

**HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON
ENVIRONMENT AND HERITAGE**

INQUIRY INTO SUSTAINABLE CITIES 2025

RESPONSE FROM THE GOVERNMENT OF WESTERN AUSTRALIA

**COMMENTS ON THE ISSUES AND QUESTIONS RAISED IN THE
DISCUSSION PAPER *SUSTAINABLE CITIES 2025: A BLUEPRINT FOR
THE FUTURE***

Achieving sustainable cities requires a totally integrated approach to the many facets involved to ensure that the different policies, instruments and relativities are all working in harmony rather than dissension, which may happen when each is considered in isolation from the others. Building the policy framework to achieve this harmony should be the primary focus of this Inquiry.

The approach taken in the Discussion Paper is one based on traditional ecological principles that emphasise the protection of the environment, heritage and green spaces, and the reduction in energy use and waste. One of the keys to sustainable cities is to develop sustainable urban structuring principles, as these are the building blocks to good urban form. The paper shows limited understanding of this, nor of best practice in this area.

The Discussion Paper should include specific consideration of air quality management and land management, use and release. The latter is one of the most effective ways of avoiding unsustainable city growth and development. A potentially powerful growth management technique is redirecting growth to 'brownfields' (that is, existing developed areas) rather than 'greenfields' (undeveloped areas), to areas where redevelopment can be beneficial to overcome decline, and to areas where the use of existing infrastructure can be optimised. Significant infrastructure cost-savings can be made by increasing average net residential densities in fringe developments, and by managing or sequencing the release of new urban land to optimise capacity in infrastructure, especially social and community facilities like schools.

The Western Australian Government takes a holistic and integrated approach to sustainability as demonstrated in the development of *Hope for the Future: the Western Australian State Sustainability Strategy* (SSS) and manages urban growth through its *Metropolitan Region Scheme* (MRS), *Metropolitan Development Program*, *Country Land Development Program*, *Liveable Neighbourhoods Code* and several related planning policies. It is also currently developing *Greater Perth* – a new long-term strategic plan with a vision based on sustainability and the reflection of sustainability principles (see Attachment 2 for more details on these different initiatives).

1. PRESERVE BUSHLAND, SIGNIFICANT HERITAGE AND URBAN GREEN ZONES

Bushland preservation guiding principles are outlined in the International Convention on Biodiversity and the World Conservation Union guidelines for urban environments. Nationally, the 1996 *National Strategy for the Conservation of Australia's Biodiversity*, signed by the Heads of Government, seeks to establish a representative system of protected areas.

At the State level, in 2000 the Western Australian Government introduced *Bush Forever*, its policy and plan for the conservation and management of bushland on the Swan Coastal Plain portion of

the Perth Metropolitan Region (PMR). The experience in implementing this policy and plan provides valuable lessons for this Inquiry and is heavily drawn on in formulating this section.

Metropolitan Retention Targets

The *National Targets and Objectives for Biodiversity 2001-2005*, sets objectives and targets for ten priority outcomes that the Commonwealth, State and Territories should pursue between now and 2005. It identifies target retention levels of 30% for ecological communities, specifying that 'by 2003, all jurisdictions have clearing controls in place that prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750; and have programs in place to assess vegetation condition. However, this target needs to be considered in a wider context of metropolitan regions including needs for housing, jobs and essential services. We must recognise that the well being of people and ecosystems is interwoven.

Compared with some other cities, Perth has a significant amount of native vegetation. However, for a number of ecological communities, the city is struggling to meet its self-imposed 10% target based on the World Conservation Union Guidelines because of the history of past clearing. With this in mind, the 30% target established in the Commonwealth Government policy should be clarified as to how it should be applied in the PMR, and other cities, particularly as its achievement would be beyond any city in Australia and could work against other sustainability objectives such as limiting sprawl and maximising the use of infrastructure.

Liability

Bush Forever avoided private land, where possible, and land committed for development. However, in order to meet the 10% target some land in these categories was identified. It is clear from experience elsewhere, that Government acquisition alone will not meet the objectives of achieving a conservation system to meet biodiversity objectives. In recent years, additions to the regional open space system in Perth has seen the liability of the Government climb to a maximum sustainable level and the Government can only commit itself to reserving and acquiring areas of highest conservation value and lands which present the community with the best 'value for the conservation dollar'. For example, the total cost of acquiring all lands in *Bush Forever* could be around \$485 million. *Bush Forever* sites will therefore be protected through a range of mechanisms, including:

- reservation and acquisition of sites of the highest conservation value. To achieve this, the Government has agreed to set aside up to \$100 million over the next 10 years;
- a range of 'off-reserve' complementary mechanisms for private rural landowners to encourage private land management for conservation, including: land covenants, voluntary management agreements, advice and financial incentives (including potential rate and tax incentives) from public and private agencies. Some form of rural negotiated outcomes may also apply where a landowner is not interested in conservation management and this may require consideration being given to subdivision for conservation, for example, rural bush blocks and the concept of a revolving fund. The latter involves government acquisition, covenanting and on-selling to a landowner interested in conservation management and has proven very successful in other jurisdictions; and
- negotiated planning solutions which generally apply to 'up-zoned' lands (land zoned Urban, Urban Deferred and Industrial, or reserved for a public purpose) and aim to achieve a balance between the needs of conservation and development.

The success of the above measures will largely depend on providing a range of incentives to private landowners, clarifying existing property rights and flexibility in the planning system.

Private Property Rights

Private landowners or companies hold the majority of vacant rural land in the PMR and many have

an expectation of future development that might not be realised through the normal planning process, irrespective of *Bush Forever*. Although speculative, many landowners feel that bushland protection and other environmental issues constrain their ability to use their land and that they have a 'right' to development or, if constrained, should be compensated at urban values. This places considerable stress on the landowner and the planning system alike.

The Productivity Commission has recently released a draft report on its inquiry into the *Impacts of Native Vegetation and Biodiversity Regulations*. As part of this process it is important to clarify the rights and expectations of landholders and to address the speculative aspects of land ownership and general duty of care.

In addition, although private conservation may have limited application in the urban context because of the speculative nature of ownership, there is a need for increased incentives for private landholders who wish to manage their land for conservation. For example, through income tax relief mechanisms for on-going stewardship of the land, which may not necessarily be tied to conservation covenants, as the take-up of such covenants in the urban context may be limited. Perhaps a sliding scale of incentives relating to the level of long-term protection attached to the land should be provided.

The preservation, maintenance and restoration of 'green zones' throughout cities is essential to support and maintain an ecological balance within human settlements, and can be achieved by:

- acknowledging, making explicit and quantifying both the intrinsic value and social amenity value of the natural environment and heritage sites;
- aligning strategies for bushland and 'green zone' preservation with compact/density land development; and
- addressing land use options to balance 'biodiverse-rich' areas with recreation areas.

The Western Australian Government achieves heritage conservation principally through its *Heritage of Western Australia Act*, and the SSS which recognises heritage conservation as a sustainability objective and describes the benefits in the following terms:

"Heritage conservation does not stand in isolation, but is inseparably linked with economic development, tourism, urban 'liveability', reduction of waste, and the social cohesion of communities. It is a major asset in promoting goals in these related areas, and it helps provide the 'glue' that holds them together.

The benefits of heritage conservation are often discussed in social terms: heritage contributes to an understanding of ourselves and the development of our society; and heritage enhances the continuity, familiarity and beauty of our surroundings. However, heritage can also have important economic benefits that are sometimes overlooked, including the following:

- *Heritage conservation attracts people and investment as a result of its positive effect on urban amenity or liveability.*
- *Heritage conservation stimulates and supports tourism.*
- *Heritage conservation creates proportionately more jobs than new construction, and provides better local expenditure-retention in regional areas.*
- *Heritage conservation promotes cost-efficient and energy-efficient building practices (eg, less demolition waste)".*

Following are comments on the *Questions for Consideration*.

Does the inclusion of green zones within city planning result in further urban sprawl, which has a greater detrimental effect for the environment by encroaching on more surrounding bushland?

'Green zones' and higher-density development can be mutually achieved and do not need to result in detrimental environmental effects or encroach on surrounding bushland. Increasing density as urban infill or new 'greenfield' or 'brownfield' developments can provide and preserve shared public green spaces (either as parkland or bushland) within the development areas.

Logic would suggest that additional 'green zones' in urban areas could lead to urban expansion. However, in the Perth context, there are large areas of land available for urban expansion in between the 'green zones' and the *Bush Forever* program provides a framework to plan future urban areas. Sprawl in Perth tends to be driven more by market forces for coastal development and low-density development, land availability and cost and past corridor planning along transport corridors. However, there have been some suggestions by the development industry that 'green zones' increase infrastructure costs and inefficiencies in the use of public infrastructure, particularly where the 'green zones' are at the urban front and development occurs beyond them, with knock-on effects in the price of future residential lots driven by increased infrastructure costs. This requires further investigation.

Irrespective of this, 'green zones' perform a number of functions aside from their biodiversity protection values, including recreation and aesthetic values for the community. With this in mind, close proximity to the urban areas and the population as a whole is essential if the community is to derive wider benefits and a sense of ownership.

In order to limit encroachment on peripheral bushland, the challenge is to prevent the inclusion of indiscriminate green space and to provide the 'intelligent' green space necessary to achieve required levels of urban amenity.

There are different types of 'green zones' as referred to in this paper. There are many arguments for and some against these different types of 'green zones' in city planning, however, none can dispute the fact that in the case of Australia's trend for comparatively low-density cities and seemingly endless supplies of developable land, have resulted in problems of urban sprawl at the cost of sustainability. To suggest that 'green zones' add to the problem of urban sprawl is not accurate, as open space, or 'green zones' should not be treated as a luxury, more so a result of sound and good planning, and ensuring the conservation of environmentally significant areas.

For example, the MRS contains many 'green zones' under the single banner of 'Parks and Recreation'. Some of these areas include existing or planned 'active recreation' opportunities, or public space that caters for the recreation needs and amenity of people living in the city as well as for its visitors. These areas also include areas of native bushland, waterways, wetlands, national parks and water reserves. In the case of Perth, they include the Gnangara and Jandakot Groundwater Mounds which are the city's main water supply areas.

In many cases, the inclusion of 'green zones' in urban areas is a minimal requirement, and in many cases, these 'green zones' are areas that either should not or cannot be developed due to their nature, being significant natural areas within the urban zone, or essential requirements for amenity and recreation requirements. Wetlands, waterways and significant bushland areas must be protected when planning a city, as must areas be set aside for passive and active recreation. If in any given city, this represents a high proportion of 'green zones', it may be a reflection of the fact that the city has been built in an area with high natural attributes (assets). This will be reflected in the nature and composition of that city.

The issue becomes one of how best to accommodate a city within an area that may present more natural constraints than others, by looking at aspects of zoning densities, careful planning and urban form. It is essential to recognise that when planning any city,

environmental constraints are given high priority, and where necessary levels of protection as state assets (for example the Swan and Canning Rivers in Perth). A well managed land use planning process should ensure fringing bushland or other natural areas are not subject to threat or encroachment, and alternative solutions to developing fringe areas (or continuing sprawl) are sought.

Options, such as urban development boundaries, increased density within existing urban zones, urban re-vitalisation, increasing commercial/social opportunities in neighbourhoods and creating important urban centres away from the central city zone (such as, Bunbury, Geraldton, Albany) as alternatives where good employment, social and economic opportunities exist, should be considered.

