LEGISLATIVE ASSEMBLY

Standing Committee on Natural Resource Management (Climate Change)

Conference Report

13th Annual Conference of Public Works and Environment Committees of Australian Parliaments 2008

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Terms of reference

The Legislative Assembly Standing Committee on Natural Resource Management (Climate Change) was established on 21 June 2007 to inquire into issues of sustainable natural resource management with particular reference to the impact of climate change and, in particular, to report on the following terms of reference:

a) The likely consequences of human-induced climate change on land (including salinity), water and other natural resources;

b) Options for ensuring ecologically sustainable natural resource use, taking into particular account the impacts of climate change;

c) Approaches to land and water use management practices on farms and other natural resource management practices, having regard in particular to the role of such practices in contributing to climate change or as a tool in helping to tackle climate change;

d) The effectiveness of management systems for ensuring that sustainability measures for the management of natural resources in New South Wales are achieved, having particular regard to climate change; and

e) The likely consequences of national and international policies on climate change on natural resource management in New South Wales.

Foreword

I am pleased to present this report to the House on behalf of the Standing Committee on Natural Resource Management (Climate Change). This is the Committee's report on the 13th Annual Conference of Public Works and Environment Committees of Australian Parliaments which was held from 23 to 25 July 2008.

The Committee had the pleasure of co-hosting this year's conference along with the Standing Committee on Public Works. This reports covers the sessions of interest to environment committees. I believe the Public Works Committee will report on the other sessions.

The theme of this year's conference was "Sustainable Urbanisation". We had the privilege of hearing from some of the country's experts from academia, industry and government on infrastructure, planning, the environment and climate change. I would like to thank the speakers for providing the conference with their insights and expertise in an area, which is becoming increasingly complex.

Not only did delegates get to hear excellent presentations they also got to see for themselves some of the projects that are incorporating the theme of sustainable urbanisation on their site inspections. Environment delegates were able to view first hand the innovative Joan Sutherland Theatre in Penrith and inspect the Penrith Lakes development. Afterward, delegates travelled to the Blue Mountains where they were briefed on the issues of sustainability and planning in the World Heritage listed area and saw first hand the wonder and beauty of the mountains. I commend both Councils on their innovation and commitment to creating sustainable communities in their areas.

I would like to thank Penrith City Council, the Blue Mountains Council and the Penrith Lakes Redevelopment Corporation for making the site inspection so informative and enjoyable.

I would also like to thank the Hon. Rodney Cavalier, former NSW Minister for Education, Finance and Energy and the current Chair of the Sydney Cricket Ground for his erudite address on sportsground administration at the official conference dinner.

Last but not least I would especially like to thank the staff at Parliament House, the attendants, catering and the secretariats without whose valiant efforts this conference would not have happened.

I am looking forward to next year's conference that will be hosted by the Tasmanian Parliament.

Karyn Paluzzano MP
Deputy Chair

INTRODUCTION

1.1 The 13th Annual Conference of Parliament Environment and Public Works Commitees was held in Sydney over three days from 23 July to 25 July 2008. More than 60 delegates from Australian parliaments. This Conference is the key opportunity for the NSW Standing Committee on Natural Resource Management (Climate Change) to meet with environment committees from other Australian jurisdictions and to discuss issues and exchange ideas.

1.2 This year the Conference was hosted jointly by the NSW Standing Committees on Natural Resource Management (Climate Change) and Public Works. The Conference was organised by a steering committee chaired by Mrs Karyn Paluzzano MP, Chair of the Natural Resource Management (Climate Change) Committee and Mr David Borger MP, Chair of the Public Works Committee.

1.3 The theme of the 13th Annual Conference was "Sustainable Urbanisation". The Conference sessions examined the theme of sustainable urban design and development infrastructure development with a focus on challenges for sustainable growth and renewal.

1.4 Key themes of the conference included:

- Sustainable urban design and architecture within environmental planning and management in a way which improves living conditions and addresses issues of inequity and exclusion;
- How to achieve sustainable design in urban areas and how to plan for 'smart growth';
- Improved energy efficiency in buildings and clean energy technologies as a response to climate change.

1.5 The Conference sessions consisted of an opening keynote panel on the topic of sustainable public infrastructure. The delegates then broke into environment and public works streams for three separate sessions, two on Wednesday and one on Friday. The conference ended on Friday morning with a joint discussion of the lessons learnt in the parallel streams.

1.6 On the middle day of the conference, delegates travelled on two field trips for the separate environment and public works streams. The environment stream visited Penrith Council and Blue Mountains City Council to learn about their sustainability programs, examined the energy efficient renovations to the Joan Sutherland Performing Arts Centre at Penrith and toured the Penrith Lakes to hear about the progressive rehabilitation of one of the largest quarries in Australia as a recreational and residential site.

1.7 The remainder of this report summarises the key points in the two joint sessions and the three environment sessions and describes the environment stream's field trip. The report also includes the transcript of the sessions described and a list of conference delegates.

DAY 1 WEDNESDAY 23 JULY 2008

Conference Opening

2.1. Mr Tony Stewart MP, Deputy Speaker of the New South Wales Legislative Assembly opened the conference. He discussed the importance of the conference's theme of sustainable urban development for the future well-being of the nation.

2.2. He then introduced the co chairs of the conference, Mrs Karyn Paluzzano MP, Chair of the Standing Committee on Natural Resource Management (Climate Change) and Mr David Borger, Chair of the Standing Committee on Public Works who each welcomed the delegates to the conference.

Session One – SUSTAINABLE PUBLIC INFRASTRUCTURE

Mr Martin Butterworth – Managing Director, Space Syntax

2.3. Mr Butterworth discussed the work of Space Syntax which maps the way pedestrians actually use public spaces to travel to attractive destinations. He argued that such empirical evidence as the basis of infrastructure planning is far more effective than the notion of "build it and they will come" which can create under-used public spaces. He provided several examples from around the world where mapping of the routes people used improved potential designs.

2.3. Combined with an understanding of how communities and local economies interact, the outcome would be to produce resilient local economies for more efficient ways to deliver sustainable cities. Building greater productivity would be made viable by discovering new urban value in “movement” economies.

Mr Mark Kirkland – Rouse Hill Town Centre Project Director, General Property Trust Group

2.4. Mr Kirkland described the Rouse Hill Project. It is a 120-hectare master planned community 35 km north west of the Sydney central business district. It has zoning approval for 100,000 square metres of retail and 100,000 square metres of commercial and up to 1,800 residences. The new Rouse Hill is a joint venture between Lend Lease and GPT, in conjunction with the New South Wales Department of Planning and Landcom.

2.5. Mr Kirkland explained with the Rouse Hill Town Centre project they tried to create a sustainable urban design, efficient use of energy, resources and materials and a living town where people can work as well as live, incorporating leisure and entertainment. In other words they tried to break out of the mould of simply building a big shopping complex that did not incorporate community or living into its plans.

Professor David Richmond - New South Wales Coordinator General for Infrastructure

2.6. Professor Richmond, the final speaker, spoke about how an infrastructure upsurge is occurring at a time when other issues such as climate change are becoming increasingly important. These issues need to be incorporated into planning infrastructure projects in the future. He highlighted that one of the biggest challenges in regards to infrastructure

and metropolitan growth, is how to achieve sustainability and strike a balance between economic, social and environmental considerations.

2.7. Professor Richmond described how infrastructure planning required long term thinking and decisions made today might not lead to results for several decades. He explained that the New South Wales government was now making up for a backlog in long term planning in its recent infrastructure announcement such as the North West metro line.

2.8. Professor Richmond encouraged delegates to learn from positive examples of strategic infrastructure planning in other parts of Australia. He thought that the public sector could learn from the private sector at times, especially in the commissioning phases of major projects. For instance it was not noticed until very late in the delivery of the Parramatta to Rouse Hill Transit way that there were no plans to sort out bus timetables and explain how the new infrastructure would work to the public.

2.9. He concluded the presentation by emphasising the role that State governments can play in relation to expanding and widening the scope and coverage of public transport. This widening not only plays an important part in city growth but also assists in addressing some of the environmental challenges we are now facing.

Session Two – JURISDICTIONAL COMMITTEE REPORTS

2.10. Delegates were then given the opportunity to make brief jurisdiction reports on the work of their respective committees during the previous year.

2.11. There were eight committees represented:

- The Standing Committee on Planning and Environment (Australian Capital Territory);
- The Environment, Resources and Development Committee and the Natural Resources Committee (South Australia);
- The Environment and Public Affairs Committee and Community Development and Justice Committee (Western Australia);
- The Joint Standing Committee on Environment, Resources and Development (Tasmania);
- The Environment and Natural Resource Committee (Victoria); and
- The Standing Committee on Natural Resource Management (Climate Change) (New South Wales).

Australian Capital Territory - Mr Mick Gentleman MLA

2.12. The most significant item flagged in the ACT jurisdictional report last year was the proposed nomination of the Australian Capital Territory as a UNESCO Biosphere Reserve. Biosphere reserves are areas of land and/or sea that have been recognised as such by the International Coordinating Council of UNESCO's Man and the Biosphere program. The nomination received a high level of support and the Committee endorsed the nomination. The Committee believed that the view of a sustainable Canberra of Walter Burley-Griffin should receive international recognition.

2.13. The Committee feels that becoming a Biosphere Reserve will encourage and assist stakeholders and businesses in their sustainability programs around Canberra and create community awareness of sustainability issues. Following from this, the Committee recommended that a national review of the management of all Australian Biospheres be undertaken. The Committee also advocated for a national UNESCO

biosphere reserve trademark and accreditation scheme. This scheme would be to encourage quality products and services and assist in funds for the biospheres.

2.14. Another significant event flagged last year was the introduction of the new *Planning and Development Act 2007* for the Australian Capital Territory and a restructured Territory Plan. The Committee conducted an inquiry into the Exposure Draft for the Planning and Development Bill in 2006. The key changes were to streamline the process and establish a clear and transparent complaints process.

2.15. The Committee also has several significant ongoing inquiries into land management and future urban development for the Australian Capital Territory. The inquiry into the Namadgi National Park Draft Plan of Management is particularly significant as the national park covers 46 per cent of the Australia Capital Territory and also provides up to 85 per cent of Canberra's water from the Cotter Catchment. The Committee planned to table these reports in late August.

South Australia – Mr Ivan Venning MP

2.16. Mr Venning from the Environment, Resources and Development Committee was next to update delegates on the past year's activities. The Committee not only conducts inquiries but also has the statutory requirement of considering amendments to development and acquaculture policies.

2.17. The Committee has completed a report on coastal development and is finalising a report on natural burial grounds. The coastal development inquiry received 31 submissions and questioned 19 witnesses. The Committee made 86 recommendations were made to Government to improve planning and other legislation. The Committee also suggesteed that the impacts of climate change be incoporated into coastal planning.

2.18. Mr Venning also announced that South Australia's Container Deposit Scheme would double the deposit to 10 cents per container from 1 September 2008.

South Australia – Mr John Rau MP

2.19. Mr Rau, from the Natural Resources Committee explained that the Committee was established to oversee two pieces of legislation: the *Natural Resource Management Act 2001* and the *River Murray Act 2003* and they remain the Committee's primary focus. He detailed how the Committee was lucky to be able to have freedom with what the inquiry looked into as long as they deal with the Murray River and the Natural Resource Management Boards.

2.20. Mr Rau spoke of the work the Committee has conducted with the Natural Resource Management Boards in encouraging them to consult communities better and more often and to listen to the community and not just the councils.

2.21. The most significant inquiry the Committee undertook in the last year was an inquiry into Deep Creek. Deep Creek is an area in Adelaide near the Fleurieu Peninsula and has been the focus of plantation forestry activity. Apart from impacting on farming and the community forestry has also impacted upon water allocation. The Committee will be looking at the impact of forestry over the next twelve months.

Western Australia – Ms Shelia Mills MLC

2.22. Ms Mills is a member of the Standing Committee on Environment and Public Affairs. This Committee has the unique requirement of having to inquire and report on petitions. A large number of these petitions refer to environmental issues. Ms Mills detailed how

responding to these petitions took extensive time and resources. The Committee's main objective in the reviewing of petitions is to allow a forum for public discussion on matters of community interest and to have their concerns brought to the attention of the Legislative Council.

2.23. From August 2007 to 10 July 2008, the Committee received 37 petitions to review. Many of the petitions involved matters of the environment or public works, such as opposition to expansion of a landfill, road upgrades in an area of residential expansion, opposition to a proposed train station car park in bushland, development of foreshore land and opposition to the development of bushland owned by the University of Western Australia.

2.24. The Committee is also conducting an inquiry into a resource recovery centre in the south metropolitan region of Perth. The inquiry stemmed from a petition that was referred to the Committee and the Committee has already received submissions and conducted a site inspection.

2.25. Due to the large number of petitions the Committee receives it has instigated its own inquiry into the petition process in order to review whether or not there are more efficient ways of handling petitions.

Western Australia – Mr Tony O'Gorman MLA

2.26. Mr O'Gorman explained that the Community Development and Justice Standing Committee was responsible for 16 portfolio areas and that has made it hard to attempt an inquiry about environmental matters. The Committee has a broad scope of topics to cover. It has responsibility for multicultural interests, the Attorney General, justice, electoral affairs, women's issues, the arts and sport and recreation, among others. To encompass the wide variety of topics they look after, the Committee conducted an inquiry on collaborative approaches of government. An interim report for this inquiry should be finalised by August.

2.27. The Committee also conducted an 18 month inquiry into the prosecution of assaults and sexual assaults. The Committee members found the inquiry to be quite emotionally difficult due to the subject matter. The report was handed down earlier in the year with 38 recommendations. Feedback so far is that the recommendations have been received favourably by the Government and the Minister.

2.28. The Committee has also just started work on an inquiry relating to community development and child protection. A report will be published in either August or September.

Tasmania – The Hon. Greg Hall MLC

2.29. Mr Hall explained to delegates that the Joint Standing Committee on Environment, Resources and Development has had a full agenda in the past year. Firstly, the Committee finalised its report on alternative fuels which contained three recommendations. The first recommendation was that the Tasmanian Minister for Energy and Resources immediately place the development of a national fuel strategy on the agenda of the Federal Council on Energy.

2.30. The second recommendation was that amendments should be made to the *Metro Tasmania Act 1997*. This Act currently requires transport operators to provide economical transport options. The Committee, however, has suggested that this Act be

amended to mandate that operators must provide transport that is socially, economically and environmentally responsible as well.

2.31. The final recommendation of the report relates to requesting a Government response to the Committee's previous inquiry into the potential of CNG and LNG as vehicle fuels. As yet the Committee has received no response.

2.32. The Committee has also commenced an inquiry into coastal erosion and begun its first round of hearings. Due to overcrowding and population growth, Australia's coastlines are facing between 100 and 800 metres of erosion by the end of this century.

Victoria – The Hon. John Pandazopoulos MP

2.33. Since the last conference, the Environment and Natural Resources Committee has finalised its inquiry into public land management practices with regards to bushfires. As there have been many inquiries by many parliaments into bushfires, the Committee's Terms of Reference were very broad, including: the extent, timing, resourcing and effectiveness of prescribed burning on both Crown and freehold land; the manner in which prescribed burning is conducted, including how applicable codes of practice are employed; and the impact of prescribed burning and recent wildfires on Victoria's biodiversity, wildlife and other natural assets.

