establish schools and community centres to support demographic diversity

8 Food – learning to reharness our resources

Domestic garden produce once formed the basis of a home cooked meal. Now a family's meal of chicken with four vegetables is likely to have travelled over 38,000 km to the dinner table and used 52 megajoules of energy getting there. Improved transport networks now bring food from all over the country and the world to our kitchens and restaurants, but it may not be sustainable. Herbert Girardet suggests 'we urgently need to examine how sustainable our food systems are, and whether we should supply more of our foods from close by.'

Ventures such as the 100 Mile Café seek to reduce carbon emissions and transport costs by promoting food and beverages sourced within 100 miles of Melbourne. There is also the potential to bring our food production closer to home by literally putting it in the backyard or on the roof or in a community garden.

Urban agriculture

Urban agriculture has been adopted on varying scales in some of the most densely-populated cities in the world. Shanghai with a population of 17.5 million has retained 42 per cent of its land mass for intensive agriculture. In the exponentially expanding Dar-es-Salaam (current population 2.5 million) 67 per cent of families are engaged in farming.

Australia and Singapore are among the few locations in the world exploring urban food production rather than just building green spaces. The Urban Agricultural Network of Australia (UANA) advocates using food wastes from nearby shopping strips or shopping mall restaurants, cafes, food stores and food services as nutrients of urban productive technologies such as permaculture, and vegetable growing. Urban agriculture has the potential to provide fresh vegetables, fruits, herbs, fish and crustaceans around or above retail food stores, restaurants, and other food outlets. It can also reduce urban air pollution from diesel transport and methane pollution from landfill.

In Australia the term 'permaculture' was coined in the 1980s to describe permanent agricultural projects that also provide for cultural needs or the social aspects of developed areas. The focus is on the productive food needs of people rather than simply planting for ecological reasons. 'Every plant is selected to provide or support some direct yield for people.' Through a local planning framework, permaculture represents one method of urban food production. It might also be expanded to include house design and sustainable living arrangements for whole communities.

Farming the rooftops and walls

The rooftops of inner city buildings in Melbourne create opportunities for local food production. At the same time, rooftop and vertical gardens would combat urban island effects and insulate buildings in winter thereby reducing energy usage and costs.

Intensive green roofs are weighty gardens including trees or large areas of landscaping. The number of such gardens is restricted by the structural integrity of buildings. But there are multiple opportunities on smaller buildings for gardens with a productive rationale. Walls can carry smaller loads in pots and trellis systems.

Community gardens

Community gardens have been a feature of many cities for years and some of the most inventive schemes have been put in place by city councils in Le Courbousier-style housing blocks similar to the Housing Commission projects in North Carlton, Fitzroy, Flemington, Collingwood and Richmond.

Internationally, unused land either surrounding housing blocks or in centralised courtyards has been transformed into vibrant and productive community garden schemes involving the residents as caretakers and urban farmers. The Urban Oasis Project in Salford, Manchester, converted wasteland surrounded by 100 apartments into a range of varying garden schemes including orchard, vegetable production, flower gardens, a meadow and a pond. The New York City Botanical Garden started the 'Green Up' program in the Bronx the late 1990s. The program provided horticultural advice, technical assistance, and training to residents, community gardeners, school groups, and others interested in improving urban neighbourhoods through greening projects. A regional compost education program composts newspapers, kitchen wastes and green wastes to produce high quality soils for the gardens.

Matching consumption with local production

While Melbourne does not face the same perils of food security as some international cities, neither are we producing food locally at a similar rate to consumption. For the concept of local food production to graft, we need to dare to imagine new methods, technologies and renewed uses for public and private space.

Droege calls for urban agriculture to "be an essential planning priority of all renewable City programmes". Melbourne could make provision for these activities in the planning documents, as legitimate and proactive means of combating climate change, adding to the city's regenerative biomass, and contributing to local food production on multiple scales.

8.1 Possible initiatives

New uses for public space

- Investigate the potential of a wide range of urban agriculture initiatives throughout the CBD, and high or medium density areas of transit cities and activity centres.
- Encourage the use of disused land, or under-utilised land such as road reserves, rail corridors, freeway median strips as productive land (orchards, vegetable gardens or more intensive systems).
- Investigate collaborative (shared) use of school playgrounds and community spaces to allow for open space to be used more creatively.

New use for waste

- Extract plant nutrients from urban organic wastes via vermiculture (worm farms) or other Council sponsored/lead business/community initiatives.
- Explore innovative organic waste management in shopping strips or shopping malls, through the planning approval processes for new retail outlets over a certain footprint (with corresponding 'roofprint').

Roof and wall agriculture

- Develop and implement a measure of a building's 'roofprint' in order to gauge and assess the viability of rooftop production proposals in the planning permit process. A ratio of biomass development land vs. open space could be formulated to ensure a basic requirement of productive potential is met on all new buildings, and significant alterations to existing buildings.
- Develop a business model and training/operational manuals for an urban rooftop micro-farm concept.
- Enable rooftop production of biomass such as vegetables via organic, water-saving irrigation systems.
- Encourage the use of rooftop and other green spaces to 'farm' insect pupae and worms for feeding to fish, and market supply.