Having public open space can encourage higher-density living in cities as each block may not require its own garden and lawn.

What are possible impacts of either increasing or limiting the proportion of urban bushland and urban green zones?

The potential retention of all remaining areas of native vegetation in Perth to meet the 30% target if it were inflexibly applied would have considerable impact on future growth of Perth. For example, considerable areas in the north west corridor have extensive areas of bushland zoned for urban development with potential cost and land supply implications if urban development was to be prevented. Conversely, the *Dialogue with the City* community consultation program recently showed strong support for an urban growth boundary and higher-density areas along transit nodes and urban hubs.

The level of 'green zones' has to be set at a limit that is sustainable in terms of the ecological function of the 'green zone', with an increased emphasis on viable conservation nodes and linkages, while also allowing for the wider needs of a growing city.

Potential beneficial impacts of increasing the proportion of bushland and urban 'green zones' include:

- increased eco-system health and robustness;
- increased community amenity and recreation activity; and
- increased social and individual physical and psychological health.

From a land development Industry perspective an increase in land set aside for bushland preservation and the creation of 'green zones', restricts the amount of land remaining for 'greenfield' land development – in effect rationing a type of 'product' available to new home purchasers. This may have flow-on impacts or indirect impacts on land pricing, the building industry, home affordability and State and Local Government tax bases.

A balance needs to be sought as does the provision of open space, which has function and well-thought out size and form.

Indiscriminately increasing the size of the 'green zones' will require more land at the urban fringe without necessarily increasing inner urban amenity.

Indiscriminately decreasing the green space will result in the lowering of urban amenity, potentially a greater cost over time than the loss of land at the urban fringe. Some of the impacts would be:

- loss of important natural features, wetlands, waterway foreshores, vegetation or bushland, etc;
- decreased amenity and passive recreation opportunities;
- less active recreation opportunities;
- reduced air quality;

- significantly reduced character/feel of the city ('concrete jungle');
- loss of any flora and fauna corridors or links to waterways and wetlands; and
- socially, less opportunity for recreation resulting in significant social issues and families having to travel outside of the city for any recreation opportunities.

Can green zones be multi-purpose - serving the recreational and social needs of city dwellers while also providing habitat and environmental benefits for native flora and fauna?

'Green zones' perform a number of functions and, therefore, it is essential that they service and are managed for multi-functions to encourage a sense of community ownership and to ensure the ecological sustainability of the other functions they perform, for example, water quality, land degradation, groundwater protection, etc.

There should be careful management through management plans, which will ensure healthy and diverse bushland, parkland and 'green zones' that provide ecological benefits as well as recreational and social activities.

Some areas may need a stronger conservation emphasis and others recreation. In effect, the end result may be a mosaic of areas of different functional values from full protection for nature conservation to informal passive recreation to active recreation. This should form part of a Metropolitan Greenspace Strategy.

However, it must be realised that once a natural habitat is disturbed or modified it is never the same again. Nevertheless, significant restoration in cities can be achieved due to the more intensive applications of labour and technology to land and waters. Greater restoration of urban ecology is set out in the SSS (section on sustainable urban design). It suggests Local Governments in the city be facilitated to develop biodiversity regeneration programs and act as 'Arks' for their region.

There are many examples of where this is very successful and has resulted in a significantly higher standard of living and 'feel' of a city. Perth has examples of good use of natural features integrated with the built form. Wetlands and waterways are a major feature of the Swan Coastal Plain, and these form part of the unique and diverse range of habitat and environmental benefits, when compared with many other major cities.

Opportunities for passive recreation include cycleways around or along wetlands and waterways, passive walking trails, raised boardwalks, bird hides, to name a few. There are many examples also of where bushland or wetland areas, where preserved and well managed, enhance the values and social amenity of developed areas.

Is it appropriate to provide incentives to encourage partnership arrangements with landholders and developers to preserve remnant vegetation on private lands?

Yes. Incentives should take into account landowner expectations, property rights and compensation issues.

How do we ensure that preserved sites of built heritage are culturally valued and appropriately integrated into planned developments?

By:

- identifying and protecting heritage places (in Western Australia through the *Heritage of Western Australia Act*, and through guidance of Local Government town planning);
- improving knowledge and awareness of the condition and value of the built heritage;
- providing incentives and bonuses to the developers and eventual owners of the heritage assets;

- providing non-regulatory mechanisms for promoting conservation outcomes including planning and financial incentives;
- best practice in infill development within heritage areas; and
- ensuring that 'sustainable building' policies and programs recognise the important role of heritage conservation to savings in energy consumption and demolition waste (recognising that refurbishment is more efficient than demolition-and-rebuild, and that building and demolition waste comprises over 50% of all solid wastes disposed at landfill in the Perth Metropolitan Region¹).

Much of the necessary work sits at the State and Local Government level. At the Commonwealth level, more specific strategies could include:

- improving incentives for owners to conserve their properties through:
 - tax incentives in line with reforms since 1999 for nature conservation; and
 - improved grant aid;
- the specific reforms recommended in a report to be considered by the Local Government and Planning Ministers Council in February 2004, which notes that incentives for built heritage in Australia are extremely limited, when compared with the scale of demand, incentives available in the natural environment, and incentives offered by governments in a number of OECD countries;
- providing seed funding for Revolving Funds for short-term acquisition-conservation-and-resale, as has occurred in relation to nature-based Revolving Funds in recent years; and
- improving Commonwealth Government agencies' practices in the management of their own heritage property (noting that the new *Environment Protection and Biodiversity Conservation Act* provides for Commonwealth Heritage Management Guidelines to be established).

The Vancouver case study offers its own comment on this question:

"[New land] Development [in Vancouver] has also been concentrated on publicly owned vacant sites, land severely impacted by the rail system, and land which is underutilized or derelict. By concentrating construction on these land types, local government has allayed community fears that the development was out of character for the local area or that redevelopment within station precincts would compromise existing lifestyles".

Conversely, the pursuit of higher-densities near transport hubs in Australia without regard to the built heritage in these areas, is potentially destructive and conflict-ridden.

How do we ensure that public green zones are integrated into new developments?

Biodiversity and bushland protection issues require policy status in the plans and strategies of governments and should be recognised as a legitimate land use by planners, developers and land valuers, and as part of an area's essential environmental infrastructure (such as water quality, erosion control, air quality, recreation, etc) to enable an area to be developed.

Forward planning is an essential component to ensure appropriate areas are recognised early in the planning system prior to commitments, land acquisition programs by developers and structure planning processes are put in place. Land use certainty and consistency is the key.

For the land developer, there are various strategies available to achieve preservation and enhancement to 'green zones' such as increased density and plot ratios to allow for more compact development whilst ensuring greater open space that embraces recreational use with the inclusion of native species (endemic) biodiversity landscaping.

¹ *Summary Report of Waste to Landfill, Perth Metropolitan Region (1 July 1998 – 30 June 2002)*, Waste Management Board, Government of Western Australia (2003), p. 19.

Strategic planning and policy (decision-makers) should identify and protect significant natural regions before planning takes place. In Perth, the 'Region Scheme' approach has ensured protection of many natural areas and recreational areas through 'Parks and Recreation' reserves owned and managed by the Crown. Much of this responsibility lies with decision-making authorities, ensuring that adequate means are in place to ensure the planning system and agencies are able to identify these areas, and ensure they are appropriately integrated in strategic planning processes, so that subsequent statutory planning occurs within these frameworks. Policy should also be in place, such as Western Australia's *Statements of Planning Policy*, to ensure priority is given to environmental and natural considerations through the planning system.

There is also the need for the development and planning industry (Private Sector) to recognise and value the retention and protection of natural areas when carrying out development. Where opportunities exist, well planned and managed integration of 'green zones' within development areas needs to be recognised as a 'development advantage', not an unnecessary constraint. This may be offset by increased densities or density bonuses in other areas within the site, and when integrated with social (local) neighbourhood opportunities, will present a well-balanced and successful development.

2. ENSURE EQUITABLE ACCESS TO AND EFFICIENT USE OF ENERGY, INCLUDING RENEWABLE ENERGY SOURCES

Several government processes are currently underway, both nationally and in Western Australia, with aims that relate to many of the issues raised in the Discussion Paper. These include the development of a *National Framework for Energy Efficiency*, which is a joint States and Commonwealth initiative overseen by the Ministerial Council on Energy. At the State level, the structure of the Western Australian electricity supply industry, and the regulatory arrangements governing the industry, are being reformed. It is anticipated that one of the outcomes of that reform process will be an increased capacity for renewable energy generators and demand-side options to play a role in the Western Australian electricity market.

The Discussion Paper makes reference to the need to increase the efficiency with which energy is used and to decouple economic growth from energy use. The need to increase reliance on renewable energy receives less emphasis and is attached to a caveat that it should be increased 'where possible and appropriate'. This emphasis is reversed, however, in the *Questions for Consideration*, with most of the questions relating to distributed generation, renewable energy, energy self-sufficiency and green power, and only one of the questions relating to the strategy of increasing the efficiency of energy use. Not only is the lack of emphasis on energy efficiency in the *Questions for Consideration* at odds with the discussion section above it, but it appears to be at odds with the many studies, both within Australia and elsewhere, that have identified very significant scope for cost-effective energy efficiency improvements in all sectors and for increased reliance on demand-side participation in energy markets. These studies have shown that in terms of reducing the environmental impacts of energy production and use, energy efficiency has a potentially very important role to play.

There is wide scope for the adoption of energy-efficient practices (or more broadly, demand management, which includes changes in patterns of consumption to manage the peak demand and greater use of distributed generation) by the residential, commercial and industrial sectors. Many of these available opportunities are not currently being utilised and this has been attributed to a number of factors. Some of the factors commonly advanced to explain this failure are:

- the lack of a nationally consistent framework that costs the environmental and social benefits of increased energy efficiency, such as the reduced emission of Greenhouse gases and local pollutants;

- a lack of information and understanding by end users of the opportunities for energy efficiency and demand management available to them and of the cost-benefits of taking up these opportunities;
- high up-front cost, which can deter individuals and businesses from investing in energy efficiency options even where the payback periods are very short;
- barriers to demand management participation in the electricity market, such as a lack of price signals, which recognises (when appropriate) the benefit of a demand-side response over network augmentation or increased generation;
- cultural factors, such as end user preferences for simplicity, convenience and 'luxury', and a lack of understanding or concern about environmental issues, will limit the up-take of energy efficiency by end users; and
- the involvement in energy efficiency of markets other than just energy markets, such as electrical appliances and housing, and the involvement of actions that cross traditional business boundaries (for example, in the case of land developers and tenants of commercial buildings).

Following are comments on the *Questions for Consideration*.

How might we implement a shift from the existing large-scale energy generation and distribution infrastructure towards an alternative model?

In terms of the need to facilitate a shift away from large-scale, centralised energy generation plant and a reliance on transmission and distribution infrastructure to supply the energy produced to end users, and towards an alternative model consisting of smaller and more distributed energy generation, there is a need to ask whether the environmental, economic and social benefits of such a shift would outweigh the costs of making that transition.

Increasing investment in distributed generation (such as renewable energy generators and co-generators located adjacent to load centres) into the existing network will have benefits up to a point in that it can reduce network losses and, therefore, reduce generation and network augmentation requirements. However, distributed generation does not provide the economies of scale that can be achieved with larger-scale, centralised electricity generation. In addition, a distribution network allows generators connected to the network to provide a back-up for intermittent generators on the network, such as those utilising solar and wind energy. Without the network, there would be a need to use energy storage or back-up systems in conjunction with distributed generators, which would significantly increase the costs of supplying electricity in that way.