2.34. This inquiry had enormous public interest and received a record number of submissions. This also required the Committee to conduct numerous site visits and hearings. The final report was tabled on 26 June. It produced 17 findings and 20 recommendations. One of the main reasons the Committee believes that bush fires have increased is that for the last three decades less and less planned burning has been done. Submissions identified two reasons for this: the timber industry and the increase in national parkland. Planned burning also creates less carbon in the atmosphere than unplanned burning. The cost of planned burning is far less than the cost of recovery from bushfires but Treasury did not recognise this fact.

2.35. The Committee has since commenced an inquiry into supplementing Melbourne's water supply. Some of the ways that the Committee will investigate include increased conservation efficiency efforts, collection of stormwater; re-use of treated waste, the use of groundwater, small locally based desalination plants, as well as any other option that the Committee may come across. The report must be tabled by the end of the year.

New South Wales – Mrs Karyn Paluzzano MP

2.36. Mrs Karyn Paluzzano, Chair of the Standing Committee on Natural Resource Management (Climate Change) and co-host of this year's conference, informed delegates that the Committee has thus far commenced two inquiries. The first was an inquiry into the general Terms of Reference for the Committee and the second was on the Emissions Trading Scheme. The Committee conducted the first general inquiry as a way of engaging with other jurisdictions, academics, stakeholders and the general public on the topic of climate change. The Committee received 52 submissions and conducted three public hearings with 26 witnesses appearing. The Committee also undertook 3 visits of inspection.

2.37. In May 2007, the Committee visited the Hunter Valley to examine coal mining operations and power stations. In June of this year the Committee visited the Cooperative Research Centre for Greenhouse Gas Technologies demonstration project of Geosequestration at the Otway Basin in Victoria.

2.38. The Committee also inspected the Hawkesbury-Nepean river system. This allowed the Committee to see first hand the importance of this system on agriculture, fishing and the surrounding communities and what impact climate change may have.

2.39. The second inquiry the Committee commenced is about emissions trading schemes, where the focus will be on the effect of these schemes on natural resource management in New South Wales. This seems to be a particularly relevant topic for the committee to undertake owing to the work of Garnaut Report and the release of the Federal Government's Green Paper on emissions trading schemes and carbon reduction.

Session Three – IMPROVING ENERGY EFFICIENCY IN PUBLIC AND PRIVATE BUILDINGS

Mr James McGregor - Energy Systems Manager, CSIRO Energy Centre

2.40. Mr James McGregor opened session three of the environment committees' stream. He discussed energy efficiency and energy generation in buildings and applying passive and active solutions in building design to improve energy efficiency. The main example he used was the CSIRO Centre, which was designed to demonstrate what could be done with commercially available off the shelf technologies to reduce a buildings consumption of energy and make it self-sufficient.

2.41. Passive design solutions have been known and utilised such as using natural air to climate control buildings and using sunlight for heat. These simple things have been largely forgotten and underused since the advent of technology allowed us to artificially control these elements in building design. Mr McGregor also discussed that passive systems should be put into the design phase so that they are there from the beginning. By using design principles that allow sunlight deep into buildings, the energy consumed can be reduced by around 90 per cent. A savings can be seen in not only electricity consumption but in the numbers of light globes used.

2.42. Mr McGregor detailed how the Centre operates partly on natural ventilation, so that for 100 to 150 days per year there is no air-conditioning. He stressed that this building's design and success in using this system demonstrated the need to go back to designing for human needs and not providing homogenous environments.

2.43. Mr Connor provided an overview of current technological trends related to sustainable built environments and described some the key features that might be seen in a sustainable development in the year 2020 including enhanced natural systems, sustainable energy generation, building materials, and energy end use technologies.

Mr Robin Mellon - Executive Director, Green Building Council Australia

2.44. The Green Building Council Australia has been operating for just over five years and is based in Sydney but has offices in Perth, Brisbane, Canberra and Melbourne. Their main goal is to try to drive the property industry towards greater sustainability and better practice, but through market-based solutions. They have 643 members across the industry including architects, government bodies, private developers, builders, manufacturers, suppliers and designers. They currently have 689 registered projects-developments that will go through the green star assessment process. There are 74 certified projects across Australia, the number having doubled in just under a year.

2.45. Mr Mellon explained that the Council aimed to reward and recognise sustainable building design practices and aimed at the top 25 per cent projects where the proponents were

prepared to expend extra effort to achieve a "green" rating. Basically the major theme of the scheme is to reduce the demand for materials, reuse materials where possible and use recycled materials where they are available. Energy efficiency and innovation are the other most important aspects of the scheme.

2.46. There are pre-conditions for applying to a green star assessment. For instance an office must produce no more than 100 kg of carbon dioxide per square metre per year. Buildings cannot be located next to a wetland or on other sites of high social or agricultural value.

2.47. Mr Mellon then discussed a number of already certified projects which are located in Canberra, Melbourne and in a few locations in New South Wales. Council House 2 (CH2) in Melbourne. CH2 comprises of many elements that work together to heat, cool, water, and power the building to create a sustainable property and has achieved a 6 green star rating.

2.48. Mr Mellon stressed that the important point about the Green Star guidelines is not that everyone achieves a green star rating but that they take their guidelines into consideration. Incorporating some of the elements of the guidelines suggest at least gets developers and builders heading in the right direction.

Mr Tim Beshara - Science Manager, Greening Australia

2.49. Mr Beshara discussed what steps governments could take to act in the face of climate change. He explained that reducing Australia 's greenhouse gas emissions would only make a limited difference given that Australia produces just 1-1.5% of global emissions.

2.50. Mr Beshara discussed the two types of human induced climate change: local and global warming. Global warming is where carbon dioxide and other greenhouse gases are released into the atmosphere. Local warming is restricted to in and around urban areas and is called the “urban heat island effect”.

2.51. It is well known that cities are several degrees warmer than their surrounding areas. There are three causes which contribute to the urban heat island effect. The first is the increases use of asphalt, concrete and tiled roofs all of which retain heat. The second reason is the lack of vegetation which has been shown to have a cooling effect. The third contributing factor is heat production by such things as air-conditioners, industrial processes and car exhausts.

2.52. Mr Beshara has conducted work on the heat island effect in Western Sydney where temperatures can reach up to 6 degrees warmer than expected. As Western Sydney is far from the coast and is situated in a basin, hot air is trapped as there is no sea breeze to mitigate the heat. The difference between the temperatures in coastal Sydney to Western Sydney has increased dramatically over the past forty years. Apart from natural reasons, new housing estates that are virtually all asphalt, concrete and tile roofs are contributing to these warmer temperatures.

2.53. When the effects of climate change are combined with the “urban heat island effect”, the problem can be quite severe. He noted that heat waves kill more people in the Western World than any other natural disaster and more than 20,000 people died in heat waves in Europe in 2003.

2.54. Mr Beshara suggested that the urban heat island effect needed to be considered when designing new developments. Solutions include reflective rooves, energy efficient buildings and more vegetation. This is also something that the public and community can understand and assist in mitigating as it relates to what they do in their every day

lives. Apart from mitigating the urban heat island effect cities will also become more resistant to climate change, rivers will be cleaner and there will be an increase in biodiversity.

2.55. Questions put to Mr McGregor, Mr Mellon and Mr Beshara can be found in the Transcript of Proceedings in Appendix One.

DAY 2 Thursday 24 JULY 2008

Morning – VISIT TO PENRITH

3.1. Delegates for the Environment Committees visited three sites of environmental interest in the Penrith.

3.2. The group visited the Penrith City Council to discuss the Council's Sustainability Program. They were welcomed by the Mayor, Councillor Greg Davies who spoke briefly about the Council's efforts to embed sustainability principles throughout the organisation's business practices. In 2007, the Council produced its first sustainability report against the Global Reporting Initiative Standards. The Council has a plan to become carbon neutral. Soon it will start recycling of organic material to produce mulch for sporting fields. The Council has a Sustainability Revolving Fund so that some of the savings made as a result of sustainability initiatives are diverted to a fund to pay for future initiatives.

3.3. Mr Ross Kingsley, of the Council's Sustainability Unit provided a detailed presentation of the Council's sustainability programs. In 2003 the Council adopted the UNEP principles for a sustainable city and the staff have worked hard to deliver on their environmental plans such as the water saving plan and the green purchasing policy. Council has reduced its consumption of potable water by 35% since 2001/02.

3.4. A data management system was developed to provide justification of the savings made from environmental initiatives. This is essential for lending credibility to the Sustainability Revolving Fund which is estimated to have saved $254,000 a year and some 1930 tonnes of carbon dioxide through such projects as replacing lights, upgrading air conditioning and using heat reflective roof paint.

3.5. Council recognises the need to educate the community on sustainability issues. It has education officers who manage a blog and run the Schools Climate Change Challenge. In 2005 it established the Sustainable Street program to encourage behavioural change at local level. Now six streets with more than 130 participants have graduated from the program.

3.6. Delegates then moved next door to the Joan Sutherland Performing Arts Centre, known locally as "the Joan". The Centre was designed by Phillip Cox and opened in 1990. In 2006, it reopened following completion of a $14 million building upgrade funded by Penrith City Council and the New South Wales State Government. The Centre now offers the finest in cultural facilities and services consisting of the 660 seat Richard Bonynge Concert Hall, New 380 seat Q Theatre Drama Theatre, upgraded 100 seat multi-purpose Allan Mullins Hall and the Penrith Conservatorium of Music -comprising 23 music studios, 2 orchestral and 2 ensemble rooms.

3.7. Mr John Kirkland, the Chief Executive Officer conducted a tour of the building to demonstrate recent extensions including a new sectional energy efficient air conditioning system. The ambient air temperature varies with the seasons so in winter patrons are encouraged to dress warmly and in hotter parts of the year they are advised not to wear jackets.

3.8. The group then travelled to Penrith Lakes where Colin Gibbs and Amanda Walmsley of the Penrith Lakes Development Corporation conducted a tour of the largest quarry in Australia on a 2000 hectare site which provides 55 per cent of the sand and gravel used in Sydney. The site has a limited life and the Corporation is rehabilitating the site stage

by stage for environmental, recreational and residential use. Penrith Lakes is now a major aquatic recreation area in Penrith Valley it is home to the Sydney International Regatta Centre, Muru Mittigar Aboriginal Cultural Centre, Penrith Whitewater Stadium, Simply Skydive and the Penrith Lakes Environmental Education Centre. .

Afternoon – VISIT TO BLUE MOUNTAINS

3.9. The group then travelled to Katoomba for a briefing by Mr Geoffrey Smith, Natural Systems Program Leader, Blue Mountains City Council on the Council's sustainability projects.

3.10. Mr Smith explained that the Blue Mountains and Banff in Canada are the only two cities in the world completely surrounded by World Heritage areas and the Council is very conscious of the need to reduce the impacts of the urban development on the neighbouring bushland. Particular problems are caused by impermeable surfaces such as sealed roads being near waterways. Most development is on top of the ridges so water runs off at speed causing erosion and depositing sediment in streams and pools. This then reduces biodiversity in the aquatic environment.

3.11. The Council worked to reduce the build-up of rubbish by installing stormwater rubbish catchers in drains. These can be difficult and unpleasant to maintain as the material putrefies in wet environments. The Council has installed a Barramy dual vein catcher that separates rubbish from the high volume storm water flows. It deflects water in a basin for long enough to catch sediments. It is much easier to maintain as the rubbish has a chance to dry out and the sediment can be collected with earth moving equipment. The Council estimates that 500 cubic meters of soil has been collected from this device over the nine years since it was installed

3.12. The Council educates school groups about sustainability by using their Blue Mountains Sustainability Activity Model. This model shows the water cycle, comparing the effects of traditional and sustainable water management in residential, farming and industrial areas. Water is poured as "rain" over the model and it passes through the different areas to a stream at the bottom. On one side, where practices encourage erosion there is turbid water whereas the other side is clear.

3.13. Delegates then travelled to Scenic World to examine the World Heritage Area bushland. A National Parks Wildlife ranger lead the delegates down through temperate rainforest below and then delegates returned by the Scenic Sender.

DAY 3 FRIDAY 25 JULY 2008

Session Four – THE ENERGY CHALLENGES OF CLIMATE CHANGE

Dr Nikki Williams – CEO, NSW Minerals Council

4.1 Dr Williams discussed the importance of coal as an energy source and how Coal-fired power stations account for around 30 per cent of global emissions of carbon dioxide.

4.2 Dr Williams considered that an emissions trading scheme would lead to radical changes to the industrial sector in Australia as 1.1 million people work in energy intensive industries. Dr Williams was also highly critical of the European Emissions Trading Scheme, which was poorly designed and had problems with too many permits being issued to energy suppliers. She argued that this scheme has not lead to reduced emissions.

4.3 She believes the Rudd Government has tried to strike a balance between what is politically and socially acceptable with its proposed emissions trading scheme in its green paper but she argued that carbon capture and storage will be the key to mitigating carbon emissions in the future and the green paper did not propose to make the necessary investment to develop this technology.

4.4 Dr Williams discussed the COAL21 fund, which is a voluntary levy between State and Federal governments, coal producers, electricity generators and research entities. This billion-dollar fund is being used to accelerate low emissions technology for coal-fired generation.

Professor Bruce Thom – Scientist, Wentworth Group of Concerned Scientists

4.5 Professor Thom discussed planning and managing our coastal and urban resources. He stated that Federal and State legislation is quite explicit on threatened species and threatening processes but the emphasis is mostly on threats to biodiversity on land and in the sea. There is less of an understanding of the longer-term impact of threats posed by the very institutions charged with planning and managing our coastal and urban resources. He argued that a review was needed of those threatening processes, which arise because of difficulties in public administration caused by conflict and lack of coordination between the different levels of government.

4.6 Professor Thom used Iceland as an example of a people who ravaged the natural resources of the country and now have had to restore them. To do this they have used the country's natural resources to develop alternative energy sources such as geothermal and hydroelectricity. As a result have created jobs, wealth and more international influence. As Australia has such ready access to coal, oil and gas we have not needed to use initiative to find alternative sources of energy.

4.7 Professor Thom advocated that legislators and committee members must use their roles to create policies that consistent and innovative policies and legislation regarding coastal degradation to make coastal communities more sustainable and to respond to climate change in a nationally consistent way.

Mr John Connor – Executive Director, The Climate Institute

4.8 The Climate Institute is a non-government, non-partisan organisation. Mr Connor spoke about adaptation to a low carbon economy and discussed the institute's response to the Federal Government's green paper on emissions trading. He examined the concerns associated with emissions targets and referred to the need for investment in renewable and low emissions technology. He also advocated linked research in those areas.

4.9 Mr Connor described the urgency of putting into place climate change policies and that the effects of climate change could be more severe than at first thought. He argued that we needed to drive new technologies and encourage investment into them. Mr Connor also spoke about the economic growth that could occur with these new technologies. He said to be wary of scare tactics that try to promote how much these technologies will cost households, as they will also contribute to households by creating new industries and employment.

4.10 The Institute had also conducted a study on energy affordability and found that with high carbon and higher world oil prices lower income families needed assistance. However, with extra energy efficiency strategies the amount of money a household spends on petrol, gas and electricity will plateau and eventually decline over time.

4.11 Mr Connor pointed out that the emissions trading scheme is not just about price but is also about finding clean technologies to replace the old ones. There are so many opportunities for Australians to be involved in, that he hoped we would embrace them and use them to our environmental and economic advantage.

4.12 Questions put to Dr Williams, Professor Thom and Mr Connor can be found in the Transcript of Proceedings in Appendix One.

Session Five – SUMMARY OF CONFERENCE

4.13 Mrs Karyn Paluzzano, Chair of the Natural Resource Management (Climate Change) Committee and Mr David Borger, Chair of the Public Works Committee reported back to delegates on the major themes that emerged from the conference.