Fish farming

- Investigate pisciculture (fish farming) in dedicated freshwater areas (such as the Yarra could provide), or in secondary treated sewage waste water.
- Encourage the use of aquaponics technology combined with urban waste management to produce fish wastes, and complement rooftop hydroponic growth.

9 Transport – moving with ease

The success of a city relies heavily on the ease with which its inhabitants move around as they conduct their daily lives. Transportation systems should not dominate the city nor should one form of transport exclude all others.

9.1 Integrated transport design improves liveability

Discussion of sustainable transport planning centres around reducing congestion by reducing the number of trips made by private cars; sustainable transport equates to seamless public transport networks combined with cycling and walking. Low density suburbs make investment in public transport less viable, hence the imperative to plan new developments and transport concurrently. We need to plan development around transport instead of transport around development.

Operation Double Fault takes a transit-oriented approach to development along the Glen Waverley train line. Proposed by a consortium which includes NAB, Macquarie Bank, builder Theiss, engineers Sinclair Knight Merz and British architects Nicholas Grimshaw, the project would build new 'villages' through the rail corridor. Under the plan stations at Heyington, Gardiner, Kooyong and Tooronga would go underground. Notorious level crossings on Glenferrie, Toorak, Tooronga and Burke Roads would also disappear. Above, the new linear suburb would already have one of the most desirable amenities—ready access to public transport. If successful, the development could become a model for other subways and linear suburbs.

The other facet of integrated transport design is reducing the need to travel. If residents can work close to (or at) home, congestion on both roads and public transport is eased. The need to travel away for work, education or community facilities has its costs in the effects on health of air pollution and lower physical activities. Developing suburban hubs has the potential to reduce outer-suburban levels of depression and isolation due lack of transport options and neighbourhood facilities.

9.2 Densities to support public transportation

Density is the single most important factor associated with transit use. Lower densities tend to encourage car use because there is an inherent conflict between lower densities and good public transport systems. As density increases, car ownership and vehicle distances travelled decline; public transport use and cycling and walking increases.

Freeman blames planners, architects, and local governments for reducing high urban density as well as for the low densities of suburbs. These densities make facilities difficult to provide without imposing a degree of car travel, which is environmentally damaging.

Newman and Kenworthy conclude that some policies can save significant amounts of energy, mainly by 'increasing the urban density; strengthening the city centre; extending the proportion of a city that has inner-area land use; providing a good transit option; and restraining the provision of automobile infrastructure.' They advocate a policy of new mass rail transit systems for the 'inefficient' cities.

9.3 Making public transport an attractive option

Changing perceptions about public transport is as important as developing the networks in the first place. For those accustomed only to driving, public transport is quite mysterious and people are often unwilling to try something of which they have no knowledge or experience.

Yarra Trams has put a lot of effort into promoting its services and making them familiar. Positioning itself as a good corporate citizen, the Yarra Trams Go For Your Life Melbourne City Romp raised money for the Burnet Institute. The company also sponsored the new parents lounge at the Royal Children's Hospital. It markets to special events at the MCG, Telstra Dome and Melbourne Park for the AFL, tennis open and Grand Prix. It uses celebrities to promote public transport and the positive effects of taking the tram to work. Making use of new communications technology, the company provides timetable information by text message, e-boards at tram stops and dial-in information for the sight-impaired.

While Yarra Trams is a good example of promoting public transport, the whole network must also be attractive. Connections between pedestrians, cyclists, trams, buses and trains must be seamless. Better coordination between timetables will promote higher use of these systems. Earlier this year, the proposal to ban bicycles from peak hour trains and subsequent protests illustrated the need for careful co-ordination and imaginative solutions.

Fare reductions for multiple trips can also encourage heavier use of the system.

9.4 New transport options for Melbourne

There is no reason to restrict public transport development to the current mix. Ferry, ultra light rail, flexicar (including electric flexicars) options, and civic or private rental of bikes all meet different needs.

9.5 Streets

Thoroughfares have become so congested with cars and trucks that trams and buses using the same streets are no longer attractive transport options. Far-sighted municipalities have gone so far as to close major highways through the city, so the space can be used for other purposes. We can establish larger areas with mixed modes of transport sharing the same road area as we have done in the Bourke Street Mall. Elsewhere, cities have mixed pedestrians and cars where speeds are kept slow.

9.6 Possible initiatives

- Free bikes and other vehicles for local trips
- Large sections of the city set aside for slower moving forms of transport in shared space (walking, bikes, slow vehicles)
- Intermodal coordination

10 Implementing change – looking beyond a common deadline

10.1 Planning policies

Without anticipating the city planning proposals, it is clear that these changes will require an analysis and revision of city and regional planning policies, the manner in which the city plans, monitors and then develops benchmarks for liveability so that its guiding development in the desired direction. In particular this will require new protocols with a focus on performance goals, not prescriptive regulation, in order to encourage innovation as the community seeks to achieve these ends.

10.2 Municipal strategic statement performance monitoring

No longer can we afford to maintain various areas of interest in silos. Key to our success will be integration of the full range.