How can the uptake of renewable energy for residential and commercial properties be promoted?

There are many different ways that renewable energy can be utilised in the residential, commercial and industrial sectors in cities. Households or companies can choose to install a renewable energy electricity generator, such as a photovoltaic array, or a solar hot water system on their houses or buildings. They are also able to contract with an electricity generator or retailer to ensure that their electricity, or a portion of it, is produced from renewable energy sources. The renewable energy generator may or may not be located close to their property or even within the city borders (which illustrates a potential difficulty, where energy is concerned, in separating decision-making for cities and for regional areas). It is often the case that locations with good renewable energy resources do not coincide with load centres or with locations that are appropriate for the utilisation of the resource. In most cases, for example, there are likely to be real restrictions on the ability to locate wind energy turbines within a city area.

What are the impediments to utilising renewable energy sources in residential, commercial and industrial areas and how might these be addressed?

As with energy efficiency, there is a range of economic, financial, structural, technical and cultural barriers to the increased use of renewable energy. The key barriers are:

- the lack of a framework that puts costs on the environmental and social impacts of electricity generation, such as the emission of Greenhouse gases and local pollutants. Thus, these benefits of renewable energy generation over conventional fossil fuel-based electricity generation, are not recognised in the market;
- the high cost of producing energy from some renewable energy sources or technologies. This is particularly the case for some of the renewable energy generators that are suitable for city locations, such as rooftop photovoltaic systems. It presents a barrier to their purchase by households and businesses;
- barriers to renewable energy participation in the electricity market, which can include having to compete with a monopoly electricity utility, difficulties in gaining access to distribution networks, weak price signals, difficulties in securing financing, treatment of balancing issues which disadvantages intermittent generators and information asymmetry which disadvantages small players. These issues are currently being addressed in Western Australia within the electricity reform process;
- community concerns about the perceived potential negative impacts (such as loss of visual amenity and production of noxious substances) of some renewable energy generators, such as wind farms and waste-to-energy plants. This level of concern is closely related to the siting of proposed renewable energy projects, the planning and environmental approval processes, and the perception and understanding of these processes and their impacts in the community; and
- the lack of understanding in the community of issues relating to renewable energy and renewable energy technologies. Many individuals and businesses are unaware of the renewable energy options that are available to them and have misconceptions about the technologies, including perceptions relating to their reliability, or lack of reliability.

The barriers to energy efficiency and renewable energy have been the subject of considerable debate and many strategies have been advanced for reducing or addressing those barriers. These include:

- introducing a national emissions trading scheme;
- providing subsidies to renewable energy generators;
- appropriate restructuring of the industry or changes to current regulations and market rules to facilitate the inclusion of renewable energy and demand-side options in the electricity market;
- developing a planning and policy framework in which the environmental, social and economic costs and benefits of energy efficiency and renewable energy projects can be adequately assessed. This would ensure the development of appropriate projects (including appropriate siting) and to address community concerns and perceptions about the projects and the approval processes; and
- providing information to the community about renewable energy technologies and related climate change issues.

Should renewable energy generation be promoted at the single dwelling level or across city regions?

Both.

Are there economic, and hence social, implications of a city increasing its use of green power and developing new complexes which are predominantly self-sufficient in terms of energy generation?

There are significant, positive economic implications.

Should higher efficiency standards be mandated for all new dwellings, appliances and business operations?

The *Building Code of Australia* (BCA) currently mandates a minimum level of energy performance for all new and refurbished houses. The BCA includes the option for demonstrating compliance with the minimum performance through the use of a rating tool, the *House Energy Rating Software* (HERS). Currently, in order to comply, a building design must achieve a minimum rating of 4-star performance using the software. These tools are designed to take account of the iterative nature of technological improvement and it is highly likely that this minimum level will be increased in time to a 5-star or higher requirement as the software and housing technologies are developed. It is recognised that mandating the minimum energy performance of new dwellings is only a partial solution as the energy used by a household depends not only on the design features of the house, but also on how the occupants use the house. Any proposal to legislate with regard to the behaviour of householders in order to minimise household energy use, however, would be difficult to regulate in a practical way and, therefore, somewhat problematic in its effectiveness – certainly education, awareness-raising and supporting efficient technologies are worthwhile pursuits. Further, it would be highly contentious and, therefore, unlikely to be regarded as a politically acceptable option.

The extension of the BCA energy-efficient measures to commercial class buildings is underway and this should assist in reducing the infrastructure demands placed on cities by new dwellings. Development of these requirements should be integrated with the development of Minimum Energy Performance standards for appliances, and could be developed along the lines of performance indicators, such as energy use per square metre for lighting or the coefficient of performance for heating and cooling equipment. Consideration could also be given to extending these requirements to existing building stock over time.

The energy efficiencies of appliances and equipment are covered under a National Appliance and Equipment Energy Efficiency program, which mandates a minimum standard of energy efficiency for certain appliances and other products. This program has been highly successful and is likely to be expanded to cover further types of electrical equipment. Effectively, the program eliminates worst practice by ensuring that only those new appliances with a level of energy performance above a set minimum are permitted to be sold in Australia. Accelerating this process and expanding the range of equipment covered under the program is crucial to reducing the environmental impact of energy use in the built environment. The Ministerial Council on Energy is currently developing a strategy for implementing this process.

How can residential and commercial developments incorporate renewable energy generation into planning and construction?

Using renewable resources in construction and energy generation and saving infrastructure.

To what extent should public and private transport systems seek to change to renewable energy sources?

It is critical that all modes of transport, as far as practical and economically feasible, avoid the use of unsustainable energy sources, and, over time, as existing infrastructure is upgraded.

Simply minimising the use of oil-based energy sources is insufficient in the longer-term as a total transition in the public/private vehicle fleet will need to be made at some time. There is a need to plan for completely sustainable alternatives.

It is sensible, in the short- to medium-term, to develop transport systems that allow for a shift from oil to gas and then to completely sustainable sources in the longer-term.

There is little need for Australia to research new vehicle designs as this is being done elsewhere in organisations and countries that have the capacity to fund such work. However, given Australia's climate and regional presence, it may be useful to trial new technologies.

A national strategy for transport energy use should be developed and maintained, which focuses on a whole range of options for not only public transport vehicles, but also private and commercial vehicles.

No cost-effective renewable energy public transport options are likely to be available in the short- to mid-term. One of the new technologies considered to have the potential to improve transport fuel efficiency is the fuel cell and fuel cell buses that are currently being trialed in cities around the world (and will be trialed in Perth from 2004). These buses, however, are fuelled by hydrogen that is usually produced from natural gas. These types of technologies are generally considered to be transition solutions towards a renewable energy transport system. The hydrogen could be produced from the electrolysis of water using renewable energy. However, this is regarded as a longer-term possible option.

3. ESTABLISH AN INTEGRATED SUSTAINABLE WATER AND STORMWATER MANAGEMENT SYSTEM ADDRESSING CAPTURE, CONSUMPTION, TREATMENT AND RE-USE OPPORTUNITIES

The principles of 'integrated urban water management' and innovation in design and management of both stormwater and wastewater are supported. This includes strategies to:

- reduce levels of consumption, especially potable water;
- capture and re-use both stormwater and wastewater (greywater); and
- promote at-source treatment of stormwater, such as permeable roadside swales and slotted pipe technologies.

Following are comments on the *Questions for Consideration*.

Should cities of the future be looking to develop more localised small scale systems of urban water management?

Although this has been proven to be largely inefficient where it has been trialed, it should definitely be considered. In the future, it is likely to improve in efficiency due to increasing economies of scale in production of small treatment plants and knowledge of best practice management.

This approach focuses urban planners and engineers to look at all opportunities to utilise and re-use local water resources more efficiently and with less environmental impact, before consideration is given to importing water from adjacent catchments or exporting wastewater or stormwater to downstream receiving water bodies.

What scale of residential water management systems is most efficient and sustainable?

This question requires further investigation. It is likely that this will vary across Australia depending on the local climate and catchment characteristics. It may also vary between supplying water and managing wastewater in the same locality.

There is a certain amount that can be done at lot level and the remainder could be done at sub-regional level. For instance, in Perth's sandy areas garden bores are installed on individual lots.

How do we transform existing developed city areas into more sustainable water management systems?

There are many opportunities within existing developed city areas to progressively move to more sustainable water management systems. This can be achieved through:

- replacement of obsolete equipment with more appropriate infrastructure;
- tax incentives at household level;
- 'demand management';
- changing community behaviours;
- exploiting every opportunity to modify both public and private infrastructure to capture and use rainfall 'at source'; and
- modifying drainage systems to capture and retain high-frequency low-intensity rainfall events (which actually comprise over 90% of total annual rainfall volume) and only 'overflow' in high-intensity rainfall events, which may only exceed retention or storage capacity about 10 to 15 times per year.

How do we encourage areas to abandon existing waste water systems, which may discharge to the ocean or other waterways, in favour of alternative waste water treatment methods?

Regulatory and market-based instruments (MBIs) should be introduced to recover the full lifecycle cost of these systems from the beneficiaries, through their utility service provider, including the costs of rehabilitating or managing the environmental degradation or harm caused by the existing systems. While this issue continues to be avoided and only the 'collection and disposal' service up to the end of the discharge pipe is charged or cost-recovered, there will be no incentive for the majority of the community or for the current service providers to change. In Western Australia, the *State Water Strategy* has established a 20% re-use target by 2012 which is forcing change.

What incentives or market based instruments might be appropriate for residential and commercial enterprises to encourage responsible water consumption and re-use?

Incremental levies: standard water usage is not penalised, but as the usage increases so does the rate per unit.

Pricing should reflect the total cost of providing a water service. Options and customer behaviour impacts of different pricing for different grades of water should be investigated. However, care should be taken about offering subsidies for lower-grade water as this may have unintended consequences of actually increasing use.

Are more standards and guidelines needed for new development to minimise waste and storm water and to maximise capture and re-use opportunities?

State, Territory and Local Governments have already produced many standards and guidelines. However, each region requires differing standards. For example, clay soils require completely different management from sandy soils.

The great need is for increased education and capacity-building in the water industry to change practitioners' current practice and behaviours that have been in place for over 100 years. It almost needs a generational change. What we should not be doing is continuing to educate the next generation of practitioners in what is now recognised as unsustainable practices.

The ability to innovate for stormwater disposal is greatly impeded by predicted peak stormwater water flows (that is, 1 in 100 year peak flood predictions) that are used by local authority engineer requirements. The engineering requirements associated with the predicted peak flows are prescriptive, which require compensation sumps to be constructed for all developments regardless of other proven innovative solutions. The effect is valuable land (either as bushland, public open space or freehold lots) being held exclusively as storm flow sumps. Consistent and coherent policy and performance-based standards need to be developed for innovative stormwater disposal that promotes at-source treatment of stormwater such as permeable roadside swales and slotted pipe technologies.