4.14 Mrs Paluzzano recounted the expert presentations that were given regarding energy efficiency in buildings. She was especially pleased that that the presentations could be tied to what delegates saw on the field trips. She made the correlation between the energy efficient Joan Sutherland Theatre in Penrith and the work undertaken by James Mcgregor and Robin Mellon. She also linked what Tim Beshara's work on the urban heat island effect in Western Sydney to the increase of temperature she has noticed in the Western Sydney suburb of Penrith where she has been a long time resident. Mrs Paluzzano saw the increase in urbanisation as the cause of the warmer climate in areas that were previously farmland and nature reserves.

4.15 Mrs Paluzzano also recapped on the field trip that was taken by delegates to Penrith and the Blue Mountains where both councils are tackling the issue of sustainability in different ways to suit their different communities

4.16 She also recounted the last session that included Dr Nikki Williams, Professor Bruce Thom and Mr John Connor.

4.17 Mr Borger then described what the speakers in the Public Works streams discussed. In the jurisdiction report delegates exchanged information about their different functions. Some committees have a role in approving public works projects in advance while

others do not, although a common problem was that these committees could not review cost overruns. The members then discussed the perennial problem of the division between executive and parliamentary oversight.

4.18 The session on Wednesday heard from Mr Mike Schur, New South Wales Treasury, who talked about the strategic context of infrastructure in New South Wales and how the State negotiates public-private partnerships. Dr Patrice Derrington talked about funding options and discussed what issues governments, Parliaments and departments need to recognise before they enter into wholesale privatisation of their functions in terms of delivering infrastructure. Finally, Greg Incoll of Incoll Development, talked about public-private partnerships and his experience of them and his suggestions for the future.

4.19 Mr Borger discussed the merits of the delegate field trip where they visited Parramatta, a city that is trying to encourage the growth of Parramatta as a second city in order to alleviate congestion and pressure on Sydney. They viewed the $105 million redevelopment of Parramatta railway station, the Parramatta Artists Studio and the Parramatta Justice Precinct.

4.20 Public Works delegates heard from Chris Johnson, a former government architect and Angus Dawson of the Growth Centres Commission, for the final session. Mr Johnson discussed the Sydney Metropolitan Strategy and discussed “polycentric” cities. Mr Dawson talked about his experiences as a private-sector developer and how this helped him in his role as a government planner trying to coordinate land releases and infrastructure provision.

4.21 Mr Borger surmised that the main theme for the public works committees was that urban planning and infrastructure projects need to stimulate job and housing growth and to create a more sustainable environment and communities.

4.22 The conference then concluded with a presentation on the Parliament’s sustainability program.

APPENDIX ONE – TRANSCRIPT OF PROCEEDINGS

Wednesday 23 July 2008

Mr TONY STEWART: Welcome to the New South Wales Parliament, the mother parliament of Australia. I acknowledge also the traditional owners of the land on which this Parliament sits: the Gadigal clan of the Eora nation. My name is Tony Stewart and I am the Deputy Speaker of the New South Wales Parliament. It gives me great pleasure to have so many members of Parliament in one place during the winter period. Despite what the newspapers say, we are all here working very hard. I understand we have representatives from all Australian jurisdictions apart from the Northern Territory. A snap election was called in the Northern Territory, which means its members of Parliament could not attend.

I particularly acknowledge Mrs Karyn Paluzzano and Mr David Borger, who are the Chairs of the respective committees and the co-Chairs of this conference. I know the conference will be successful for everyone because much work has gone into its organisation to make sure it delivers all your expectations. Present today are 45 members and staff from the various parliaments. The conference theme this year, as you know, is sustainable urbanisation. During the conference the New South Wales Public Works committee and the Natural Resource Management (Climate Change) committee intend to examine sustainable urban design and the development of infrastructure, focusing on the challenges of sustainable growth and renewal, which, of course, are so important today in community expectations, government focus and government policy. You will examine these issues over the next 2½ days.

I understand that there will be a field excursion to Parramatta, the electorate of David Borger. I am sure he will be able to provide you with a fair idea of some infrastructure issues you will confront and examine for sustainable development. I believe you will be attending the Blue Mountains area also, which is an area on the edge of Sydney. You will see some environmental issues that Karyn Paluzzano and her committee have been examining and will assist them in the context of what you are doing in your States and territories.

The key themes are sustainable urban design and architecture within environmental planning and management. These will be examined in a way that improves living conditions and addresses issues of inequity and exclusion, how to achieve sustainable design in urban areas and how to plan for smart growth. Given the urbanisation issues with which we are confronted at the moment and the density of urbanisation around most of our city areas, it is particularly important how we deal with those issues in a sustainable way. You will look also at improving energy efficiency in buildings through clean energy technologies in response to climate change issues.

Of course, that is something we have been working on very solidly in New South Wales, as you have been doing in your jurisdictions. We urgently need to put our heads together and come up with a common perspective. They are issues of critical importance to everyone and we cannot escape them anymore, particularly given the timely release of the Garnaut report and the Commonwealth Government's subsequent initiative regarding the emissions trading scheme, which is now being examined and debated in our communities.

They are controversial issues and we need to tackle them. We need to be bold and we need to understand that to have a sustainable future we must make the decisions now for our children to have an adequate future and to ensure that the environment is protected. The decisions must provide a full opportunity for other governments to build on the blocks you are putting in place now. What you are doing is of paramount importance. This was discussed at the recent G8 Summit. The comments of the Prime Minister made it very clear that the Commonwealth Government is not going to deviate from the need to have sustainable development put in place within the parameters of what is occurring with climate change issues.

You have a really big challenge ahead of you, one I do not envy but which I know you will tackle adequately because together you will be able to network your decisions and come up with consensus options that will make Australia a better place for us today and for our children in the future. I again welcome you to the New South Wales Parliament. I am sure you will enjoy our amenities. This is the oldest Parliament in Australia and the one from which all other parliaments have sprung. We are very proud to have you here. We know that over the next 2½ days you will make a difference for the better of this country.

Mrs KARYN PALUZZANO: As Chair of the Standing Committee on Natural Resource Management (Climate Change) I welcome all members from the environment committees. Welcome also to members of the public works committees, as I am also a member of the New South Wales Standing Committee on Public Works, and have been since 2003. I know you are not pilgrims, but you are World Youth Day pilgrims with a passion with a passion for the environment and public works.

As you are aware, last week Sydney hosted World Youth Day; it was a week of much celebration in Sydney. It was also a week during which many people visited local Op shops. I was at my local parish when the Polish delegation arrived early in the week and a van pulled up from the local Op shop. People were trying on the smallest beanies and jackets because they clearly had come quite unprepared for our weather. We welcomed the world last week and this week we welcome parliamentarians from across the various jurisdictions. Hopefully you can share some of Sydney's warm weather with the cooperation of the solar radiation!

I also acknowledge the Gadigal clan, the traditional owners of the land and waters, and pay respects to their guardianship and to their elders past and present. I am proud to be co-hosting the Thirteenth Annual Conference of Public Works and Environment Committees of Australian Parliaments. It is important that as parliamentarians, and also the secretariats who are present, that we tackle and discuss those issues that are both common to us and different to us in our jurisdictions. We have chosen the theme of sustainable urbanisation because although most of us are from the urban areas of our cities, and some are from rural areas, we all visit urban areas. Therefore, the issues we confront with urbanisation hopefully we will put in a sustainable context as we move forward this century.

During my time as Chair of the climate change committee I have been able to bear witness to the increasing public perception of climate change. Our Deputy Speaker alluded to that sudden interest. The Australian Government has just launched its campaign "Think Climate Think Change Think Now" and also its green paper. Climate change has been the focus since the Federal election last November. Climate change has been an issue also that our local communities have been discussing. It will be interesting to see how we address the issue with practical solutions. Over the next few days hopefully we will be able to contribute to the debate with the guest speakers. Our priority is to mitigate the effects of climate change and improve our cities.

Amongst our guest speakers on the environment theme will be representatives from Greening Australia, the New South Wales Minerals Council, the Climate Institute, the Wentworth Group of Concerned Scientists, the CSIRO and the Green Building Council of Australia. I am excited also for the environment strand in that we are participating also in field trips. As the Deputy Speaker alluded to, we are going west and getting out of Sydney heading towards Penrith, which is my electorate. The Penrith electorate is 55 kilometres from where we sit now. It is at the edge of the Sydney central business district or metropolitan area. My electorate has two local government areas in it. The Penrith local government area is about the fourth largest in New South Wales with 200,000 people.

The electorate boundary also takes in the lower Blue Mountains, which is part of the Blue Mountains electorate. Within those two local government areas we have the natural assets of the Hawkesbury-Nepean river system and a world heritage national park. So, we have our urban fringe coexisting with those two wonderful assets. The Hawkesbury-Nepean river system supplies water for most of the Sydney area. So, if you turn on the tap this morning, the water will have come from the Hawkesbury-Nepean river system via the Warragamba Dam.

It is an area with quite different challenges. You will hear from the Penrith City Council. When I was a member of the council in the year 2000 we initiated a Sustainable Penrith program where we adopted a number of policies and practices to move towards a sustainable city. That started in 2000 and in 2008—eight years on and I am not a council member anymore but I am there in spirit as the local member—we have a number of programs and policies. You will hear about the Sustainable Cities program that takes in the Sustainability Street program, some of you may know of that. We now have Sustainability Schools. We also have smoke-free parks, where the community is not allowed to smoke within a certain area of local playgrounds. So there are a number of initiatives to make the city more sustainable that will be discussed when we go to the Penrith City Council tomorrow on our field trip.

We will be going to the Joan Sutherland Performing Arts Centre—the only performing arts centre named after Dame Joan Sutherland. The centre is situated near the Civic Centre of Penrith. It was built by Phillip Cox in 1990 and has recently had a $14 million extension with sustainable building designs and codes. I cannot describe it but when you visit the centre you will be able to experience it. We will also be visiting Penrith Lakes. The Penrith story is about rocks. People think the Penrith story is about football, sport and natural assets; the real Penrith story is about rocks. We have the biggest quarry in the southern hemisphere that quarries rocks and crushes them. The sand and the gravel are taken somewhere else and you probably drive on the bitumen, and the buildings you see

here in Sydney, and probably elsewhere, have been made from the cement and the aggregate of the Penrith Lake's system. It has been a quarry for almost 100 years. It is adjacent to the Nepean River and is on the flood plains. Previously it was very good soil and had many dairy farms. It was discovered 100 years ago that the rocks could be crushed and made into roads and building materials. They have been doing this for almost 100 years but a large hole and subsequent holes have been left as a result.

In 1980 the Premier at the time, Barrie Unsworth, and the then Planning Minister, Bob Carr—you might know of those two names—decided to sign a deed of agreement between the State Government and the quarry men. The deed of agreement said that once the quarry finished they would remediate the land and have a lakes system. The site covers 2000 hectares and 80 percent of that site will be a lakes system—it is huge. For those of you that have been to Sydney and seen the rowing or the Whitewater stadium during the Olympics, or subsequent to the Olympics, you will know that is where Penrith lakes is but it is only one-tenth of what will be developed in the future. So the Environment Committees will have a look at that. It still has the rowing and Whitewater stadium. I was there yesterday with the Minister for Gaming and Racing, and Minister for Sport and Recreation, as we met the Nepean female pair rowers and wished them well for Beijing. It is also used for skydiving and many cultural and social activities. It has an environmental education centre on site as well. It is used not only by just elite athletes but also by the community generally. After that we will be going to the Blue Mountains to look at what the Blue Mountains City Council does in relation to the urban natural environment interface. We will also be looking at the ecotourism that has been developed in the Blue Mountains.

If you have opened your bag this morning you will probably wondered about the glass bottle that is included in there. You have probably scratched your head as to why has David Borger, Karyn Paluzzano and the Public Works and Environment Committees given you a bottle of sake. It is not to make the networking that is going on easier but to explain two things about Penrith. Firstly, we have O-I Glass. The sake bottle is manufactured in Penrith. O-I Glass is one of the largest bottle and glass manufacturers in Australia. The site was chosen by the Japanese as a site for a sake brewery because of the water from the Hawkesbury-Nepean system. The brewery uses the Hawkesbury-Nepean water; they brew their rice and make sake. It is the only sake brewery outside of Japan in the southern hemisphere and it exports to the world. So it is a little gift from Penrith to you.

If you look at the back of the pamphlet about the brewery, the location of the brewery is fairly significant. It is located at the base of the lakes system. The river bends around and the bend is the boundary of the head of the Lakes Development Corporation. The brewery is at the base of the lakes system, it uses our water and in the future it will be at the gateway of the lake system. The lakes will eventually be used not only for recreational activities but also as an urban area and the Penrith Lakes Development Corporation is in the middle of the planning process for that urban landform. So it is a pretty exciting time to be the local member but it is also a very interesting place for you to visit. I will now hand over to David Borger, who will deal with the public works aspect.

Mr DAVID BORGER: I also acknowledge the traditional owners of the land, the Gadigal people, and thank them for their custodianship of this country. On behalf of the Public Works Committee of this Parliament I would like to welcome you all to the conference. My colleague, Karyn Paluzzano**,** referred to the environmental challenges we face in the future in our various environments, particularly in Penrith. I would briefly like to touch on an issue of sustainability that is often not covered. When people talk of "sustainability"—I know it is a very overused term—they are mainly talking about the purely environmental aspects of sustainability. But there is another dimension: how do we have sustainable neighbourhoods, towns and cities? In fact in New South Wales one of our big challenges has been how to decentralise some of the good things that happen in the centre of the city with jobs and housing and get them out to where the people are starting to be?

Tomorrow we are going on a brief tour of Parramatta. I urge you to come, particularly if you are in the public works stream. Parramatta is the most successful example of government office decentralisation in Australia. It has been a very conscious policy of the State Government, and much earlier the Federal Government, to move some of the jobs from Sydney out to where the people are. The whole police centre of New South Wales has been shifted out there now. The administration of justice takes place from Parramatta. There are a number of big projects. I guess the issue in Parramatta is showing how government investment, government jobs and public works can stimulate investment in the private economy and lead to job and housing growth and urban renewal that we are all looking for in our cities and neighbourhoods. I really urge you to come. We are going to go for a walk and look at our new $150 million railway station and some of the new buildings that are housing some of those government departments. You will see how that is starting to revitalise that city.

The other issue I briefly wanted to touch on is the issue of public works in the cultural realm. We are starting an inquiry in our committee on the distribution of cultural funds across New South Wales. It seems that the great cultural institutions of the State: the Art Gallery, the museums, the Sydney Theatre Company, the Museum of

Contemporary Art, the Conservatorium and all those great cultural institutions that every State probably has, were constructed in the very centre of the city. Obviously that has always been very important to the States but since that time there has been huge growth of people and jobs, there has been decentralisation and the city has spread—we are now a metropolis! There are two million people living in Western Sydney, for example, and many other people living in regional areas. The question is whether the State or the private sector or local government can work together to invest in the sort of cultural infrastructure that those areas that are decentralising need, and how do you make that happen? That is an important issue for public works committees across the State, as well as for Ministers who cover those portfolios.

Western Sydney is home to two million people. It has one of the largest economies in Australia, outside Sydney and Melbourne. Parramatta is the sixth-largest central business district in Australia. However, there is rarely any discussion about building the type of cultural infrastructure in Western Sydney that will help to reverse the shift of young, creative and talented people to the urban village of the Sydney central business district and help to create a sense of place and identity for Western Sydney residents. The sorts of things we will be trying to do there are to provide facilities for artists, writers and performers as well as attracting film makers, designers, architects, multimedia and technology companies to the area as a way of stimulating a creative economy for the region. The local council, Parramatta City Council, has achieved this despite housing one of the largest Westfield shopping centres in the southern hemisphere. Another challenge for cities as they grow is how do they compete in the mainstream in the downturn against the global pull of the huge black box shopping centres? That is a challenge for State and local governments.