We simply do not have time for gradual change—in the way we plan, design, build or think. The urgency is too great to wait for behaviour to change at an individual level. Stronger regulatory systems are needed to bring about required change quickly. So decision-makers and politicians must be key players. They must make big decisions even though they are likely to meet initial opposition. Saying ‘maybe’ is not going to achieve the required change. And the time we have to make these decisions is so short. We have to hasten our thinking and make the big decisions at incremental stages.

10.3 Corporate social responsibility – what can business leaders teach us?

The challenges we face demand large-scale changes in the way we operate. Innovation drives the market so commerce has a key role to play in introducing change quickly. Yet those market forces must also learn how to act sustainably.

Companies all over the world have learned that operating sustainably has direct business benefits. The concept of corporate social responsibility (CSR) is based on the principle that ‘today’s economic activities must not compromise tomorrow’s quality of life.’ So arises the ‘triple bottom line’—the economic, environmental and social implications of a company’s products and processes.

What it takes to build a sustainable company mirrors in many ways the changes needed to build a sustainable city. Among them is the importance of broad stakeholder involvement and the need to be open to innovation. ‘A vibrant CSR strategy helps drive change from within a company by highlighting issues, stimulates internal dialogue, and is often used as a tool to challenge business leaders on their performance.’

CSR as a model that has undergone many years of testing, offers direction for a city looking to head down more sustainable paths.

10.4 Community consultation – intra and intergenerational equity

Education and health care

Underlying the drive for sustainability should be a concern for social wellbeing. The design of our city must meet social as well as economic and environmental needs. How do we all remain healthy in a changing environment?

The Office of the Victorian Government Architect (OVGA) promotes well designed teaching/learning environments in conjunction with the Department of Education. The aim is to increase pride, participation and greater interaction. Both bodies continue to participate in design and educational research programs. (See the Good Design Guide on the OVGA web site. Go to www.dpc.vic.gov.au and search for government architect.)

Others are also taking the initiative. The Heart Foundation collaborated with planners and social agents to produce “Healthy by Design: A Planners Guide To Environments For Active Living”. And the Healthy Cities programs operate in Melbourne and abroad.

Environment is also a major consideration in health care. The OVGA promotes design that improves recovery times through more relaxing environment taking into account air, natural light and acoustics. Perhaps there is also potential for greenery and active participation to aid in recovery processes, for example adopt a plant for the chronically ill.

We need to find methods by which we can plan for social improvements, short of social engineering. This will involve negotiating better use and structure of neighbourhoods and the CBD public realm. There would be adequate provision for pedestrian infrastructure and allowance for full accessibility and future needs. There would be accessible play equipment and public amenities—‘disability’ would be mainstreamed. It would involve innovation in the design and provision of services, multi-functional landscape elements for example.

Incorporating sustainable design principles into work places can improve morale and increase productivity. The CH2 building provides an example.

Consultation

Involving the people for whom plans are being made in the planning process has significant benefits no matter how high level those plans are. There are many resources available to support public participation.

- www.iap2.org - the International Association for Public Participation has a toolbox of methods. The Australasian chapter also provides a range of resources on its web site: www.iap2.org.au
- www.changemakers.net - Changemakers has thousands of examples of ‘social innovation’ from around the world. It is funded by the Ashoka Foundation, an organisation of private philanthropists working on systemic change for social issues.

- www.mediate.com - “the world’s dispute resolution channel” offers many resources and links to articles.
- www.vlgaconsultation.org.au - the Victorian Local Governance Association’s designated website for consultation and community engagement.

10.5 Implementation tools

In developing a more sustainable city, we are seeking achievable and cost-effective means of implementation while revolutionising the way we collectively think about the world and our place in it. With such vast change in behaviour and thinking required, the development of a sustainable city must be undertaken on a number of fronts:

Growth management strategies: Planning Policies, Rules, Regulations, monitoring and enforcement; Zoning role and limitations

Informal and voluntary mechanisms: eg; carbon credits, carbon tax, rent relief, subsidies, tax breaks, other business incentives etc

Educational opportunities: ‘good citizen’ incentives, neighbourhood programmes, passive and active participation in the structure and function of a future city.

10.6 Possible initiatives

A vision for liveability

- Make clear the policies surrounding urban sprawl and growth management.
- Ensure consistency between Melbourne 2030 and City Plan 2020.
- Explore the Activity Centres and the areas outside them (mixed urban village concepts) Reinforce the individual loci as sustainable hubs within the larger city itself. The CBD is just the largest and most functional of these hubs, rather than being a discrete and isolated.
- Ensure collective responsibility; form community groups with specific purpose. Tap into volunteering nature, civic pride, sense of self-worth and guardianship programs.
- Develop an urban design framework or protocol for each sector – community, housing, industrial and so on.
- Identify key redevelopment areas in the city such as Federation Square and Railway Square, and make sure there are brown-fields implementation policies in place. Ad hoc competitions without an underlying structure or strategy will lead to more Federation Squares throughout key citizen spaces.
- Establish a hierarchy of master plans but within an integrated and cohesive urban design and environmental structure. Activity Centres are a start.