4. MANAGE AND MINIMISE DOMESTIC AND INDUSTRIAL WASTE

The principles and practices of 'cleaner production' and 'eco-efficiency' are supported, and it is recognised that mixed-use areas both in and between residential and industrial areas are critical to sustainable cities and can be achieved by:

- classifying industry types beyond the broad 'light, general and heavy' classifications to allow for appropriate mixed-use residential/industrial/commercial areas centred around transit nodes;
- encouraging buffer transitions to allow clean eco-efficient low-emission industries to be located close to employment, transit and commercial nodes; and
- promoting industry initiatives to reduce resources to landfill and develop and support more efficient land development and construction practices (such as the WA Sustainable Industry Group (WASIG) at Curtin University which promotes, develops and supports cleaner production and eco-efficiency within Government, industry and the community throughout Western Australia).

Western Australia is increasingly including mixed-use zonings in both industrial and residential estates, and has long demonstrated innovation in co-locating industries for 'closed-loop' production cycles (that is, where one industry's 'waste' is used as a feedstock or 'recourse input' for another (adjacent) industry).

The *Strategic Direction for Waste Management in Western Australia* is consistent with the Discussion Paper and seeks to map out the actions required in Western Australia.

However, some of the strategies involve action at a Commonwealth level. For example, providing tax incentives to encourage investment in cleaner production infrastructure resulting in accelerated depreciation of capital. The Commonwealth Government can also influence product design through extended producer responsibility provisions or direct negotiation with industry to enact product stewardship programs to minimise product lifecycle impacts.

Following are comments on the *Questions for Consideration*.

How does a sustainable city bring about attitudinal change and encourage its inhabitants to accept greater responsibility for waste minimisation and management?

Outcome 8 of the *Strategic Direction for Waste Management in Western Australia* refers.

Attitudinal or behavioural change (that is, encouragement to accept greater responsibility for waste minimisation and management) at an individual level can be treated as two separate aspects. Current initiatives in Western Australia (most notably the Southern Metropolitan Regional Council strategy) have focused on influencing behavioural change. This has resulted from the recognition that whilst attitudinal change may have more desirable and longer-term benefits, the ability to affect attitudes is more difficult than strategies for behavioural change.

WASIG is actively involved in promoting, developing and supporting cleaner production and eco-efficiency within Government, industry and the community throughout Western Australia. Amongst the several Western Australian Government agencies which are signatories to WASIG's *Cleaner Production Statement*, LandCorp is active in supporting efficient land development and construction practices as well as reducing resources to landfill.

Education and financial incentives or disincentives are a possibility. An informed and participative community will allow each individual to take responsibility for action and assist in the effective management of wastes. The initial focus would have two parts – promotion and education to allow individuals to participate in collection services designed to support existing and future infrastructure.

Waste Management

Western Australia is developing resource-recovery treatment systems to manage municipal and some commercial wastes. The effectiveness of resource-recovery is dependent on reducing contamination levels in the incoming waste stream. Reducing problematic or hazardous components from the collection systems is important to achieve this end. Individuals need to know how to interact with these systems if the resources recovered are to maintain a value and be re-used.

To achieve this, a better understanding is needed of the residual waste streams, which currently go to landfill, and investigation of the cause of this. Answers to these questions can then form an input into the promotion and education programs.

Changing consumption habits

Influencing purchasing choices is about developing a better understanding of product lifecycle impacts and promoting this to the consumer. Eco-labelling for water and energy consumption is one aspect, but understanding the end-of-life impact is also important. The consumer has a right to know what happens at the end of a product's life.

Use of media to highlight the issues surrounding problematic wastes (computers, NiCd batteries, televisions, used tyres, whitegoods, etc) is the first step to behaviour change. This should be focused on getting consumers to ask the question about end-of-life impacts and assist governments in negotiating stewardship or take-back schemes for these products, essentially promoting and creating a demand for this service. This will allow the end-of-life costs to be factored into the purchase price of the goods.

What types of industry are appropriately located within cities, and how do sustainable cities respond to production processes and waste treatments that exist to meet city consumption patterns but occur outside of city limits?

Outcomes 5 and 9 of the *Strategic Direction for Waste Management in Western Australia* refer.

All but noxious industry should be able to co-exist within city limits. Noxious industry by its very nature requires significant operational and safety buffers.

Appropriate siting of these facilities is essential to the success of any transitional strategy. The type of industry needs to be negotiated with the general community and locally. Western

Australia is working in partnership with industry and the community to locate a suitable planning precinct for managing hazardous/industrial waste.

This is largely a state and local issue and is best dealt with at this level, however, there may be a need in the short-term for a national facility to treat wastes, such as PCB's or OCP's, where the supply of these wastes is not economic on a State basis.

In addition to the partnering process required to identify appropriate sites for these facilities, there is a requirement to protect these from urban encroachment. Poor planning decisions have been made that generate conflict over incompatible land uses around existing facilities. Planning control mechanisms are required to prevent this from happening once these facilities are established.

What strategies are appropriate to encourage eco-efficiency and the reduction of domestic waste?

Outcome 2 of the *Strategic Direction for Waste Management in Western Australia* refers.

Reduction in the production of waste materials must first be addressed. Packaging must be minimised and recyclable materials should become the norm. This enables an eco-efficient community to begin to develop.

Understanding of product lifecycle and end-of-life impacts are required to achieve this. This can be mandatory on problem products which can then influence product design to minimise these impacts. Targets for recovery of problem wastes should be established and published and stable markets established for recovered materials.

What strategies are appropriate to encourage eco-efficiency and the reduction of industrial waste?

Outcomes 1 and 2 of the *Strategic Direction for Waste Management in Western Australia* refer.

Incentives are required to enable capital to be allocated to recycling of waste material for economic and obviously environmental gain. R&D programs require tax breaks for them to be a functional part of industry.

Industry plays a large role in eco-efficiency and waste reduction. This should be done at the earliest stage of product development, by adopting product lifecycle and end-of-life impacts into the design and manufacture. Strategies such as waste and energy audits, and cleaner production are essential.

A demand for these products needs to be created and the end-of-life impact factored into the purchase cost. This is a unique role for the Commonwealth Government which can mandate compulsory extended producer responsibility schemes.

There is also a need to identify and publish a priority list of these products and/or services to send a clear message to the industries responsible. Establishing targets for waste reduction or reducing end-of-life impacts, such as programs that have been initiated in Japan 2001 that have compulsory recycling targets on specified whitegoods. Governments can also influence this by showing leadership in purchasing.

Are there economic impacts for a sustainable city in dictating higher environmental standards and waste treatment?

Outcome 3 of the *Strategic Direction for Waste Management in Western Australia* refers which emphasizes the need to seek the highest resource use from any materials recovered from the waste stream.

There is an intangible positive social and economic dividend to communities involved in this approach to waste management. Investment in initial infrastructure will be expensive. However, once the initial outlay has been recouped, society is then ahead of the game.

Higher environmental operating standards will ensure the true costs are factored into any processes for waste treatment. This will provide opportunities for the establishment of small and innovative businesses in resource-recovery and hence the creation of new jobs. Support by way of small business development grants or minor infrastructure assistance can be employed to drive the innovation needed.

A working example of this approach in Western Australia is Pot Recyclers. This company has been established to recover the estimated 100 million plastic plant pots (equivalent to 8,000 tonnes of waste material) typically discarded to landfill each year. The company has now developed drop-off and collection services at participating nurseries then sorts, cleans and re-uses suitable pots back into the market and finally cleans and recycles the plastics back to the manufacturer. There are potentially several hundred businesses that can be established to manage aspects of the current mixed-waste stream.

What is the role of industry in ensuring sustainable cities, and what incentives or standards are appropriate to achieve this?

The industrial sector is the single largest user of resources and producer of waste. If industry can make significant changes then the impact on the community will be very noticeable.

Similar to the strategies for dealing with eco-efficiency, it is essential for industry to report on lifecycle and end-of-life impacts of their products and services. The way goods are presented to market, such as the use of packaging, are important. Design standards can be placed on products to ensure a significant percentage of those products can be recycled or are made up of recycled content. Design should be based on durability of product and ease of resource-recovery.

Use of a system employing mandatory advance disposal fees, coupled with rebates paid against achievement of reduced end-of-life impacts established by policy would provide the push-pull mechanism to drive these changes. This intervention is best dealt with at the Commonwealth level with co-operation from each of the States and Territories.

How can industry be encouraged to be more socially and environmentally responsible, and to work in partnerships with local communities?

Industrial responsibility and heightened activity in local communities can be encouraged through a process involving legislation, education and incentives.

Investment in local business to provide the necessary infrastructure to recover resources from the waste stream is an example of environmental and social responsibility. . Specifically, Western Australia, where transport distances to markets make many of the resource-recovery options marginal, would want to see industry encouraged to establish resource-recovery centres and other remanufacturing infrastructure to support a local market. This could be encouraged through MBI's that would provide the seed capital needed to develop the appropriate environment for business investment in this area.

MBI's are best developed and managed on a Commonwealth level but funding needs to be allocated locally to take account of the local needs or local market conditions. Examples could be investment into R&D of new building products from waste materials or infrastructure investment into businesses that could deal with problem wastes such as used tyres.

5. DEVELOP SUSTAINABLE TRANSPORT NETWORKS, NODAL COMPLEMENTARITY AND LOGISTICS

The growth and development of Australian cities has occurred since the end of the Second World War in conjunction with the growth of the automobile era based on the increasing use of cheap fossil fuels. Such settlement patterns are characterised by being widely dispersed, and containing a relatively low density of persons per kilometre. The resulting consequence of this low-density urban sprawl is that the phenomenon of 'automobile dependence' is now firmly entrenched and reinforced by the built form of these cities.

However, there are now serious concerns with this form of development given that global oil production is peaking and will become increasingly scarce and expensive in the medium-term. It is now widely recognised that the current pattern of development of Australian cities is unsustainable in the medium- to long-term and that steps must be taken now to change this trajectory of development. Access to, and availability of, viable energy sources will be a major strategic issue of the future and will affect the future prosperity of nations. The challenge for decision-makers is to facilitate a smooth transition from an economy that is oil dependent to one that can access and make efficient, equitable and environmentally sustainable use of diversified energy sources.

The *Sustainable Cities 2025* initiative is one step towards developing a broad understanding of the strategic development issues that will affect cities in the future while offering solutions whereby the Commonwealth Government can play a vital role in assisting a move towards a more energy-efficient and sustainable transport and settlement pattern for Australian cities.

Governments should:

- apply transport strategies and technologies as a service that facilitates the efficient movement of goods and people;
- prioritise nodal town and city centres around high-volume/frequency transit centres; and
- apply integrated urban planning to align transport logistics and routes with land use zoning for industry, residential estates and commercial activity.

Following are comments on the *Questions for Consideration*.

What initiatives can assist in the reduction of automobile dependence

Investment in public transport systems, end-of-trip facilities and walkable environments.

Recognition, support and development of compact mixed-use transit-oriented development (TOD) is key to the reduction of automobile dependence. TOD nodes are increasingly being developed in Western Australia as part of its sustainable urban development objectives. Critical to these initiatives is the education and awareness by the public and industry about the benefits of compact TOD, especially in established affluent inner- and middle-ring areas.

From the land development perspective, redevelopment and/or revitalisation around all railway stations to create high-density mixed-use villages or urban-centred nodes is key for the promotion of increased public transport.

The Commonwealth Government should review all transport- and access-based² taxes (*Fringe Benefits Tax (FBT)*, *Goods and Services Tax (GST)* and land taxes) and restructure

² An access-based tax could be, for example, taxes on the purchase of facsimile, internet or telephone services and equipment.

them to encourage sustainable alternatives to the private car, to discourage more and longer trips and discourage the purchase of less efficient cars.