I would like briefly to mention some housekeeping issues before I introduce the first speakers for today. I remind people that you should wear your passes when you move around Parliament House. This will save you having to go through security every time you come in. Will you please let Catherine or one of the staff of the secretariat know today, if you have not already, whether you will be attending the lunch in the parliamentary dining room on Friday, so we can finalise the numbers for catering.

Please remember to wear warm clothes and flat shoes—Parramatta does not look like what is shown in that slide—to the Blue Mountains tomorrow. I remind you that both buses will be departing the Sofitel and Marriot hotels at 8.00 in the morning. Unfortunately, rain is forecast for tomorrow. If you do not have any wet weather gear and need to borrow an umbrella or something, please let the secretariat know and we will see what we can do. I think there are about half a million plastic ponchos left over from World Youth Day. Dinner tonight will start at 6.30 p.m. at the Australian Museum, at the corner of College and William streets, so please use the William Street exit.

I will now introduce the speakers in our first session. We have tried to get speakers who may not have the same world view, which I think is always useful. Our first speaker is Martin Butterworth. Martin is the managing director of the urban, economics and strategic design company Space Syntax. Across the world the firm provides critical knowledge links between economics, planning, transport and architecture. It forecasts the consequences of urban infrastructure planning to help build local movement economies. Its evidence-based approach helps to improve the economic and social performance of cities and to attract public and private investment opportunities with reduced risk.

I have worked with Martin before, in Parramatta and other places. Anyone who is interested in public works or who may go on to become a Minister or to lobby Ministers in various jurisdictions to get things done needs to be aware of these sorts of issues. Essentially, a lot of public works projects take place and we do not always think about the consequences to the pedestrian economy around major projects, major street systems and transport systems. The sort of work Martin does is a way of minimising risk to government, so when you build the great Taj Mahal or the new highway or freeway or whatever, that you do not destroy the local economy of a place by changing those critical pedestrian links in the process.

I thank you for coming.

Session A—Sustainable Public Infrastructure

Mr MARTIN BUTTERWORTH (Managing Director, Space Syntax): Good morning, everyone. Last week I was at a conference and we were discussing cities and their performance. Commercial gain and public good were seen as opposites. I ended up listening to that debate and then posed the question for today, in one sense to lead into what I am to speak about. It seems a reasonable response is, if we build movement economies, which I will explain a little later, we can improve economic performance of cities. So, how do we look at these questions in

detail? What are the types of comparisons we can make? If we look at a place in Western Sydney called Auburn and compare it with central Melbourne. There are major attractors in central Melbourne, of course, and none, at the time we looked at our work, in Auburn.

Auburn looks like this, as shown on the slide. It could be any Australian country town or any Australian suburban centre. Flinders Street, the famous railway station, is the busiest railway station in the country, and good public transport is on hand. Auburn sits on a railway line. It has major roads near it. It has a river to the west. It has Sydney Olympic Park to the north. Its town centre is in that position and its busy high street, called Auburn Road, sits there, as shown in the slide. We are going to compare it with central Melbourne, the one-by-two kilometre grid of the city.

Auburn has a pedestrian study done. Its railway station sits there and has about 8,000 per day. Its busy high street has about 1,100 pedestrians per hour per weekday. That means very little until we make a comparison. If we average that over a year, about 2.1 million people use that street. If we compare that with central Melbourne—the Hoddle grid and the CDB—there are two major railway stations with 170,000 people using them per day, major redevelopment and investment of $15 billion over some 15 years—Docklands and Southbank. Flinders Street is where the railway station is that we are going to compare. We are going to look at the busiest part of Flinders Street in the city, and there are 1,100 pedestrians per hour per weekday. This adds the question, is part of Western Sydney, a small suburban centre, performing beyond its measure? When we look at the performance internationally—and various pundits are claiming that Melbourne is the most liveable city in the world—we can start saying there are some things in our cities that we have not tapped into and that may be a social and economic performance that we need to have a look at. That was the reason I was interested in the debate in the conference last week as to why commercial good and public good cannot be reconciled and they are the same thing.

To make it a bit more problematic for the example with Melbourne, Melbourne has major attractors, as I mentioned, and Auburn's high street meets all of those streets in Southbank and in the lower part of the central business district of central Melbourne. So, none of the bridges across the Yarra come up to the rate at which Auburn's high street works. It is really an attractors only system. Its urban layout does not work as powerfully as it may or is more efficient or productive as it may be by having these new public and private investments. If the layout itself is working well we start to see the new thing, or the thing we used to have in cities, and that is high economic and social performance.

When we look at urban cohesion—this is a slide of Berlin in 1940. You can see the buildings define the movement pattern. This slide is 50 years later. It is not after the war, the bombing that is, but this is adding that local space into the system and replacing certain buildings. The fragmentation has occurred so the movement patterns are not intelligible enough for people to use them in the same way as they did some 60 years earlier. We see these types of occurrences when we invest in places like Macquarie Park, one of the largest office parks in the country. So, the sparse layouts and attractors do not maximise economic and social performance. So, it is this problem of creeping underperformance that we are wanting to address in some of the aspects I want to talk about today.

So, how do movement infrastructures improve economic and social potential? Around the world our work looks at and finds that attractors account for only 20 per cent of movement, whereas urban layout is some 70 per cent plus. If we spatially integrate those properly—we looked at an earlier example in Berlin—we start getting the economic and social multipliers that we once had in cities. Investment, in itself, starts stimulating a productive local economy. The objective evidence is about natural movement. That is the key to how buildings and cities work. Spatial layout is the key to how natural movement works—an issue that I will explain in more detail later.

The investment points of view are that the public sector will improve accessibility to those facilities. For example, in Western Sydney, in Western Melbourne, and in all the areas of Brisbane and other capitals, we invest enormous amounts of money to try to provide facilities so that local residents can go to them without having to go to urban centres. However, they need local urban centres in order to do that. In the private sector we are finding that we can realise new economic potential when we start looking at untapped value in our urban fabric.

A local movement economy involves a combination of a number of things: a relationship between the ease of access of urban layout, the numbers of pedestrians, vehicles and public transport, and the distribution of land uses. We do not want certain land uses in places that are not busy and we do not want to call them retail and hope that they will work. The build-it-and-they-will-come principle does not necessarily help us to produce the powerful economic and social centres that we once had.

Let me go to an example rather than talking about some abstract issues. In central Parramatta council and the private sector are investing some $1.5 billion in Civic Place to try to produce a new development that has some 40-storey buildings. The land use is cultural, residential and commercial, it will have public facilities, and it will be water sustainable. The buildings on the public site are shown in the green outline on this slide. Public open space is also shown, and there are a number of squares. Our modelling allows us to predict the likely movement patterns—in this case just pedestrians, as we did not look at vehicles. Where there are red lines there is high pedestrian movement, and where there are blue lines there is low pedestrian movement, and there are various grades in between.

This is not doing counting; it is simply stating that the spatial layout is easier to get to in the red lines than it is in the blue lines. The $1.5 billion redevelopment is reflected in the dotted line on this slide. We say that the routes that go through there are base routes, and we call that nought movement. If we look at what was produced in 2005—the designer's new pedestrian infrastructure—we see some blue footprints and those footprints are for the new routes. We have improved those routes by some 27 per cent. What we did in the space index—although we came in late in the process—was to add different routes from our understanding, not just from within the site.

We brought the local urban fabric into the site to form a part of it. We brought thoroughfare movement into an area that needs to have more pedestrians for the land uses for which it has been prepared, so we improved it by some 200 per cent. Council can then go and say to the developer that it might have an unexpected increase in its return. This slide depicts the new routes within and outside the site and it also depicts two new routes that have some public land available—which are possible ways for us to improve it even further. Sydney's sustainable future on a very large scale is dictated by the City of Cities concept, which we are doing in all our major urban and metropolitan strategy planning.

This slide, which I prepared a little while ago, shows the whole of the Sydney Basin up to the Blue Mountains, or to the Nepean River in the far blue-green area. You can see on this slide the road systems, the parks and the large areas where the urban centres exist. This slide depicts the new growth areas and seven urban centres that have been suggested at different times. Some are located in the old areas of Olympic Park, in the green square, and the rest are new. Let us look at a five-kilometre radius from each of these urban centres and say that that is the sphere of influence, and nothing more.

In the eastern older part of the city, all the way up to the northern beaches and down to the bays beyond Botany Bay, there is a dense arrangement of urban centres. However, in the south-west and in the north-west we do not have them. Let us take this slide as an experiment and say, "If we had urban centres at the same rate of density we would probably need another 30 centres in the next 20 or 30 years." When we are talking about 30 centres that sounds as though it is an enormous task for the private sector and the public sector to work together to produce such a thing. We find it very hard to produce even one centre.

Perhaps we need to look back at what happened in Auburn. Auburn is not big but it seems to compete effectively, so there might be some reason to build some smaller urban centres as well as larger urban centres and then major infrastructure projects such as ports, roads and rails can be integrated effectively across the system. Rather than selecting certain parts to be improved we can improve the entire city, and we can do this across our capitals as well as in our townships. This is the way in which we look at a key linking of infrastructure issues. This slide shows an investment model of regional public infrastructure in Britain. It tells us where we can start experimenting and whether there is a likely investment profile that might not necessarily be seen in the usual fashion.

These maps show the ways in which people move around the system, how they are made productive or unproductive, and they might work in a pattern to help growth. London, which is a part of this system, is 50-kilometres wide. The slide also depicts a number of other cities across an area of 330 kilometres. To give you some sort of scale, Britain is next to Europe. We have mapped and modelled that part of the system and we have continued across the entire British Isles. In New South Wales, Sydney is literally the distance from Canberra to Newcastle and Auburn in between. In that 50-kilometre area of central greater London we can look at a much more effective integrated transport and land-use model than we had in the past because we are looking at the whole system and all its constituent parts—from important bits to unimportant bits.

The global London map on the left-hand side of the screen depicts central London, vehicle infrastructure and vehicle movements, and the map of central London, which covers an area of 800 metres, depicts urban villages and the way in which they are integrated. We can look at pedestrian infrastructure models in lower Manhattan in New York. This slide shows the World Trade Center and some initial work that has been done by

British architects. Going back to Parramatta, we can look at the pedestrian infrastructure—the peak central business district is again is depicted in red—and we can compare it to the vehicle infrastructure.

I am sure you can start to see how powerful these tools are in helping us to forecast likely performance when we put projects together. These tools also enable us to compare project systems by looking at the accessibility network. We can also link infrastructure to land-use patterns. This slide shows part of a city in Saudi Arabia—the port city of Jeddah. We can link infrastructure to building densities and we can link transport infrastructure with port infrastructure. This slide shows the same city and its port facilities. We can link infrastructure with urban safety—this slide shows a study of some 20,000 cases of burglary in south-western Perth—and we can find the hot spots and very low movements in urban sprawled areas.

To show you our experience, the largest task to date is a city that is sustainable in its economic and social performance and also in its environmental performance The city of Jeddah, which sits on the Red Sea, is some 70 to 100 kilometres from the great sacred cities of Mecca and Medina and has a population of four million people. It is about 50 kilometres along—about from here to Penrith—and it is slightly thinner. By 2020 the intention is to treble the population from four million to 12 million people and to double the footprint from 750 square kilometres to 1,300 square kilometres.

This slide shows the proposed plan and some of the initial work that we have done. We have strategically redesigned the city based on movement infrastructure and understanding movement economies so that we have an accessible, polycentric city. Because of massive transport costs around the world people need to be able to get to facilities that are provided for them without having to go to major centres. Rather, they require a choice of centres.

So we can look at the public infrastructure actual productivity. If we are putting in one part of the city a proposed motorway on the western side, we can make that work and improve rather than produce a barrier causing greater urban growth in that part of the system.

Unlocking economic potential in a smaller and much more appealing way—in three dimensions—is how we put these attractors in the urban task. This slide shows a city centre with a redevelopment site and busy roads. The task was to include two storeys of retail with some commercial towers above. The analysis showed high movement in two streets, indicated by the warm colours, and very low movement elsewhere except down to the south. The slide indicates either side of the street, the pedestrian crossings and a pedestrian structure. That is normally thought of as an adjunct rather than the centrepiece of a way in which we as human beings work cities in all parts of the world, irrespective of cultures.

The analysis suggested that we should not interrupt movement along the major businesses, so we multiplied it. We also brought business throughout the potential site. The result is that we can tell which routes perform well and the percentage increase—that is, from 10 per cent to 113 per cent. These are the desire lines; they are not made up because I thought it was a good idea at the time but based on objective evidence and empirical studies of pedestrian movement around the site. The circles represent public spaces or potential public spaces because they have movement through them back out into the urban fabric. They are therefore likely to have multidirectional movement rather than simply be placed next to something we hope works.

We sculpted the movement system for the two storeys of retail in orange to suit the movement. We actually integrated the two attractors with the movement infrastructure. There were suggestions about unused or underutilised spaces a little further away and in parts of other buildings. We could improve that and the clients liked it enough to suggest that they buy another site and see how that can integrated. We were involved in some other projects nearby. In the English project we can cover the retail section with a glass roof and see whichever tower for the commercial formation is effective according to the investor's financial understanding.

In a sense, we have made two new routes in the urban fabric. Unlike master planning, which tells us what it looks like from a balloon passing over, people do not look at plans, cities, buildings and projects from an aerial perspective, although we have to draw them way. We look at them from ground level. If we know where we have been—hopefully—and where we are going then, because the route is simple and direct, there is the likelihood that people will browse and buy rather than avoid the area. These are the two new routes from a pedestrian viewpoint.

We then even further removed ourselves from the way in which some of our abstract analysis looks at things and got down to the way in which, no matter who we are, we intuitively use space. This slide shows the strategic design of movement in Trafalgar Square in London. It is defined by buildings, two fountains and a column. The back has a retaining wall and there are two dogleg staircases at either end. This slide was taken a number of

years ago. There are iconic representations including a tall column with Lord Nelson on the top. It was built in the 1840s. Four years ago we found that there were few people but lots of pigeons. When we went to the busier areas—that is, where the people were—we found there were more pigeons than people, but still there were more people. We noticed that they were not wearing suits, so we knew they were not Londoners. These were tourists. Most people who go to London go to Trafalgar Square, but Londoners have not been using the square effectively for 160 years. I will provide an explanation for that in a second.

Some people suggested that the pigeons were the attraction for people coming to that part of the square. To allay the fears that we needed pigeons in our public spaces we asked the seed sellers to move to the south western part and the pigeons went there and the people stayed put. The other feature was that large numbers of people loved crossing these roads, which have very fast traffic. Again, there were no suits, or very few Londoners—it was mainly tourists. They liked to go in large numbers to, of all things, traffic islands. We thought that traffic islands were not the reason Trafalgar Square was the most attractive place to be or that had attracted huge numbers of people from across the world annually for 160 years.

We thought about how we could explain this unusual behaviour and try to improve it. If we stood in the middle of the square—the yellow dot represents that—the view field in all directions is the pink area, afforded by the buildings that are in the way. That is what you can see of London. The blue dot is the most popular of all the traffic islands. If you move to there you can see most of London, or that part of London. So we great people who design public spaces did not quite capture what everyday people actually knew—that it was cleverer to go to a traffic island to find out where you are and therefore visit other facilities. This is the way we as human beings across cultures—even more fundamentally than cultures—find out how we use the system. If the facilities are available to us—as you might say in Darling Harbour or parts of Docklands in Melbourne—you will find that there are great facilities but it is hard to get to them. The facilities have the problem that we see as creeping underperformance.