Taxes on LNG/LPG should not be increased until a majority of vehicles are using these products. There is little sense in stalling movement towards an energy source Australia has in abundance. Taxes could be increased once most vehicles use gas not before! If the Commonwealth Government requires more revenues it should get it from increasing petrol and diesel taxes – an energy source Australia will need to wean itself off sooner than it will gas.

The Commonwealth Government can provide funding assistance through the *Australian Land Transport Development (ALTD) Act (s26)* for public transport infrastructure, services and behaviour change programs to increase public transport patronage and reduce car dependency.

Public transport is a national-interest issue impacting on all sectors of the community and should be funded by the Commonwealth Government. Currently, Commonwealth Government funding is skewed towards road projects: between 1998 and 2002, 94.5% of the \$6,317 million was allocated to roads with the remaining 5.5% allocated to interstate railways and one-off Federation Fund projects. A more balanced approach is needed if the projected increase in congestion levels caused by increasing car use is to be avoided. The work undertaken for the Australian Transport Council should be continued with the co-operation of the respective State and Local Governments. It is recommended that funding for public transport and other non-automobile transport modes be increased by a transfer of Commonwealth Government funding for urban roads, based on documented research and cost-benefit analyses.

Commonwealth Government funding can be directed towards Sustainable Urban Design Projects (similar to its earlier *Better Cities Program*), which aim to encourage sustainable modes of travel like public transport, cycling and walking. Furthermore, these funds can also be used to design urban settlements that reduce the need to travel long distances by facilitating the creation of fine-grained mixed-use communities. However, there is also a need for a performance measurement system or scorecard to assist in monitoring the performance of these developments in the context of delivering sustainable transport outcomes (namely, increased public transport modal split, reduction in household car ownership, reduction in vehicle emissions, increase in pedestrian/cycling patronage, etc).

State and Territory Governments can actively manage growth through controlled land releases that avoid leapfrogging from the development front, and balance 'greenfield' development with 'brownfield' infill redevelopment and densification. This initiative can be used in conjunction with the increased Commonwealth Government funding levels for public transport.

A series of financial incentives should be introduced to minimise fringe and ex-urban development. For instance, modification of the *First Home Owners Scheme* grants to include greater incentives for 'brownfield' development (more money for 'brownfields' as opposed to 'greenfields' development) and direct and indirect tax relief and stamp duty concessions. There is also evidence from the United States that other programs such as location-efficient mortgages can be introduced to encourage 'brownfield' development in appropriate areas.

There is a distinct and identified need to develop urban parking strategies and policies to be applied in capital cities and major regional centres. Following from the development of these strategies, Commonwealth Government funding initiatives aimed at reducing car dependency through parking management can be introduced. For instance, funding for cash-out strategies where employees are paid a sum of money for employer-provided automobiles or given public transport passes by employers to reduce parking demand in workplaces. This initiative is currently being implemented in the United States and to a lesser extent in Canada.

Another significant role for the Commonwealth Government is to reform the FBT and eliminate GST on public transport and on fuel used in public transport vehicles to foster greater use, especially employer-based plans. The United States Government has recently increased the monthly tax exemption for public transport travel costs from \$65 to \$100. Changes can cover:

- FBT exemptions for public transport passes provided by employers and FBT-free salary sacrificing for bicycles purchased by employees;
- a change to the FBT rate applied to how far the company car is driven ³; and
- wider coverage of FBT to parking provision.

Should new transport technologies, such as electric cars and buses, be promoted as alternatives to conventional fuels?

In the short- to medium-term Australia should maximise the national benefits that can be gained from its extensive gas supplies.

A comprehensive energy policy program should be developed

Mobility is only one form of access. The Commonwealth Government should work towards employing and strongly encouraging the Internet, telephone, fax and other non-mobility-based forms of access to goods and services.

Australia should support and trial non-mainstream, currently-available, alternatives such as the air powered car (see www.theaircar.com).

What are the features needed in new settlement areas to encourage more diverse and sustainable transport networks?

Compact TOD coupled with graduated densities relevant to radial distances from the transit nodes is a critical feature in 'new' settlement and infill planning and design.

Commonwealth Government funding can be directed towards Sustainable Urban Design Projects (similar to its earlier *Better Cities Program*), which aim to encourage sustainable modes of travel like public transport, cycling and walking. Furthermore, these funds can also be used to design urban settlements that reduce the need to travel long distances by facilitating the creation of fine-grained mixed-use communities.

More diverse and sustainable transport networks can be encouraged by:

- infrastructure - including new rail lines;
- urban design that features an emphasis on walking- and cycling-friendly streets – wide footpaths, cycle lanes, bus lanes and bus priority measures, grid pattern street design, a shift from 'big-box' style shopping centres to strip retail facilities, street-scaping measures such as tree planting on verges to provide shade, seating facilities, street art;
- human-scale developments based on the concept of 'Urban Villages' (and promoted in Western Australia by its *Liveable Neighbourhoods* design code) encompassing walkable 'ped-sheds' to public transport stops, pedestrian- and cycle-friendly streets designed in a grid pattern to increase connectivity and permeability;
- an emphasis on medium- to high-density TOD in areas well serviced by public transport. These activity centres would ideally include a mix of land uses including a variety of housing types, employment opportunities, leisure activities and entertainment facilities. An increase in residential density should aid in the cost-recovery of public transport investment and make provision in new areas economically viable; and

³ The current system encourages increased travel by reducing the FBT the further a car is driven. For sustainability reasons the tax rate should increase, not decrease, with greater distances.

- a coherent pattern of land releases and development to avoid leapfrogging. 'Greenfield' development to be co-ordinated with the introduction of new public transport and other community services (schools, shops, jobs and entertainment).

What is the role of the federal government in assisting metropolitan areas to restructure transport networks in line with more sustainable settlement patterns?

Public transport is a national interest issue affecting the current and future prosperity of the nation in sectors ranging from efficiency of freight movement, liveability of cities (health, environment, amenity, social equity and accessibility), the costs of road trauma and international pressure to reduce Greenhouse gas emissions.

The ability of the States and Territories to meet the economic, environmental and social challenges arising from the predicted growth in traffic congestion in our cities is beyond their fiscal capabilities and Commonwealth Government funding is essential if these issues are to be effectively addressed.

Like national governments in the United Kingdom, United States and Europe, the Commonwealth Government should take a leadership approach towards funding public transport, support behaviour change programs and reform the FBT which currently stifles public transport patronage.

The primary role for the Commonwealth Government is to create a structured funding program aimed at increasing public transport hardware and software technology and the use of effective behaviour change methods such as the Western Australian *TravelSmart* program. The Commonwealth Government can provide funding assistance through the *ALTD Act (s26)* for public transport infrastructure, services and behaviour change programs that will increase public transport patronage and reduce dependence on the car.

Another significant role for the Commonwealth Government is to reform the FBT to foster greater use of public transport, especially employer-based travel plans. Changes to the FBT can cover:

- FBT exemptions for public transport passes provided by employers and FBT-free salary sacrificing for bicycles purchased by employees;
- a change to the FBT rate applied to how far the company car is driven ⁴; and
- wider coverage of FBT to parking provision.

Taxation changes can also be used to influence employment location decisions which, coupled with better public transport, can help reshape cities into multi-centred urban environments that reduce the need to travel long distances while increasing accessibility to employment.

What are the needs of transport systems for them to be equitable, accessible and economically viable?

Transport systems need to be fast, reliable, comfortable, safe and integrated to provide for the varied needs of the travelling public. They should seek to optimise frequency, routes, travelling time and conveniences, such as parking, to encourage travellers to use them instead of the private car.

Trains should act as the 'spine' for transport services, with buses and local cycling/walking networks feeding into them.

⁴ The current system encourages increased travel by reducing the FBT the further a car is driven. For sustainability reasons the tax rate should increase, not decrease, with greater distances.

Is a more decentralised nodal type of transport network appropriate for commuter and traveller needs?

In isolation, yes. However, there are many other implications that must be considered as part of a holistic approach: for example, decentralisation may have potential broader negative impacts on cost of infrastructure and service provision as well as negative cost-impacts on low-socioeconomic groups.

It would only be appropriate if the respective urban form is consistent with a decentralised transport system (that is, intensification at regional nodes, implementation of shared-/mixed-use parking, good pedestrian/cycling links, affordable housing, a range of housing types, medium density, etc.)

There is a need for communities (nodes) to become as self-contained and self-sufficient as possible from an employment and goods and services perspective. Transport systems can then, with suitable land/housing/precinct designs, become highly non-motorised within nodes and motorised between nodes.

Western Australia's *Smart Growth* and *Liveable Neighbourhoods* are land use forms that contribute well to this form of transport system. However, it must be noted that there must be a measurement system in place to ensure that this type of urban form will be effective with respect to reducing the reliance on the private automobile.

There are, however, other designs other than 'decentralised nodal' that can work well. High-activity corridors should also be considered.

What are the transport logistics needs of industry and how can these be managed in a sustainable city?

Industrial estates need to be included in strategic urban planning to ensure appropriate location for their linkage to transport infrastructure (road, rail, ports and airports), and access to places of employment and commercial activity.

Efficient storage and movement of freight is crucial for the economies of both cities and the nation as a whole. The movement of freight within cities has the potential to significantly impact on the wider transport system by competing for road and rail space and the liveability of the city in general in terms of increased public concern about road safety and the movement of hazardous goods on public roads.

A 'business as usual' approach to handling the transport logistic needs of industry is unsustainable given future modelling scenarios and the challenge for the freight systems to accommodate growth in the context of changing community priorities, technology, economic conditions and environmental imperatives.

Logistics is concerned with the maximisation of efficiency in freight movement especially relating to that of road freight in urban areas given the projected increases in congestion and competition for limited road space. Operating efficiency can be increased by the development of a network of planned freight routes.

Currently, Commonwealth Government involvement in freight movement is largely restricted to the proposed *AusLink* program. Freight issues within cities fall within the *AusLink* urban links framework. However, funding is severely restricted and is only available for freight routes linking into major ports and interstate intermodal terminals. The *AusLink* framework does not address freight movement within cities, which constitutes the majority of freight-related logistical problems for industry and the wider community.

The Commonwealth Government should expand the *AusLink* framework to incorporate and address the logistical problems of freight movement in cities. Additional funds aimed at ameliorating freight movement inefficiencies can be used to identify and fix freight 'hotspots'.

Commonwealth Government funds can also be directed towards the development of purpose-designed freight routes (road and rail) to avoid conflicts with general traffic wherever possible.

Creation of a Commonwealth Government funding program for public transport hardware and software in major cities can reduce the number of private cars on the road thereby freeing up road space for more efficient movement of freight.

The Australian Logistics Council has identified the following issues on freight movement in cities:

- need to improve the balance in respect of the development of all freight transport modes;
- limited real modal choice available to logistics service providers;
- problems are created by future land transport network planning being subjected to influences that have a short-term focus;
- need to pay increased attention to the integration of land use planning and future freight transport demand;
- need to adopt a more balanced intermodal approach to the funding of freight transport infrastructure - roadways, railways and seaways into and out of ports;
- need to pay increased attention to protecting the on-going uninhibited use of infrastructure associated with nationally significant activities/operations; and
- need to consider the potential for the structure of freight transport demand to materially change in the future.

6. INCORPORATE ECO-EFFICIENCY PRINCIPLES INTO NEW BUILDINGS AND HOUSING

Buildings, and housing in particular, are the largest component of the built environment and have a major influence on the ecological footprint of communities. Housing also contributes to the development of social capital and the quality and accessibility of housing has been demonstrated in research to influence non-shelter outcomes such as health, education and employment ⁵.

Sustainable cities will need to take account of current demographic changes, particularly the ageing of the population and the trend towards smaller households. These trends will influence demand for housing that is adaptable, affordable and provides diversity and choice in style and location. The Australian Housing and Urban Research Institute (AHURI) submission to this Inquiry highlights these trends.

The Discussion Paper concentrates on the environmental sustainability of buildings and housing, but a sustainable city will be one that integrates environmental, social and economic sustainability, and ensures the provision of housing that will meet current and future needs, and supports the non-shelter aspects of housing.

Consideration also needs to be given to the current mismatch between the trends of rising demand for smaller houses yet increasing house sizes. Strategies to encourage housing that uses less resources and is less resource intensive are necessary. Some suggestions to achieve this could be:

⁵ Refer AHURI research, *Housing Assistance and Non-Shelter Outcomes*, June 2003

- research and quantify infrastructure and materials costs as relating to building size. This will resolve the debate within the project homes market on profit differentials for relative housing size as to whether smaller, more compact homes are more or less expensive than larger homes in terms of materials costs;
- reviewing the capital gains-free status of owner-occupied homes, which to some degree encourages a trend to increased size of dwellings; and
- accelerated depreciation rates for affordable and sustainable single and double unit accommodation in areas well located to services.

Western Australian research has identified the following:

- growth in 1-2-person households not being matched by the supply of smaller dwellings;
- a steady increase in the proportion of older households (including an increasing number of frail elderly) whose housing needs change as they age;
- a dip in the proportion of households in their twenties which, if not offset in the future, could have an adverse impact on family formation and the labour market;
- growth pressures in Metropolitan Perth and the South West which are likely to adversely impact on affordability, accessibility and sustainability, unless managed;
- ageing of the large stock of existing dwellings and the resultant need for those dwellings to be kept in good condition and to be adapted to changes in demand; and
- a long-term decline in the share of both low-cost private rental housing and social housing coupled with strong demand for rental housing from low- and moderate-income households contributing to growing affordability pressures.

The vast majority of the dwellings currently in use (and those to be built in the future) are in the Private Sector. Therefore, governments at all levels must work closely with developers and private owners or investors to make sure that the future supply and mix of dwellings will meet the anticipated needs. This collaboration will involve giving more attention than in the past to using the planning system and residential development regulatory processes, not only to guide the delivery of new dwelling targets in aggregate, but also to ensure that the location, tenure and mix of dwellings being provided is optimal for individual households and that they are well integrated into the local neighbourhood and community.

The Strategic Intent of the Sustainability Principle

The housing sector has a critical role in environmental, economic and social sustainability in the development and renewal of cities, regions and local communities. Sustainable housing:

- is accessible to people from diverse backgrounds and abilities;
- is affordable at all income levels;
- has easy access to services and amenities;
- provides a reasonable level of privacy and security;
- minimises the use of energy and resources through the lifecycle of the building;
- minimises waste products and maximises recycling and re-use of materials;
- assists the financial viability and competitiveness of the housing industry; and
- assists in the strengthening of communities and in building social capital.

Housing is a long-term investment. Past, present and future decisions about residential development and about individual housing design and lifecycle management will go on

impacting on the sustainability of States and Territories, cities, regions and neighbourhoods for many years to come. To improve sustainability outcomes through housing, a wide range of issues ranging from the future development of cities and towns, the design and construction of new housing, the redevelopment of existing residential areas as they age and decline and the condition and use of the existing housing stock must be addressed.

There are major challenges to be faced in Western Australia to enhance sustainability through the housing sector. Key among these are:

- the over reliance in the past on dispersed, low-density settlement forms which can impact adversely on many aspects of sustainability – especially by increasing car dependency, reducing accessibility, giving rise to higher infrastructure costs and less efficiency in the provision of services, and by reducing the supply of agricultural and bushland;
- the long-term trend to larger houses and higher housing standards that add to both resource use and to housing costs, as well as reducing affordability for those who have the least capacity to pay. In 15 years (1985-2000), the average floor area of new houses in Western Australia increased by 22% from 188m² to 230m²;
- the homogeneity of the housing stock compared with diversity of households. In Western Australia over 75% of the existing housing stock is detached dwellings built mainly for families. On the other hand, 50% of households consist of single people or couples only. Almost 33% of the total dwelling stock consists of 4-bedroom homes, compared with a national average of 21%;
- the mismatch between the housing supply and housing need, which is reflected in the highest rate of under-utilisation of the housing stock in Australia: 45% of homes in Western Australia had 2 or more spare bedrooms in 1999;
- addressing the housing needs of a population that is ageing, and experiencing increasing disability in the process, will require a change in community attitudes to embracing adaptable housing concepts that assist ageing;
- the perceived trade-off between the cost of achieving more sustainable forms of living and containing the costs of housing provision that can be a barrier to addressing sustainability issues. Triple bottom line assessment offers a mechanism for assessing the validity of this perception but it is recognised that much more information and research is required before valid conclusions can be drawn; and
- the requirement to concentrate on decreasing resource use in existing privately-owned dwellings, which make up the vast bulk of the housing supply. Reducing housing-related resource use will involve engaging large numbers of individual households in the processes of refurbishment and retrofitting.

The use of a greater variety of housing forms within the existing footprint of a city will promote environmental sustainability. Emphasising new forms of residential development will help to contain the extension of a city and better utilise existing infrastructure. At the same time it will contribute to social and economic sustainability through ensuring that the mix of housing is more in keeping with demographic trends and housing and labour market needs. The notion of population targets for local governments could form part of future public policy.

A strong emphasis on the provision of a component of affordable housing in new residential development through joint public and private action will directly support social sustainability goals by contributing to social integration and social equity. The orientation of the housing supply to a greater share of smaller housing will also contribute directly to resource savings.

Sustainability goals will also be facilitated through diversifying and enhancing the capacity of the social housing system and giving more policy focus to the interconnections between housing and broader social outcomes for social housing. The recognition being given to the roles and the responsibilities of housing providers in contributing to community building and revitalisation processes goes to the core of the principles of sustainability.

The Physical Sustainability of Current and Future Housing

Much of the discussion to date has focused on the physical form of the housing stock and trends in housing arrangements, many of which relate to the economic and social sustainability of the housing system. The environmental dimension of sustainability includes such issues as the physical design and construction of housing, natural resource use and other aspects of location and access to employment and services which are the domain of the broader land use planning system but have a major impact on housing outcomes.

The provision of new housing sits at the end of a very fragmented supply chain. There are many points along the land planning, subdivision development and housing design and construction path that can influence sustainable outcomes.

Of these factors, urban form is considered to be by far the most important. Without sustainable urban form, sustainable housing is problematic. For example, lot orientation and street layout affect the degree to which a dwelling takes advantage of solar passive design principles. Urban form also determines factors such as the availability of transport options and proximity to services and employment.

Beyond the urban form issues, a number of sustainability initiatives are being developed and implemented both nationally and locally in the housing sector, addressing:

- housing design and construction;
- household energy use;
- water resource use; and
- waste generation.

Consumption of housing and household behaviour in terms of the way we live also impacts on sustainability outcomes. People living in dwellings use energy and water and produce waste. In Western Australia, households account for 6% of final energy use and 50% of the overall demand for water in urban centres, and construction and demolition waste represents the largest single source of landfilled waste, while municipal solid waste from households is the second highest proportion (a total of 2.3 million tonnes in 2000) ⁶.

Housing Design and Construction

Housing design has a significant influence in the environmental sustainability of housing. For example, the incorporation of solar passive principles into housing design can minimise the need for energy for space heating and cooling, leading to savings in both operational energy costs and Greenhouse gas emissions. However, until recently, there was little attention given to the design of environmentally sensitive housing. As a consequence, the vast majority of housing in Western Australia may have low environmental sustainability in terms of natural resource use such as energy and water consumption. Furthermore, housing is a long-term investment (generally 50 years or more), which impacts on the capacity of policy makers to improve the sustainability of the urban landscape. Improving sustainability outcomes from the existing housing stock remains a significant challenge.

Embodied energy, the energy used by all the processes associated with building a house including the extraction of the natural resources, manufacturing of materials and equipment, transport and administrative functions, is not insignificant. It is estimated that the energy embodied in existing building stock in Australia is equivalent to 10 years of the total energy consumption for the nation ⁷.

⁶ Waste 2020 Taskforce Report and Recommendations, January 2001

⁷ *Embodied Energy* CSIRO Built Environment Online Brochure, www.dbce.csiro.au/ind-serv/brochures/embodied/embodied.htm

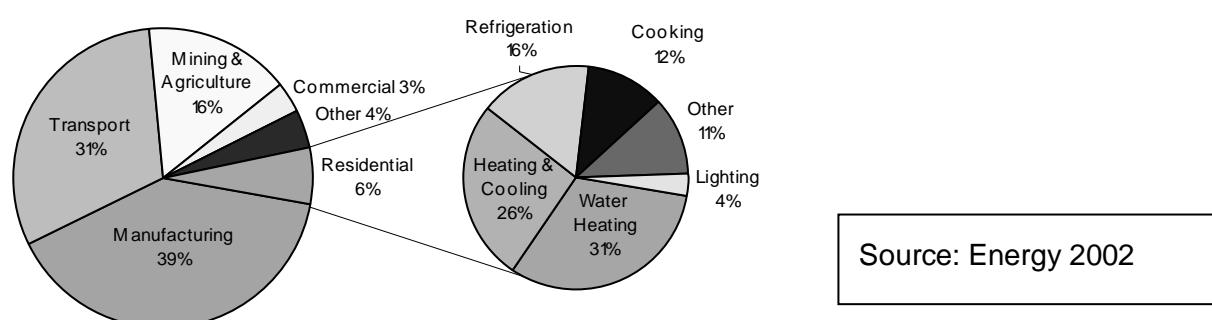
Embodied energy is particularly pertinent to Western Australia due to the dominance of double brick, slab-on-ground construction. Whilst Western Australia has an abundance of natural clays and basic raw materials, the embodied energy of bricks and concrete are amongst the highest. CSIRO indicates there are trade-offs in making dwellings more energy-efficient as this usually requires materials with more embodied energy. As noted by CSIRO *"as buildings are becoming more energy efficient in their operation, the embodied energy is approaching half the lifetime energy consumption"*.

The BCA sets out minimum design and construction regulations and is subject to on-going national review by the Australian Building Codes Board (ABCB). The scope of the current BCA96 is moving beyond the traditional safety, health and amenity issues to a broader agenda encompassing, energy, access and affordability. Sustainability is now being considered as a new goal in the drafting of the next iteration of the BCA referred to as BCA21.

Energy Use

As indicated, households consume only 6% of Western Australia's final energy use. The breakdown of household energy use in Figure 1 indicates more than half is used in heating, cooling and water heating which are components that can be reduced through appropriate design and alternative energy heating systems.

Figure 1 – Energy Consumption in Western Australia and Household Use – 2001



Source: Energy 2002

In response to a joint CSIRO-Australian Greenhouse Office report on building energy performance requirements (November 1999), COAG resolved in July 2000 to develop suitable national energy efficiency provisions for domestic and commercial buildings. This culminated in the introduction of energy efficiency measures for Class I buildings (houses) into the BCA in January 2003. These new regulations came into operation in Western Australia in July 2003.