How do we maximise this performance in cities, both socially and economically? If we can have urban centres that are highly accessible then they will be great trading centres. If those centres are great trading centres they will have lots of people. The local community will actually be socially cohesive. You can put the social and economic performance in the one basket and start making cities as we used to understand them. These are the parts of the world we like going to; we like going to the parts of cities that work.

In this analysis we followed people on the blue lines—which indicate that not many people crossed the square. The red dots represent people stopping for encounters, whether they be important or unimportant. It shows that people use the space. The green lines indicate average movement and crossings over weeks. We modelled it either side of the street and included the underpasses and overpasses. The slide indicates that most movement occurs not through the square but down to the south. One small example of reiterating from one point of view is that if we went from the church to the arch, there would be five changes of direction, but if we used the square there would be 14 changes of direction. Unless someone is coming to the square to see it and to celebrate London, they will use the square no matter how difficult it is to get there. However, Londoners tended to do the first task and miss the entirely.

We did not build another attractor; we simply suggested the design for a staircase. That is the blue part on the slide. Therefore, a new staircase was installed at the back the square where there was a retaining wall. To change this we had to persuade English heritage—the great unmoved mover—to more complicatedly accept changes in the arrangements, and perhaps to introduce legislation in Parliament, that one of the world's most famous squares could be changed and improved from the original design.

This was the solution at one point. We improved movement through the square by 1,300 per cent. Now Londoners and tourists use their famous square. It is celebrated not only at party time when the British football occasionally wins a game but also throughout the day and every day. That is what we are finding in our cities that we have new areas that are not used except at weekends as attractors, but we need to get them to be used during the week by both vehicles who bring pedestrians from a distance, and when you de-civilise those vehicles so that they do not cause the congestion that we do not want in cities, and we also need to have the local people using them.

So this is the photo collage that we thought would occur with the new staircase, and this is a photograph taken after it was opened. It cost $A42 million to put a staircase and do some changes for some retail but that was because it was such an important square and it had to be very carefully designed. So in a sense we analyse, we go out and observe and then we do our strategic design and forecasting and so there is a solution for a particular urban problem.

So if we go back to Parramatta and have a look at not just what we have been speaking about, the predictive model, and have a look at what other things in detail we need to understand, before we actually make these changes, and see the consequences economically and socially. We looked at pedestrian movement from 6.00 a.m. to 8.00 p.m. weekday and weekend, and you can see Church Street is the street in the middle that has high movement all the time. We had the summary of pedestrian flows. We looked at workers, locals and tourists as a split so the workers in the blue during the week, and they evaporate on the weekend. So it is really a local system that has been working, added to during the week. And there was only 1 per cent of tourists there. We looked at some 55,000 people and that is split, as I said, between locals, tourists and workers.

We looked at ground floor land use patterns, and first floor. We looked at building frontages whether they were active or blank. We looked at building entrances as the public go into them or had you controlled entrances as you do to come to Parliament House. We looked at the urban block size because the smaller the block the easier to get around so that the pedestrian system can actually be a functioning infrastructure. We looked at way finding from the transport interchange so that the red lines show you the routes that are 2.5 minutes away, yellow are 5 minutes away, green are 10 minutes away and blue are 15 minutes away. Then we looked at the public car parks and how that serviced the system. We looked at how the bus routes were compared with the pedestrian infrastructure. Is it better to put that bus route down this route so you will get more people using it or is it simply because it is equally distant between that bus route and that bus route and over here?

We finally looked at the vehicle infrastructure. Twenty years ago Church Street was closed, as a number of streets in our major cities were closed, to vehicular traffic on the pretext that it would produce a pedestrian heaven. If you went down Church Street before part of it was opened recently you would have found that some of the major buildings were $2 shops, so the idea of closing off systems to vehicular traffic which brings pedestrians from a distance, if you remember, is itself fraught with concern, and we need to see what the consequences are. So that is the closed to the vehicular part, and there is the solution of opening it fully and seeing what the consequences are, and we can go into it a bit deeper.

When we have a look at unlocking again in some recent projects, the economic and social potential, I will just lightly touch on Green Square in Sydney which is a $1.5 billion redevelopment by the Government. You can see that Green Square lies in that circle in the middle, and to the north the older areas of Newtown, Chippendale, and Surry Hills—this is the pedestrian infrastructure by the way—are very productive and efficient movers of people with the pedestrian routes. But the likelihood of getting pedestrian routes through this area here is concerning. So the DCP that came out a number of years ago has these pedestrian routes. The concern is how do we make those more effective so that they match in some fashion Surry Hills, Chippendale and Newtown, and therefore, the investment profile of what the private sector are wanting to put in there is actually going to be realised. This is the existing vehicle infrastructure which is much more powerful as it goes past the site in some way and that may be one of the reasons that we are not looking as carefully as we might.

Finally, Macquarie Park in Sydney, a major redevelopment is occurring there. It is one of the important office parks in Australia. It is part of a knowledge corridor for the Metropolitan Strategy. It has the Macquarie University to the northern end. Its pedestrian infrastructure is efficient, and you can see the problem of all these attractors with a movement pattern for pedestrians in the blues and greens of quite low movement. So what happens is people tend to hop in their cars to go from one part to another rather than walk because the box is so big and the distances are so great. By the way, the Government is investing and will be opening soon $2.2 billion worth of public infrastructure for rail in those three sites linking Epping with Chatswood. So the Master Plan suggested routes, you can see they have improved. Our concern was that the blocks are still very big, and that we could improve that even more and produce an urban centre, so this is one of our solutions and that is not moving any of the existing buildings but providing routes through the sometimes public and sometimes private sectors land, and then having negotiation between the two.

So building movement economies is part of what we consider is sustainable infrastructure. So we analyse urban options and their layouts—these three general types. If we take a more obvious one, the grid, we can determine our block sizes and shapes. We can look at and forecast the movement potential. We can then look at the land uses and allocate them so that high movement is associated with high land use requirements, like retail is the highest, for example, and residential is the lowest land use in terms of movement, but we do have to remember in residential, we do not need it too low so that it ends up becoming unsafe. And then we can look at distributing the FSRs and the building forms.

So we provide, in one sense, movement economy databases. This is Boston. So instead of just simply seeing the buildings, you can see that the buildings are overlaid on the pedestrian movement pattern, itself a public

infrastructure force of economic and enormous social importance. So our objective evidence helps with investment by unlocking value. It helps with strategic design by forecasting the economic multipliers and it helps with providing independent advice for public and private arrangements. So if you are in planning, it helps you to determine land uses based on movement infrastructures. And if you are in transport, it helps you integrate road and rail with pedestrians. If you are in Treasury, it helps you evaluate public infrastructure and expenditure. If you are in investment, it reduces risk and as parliamentarians you can have more confidence in your decisions. Thank you for your time.

Mr DAVID BORGER: Thanks very much Martin for your insightful address and if you are worried about dead beat towns, or main streets that do not work or pedestrian malls that are unsafe or various other issues in your electorates, the Space Syntax website is very insightful. I encourage you to look at that or give Martin a call if you need any further assistance. We need to move along quite quickly now, as we are running a little short on time.

Our next speaker is Mark Kirkland. Mark is the development project director at Rouse Hill town centre for the General Property Trust [GPT] group. He was responsible for the project's delivery in Rouse Hill, Sydney. Mark played an important interface role there between the retail, residential, commercial, civic and educational components of the Rouse Hill town centre. Mark has 14 years of industry experience. Prior to joining the GPT group he held construction, project and development management roles working on a number of major retail developments such as Sunshine Plaza, Erina Fair, Penrith Plaza and Bluewater in the United Kingdom. Would you please give Mark a warm welcome.

MARK KIRKLAND (Rouse Hill Town Centre Project Director, General Property Trust Group): You have probably gathered that I am one of these dirty developers from the black box shopping centre world. Be kind. We are trying to break out of the mould. Thank you for giving us the opportunity to come along and present today. I had the opportunity to be project director on Rouse Hill Town Centre, which is a little different. Our company perspective looks at these types of things as large pieces of community infrastructure so I plan to talk about infrastructure in the broader context of what we have done around this project.

We did a case study of Rouse Hill Town Centre and what we tried to achieve from the point of view of sustainable urban design, efficient use of energy, resources and materials and I will give a little bit about the social outcomes of what we set out to do, how we manage to achieve it and some of the challenges we have struck along the way.

For those who are not familiar with it, Rouse Hill is 35 kilometres north-west of the Sydney central business district. It is one of those identified major growth centres that was touched on in the earlier presentation. The land for the site was purchased by the Government in the 1980s, so it has been sitting there identified as a new regional centre for Sydney for quite a while. Rouse Hill Town Centre, which is what I was more directly involved in, is the centrepiece of a broader urban development called new Rouse Hill, which is basically a 120-hectare master plan community. It has zoning approval for 100,000 square metres of retail and 100,000 square metres of commercial and up to 1,800 residences.

The new Rouse Hill is a joint venture between Lend Lease and GPT, in conjunction with the New South Wales Department of Planning and Landcom. In early 2001, 2002 and 2003 the Government went through a process of putting the opportunity out to the development market, calling for expressions of interest, shortlisting people, and the Lend Lease-GPT consortium was ultimately appointed in 2003.

The overall site of 120 hectares consists of a number of residential precincts. There is a significant expanse of open space, which is mainly along the Cattai Creek corridor, an existing creek that runs through the centre. There is an education precinct with a primary school and a high school. The Rouse Hill Town Centre sits at the heart of that. There is a future commercial development area that has a mixed use commercial-residential-retail zoning across it and this is Windsor Road, which links back to the M7 and M2 and back to the central business district. It is also on a bus transit way that has recently been developed by government. It is also earmarked as the end station on the future north-west rail link.

This is a shot of the town centre in March this year when we opened stage two. You can see some of the residential infrastructure being developed. You can see the Resi display village and the creek and you can see the primary school that opened 18 months ago. You can see Windsor Road, the bus interchange and this is the future development area for further retail and commercial use. Around the perimeter of the town centre are a number of sites that have not been built on. That was part of the urban planning principle of trying to leave some areas for sleeving of the retail boxes, which I will touch on shortly.

I will do a quick overview of the town centre and what we have done from an urban design, resources and social perspective specific to the town centre. The town centre project is a $470 million greenfield development consisting of 65,000 roughly retail spaces. Retail is the big commercial driver for the town centre. It is made up of 200 specialty shops, five big major anchor tenants. The thing that is a bit different about this project compared to a more traditional shopping centre, apart from the urban design, is the other mix of uses that were introduced through the project. A number of apartments have been built along the main street through the joint venture. Working with Baulkham Hills Shire Council, it has developed a library and community centre that sits in the heart of the town square and a range of other learning and community spaces have been developed as part of the project. We are still procuring tenants for those, as well as a significant amount of public realm.

We opened in two stages—in September of last year and March this year, having started project construction in April 2006. It has taken just under two years to build this project. From an urban design point of view, one of the fundamental things in the big documents from government was that it wanted to see a very different model and a town centre model, not a shopping centre model. For us it was: how do we turn the whole thing inside out and make a genuine, authentic town, which is something that is quite challenging when you think that towns grow up over hundreds of years and we were trying to do it in a two-year period.

The whole notion of trying to maintain the strong retail fundamentals that we needed to get the thing working commercially but mixing through this whole layer of other uses and activities—and a lot of that was about making it a living town where people can work as well as live, incorporating leisure and entertainment to give it the longer life that we expect to find in a town as opposed to a shopping centre—and even things like learning and community facilities such as adult education classes that run through the evenings and council facilities that run to midnight with rooms that people can hire out for events, to try to broaden the spectrum of uses and hours of activity of the place.

The challenge was trying to deliver strong retail fundamentals in a town model, not a closed-in shopping centre. We positioned all the major boxes on the corners, which gave us the strong pedestrian links, where we more typically put the specialty shops that run between the majors. The reddish coloured area was the pedestrian-only circulation pattern. Then that was bisected by Main Street and Civic Way, with the town square right in the centre and the library building sitting on that. We have a mix. Whilst those are privately owned, they operate like any other road in any other town; they are open 24:7. People can come and go as they please. They have on-street parking. The addresses for the residential apartments come off the main street.

There is quite a complicated layering of the subdivision pattern, the structures and the ownership through the town, when you take all that stuff into account. Then these are the sleeve sites. Between the outside of the retail and the perimeter road system, the master plan allowed for future development that would then give the opportunity to begin to sleeve in some of the big retail boxes and create some outward focused activity onto these perimeter systems.

The planning is around more commercial type uses at this end, closer to Windsor Road and the transit interchange, and maybe more residential at this end, which gets down closer to the creek and looks down over the bushland and the waterways. Of the 100,000 square metres of retail and commercial that is zoned for that space, we have built just over 71,000 with what is there today and there are 104 apartments along Main Street but ultimately this can take 400 to 500. That gives you a rough indication of the quantum of what can still go in terms of future growth on to that site.

One of the fundamental shifts, one thing that is quite different from a normal shopping centre is that all the parking is underground. That was strongly driven from an urban design perspective, so you do not see any car parks. You might have noticed in the earlier aerial photo there were one or two ongoing parking areas but they are really future development sites that will ultimately be built over. This is a good and a bad thing. From a commercial point of view it created a lot of challenges but the flipside was it was highly accessible for visitors to the town. They park and are taken straight up into the centre of town through a whole lot of different vertical circulation points. From an access and amenity point of view it was great. I will touch on it again later but it created a few challenges from an environmental sustainability point of view. There are some instances when the situation is a trade-off between urban design principles and environmental sustainability principles.

This photo is a layering of the other mix of uses I was talking about. Predominantly it happens along Main Street, which is the main area. On the northern side of Main Street there is a single level of commercial space, which is really where some of the learning-type uses will be housed. The apartments are up to eight storeys high on the south side of Main Street so they do not shadow the street; they get the northern aspect out over some of the bushland and the creeks, not only to deliver a planning strategy but also to try to give some genuine scale and

authenticity to that as a street environment. There are various models around where people have tried to do street-type retailing in recent developments but the thing that makes this a bit different is having that genuine mix of uses on the upper levels, which you do not see quite so often. The library and community buildings sit in there and some of our commercial office space, which fronts onto Windsor Road and the transit interchange.

I am just going to flick through a few photos so that you get the flavour that it is still a strong retail environment. It is a regional size shopping destination, but hopefully you will get a sense that whilst we have areas with differing degrees of cover, from the full roof that you see, it is still open to the elements. There are no sliding glass doors. Areas that are pedestrian only have a more traditional street-type response to the weather with a typical three-metre wide awning on either side to provide protection to the shops. This photo shows a large internal space that more typically you would call a food court. We have tried to go a bit beyond that. One of the interesting things is that we have a big screen down the middle of it, which is basically covered out because of the master plan of the overall 120 hectares. There is a strong pedestrian route that comes up from one of the residential precincts to the town square and comes through this space, so we had to design it so we could move all the tables and chairs and secure them out of hours but still have it open as a safe environment when those residents start to want to use that access way.

This photo is of Main Street and you can see the apartment buildings up above, retail below and on-street parking. We went to a fair bit of trouble to design the streets as low traffic flow. All of the car parking entries and exits come off the perimeter roads so you do not actually need to drive up and down Main Street to access the main car parks. The idea here was to try to create an environment of quick-stay parking if you want to quickly pop into the bank or the post office; this is all 30-minute stuff. So we wanted to generate turnover and low traffic flows and make this as pedestrian friendly as we could.