The Class 1 regulations require all new housing and major renovations to meet a 4-star energy rating using one of several rating programs. This minimum requirement is reduced to 3.5-stars for the tropics. The BCA sets out a range of 8 climatic zones across Australia from the alpine region to the tropics. Western Australia is covered by 5 of these 8 zones.

Various design and construction measures are required under the BCA for various climatic zones which include such things as insulation, building materials, size and orientation of openings, etc. Whilst the BCA sets out a general minimum 4-star rating for new construction, various States and Territories have adopted a range of other responses:

- the Victorian Government announced in June 2003 that all new housing in that state would have to achieve a minimum 5-star rating by July 2005⁸; while
- the ACT Government requires all established dwellings be rated prior to sale.

⁸ Sustainability in the Built Environment, Department of Sustainability and Environment (Sept 2003)

In September 2003, the ABCB released a regulatory proposal for energy efficiency measures for Class 2, 3 and 4 Buildings⁹ which cover all other residential dwellings other than houses. If the measures are accepted, they will be incorporated into the BCA in 2005.

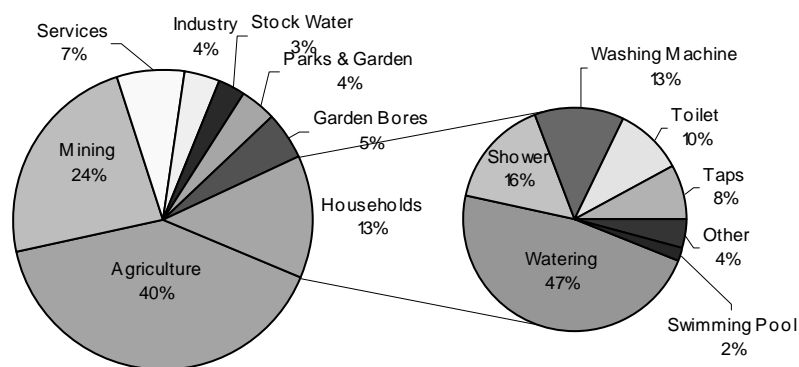
Water Resource Use

“It is often thought that households are the most significant users of water but this is not the case. Overall, households use 18% of the total water used in Western Australia – 13% from scheme supplies and 5% from garden bores. By comparison, irrigated agriculture (40%) and mining (24%) use more water, some of which is low quality and not suitable for potable supplies”¹⁰.

This quote highlights a misconception of household water use. However, Figure 2 puts residential use in context. Whilst not the major user of overall water resources, households are clearly a major user of potable water supply compared with the other two major treated water users, the services and industry sectors.

Household water use varies significantly both across Western Australia and also seasonally which is primarily associated with climate conditions and the impact on external water use as indicated in Figure 2.

Figure 2 – Water Consumption in Western Australia and Household Use – 2001



Source: *State Water Strategy and Domestic Water Use Study*

While Western Australia currently uses only 13% of its sustainable surface water yield and 18% of its sustainable groundwater yield, much of the available water is either brackish or hypersaline and not suitable for potable water use. A long period of dry weather has highlighted Western Australia’s vulnerability to climate change. Much of the current unused water resource capacity is remote from existing industry and population centres in the State’s South West. In response to this vulnerability *“the Government is now asking all water use sectors and the broader community to improve water use efficiency over the next ten years”*.¹¹

The *State Water Strategy* contains a range of water conservation and efficiency measures to reduce water use from 180 kilolitres per person per year in 2002 to 155 by 2012, including:

- a *Waterwise Rebate Program* – offering rebates on a number of domestic appliances plus garden bores and rainwater tanks;
- pricing mechanisms to change consumer behaviour through higher unit cost rates as consumption increases; and

⁹ RD 2003-1 *Energy Efficiency Measures, Regulatory Proposal for Class 2,3 & 4 Buildings*

¹⁰ *Securing Our Water Future: a State Water Strategy for Western Australia* (2003) p8

¹¹ *ibid*

- water re-use – greywater recycling of bathroom and laundry water for gardens.

The measures support a number of initiatives that have been in operation for a number of years such as:

- the 'A' rating water efficiency appliance rating system;
- dual-flush toilets in all new construction which resulted in a 35% reduction in toilet water use since 1982; and
- promotion of native gardens.

Land development is directly linked to sustainable building and construction and can strongly influence built form outcomes in terms of location within urban form, infrastructure provision, mixed-use options, choice and affordability. Western Australia is acting on this through:

- building design guidelines within residential and industrial subdivision development;
- partnering with Local Governments to implement appropriate mechanisms to achieve green building;
- partnering with industry to develop and promote the design and construction of green building, specifically through the Housing Industry Association's *GreenSmart Program*;
- developing joint venture arrangements with building companies to promote the design and construction of efficient buildings; and
- a *Project Design and Assessment Toolkit* that addresses the lifecycle of projects and is designed to be complementary to other assessment systems such as *BASIX (Building Sustainability Index)* and *NABERS (National Australian Built Environment Rating System)*. It can be used for project design and assessment and provides best practice resource links and case studies to support education for sustainable building.

Following are comments on the *Questions for Consideration*.

How can green construction and refurbishment techniques be integrated into standard building practices?

There are a number of mechanisms to integrate sustainability into standard building practices. These include the regulatory framework (such as the planning system and legislation) and promotion of best practice.

The integration of green construction into standard building practices needs to be addressed at all phases of the planning, development, design and construction lifecycle.

In order to assist the building industry to comply with a more sustainable regulatory and planning framework, it needs to be supported with both tools and incentives. For example, a number of energy rating tools have been developed and other more comprehensive tools are in development (*GreenStar*, *BASIX* and *NABERS*). These need to be promoted widely to industry, and possible incentives offered to ensure training and awareness-raising. Equally, government and industry need to work towards identifying common tools to ensure consistency of use.

Appropriate land development, mainly in terms of road and lot orientation, is critical to support passive solar energy-efficient design. While this mainly applies to residential estates, it is also largely relevant to industrial and commercial development.

Addressing the key attributes of green building at the earliest stages of building design is essential. Although most architects and designers understand passive solar energy efficient-

design, there are broader and more specific sustainability aspects that may not be well understood in terms of technological innovation, lifecycle assessment and costs and availability.

Education, training and up-skilling is essential to achieving these outcomes. Publications such as *Your Home* technical manual and *Environmental Design Guide* have been helpful in achieving these outcomes but are voluntary and passive in application. Greater and more specific efforts are required to make these and similar program initiatives more widely accepted and used.

The Western Australian residential building sector is dominated by concrete slab-on-ground and clay brick wall construction. This 'standard practice' does not lend itself to adaptable or modified retrofitting. Further, the materials are manufactured from non-renewable resources that require energy intensive production processes. Promoting (and where necessary developing) building materials and components that incorporate the principles of cleaner production and include recycled and/or recyclable materials and can be easily modified for re-design will address many aspects of resource depletion, energy use, and building adaptability.

While much R&D has been undertaken into sustainable design of residential, commercial and institutional building, there is a lack of similar research into industrial buildings. Assessing and quantifying the costs and benefits of eco-design and construction in all types of industrial buildings is required.

BCA has recently introduced minimum standards for energy efficiency in housing. This requires all new construction and major refurbishments to be rated to 4-star energy efficiency. This is a powerful mechanism for incorporating energy efficiency into building standards. These provisions will be extended to commercial buildings and non-residential buildings (schools, hospitals, etc) in future amendments of the BCA.

The BCA could be used to promote other green practices such as water efficiency, waste minimisation, sustainable building materials and Universal Design. Another mechanism in this class could be the introduction or amendment of current Australian Standards to incorporate sustainable practices, particularly in the production and use of building materials.

As the BCA only provides for minimum standards, there also needs to be mechanisms in place to promote best practice standards ('to keep pushing up the bar'). There is, therefore, a need to identify, develop and promote best practice sustainability standards in planning, building and construction. Governments can lead by example on this by ensuring best practice standards are applied in government housing and buildings, and government procurement policies.

Current Local Government by-laws can present barriers to the use of new materials and innovative building designs. Governments at all levels need to work together to amend these by-laws in order to support sustainable buildings.

How can eco-efficiency innovations be promoted to achieve a market value in both commercial and residential buildings?

There are two aspects to this issue. The first is to consider instruments that will encourage the use of eco-efficiency innovations such as:

- developing best practice uniform design standards and guidelines in partnership with industry associations and State and Local Governments which will promote and stimulate beneficial change;
- progressively introducing the environmental rating of buildings, and promoting the disclosure of this rating at the time of sale or lease of the building;

- providing incentives for builders to incorporate eco-efficiency innovations, such as solar passive design, greywater systems, photovoltaic systems and rainwater tanks. This could be through the use of rebates or taxation concessions;
- investigate (and waive) service and head-works charges and costs that financially impede the application of sustainable innovation. This relates specifically to innovations within developments or buildings that are independent of urban infrastructure, such as on-site treatment and disposal of stormwater, greywater and effluent, water harvesting and renewable energy generation;
- creating mechanisms that allow the market to 'reward' innovation through the marketing process whereby a product that has an inherent point of difference can give the company the competitive edge and commercial reward for their innovation;
- building design awards for specific building types within the building and construction sector (particularly for new industrial premises and small to medium enterprises) will promote and stimulate beneficial change. This is a strong component of the *GreenSmart Program*, which relates solely to residential homes. Similar initiatives can be developed and promoted for all other building types; and
- the Commonwealth Government supporting the development of eco-efficiency innovations through research and investment funding and instruments that will promote eco-efficiency innovations, for example, accelerated depreciation on the next generation of solar cells.

The second is to consider strategies that will sell the benefits of sustainable buildings to the building industry, that is, by promoting the marketing advantage of such buildings, such as:

- quantifying and marketing the costs and benefits of green building, that is, distinguishing first or capital costs from lifecycle costs. This would need to cover all main building sector types: residential, industrial, commercial, schools, hospitals. On-going research has determined that while first costs may add a 2-5% premium, total financial benefits are >10 times this cost premium, and typical payback periods can be achieved in 3-5 years;
- promoting the benefits of sustainable buildings to the consumer through demonstration projects, education and awareness-raising programs, taxation concessions and rebates, 'green' home loans (for example, Bendigo Bank's *Green Loan*);
- the Commonwealth Government restructuring the *First Home Owners Scheme* grants to encourage the construction of sustainable houses;
- recognising sustainable buildings through the sponsorship of major conferences and building awards; and
- Governments encouraging 4-5-star rated buildings by only leasing commercial space that meets this rating.

What are the impediments to eco-efficiency principles being taken up across new housing developments and commercial areas?

A lack of consistency in, and application of, planning guidelines, policies and the approvals process is an impediment to the adoption of eco-efficiency principles in new construction. Builders are confronted with a multiplicity of Local Government regulations and interpretations that affect consistency in constructing sustainable buildings.

Another important impediment is a lack of understanding and knowledge of the costs and benefits of green buildings both in environmental, social and market terms by both builders and consumers. This affects both the demand for, and the supply of, sustainable buildings.

Aligning the 'chain of responsibility': commercial property separation between owners, managers and tenants. The building owner (unless they occupy the building) or property managers do not receive any direct financial benefits of building operating efficiency measures, other than increased tenancy rates. This issue needs to be resolved. Promoting and marketing the benefits of green building to potential tenants in terms of increased productivity, occupant health and reduced illness, and reduced energy operating costs will increase market share which will result in increased and longer-term tenancies.

There is a clear need for education and information campaigns aimed at consumers to promote sustainable housing, supported by incentives. Governments also needs to work with the industry to educate its members (there is an opportunity to build on existing programs through Environment Australia and the Australian Greenhouse Office in conjunction with peak bodies such as the Housing Industry Association).

The *Year of the Built Environment* would be an excellent opportunity to raise awareness about, and promote the benefits of, sustainable building. It would also be an appropriate time for policy development in this area.

Another method to be considered is the greater promotion of cleaner production standards in the construction, refurbishment and demolition of buildings. Cleaner production encourages eco-efficiency in practices, resource use and waste minimisation. For example, waste minimisation can be encouraged through the re-use of building materials (and reduction of waste to landfill), the promotion of recycled and recyclable materials, and the development of new processes and practices that will reduce waste in construction and demolition.

What type of incentives or standards for new developments might be appropriate to encourage more sustainable complexes?

Subdivision planning and development that supports sustainable outcomes, specifically road and lot orientation, integrated urban water management, biodiversity preservation, and resource efficiency.

This could be achieved through a number of mechanisms such as environmental rating of buildings for sale or lease, taxation concessions or rebates for refurbishments or eco-efficient innovations.

Incentives such as rebate schemes for energy, water and resource efficiency have proved to be invaluable for stimulating the acceptance and up-take of new and emerging technologies. These programs must be supported and continued. The Commonwealth Government can play a significant role in promoting sustainable technologies and efficiency by increasing support for rebate incentive schemes such as energy efficiency initiatives promoted through the Australian Greenhouse Office.

It is important that incentives or standards not be restricted to new developments only. New housing construction in Western Australia, for example, only contributes 2% to total housing stock per year, therefore it will have little impact on the sustainability of the housing stock for many years. It is vitally important to consider strategies to promote the retrofitting of existing stock to encourage sustainability.

Funding for research and to promote innovative urban projects, particularly those that demonstrate best practice principles in urban regeneration, redevelopment and retrofitting of existing buildings, would also assist. There are real gains to be made, for example, in projects that consolidate development along existing public transport nodes.

Through the recent *Dialogue with the City* consultation process, there was a clear preference for the more efficient use of existing developed land and capitalising on vacant land opportunities along existing major transport routes, rather than development on the urban

fringes. The issues of urban growth boundaries, higher densities and infill development will therefore be of increasing importance in Western Australia.

While the State Government has implemented a number of initiatives in this area (for example, the *Liveable Neighbourhoods* guidelines and the *New Living Program*), the Commonwealth Government can substantially facilitate this process through the establishment of a new *Better Cities* program.

Are existing building standards and product labelling sufficient to enable informed consumer choices and to ensure that the use of eco-efficiency materials and designs are maximised?

Existing building standards and product labelling are clearly insufficient. While there is evidence of improvement in both these areas, sustainability would be served by accelerating development in both these areas.

It is acknowledged that both government and industry have made positive steps to create beneficial change to delivering a higher-performing product through standards. Even so, there is concern and that current initiatives and their targets are not creating an atmosphere that promotes best practice. The BCA has introduced energy efficiency amendments. These are acknowledged as being useful and supportive but are not designed to create best practice and only address some aspects of energy use. A best practice standard based on, for example, the *BASIX* or *NABERS* criteria is required.

Product and materials labelling is improving. Initiatives such as *Energy Star*, *Energy Rating*, *Eco-label* and *Eco-specifier* all support product and materials sustainability. More lifecycle assessment of standard building materials and components is required.

Consumer information and awareness initiatives need to be developed to allow for informed choice, which will in turn stimulate market change.

The Commonwealth Government could assist this process by supporting the development of sustainable building standards (for example, through regulatory frameworks) and also implementing a national labelling system for materials and designs. In relation to energy, it is important that the labelling system also considers the issue of embodied energy in order to fully inform the consumer.

7. PROVIDE URBAN PLANS THAT ACCOMMODATE LIFESTYLE AND BUSINESS OPPORTUNITIES

Urban design is a key component for energy efficiency of the built form and, in particular, housing.

As housing designs become more energy-efficient, the impact of the urban design and, in particular, the lot or block design, on the housing response becomes greater. Providing a property right to solar access, aspect and amenity may have to be considered to ensure that the benefits of energy-efficient design are an enshrined right.

Methods to measure and rate solar performance are currently being developed and should be implemented on all new developments to ensure that the potential for energy-efficient housing is maximised.

Following are comments on the *Questions for Consideration*.

What planning models and zones can we use to accommodate the different lifestyle needs and preferences of Australians in cities?

Residential areas should by and large be mixed in nature (incorporating certain non-residential uses) and density to accommodate a range of dwelling types and environments.

A sustainable planning model which aims to meet the different lifestyle needs and preferences of Australians in cities is encompassed within *Liveable Neighbourhoods: a Western Australian Government Sustainable Cities Initiative* (Edition 2, June 2000).

The model of *Liveable Neighbourhoods* recognises that the design and layout of a subdivision is a fundamental determinant of the urban form where it can:

- set the urban character and design of an area;
- allow or inhibit social interaction and thereby influence the likelihood of community formation;
- force or reduce car dependence by encouraging the non-car modes of walking, cycling and public transport;
- give or deny access to facilities for all users of the urban environment; and
- provide or prevent opportunities for locally-based business and employment.

It focuses on the idea of an urban structure based on walkable mixed-use neighbourhoods with interconnected street patterns to facilitate movement and to disperse traffic. Daily needs may be within walking distance of most residents. With good design, more people will actively use local streets and thereby enhance safety. Local employment opportunities are facilitated within the town structure, providing the community with a firmer economic base and enhancing self-containment of neighbourhoods and towns. Safe, sustainable and attractive neighbourhoods are sought with a strong site-responsive identity supportive of local community. This model promotes better community, employment, and environmental sustainability than conventional planning practice.

Are urban hubs and communities concentrated around public transit nodes an appropriate future model to suit Australian lifestyle needs?

TOD is a model which is supported through the *Liveable Neighbourhoods* approach. One important point to note regarding TOD, however, is that the lot sizes provided around public transit nodes should be of sufficient density to support the key public transport services being provided. Another important point is that such communities should be provided with walkable catchments of between 400 and 450 metres radius of public transport including bus routes, proposed bus stop locations and existing/proposed rail station locations.

The Western Australian Subiaco Central area is evidence that urban hubs and communities concentrated around public transit nodes seem to be the most effective and efficient model developed to date.

Liveable Neighbourhoods includes the following requirement in relation to public transit nodes and community development:

“In areas close to town centres, railway stations and major bus stops, lot sizes should be developed which enable adequate medium density housing to be produced to support the facilities and/or public transport service. This may be achieved by:

- *providing for housing density of at least 25 dwellings per hectare within 400m of railway stations, and at least 15 dwelling per hectare from 400m to 800m of stations;*
- *ensuring housing densities of at least 15 dwellings per hectare within 400m of major bus stops; and*
- *locating housing close to public transport stops for those groups in society dependent on such forms of transport”.*

How do we transform existing suburban and inner city developments into more sustainable forms of community living?

Liveable Neighbourhoods is a model which can be used for structure plans and subdivisions for new urban development on 'greenfield' sites at the urban edge or 'brownfield' sites on large urban infill sites within developed areas. The principles can nevertheless be applied within existing suburban and inner city developments where appropriate. In Western Australia *Enquiry-by-Design* processes are used to engage local communities, using these principles, in a process of exploring urban design options and solutions for existing urban areas. Following is a list of some of the *Liveable Neighbourhoods* principles and then a suggestion of the way that principle could be applied for reviewing existing suburban and inner city developments:

- *to provide for an urban structure of walkable neighbourhoods* – existing suburban and inner city developments could be reviewed in terms of their walkable catchments to facilities, employment, and public transport and options for improving walkability could be developed;
- *to provide for access generally by way of an interconnected network of streets* – the street network in existing suburban and inner city developments could be reviewed in terms of accessibility and options for improving accessibility could be considered such as the linking of cul-de-sac locations where achievable;
- *to provide for active street-land use interfaces, with building frontages to streets to improve personal safety through increased surveillance and activity* – at the Local Government level, appropriate design guidelines could be prepared for the construction of new homes and particularly townhouses and villas;
- *to facilitate mixed-use development which provides for a wide range of living, employment and leisure opportunities* – at the Local Government level, the fostering of home-based business and mixed-use development could encourage a wider mix of uses within communities.

In addition, incorporating affordable housing, making the area accessible by reliable and affordable public transport, developing and nurturing community facilities and events, and educating and promoting the values of 'community' are vital.

How do we ensure that further urban expansion occurs as planned community developments?

Key tools are legislation and policy.

The Western Australian Planning Commission ensures further urban expansion occurs as planned sustainable community developments through:

- the *Liveable Neighbourhoods* principles;
- the MRS, the zoning mechanism through which the expansion of community development is controlled in Western Australia;
- *Metroplan* (1990) and the *State Planning Strategy* (1997) which provide a vision and policy framework for land use planning encompassing the whole State for the period to 2029; and
- a number of other policies which guide the subdivision and development of land in Western Australia.

Are there dangers in developing decentralised cities with multiple urban hubs and how do we address these issues?

If multiple urban hubs are developed beyond the development front then this can have implications for the cost and provision of infrastructure, including public utilities, roads and public transport, as well as implications for the provision of retail and community facilities.

However, if multiple urban hubs are integrated within a planned framework for development, then the diversity which they have the potential to provide (such as for density and employment) can greatly benefit the development of sustainable communities.

What community, commercial and biodiversity needs should be addressed in developing new urban centres?

The triple bottom line is a highly complex outcome. As each urban hub will be different in form and function, sustainability guidelines would need to be incorporated in any master planning of each such area and detailed implementation strategies would also be required (design guidelines, policies, development controls) to address the issue at a localised level.

Liveable Neighbourhoods recognises the need to design for communities. Approaches to urban development in the past have typically had an emphasis on land use segregation but one of the primary objectives of *Liveable Neighbourhoods* in planning any new part of a city or town is to design a framework for the community that is sustainable, safe, stimulating and efficient. It seeks to address some of the issues of community design by encouraging safe, convenient and attractive neighbourhoods that meet the diverse needs of the community, are adaptable to future change and which fit into the existing and planned urban context. One objective is:

“To facilitate an environmentally sustainable approach to urban development by minimising non-renewable energy use and car dependence; encouraging greater local self-containment of neighbourhoods and towns and protecting key natural and cultural assets.”

Commercial needs are addressed in *Liveable Neighbourhoods* by a focus on the structuring of urban neighbourhoods based on walkable catchments to locate commercial centres, and the encouragement of mixed-use development and a range of lot sizes:

“Adequate lots for non-residential or mixed-use development should be provided in appropriate locations to facilitate business and employment generation, taking into account:

- *the need for business and home-based business to locate around town and neighbourhood centres and along arterial routes;*
- *opportunities for home workspace development, often backing onto or fronting across industrial development;*
- *ability of uses and building forms to act as noise buffers to external noise sources such as major roads, railways or industries;*
- *the capacity of potential mixed-use lots initially developed for housing to efficiently convert to or add a business use; and*
- *opportunities to allocate highly accessible strategic sites on transport routes to large scale industrial or distribution uses.”*