This photo is the other end of Main Street, which is a bit more vibrant. It is more the nighttime leisure and entertainment area, with cinemas above and some of the restaurant precinct below. This photo is interesting because it shows a bit of a hybrid. It is an area that is open to the sky with typical three-metre wide awnings on either side. There are various areas through the town centre where we have additional layers of operability. The idea of these high-level awnings is that at certain times of the day they come out to protect the retail shopfronts from sunlight, because retailers hate their merchandise being faded—obviously it is a more critical issue if it is food. The awnings come out if it is raining or hot to help temper the weather conditions a little. We have put a highly intelligent building management system through the whole place where we have lots of these operable elements to try to get the right balance between something that does not have a roof on it permanently and being able to create the right level of amenity for visitors and for people who have businesses there to be able to function in most weather conditions.

This photo shows the heart of it all, the town square. I touched on this at the start when I said we like to think of these places as bits of community infrastructure. It was great within a day or two of opening to see people turn up with their kids with towels over their shoulders obviously coming to have a splash around and cool off and run through the fountains. You can see the residential buildings flank town square on either side. You cannot see the one on the other side of the image but they overlook Town Square. This is the council's library and community building. It is a great space; you go there at seven o'clock in the morning and people have got their coffees and are sitting around watching and enjoying themselves. The community response to what we have been able to achieve has been fantastic.

This is another area we have put a lot of focus into. There is a younger family demographic out there and we really put a big focus into giving something back. We have created an area that we think is quite popular and has been well received. It is a bespoke play area, which is always full of kids and mums with prams. We put a big focus on the whole precinct. The amenities and the parents' facilities that go with it are just across the way; they are not stuck down a back corridor. They are close to the public space. We have tried to make those best-in-class facilities. There is a coffee shop where mums sit with their prams while their kids have a play. It is a space they can come along to and enjoy. We find that a lot of people just come to do things with their kids and they do not necessarily always shop or buy anything every time they come. They just come because it is a great place and they enjoy it.

This is an area called Market Square, which is between the town centre, Windsor Road and the transit interchange. This is an area that has been set up as a multipurpose community space. When we opened the second stage we ran things like outdoor cinemas as part of the promotion. We get people like the Buick Car Club turning up to do a concourse of 12 cars. We get people wanting to do sporting registration sign-ons. We have monthly growers markets there with Hawkesbury Harvest, a collective of growers in the Hawkesbury-Nepean region, which have been really popular. It is more about trying to give something back to the community so they

feel like it is their town centre, not ours. That is the ultimate success for us, I suppose. We feel we have done a pretty good job in trying to change the shopping centre paradigm. I suppose we are biased, but a great bit of news for us was to hear at the weekend that the architectural team won the Lloyd Rees urban design award of the Institute of Architects. They will go into the national awards for their design of the town centre.

I have touched on some of the challenges, but the basement parking was one. From an urban design point of view it was desirable for everyone involved with the project to have the parking underground but when we did the analysis from an environmental point of view we figured out something like 30 per cent more energy would be consumed by virtue of having to dig the hole and create the basements and then ongoing operationally having to light them and ventilate them. That is an example where sustainable urban design and sustainable environmental design do not necessarily always go hand in hand and you have to be conscious of those sorts of trade-offs.

The other one from the design point of view, obviously we wanted to try and create the diversity of a town with the diversity of materials that go with that and it was challenging quite often to get stuff that had the right long-term durability and maintenance requirements and stuff like that. Sometimes we are a bit limited in some of those areas.

An interesting one: I think one of the themes or something mentioned in the conference papers is the issue about access and equity for people and we had a wad of dialogue with council and they pushed us quite hard, which was quite good in hindsight, about what is the whole philosophy for how you manage and use privately owned public spaces. So the two roads in particular through the middle of the town, what is my right if I want to go along and hand out religious leaflets or political pamphlets or have a protest about something, because typically in a town you would not have anyone managing that or controlling that. So we put a whole structure around that; we looked at the way it is done in places like Sydney Olympic Park and the Foreshore Authority and Sydney City Council and we sort of adopted a model. We have never gone beyond that even, because a lot of those areas sometimes say these are the only types of things you can do. There is no documented right of appeal if you get rejected; there is no guarantee of approvals; and with issues of a whole lot of things like that we think it gives us a pretty robust framework and seems to be working so far.

From the resources and environment perspective, at the time we embarked on the project some of the star rating tools were around in commercial office type projects but there was not really stuff so readily available for retail. So we embarked on a route of looking at our eco-footprint rather than star rating tools. I mentioned we had a number of objectives in the framework of how the project was awarded from government, so we benchmarked our eco-footprint. If you look at the red on the screen it would be what a typical enclosed shopping centre of the same size would represent in terms of ecological footprint. At the time we were awarded the project with all the initiatives and things that we had to deliver to government we were sitting in the yellow territory. So we were at about a 19 per cent reduction already.

Post-completion we are saying we are at about 25 per cent, which is the green, and the big inroads we have made predominantly have been the work we have done with tenants, because in a shopping centre environment tenants definitely use about two-thirds of the energy of the place. So it is very easy as a landlord to put all the smart stuff around the base field in the common areas that you control; it is much harder to try and get tenants to engage in that. I will just touch on each one of those axes in a little more detail.

Biodiversity, compared to business as usual, got about a 50 percent better result, and that was just through the opportunity—we had the space there—to introduce things like bio-swales and to introduce a lot of native planting around the perimeter sites—something like 130,000 trees and plants have gone into it. The whole focus across the whole project was about water sensitive urban design; it was not just about us capturing all the rainwater off the roof to reduce water consumption; we were making sure we were putting the right flows back through the creek system as well to ensure the ongoing sustainability of that—rooftop gardens and things like that.

There were some challenges, and they were not major, in trying to create diversity and vibrancy and the like in the town centre. We probably wanted in a few instances to use species that were not necessarily indigenous because we wanted to get the change in colours through the seasons and trees that lost their leaves so that we had a better response to the environment in letting sun in in winter and things like that. Also, the underground parking: While they probably allowed us to build the whole project on a smaller land footprint than what we normally would, there was the trade-off from the energy consumption perspective that we talked about earlier.

Materials: We did a whole load of stuff but this is just some of the headlines. There was a big focus: a lot of the road base and sub base all came from recycled sources; all the non-structural concrete—blinding, slates and things—have a higher recycled content. There was a lot of focus on reducing the cement component in concrete

and using more fly ash, lots of recycled content in the structural steel and the reinforcing and even through other metals like aluminium and stuff that we used through the project. Timber was an interesting one because when we started to do some of the timber selections there seemed to be a whole range of different types of accreditation programs, and digging behind all that and finding out the ones that truly were the most sustainable was an interesting challenge.

Fit for purposes was probably one of the biggest challenges we had because whilst we were trying to choose materials that had a high recycled content or low embodied energy or whatever, at the end of the day we still needed to make sure it was durable and had a longevity to it. There are some instances where you do not really have a choice, you just have to use a particular type of material, like restaurants, for example: from the health point of view their kitchen equipment really needs to be stainless steel; there is probably not another material you can choose. So I suppose it is just recognising some of those constraints and also where the market was up to in terms of suppliers and how much information they could really give you about what embodied energy there was in the product or how much recycled content, and when you dig behind some of that sometimes it is not that easy to get behind it all.

Energy and greenhouse emissions: Again, quite a significant reduction, and that is largely because of the open street environment, so we have not actually got a lot of common areas we have had to air-condition. Since we were air-conditioning we put a highly efficient central plant system in there. Quite often the major tenants, like the Woolworths and the Coles and the Targets, they want to have their own air-conditioning plant, but we managed to get all of them to go on the central plant as well, which made it a lot more efficient. We invested a lot of money in the technology in the metering so we can trend how we are going against our forecast. So if we see a spike in energy consumption we know something is not commissioned properly or is not switching itself off as it should be, so we can catch the problems upfront before they happen.

A lot of work has gone into the solar design strategy, so getting the building height and massing into the right spots—the bits that operate so we can let sun down into the spaces in winter, that we can keep the heat down in summer, all that type of stuff. Lighting was a big one as well. Obviously, first of all, getting the lighting that was right and not overlighting it; then achieving the lighting with very efficient fittings, and then, thirdly, make sure you only have lighting there you want, so a lot of back-of-the-house areas and things need motion detection and that type of stuff through it. That was really through the retailers as well.

Challenges: Retailers love lights and the more they can put in the better, and quite often when they are designing their fit-outs they will get an architect to do it and they will not necessarily get a specialist lighting designer. So they tend to be on the conservative side and put too much lighting in there. That is part of the engagement with the retailer design processes that is a bit of a challenge. At the time we started the project we knew there was constrained electrical capacity out in the north-west sector generally, so a lot of this stuff we had to do because if we had to consume like a normal shopping centre would, we would not have the power to do an open project. So there was sort of a business imperative to achieving some of this as well.

The last point—it is not really so much in relation to this project but some other things we are looking at. At the moment we are looking to put a coach in and things like that. We are halfway between two markets: we are trying to get gas into one of our projects, and the smaller retailers seem to be quite well protected with some of the legislation, or if you are a big industrial conglomerate consuming a lot of gas you have a different negotiating position. We are stuck in the middle. So it is quite difficult if the infrastructure is there to actually get it into your projects in some instances so you can use some of these technologies to save energy.

Water: Whilst that says 47 per cent, that is from an eco-footprint point of view. We have actually reduced our water consumption by about 60 per cent compared with a typical centre of the same size, and I think that is even about 20 per cent better than Sydney Water's current best practice guidelines. We think we have done pretty well there. Within that, out at Rouse Hill Sydney Water has a recycled water system, so we would manage within that reduction. A high component of what we are using is from the recycled system rather than the potable system.

I will go through some of the things we have done. Firstly, with regard to cooling towers, the bleed water from our cooling towers goes through a chemical treatment process and gets reused—which has been done before in a commercial office building context, but we think it is the first time it has been done in retail. As I touched on earlier, rainwater collection was tempered by making sure we were still keeping good-quality flows through the creeks. With respect to metering, historically we have gone back into other centres and we have retrospectively done sub-metering. If you have a toilet block or a leaky cistern, or something is leaking in a plant room, the metering system can pick that up straightaway so you reduce a lot of wastage.

With regard to green leases, we did not say to retailers, "You have to reduce by X amount"; we went a step further and recognised that they would not necessarily have the background or the skills to figure out how to get there on their own. We were quite specific in saying, "You must do this, this and this, and you cannot do X, Y or Z." That was embedded in the leases, so we have the right, if they do not do the right thing, to go back and rectify some of that sort of stuff.

I will talk about some of the challenges. Obviously, getting the retailers on board again was a big thing. I suppose a pet gripe I have, working in the development industry, is the way some of the infrastructure charges work around water. We have forecast that we are achieving that 60 per cent reduction, but we do not get any acknowledgement for that, in the way that the head works, charges and so on get calculated. From our point of view, we would be quite happy to invest that money into other technologies and try to make even further savings, but it is just not quite there at the moment from a legislative point of view.

With regard to transport, we have a pretty strong green travel plan out there. Obviously, being located on the T-way, that is a good thing, and ultimately with the trains coming at some point in the future, which is currently earmarked for 2017, that will help increase that reduction even further. There is an integrated network through the town centre in the broad approach, which ties back into the regional cycleways and pedestrian ways.

We have put a lot of investment into a car park management system, which some of you may have seen on other projects. Basically, it has a little red or green light above every car parking space, so it very quickly and efficiently guides people to a vacant space. The consultancy had done a study on a previous project, and they reckoned it reduced movement through the car park by about 55 per cent. The exhaust gases and the need to ventilate that, and so on, obviously has some environmental benefits.

Whilst we had a really good partnership with the Government and the parties involved, and everyone worked together collaboratively, at the end of the day it was probably an easier challenge to get Windsor Road upgraded than it has been trying to get additional bus services. Even though the funding is there, it has been a slow process to try to improve some of our public transport infrastructure.

As I said at the beginning, the tenant aspect is probably the area where we have made the biggest inroad from the point that the project started. There has been about a 42 per cent reduction in eco-footprint compared with business as usual. We built an eco-footprint calculator, so that every tenant, when they lodged their design, had to run their design through the calculator and we had pass or fail criteria. We gave them all sorts of guidelines which we developed, about where to go to find sustainable materials and materials with low embodied energy, as well as stipulating quite clearly what the minimum water and lighting requirements were, and all that was embedded in the green lease. But also, they have to participate in travel surveys, the green travel plan, waste management strategies, and those types of things.

From a social perspective, we also had a big focus on what are the social outcomes we can deliver around the project. The whole concept of life-long learning was a big thing that was part of our discussions with Government and it goes across the whole project. We obviously have things like the more formal learning opportunities, with the council and the library being in the heart of the town centre, and there are other spaces that we are leasing to learning-type providers, such as community colleges and those sorts of people. There is a secondary, less formal layer running through all of that, where we have invested in public art and interpretive strategies, and even a little eco-footprint trail, to get our message out to the community and to get a bit of a ripple effect off the back of the good outcomes we have managed to achieve.

The other great social aspect was from a job point of view, when we opened the 170,000-page views we had on our website. We had all these retailers needing to employ staff and a heap of people in the local community looking for jobs, so we became a portal in between, through our website, to put the two in touch with each other. Quite a few positions have been placed through that. I would be happy to answer questions. Thank you.

Mr DAVID BORGER: I now introduce the third speaker, Professor David Richmond. Professor Richmond is the New South Wales Coordinator General for Infrastructure. He has a distinguished career, which is well regarded by the private and public sectors, both nationally and internationally. Professor Richmond was responsible for the delivery of all facilities for the Sydney 2000 Olympic and Paralympic Games. Planning and developing major urban land projects, hospitals and urban renewal projects are also in Professor Richmond's curriculum vitae. Such projects include John Hunter, Fairfield and Sydney hospitals, and also the Paddington Green and Newington residential developments. Until recently Professor Richmond chaired both the Sydney Olympic Park Authority and the Redfern Waterloo Authority, where the total new, developed and contracted infrastructure expenditure now exceeds $1.3 billion. Welcome, Professor David Richmond.

Professor DAVID RICHMOND (Chair, Redfern Waterloo Authority): Thank you very much, David and Karyn. It is a pleasure to be here today. I may have drawn the short end of the stick, because you have had all these classy presentations but not very much time left at the end. So I will try to not talk for too long, so that there is a bit of an opportunity for questions.

The theme of sustainable public infrastructure is a very topical one at this point in time. I think it is relevant to note that across Australia at the moment governments are investing in infrastructure in a manner that we have not seen for some decades. In New South Wales, for example, in the next four years the expenditure under the Government's capital works program will be 58 per cent higher than in the previous four years. This year New South Wales is mounting a program of $13.9 billion, and similar programs are being mounted across Australia at the moment. So it is an opportune time to start thinking about how we maximise the benefits of this investment.

This infrastructure upsurge is occurring at a time when we are wrestling with some fundamental issues in terms of climate change and global warming, and how in the future we deal with these great challenges that are upon us in terms of the ecological environment. So it is a critical period to be thinking about how we develop infrastructure in a sustainable manner. It is very important that we remind ourselves that sustainability is not just an environmental concept; it is about economic and social sustainability as well. No matter how much better we get at measuring, understanding and appreciating some of the environmental impacts of development, we will still have to make trade-offs between the environmental, social and economic objectives that underpin the idea of sustainable development. Of course, that is one of the great challenges for governments. But those who are passionate about the environmental sustainability issues, those who are passionate about the social sustainability issues, and those who are passionate about economic sustainability will not always be in unity.

That is a really big challenge for governments. It is as minor—and I am not suggesting we try it as an example—as the example that we heard about stainless steel in the kitchen. That is just one simple example of the thousands of trade-offs that need to be made in developing infrastructure between what might be regarded as social sustainability, that is, public health issues, and environmental sustainability in terms of the use of materials. It is very important that we do not lose sight of that because a lot of the growth in knowledge will inform those issues but it will not be a substitute for decisions. The decisions will be made by and large by officials who will be better informed. It will not take away the need to make those sorts of judgements.

Listening to the speeches this morning there are two things that came to my mind which again I would reinforce. One is that many of the things that we are dealing with in our lifetime, in our working lifetime, have long lead times. If you talk about the example that we heard from the first speaker in the welcome of the Penrith Lakes scheme, what was the critical date? It was some time in the early 1980s. You heard about Rouse Hill. What was the critical date? It was some time in the 1980s. It is a very big challenge, particularly I think for the politicians because we are talking here about quite long-term activities that will not bear fruit for a couple of generations. It is very important when we are looking at infrastructure that we do not lose sight of that. There is enormous pressure for instant gratification, instant results, but these are long-term issues. Unfortunately, one of the great tragedies that has beset the Western world, and we are no different, is that in the last 20 years to a large extent we have lost sight of the idea that we do have to plan 20 years ahead. We are scrambling at the moment to make up in many places for that lack of foresight. Again, it is an important thing. These are long-term projects and issues.

From that there is another point—you do not have to get everything right and resolve everything and complete everything now. That is another important issue. We need to think about where we want to get with the project in the long term, our best guess at what would be desirable in a couple of decades, and think about what we do in the interim period. We need to be thinking in a bit more creative way. A simple example of that is that in the south-western part of Sydney, one of the growth centres, we will go out to tender in the next few weeks for a major extension of the south-western railway, part of our major investments in the rail link. There will be a place where we need to stable the trains. That is significant for running the railway because like horses trains need to stay overnight and be looked after and start out again the next morning. That place will also be a place where in the long term, in 20 years, there could be a Rouse Hill-type town centre. The question that I want to get people to answer is: What do we do between now and then? One of the things that we do to make that a sustainable and sensible place for people as a start out is a car park where commuters come to get on the train at the end of this rail line. As a start out some very limited convenience capability, shopping and things like that. If it does happen, there is no reason for that to always stay there. So there is this issue of thinking these things through into the long term.

The other thing that is very important for Australians is to look around Australia. Last year when New South Wales was starting its successful attempt largely, as it has turned out, to reform its land use planning laws, I spent

a fair bit of time with the New South Wales planning Minister going to other States to look at what was going on there. The thing that struck me was that we can talk today about Rouse Hill and Parramatta and all the things that are happening in Sydney, but so can every other State. Many of the great lessons about how we do infrastructure well, how we address these issues of sustainability, are already there with us as living examples. That does not mean it is not important to get knowledge and skills from overseas. But one of our problems is that we do underestimate the extent to which we are addressing these challenges and how much there is to learn across the State borders.

It is something that has always surprised me as to how little we do learn from each other because every State has comparable examples of good practice, interesting and innovative approaches to urban development and there is a lot to learn from what we do. We should not have too much cultural cringe about what we do. In fact, when you look around the world and you go to those places where there is significant growth, quite often it is the case when you get into those environments you will hear that familiar accent. There is an Australian there. We are very critical of what we do. In fact, we are doing very well in a lot of areas. We just need to build on those achievements and understand a bit better what we are doing.

The question of sustainability has been quite well addressed in two presentations. You have seen different elements of it. I do not want to go into it in great detail. What I do want to talk about is the importance of thinking through the issues of environmental, social and economic sustainability through all the phases of the delivery of infrastructure and not losing sight of that as you progress through the phases. Just because you think you have solved the problem in the planning phase, do not assume you do not have to do other things later on. One of the things that particularly the public sector is not good at is that end-to-end approach to these issues—starting with the broad policy and strategy, getting that right and then moving to the more detailed planning phase, the way in which we deliver the project.

One of the things that we are very poor at is commissioning the project. That is something in major public infrastructure, particularly where you are trying to address these three themes of economic, social and environmental sustainability, that becomes very, very important. Unlike the private sector, we do not spend enough time thinking about how the opening and the delivery of the project, the commissioning phase if you like, will actually impact on the users. A simple example of that, there was a reference in the Rouse Hill presentation to the transit way which runs from a wonderful place called Parramatta, which you have heard about, through to Rouse Hill. We looked at the transit way as it was nearing completion. Golly gee, there was nobody in charge of commissioning and there was no money for commissioning. That is fairly typical of a lot of government projects.

We put half a million dollars into that commissioning phase. The commissioning was about sorting out the relationship between the bus timetables and the use of this new piece of infrastructure, the need to have lots and lots of people on the ground so that the consumers to whom this was directed actually got first-hand information in those early couple of months so that the social outcome in this case and the environmental and economic outcome of getting more people to use the buses actually had a chance of happening. Even though there was a lot of thinking done in those pre-phases, it is very important to make sure that that thinking is sustained right through the project. Of course, once you have commissioned the project there is the operating and maintenance. Again, the Rouse Hill example is an interesting way in which the public sector can learn from the private sector about that.

Of course, the final phase—what are you going to do about the thing in the end—is also an interesting phase. One of the great benefits of the use of public-private partnerships for the public sector has been that it has forced our mind to what happens at the end of the 30-year concession, or whatever the concession period might be. A minimum position, of course, is that we want it back in a proper condition. That is a big advance on where we would be if it were just a government project, if I could use that term. In other words, we do need to think much more in pursuing these objectives of sustainability about even that final phase—what is actually going to happen with the project. An interesting example of that will be Sydney's new North West Metro rail link, which will be the first urban metro rail in Australia. It will go from the CBD to Rouse Hill—to come back to Rouse Hill—and we will commence construction in 2010. My personal challenge from the Premier is to see if we cannot start in 2009. We will do our best.

That project straightaway raises these sorts of issues. Sure, it has also sorts of attractive criteria in terms of environmental and social sustainability because it addresses issues about moving people through public transport and all the attendant benefits of carbon reduction, but we also need to address funding issues: What are we planning and building for? Is this going to last 100 years? Will it last 30 years? These are questions that we will ask the Government to answer at the end of the year when we develop the final definition report.

These are really important issues that we need to wrestle with in relation to the sorts of projects: It is important to take a long-term perspective. That does not mean that you will always get the long term right—indeed, often you will not—but at least there is some thinking and at least there is a benchmark for others when they come along to evaluate your view. They will be able to say that 20 years ago these people thought this, and why they thought this. What has changed? Why will we not take a different perspective? It is very important to keep that long-term perspective in the provision of infrastructure. Too often we have forgotten about that, particularly in New South Wales, dare I say. We sort of lost the capacity for a while to do long-term planning. We are really working very hard to make up for that at the moment.

It is terribly important that governments maintain their ability to identify, if you like, the property rights and infrastructure that are needed, particularly in major urban areas such as Sydney. We have seen a resurgence of urban planning at strategic level in recent years right around Australia in attempts to do that. Projects like the North West Metro, which are designed to cope with long-term population growth and start a new era in terms of delivery of rail in Australia, probably will be the first of a number of metro rail projects, which we are all familiar with when we travel but have never seen in Australia. We hope that after this we will have money from the Federal Government for an inner west metro study, which we are about to embark on from the CBD to that wonderful place called Parramatta. It is a great place, Parramatta.

The significance of that is that I am sure it will start a pattern in other places across Australia, but it sets the scene for a very different approach to urban transport in Sydney in the decades ahead. These are some of the things we need to be contemplating as we deal with the issue of sustainable development. These are some messages that I put to you that you may respond to, accept or reject, which is fine. One of the biggest challenges is the challenge of growth in our metropolitan areas. The big challenge, aside from coping with the scale of growth, is the fact that, in settling in Sydney in most places where the growth is likely to occur, we have run out of infrastructure. We have run out of infrastructure that was provided by our forebears. There are limits to how much our heavy rail system can be expanded, which is why we are going in overload in the long term to a fast metro rail across Sydney.

There are limits to extending the sewerage system further, which is why we have a very massive program of sewage treatment plants and major works in sewers. There are limits to the electricity distribution system, which is one of the reasons we have had such a massive program of maintaining, improving and expanding that system. We are at that fairly critical point, so there is that challenge; but there is the overriding challenge too of managing our growth in a sustainable manner. One of the big challenges as we look at metropolitan growth is how we get the sustainability we have spoken about and strike a balance between economic, social and environmental considerations. That is a very significant issue as we move forward.

The other important matter is the balance across the region and the outcomes for quality of life and wellbeing of people generally. We have a strong tradition in Australian cities of distributing much of the social capital fairly well, in my view, particularly recreation-based social capital. Of course, we had that very special period in Australian history where the national government in the seventies, the Whitlam Government, initiated an enormous number of programs right across major urban areas, of which we are still very significant beneficiaries. It is important that we do not forget those lessons. It meant that people all over Sydney received significant upgrading of recreational and other facilities, let alone sewerage, at the time. It is a very important tradition to maintain that kind of spread of social capital. How we balance the gains from urban development across the regions is very important.

At the risk of taking a slightly different view to that of the previous speaker and one of the co-chairs, be very careful about interpreting that as facilities in place. In other words, it may be very important to have certain things in place so that local people can use them, but in a global city, and in a city particularly like Sydney but also in some of the other Australian cities, it may often be much more important to ensure that people can get to places than it is necessary to provide facilities where people live. Having said that, there is obviously a balance, but it is very important that we do not get too carried away and think that we have to duplicate everything in particular locations.

Australia is a very mobile society in every sense of the term. Notwithstanding the impact of petrol prices, it will continue to be that way if for no other reason than that we are a very dynamic entrepreneurial economy and we have hundreds and hundreds of thousands of costs centres of individual employers and small businesses. That is not going to change; in fact, it might intensify. That means that people are moving around a lot, so let us be realistic about what it is we provide in place locally and what we provide elsewhere. The important thing is that people have access in the future to the range of benefits they have now in terms of living in the city.

The other big challenge is a perennial one, and that is linking investment decisions to land use planning decisions. One of the major themes of State government over 50 or 60 years is how you do that and how you make sure that when people make land use planning decisions we get a strong link with investment decisions, particularly around infrastructure. That is now more complicated because we feel it as, in very simple terms if you like, the urban space about us. We have to have much more regard to the environmental impact of decisions and to reconciling the need to maintain not only population growth, infrastructure supporting it and investment in that but also environmental sustainability and the ability to ensure that vegetation is protected. All of those considerations place a greater challenge on government and on the community in forming linkages between land use planning decisions, investments in public and private dollars, and environmental decisions.

One of the keys to environmental sustainability and social and economic sustainability in my view is the commitment which I think is now strongly embedded in a number of State governments, but certainly in New South Wales, to expanding and widening the scope and coverage of public transport, and how important that is to the growth of cities and, of course, how fundamental that will be in addressing some of the environmental challenges. Things like the North West Metro and the future metro programs in Sydney are a very important part of that, but in our type of cities the other thing that is very significant is the expansion of the bus networks, bus priority systems and those kinds of things that we are seeing in a number of cities.

If there is one thing that I see as underpinning sustainability in the urban environment it is widening the scope of public transport systems in an appropriate manner, which does not necessarily mean building railways or light rail everywhere; very often it will mean buses and accessibility for buses. That probably is one of the major challenges that we face in our urban cities at the moment, hence the State Government's funding in New South Wales of the North West Metro, the funding of a feasibility study for the inner west metro from the Commonwealth and State governments we are about to start on, and the funding of a major study for what we call our M5 corridor, which is the corridor from the airport to Campbelltown in the south west. These are all symptomatic of the need to improve access, but at the same time extend and widen the coverage of public transport. I think that is as strong a message as any that I can suggest to you and that I would leave with you.

Mr DAVID BORGER: Thank you very much, David. We very much appreciate your comments about the challenges for us as politicians and representatives in terms of the longevity of the big infrastructure investments. Projects that are proposed by us now may come to fruition under future governments and representatives. It reminds me of when I was Lord Mayor of Parramatta at the young age of 29. I spent most of my first year opening projects that I did not agree with and did not want to take place that had been worked on by other people. In years hence I then had the indignity of seeing the things that I believed in passionately being opened by people who opposed them. I also thank the other speakers. We are running a little behind time but I will ask our three wise men to take a seat on the stage and answer some questions from the audience.

The Hon. SUE NAPIER (Tasmania): Thank you very much to the speakers. If you overlay the ageing demographic on pedestrian patterns and the way in which suburbs and precincts are being designed and also look at the implications in terms of public transport, quite often an older person can drive—not necessarily safely but more safely—at least to the shopping centre whereas they cannot walk even to get to public transport, let alone try to connect with some of the pedestrian spaces that are being discussed here. What structures are being built into planning in order to deal better with the ageing demographic?

Professor DAVID RICHMOND: It is a really important issue, and it underlies the significance of not getting too carried away with particular solutions. The importance of the motor car to many older people is sometimes very much ignored by planners. The assumption that somehow it is all ambulatory access can have a very significant impact on the quality of life of people with disabilities and older people. Certainly in New South Wales there is an ageing strategy that is being developed that is an attempt to try to make sure that as much as possible across all areas of government the impact of the ageing population is factored into what we do. That can range from, "How big is the ambulance?" because very often you will not be taking just one person but the carer and the patient. There are so many issues that need to be looked at as we respond to an ageing population.

In terms of the issue of urban planning, it comes back to the point about balance. You need to be able to get both. You need the outreach of public transport but many people need much more the ability to use either their own vehicle or some form of door-to-door transport. In my view, one of the things that we have let lapse in our social policy area—which is linked to this—is the whole question of how effectively we use the community transport sector. I think that is a very important factor that we must regenerate in the dialogue around urban amenity. It tends to be a sector that suffers fairly severely in budget-constrained times, which is not a good thing.

Mr MARTIN BUTTERWORTH: I agree with David. If you look at old parts of our cities you will find that you still use cars even though it is a walkable world. It is that judicious combination that is important—David is nodding in agreement. I live in a part of Sydney called Potts Point, and we do not have car parking at Woolworths. But that does not stop people walking there. Of course, other services are at a distance and, whether you are old or young, you need cars to access and use those facilities. In new areas you have literally no choice but to use the car. If you look at some parts of the Gold Coast, you cannot get to many facilities without using a car. Therefore, that sparse development rather than denser development—and I do not mean tall by dense—has an enormous number of lessons that we can learn from. I do not see why we do not put that in our master planning and in our general planning for infrastructure across cities.

The Hon. BOB SUCH (South Australia): I think it was you, David, who mentioned having foresight. I have introduced a bill into our Parliament to create a foresight committee—not a saga but a committee. I have not got it up yet. As I understand it, the British Government set one up within the bureaucracy—I believe it should be within the Parliament—to look at issues, not crystal ball gazing, 20 or 30 years down the track. Recently southern Australia was caught out by the water shortage, and Sue mentioned the ageing of the population. You can apply it to all sorts of areas. I do not know what the panel thinks about establishing a committee specifically to look at issues down the track rather than the current committee system that looks at today's or yesterday's issues.

Professor DAVID RICHMOND: I am not here to encourage parliamentary committees; I am a bureaucrat and it makes more work for us. However, I think one of the things we lack in Australia is that quality of discourse around these issues that is provided in other countries. In the United States it is often provided by right-wing, left-wing and middle-of-the-road foundations and research institutes. We do not have that in Australia, and I think it is a pity. There is indeed scope for mechanisms that start to address some of these issues because, in spite of what some people will argue, most of this is predictable in the sense that you can predict it will be an issue. You may not predict exactly what form the issue will manifest itself in, but it was pretty obvious that there were going to be long-term issues in relation to water in Australia, for example.

The embedded changes in the population were there 30 years ago. We knew that ageing was coming and we could watch other societies age. So it is not about, as you say, being all that speculative; it is about just looking at the trends, postulating some of the scenarios and forms they might take and getting people ready to address them. You do not necessarily have to come up with a solution; it is about getting people to start to think and get ready. So I think that sort of idea is good. I am not going to say that it ought to be a parliamentary committee. But, if it were, I would say sunset it because what you probably need is new blood coming on in a few years to start a new generation of thinking about the same issues.

Mr DAVID PISONI (South Australia): The examples we saw today were mainly on almost greenfield sites. I wonder whether you have any examples of redevelopment in older, heritage areas and how well you were able to implement policies and strategies that you have outlined today and still maintain the character of those areas. Can anyone shed some light on that issue?

Mr DAVID BORGER: Parramatta is one of the oldest parts of Australia—in fact, it houses the oldest building in the country, Elizabeth Farm Cottage. Do any speakers wish to respond?

Professor DAVID RICHMOND: It is a big issue. There is almost a contradiction in the concept of being able to maintain the character because any significant intervention in the existing urban environment will change the character. It does not mean you change it totally; the challenge is how to maintain the better features of the social and economic environments of a locality and still achieve some broader objectives. In recent times most of the development in what we refer to as the brownfield areas of Sydney has been on cleared industrial sites and things like that. So the challenge has not been as acute.

More recent activities such as Redfern-Waterloo, in which I was involved as chairman of the authority, are an example of a real attempt to try to do a number of things to address employment growth in the area with buildings, particularly office accommodation, and to make use of old buildings that have become public buildings, which served a function in the past that no longer is appropriate such as an old inner city hospital, an old inner-city school that had become redundant, trying to find ways of recycling those in a context of a community that has very significant social problems with low-income public-housing tenants and a very significant, very active and quite volatile Aboriginal community.

That has been a very interesting exercise in trying to introduce new urban forms, build up densities, particularly in the commercial office sector, so we can get some employment, and also bring in high-tech firms. But it is very early days. There are not a lot of examples of significant development in Sydney where you actually have

changed the character. Most of that occurred 20 or 30 years ago and then was stopped. What we have increasingly done is try to enhance the existing character of urban areas. As we develop along the major corridors, particularly, say, along the Parramatta Road corridor leading out to Parramatta, the North West rail corridor but mainly the areas between here and places like Chatswood, that will become a big challenge. But in order to get some of the sustainability benefits from the $12 billion investment in the rail we are going to have to look for higher densities and changes in some of those urban areas. It will be something to watch.

Generally, what Sydney has tried to do is avoid wholesale redevelopment and upgrading of densities in many existing urban areas and focused on those corridors and centres to get the benefit. I actually think that is a good policy because I would hate to see Australia lose some of the character and real benefits to Australian households that come from many aspects of our low-density lifestyle. I would hate to see that disappear. We have the great opportunity to show people how in an inner city like Sydney or Melbourne you actually can have both and they both work very well.

Ms JOANNE DUNCAN (Victoria): Mark mentioned something about headway costs; I assume that it is like developer levies. You said that legislative changes might be required for that. Could you elaborate?

Mr MARK KIRKLAND: I think it is just the way the structure for the Independent Pricing and Regulatory Tribunal [IPART] works. As I understand it, Sydney Water puts its pricing structure together and that goes through the independent review process, but it does not really differentiate between a development that may be using half the water of an equivalent project up the road: you still get charged the same on a site-area basis. It almost works against you as a disincentive to actually try to go the extra yard to do something that is sustainable. On something like Rouse Hill in a retail context, we could get it to work commercially because it was a greenfield environment and we had to set up all the lease structures and things. But if you are in an existing centre, the way the outgoings recoveries work, as an owner, a lot of those operational savings go back to the tenant. So, the only incentive really is capital cost savings if you are redeveloping a centre and doing water-saving initiatives. I just think there are probably other more efficient ways to look at it to try to encourage the industry to do more.

Mr RAY WILLIAMS (New South Wales): Mark, you were very humble and downplayed the significance of the parking area at Rouse Hill. Given the technology and the wonderful advances we have made there, you might explain it to the audience. Whilst you spoke of the obvious downfalls in digging out that underground site, I believe the future incentives from not getting emissions pouring out of cars while they are running around searching for a parking spot are very significant. Would you elaborate on that?

Mr MARK KIRKLAND: As I touched on in the presentation, each parking bay has a little LED light above it. As you are driving along at the end of an aisle it will have a little sign that says there are 20 empty spaces down at aisle. As you turn down the aisle you can see the 20 green lights to identify where they are. It gets people very quickly from the outside road system straight to an empty car space without constant circulation through the car park. Along with the backyard play area it is probably the other thing that has had the most positive feedback from the community in the range of things we have delivered at Rouse Hill Town Centre.

Mr DAVID BORGER: The Rouse Hill Town Centre is not on the list of places we will visit tomorrow, but if people are staying longer in Sydney and would like to see the town centre, you can catch a train out to Parramatta and then take the David Richmond rapid bus expressway, which will take you directly to the Rouse Hill Town Centre. I thank everyone for attending today, and the three wise men for their contributions. They have all added some insight, wisdom and knowledge from years of experience in the public and private sectors. I ask everyone to join me in thanking our panel Martin Butterworth, Mark Kirkland and Professor David Richmond, as well as our committee staff and Hansard reporters for their contributions this morning.

(Session A concluded at 11.30 a.m.)

Session B—Jurisdictional Committee Reports

Environment Committees

Mr THOMAS GEORGE: Welcome. I have been asked to fill in for the Chair, Karyn Paluzzano, who has been called away to a meeting. My name is Thomas George and I have the honour of representing the seat of Lismore on the north coast of New South Wales. I welcome you to this session where we have the chance to learn

about what each other has been doing in our home jurisdictions and what inquiries we have been undertaking. We have an hour and a half together.

I understand that there are eight committees represented here this morning: the Australian Capital Territory Standing Committee on Planning and Environment; two committees from South Australia—Environment, Resources and Development Committee and the Natural Resources Committee; two committees from Western Australia—Environment and Public Affairs Committee and Community Development and Justice Committee; the Tasmanian Joint Standing Committee on Environment, Resources and Development; the Victorian Environment and Natural Resource Committee; and the New South Wales Standing Committee on Natural Resource Management (Climate Change). The representatives of the Northern Territory who were meant to be here sadly were forced to withdraw because an election was called this week—good luck to them. I do not believe there is any fixed order for giving reports so I will call for volunteers from the chairs of the committees. Is there a volunteer for the Australian Capital Territory committee?

Mr MICK GENTLEMAN (Australian Capital Territory)**:** Good to see you all again. I recognise that we are meeting on the lands of the Gadigal people. I respect their continuing culture and the unique contribution they make to life in this area. Since last year's conference the Australian Capital Territory Legislative Assembly's Standing Committee on Planning and Environment has tabled four reports and has a couple of significant ongoing inquiries. The most significant report flagged in our jurisdictional report last year was the proposed nomination of the Australian Capital Territory as a UNESCO Biosphere Reserve. That report examines a range of issues arising from the proposed nomination.

Biosphere reserves, as you are aware, are areas of land and/or sea that have been recognised as such by the International Coordinating Council of UNESCO's Man and the Biosphere program. The proposed nomination received a high level of support from stakeholders including the Australian Government and academic and community views, and the committee recommended that the nomination proceed. The committee agreed that it was Walter Burley Griffin’s vision for a sustainable Canberra and Canberra's modern urban planning that warranted international recognition. The proposed nomination would also raise awareness about sustainability issues in the broader community and stimulate behavioural change. It should also help to grow the institutions, agencies and companies working on sustainability in the region.

Elsewhere, the designation of biosphere reserves has provided a positive incentive for the diversification and strengthening of local economies and sustainable development, particularly in the areas of tourism, ecotourism, and the branding of quality regional products and services. The committee did visit quite a few biosphere reserves in Australia. The main ones of interest were in Victoria, down in the port region. In that region we looked at issues that were coming up in planning through that process. One of them, of course, was the new port for Melbourne.

The committee also recommended that a national review be undertaken in relation to the management of biosphere reserves that have already been designated in Australia. Finally, the committee advocated the inclusion of a national UNESCO biosphere reserve trademark and accreditation scheme in the proposal for quality products and services produced within Australian biosphere reserves. So we saw that while biosphere reserves were a wonderful idea for giving people the incentive to be more sustainable and encourage ecological diversity, there needed to be some money coming into those areas as well to generate more wealth for the area and more interest in the reserve. Therefore areas that had spent money on branding and brought about tourism had more income coming in.

Another significant event flagged last year was the introduction of the new Planning and Development Act 2007 for the Australian Capital Territory and a restructured Territory Plan which reformed the Australian Capital Territory's planning system to make the planning and development assessment system simpler, faster and more effective. The committee inquired into the Exposure Draft for the Planning and Development Bill in 2006. The key changes from the Planning and Development Act 2007 included: classification of new assessment track systems to easily identify which assessment should be used; outline of new development assessment framework to provide transparency and consistency in the way development assessments are processed, outline of the environmental impact statement process; outline of the new compliance regime requirements to ensure that the interests of community and individuals are protected; and it established a clear and transparent complaints process.

We had a quite convoluted planning system in the Australian Capital Territory and it is, of course, covered over the top by the National Capital Authority as well: a two-system planning system. The National Capital Authority, as you are aware, is now in the middle of an inquiry being done by the Federal Government with a view to providing an easier planning system for Canberra. Some of the changes to the Territory Plan included:

incorporating existing planning controls from guidelines such as neighbourhood plans and master plans into the Territory Plan; consolidating and simplifying land-use policies, guidelines and development codes; and providing clearer guidance on what criteria the Australian Capital Territory Planning and Land Authority will assess a development application against.

The committee also has several significant ongoing inquiries into land management and future urban development for the Australian Capital Territory. The inquiry into the Namadgi National Park Draft Plan of Management is particularly significant as the national park covers 46 per cent of the Australia Capital Territory and also provides up to 85 per cent of Canberra's water from the Cotter Catchment. Namadgi also conserves a wide variety of ecosystems and is part of the Australian Alps bioregion. The plan of management establishes a framework to protect the significant values of the park whilst ensuring that there are still opportunities for nature-based recreation, education and research.

The first plan of management for Namadgi National Park was prepared in 1986 under Commonwealth legislation and it has been quite some time since we have had a redraft of that plan of management. Some of the changes include the expansion of the Namadgi National Park in 1991, cooperative management arrangements with the Aboriginal community, advances in knowledge on park values and conservation requirements, and the implications of the 2003 bushfires. You will all remember visiting Canberra, or those that were with these committees in 2006 when we held the conference there; you saw the devastation from the bushfires particularly in Namadgi and the Tidbinbilla Nature Reserve. I am happy to say that a lot of Tidbinbilla has recovered and there is new epicormic growth coming out the old red and yellow box there. In the Alpine parts of the park the Alpine Ash is regenerating as well. We now see dead Alpine Ash that has not fallen quite high—probably 15 metres high—and the new growth is now over a metre and a half of new Alpine Ash, which is really good to see.

I should let you know as well that that cold, windy and wet day that I got you out on Mount Stromlo to plant those trees was very successful. The shrubs and trees are now about a metre high, so you did a really good job there. Also in the burnt area on the top of Mount Stromlo a lot of the observatory huts and telescopes have been rejuvenated. The original old administration building of the observatory has been rebuilt—it is a wonderful building. Unfortunately they could not do much with some of the old telescopes themselves and, as you are aware, the very big telescope was too far damaged. But there is a lot of new work happening up at Mount Stromlo with laser technology and also there is a new construction area that builds telescopes and telescope parts for observatories all over the world. In fact, they are helping to build the mirrors for the new Magellan II telescope, which I understand will be able to see as far back as the Big Bang.

One of the other inquiries we have been looking at, apart from the Namadgi National Park, is the draft variation to the Territory Plan for the new urban development in the Molonglo valley region. It is going to be the biggest urban development in the Australian Capital Territory since the northern parts of Gungahlin and it responds to the strategic directions provided in the Canberra Spatial Plan of 2004.

Molonglo is placed to accommodate a significant part of the future population growth in Canberra over the next 30 years and beyond. Some of the key issues that have been raised in submissions to the committee include environmental issues such as the opposition to a creation of a lake in the Molonglo Valley area, and conservation of habitat such as pockets of yellow box red gum grassy woodlands and habitats for the raptors and pink-tailed worm lizard. There are also traffic concerns and public transport linkages to existing town centres and central Canberra.

Recreational users such as equestrians and cyclists were also concerned about the integration of recreational trails into the urban open spaces and the interface with urban areas. There are also concerns about population projections and housing supply, and bushfire protection, because that old forestry area was totally burnt out in the 2003 fires. Those areas have been highlighted for bushfire management. The committee is likely to table its reports on these inquiries during the last August sitting term this year. That is my report.

Mr THOMAS GEORGE: I call the representative from the South Australian Environment and Resources Committee.

Mr IVAN VENNING (South Australia): This is my thirteenth conference. I have attended every conference thus far. Thank you, Thomas and Tony, for your welcome. It is great to see you all again at this environment and public works conference. I find it very valuable, which is why I am away without official leave from my Parliament today. I am the Whip, so I am in deep trouble. I think that this conference is very valuable. I forward the apologies of our presiding member, Ms Lyn Breuer, who had to cancel at short notice because of personal circumstances.

As a current and former presiding member of the South Australian Environment, Resources and Development Committee, it is my pleasure today to provide a brief summary of the activities that the committee has undertaken in the last year. The committee's time is divided between conducting inquiries and responding to statutory responsibilities, principally considering amendments to development plans and aquaculture policies. One major report has been completed—our report on coastal development. Essentially, that report is an examination of the impacts caused by the sea change phenomenon. The committee is finalising a report on natural burial grounds.

During the coastal development inquiry the committee considered 31 submissions and heard from 19 sets of witnesses, and the final report was tabled in November last year. The committee found that, despite good practice and policy, issues concerning compliance, consistency and integration needed addressing. There were too many examples of bad development decisions. Some 86 recommendations were made to the Government to improve planning and other legislation. The Coastal Protection Board has few powers to enforce its decisions, and these relate only to coastal hazards. Planning authorities follow the board's advice only 20 per cent of the time.

In order to achieve integrated management and planning the committee recommended that a coast-focused agency be created. Any such agency should have greater powers of direction. The Native Vegetation Council is the authority that approves any clearance of native vegetation, but there is no referral process for developments threatening rare or vulnerable species. The committee believes that areas of significant landscape value should be protected because of the creation of scenic protection areas. Zoning was seen as an important tool for the protection of the coast so as to minimise ribbon development and to confine growth within established townships. The current planning process does not address a cumulative impact.

There are no thresholds and, as many people commented for the coast, "It is death by a thousand cuts." Much of the report concerned marine impacts. Sea grasses and reefs are at great risk but, as they are out of sight, they do not get as much attention as dune systems, et cetera. South Australia's coastal waters have evolved in a low run-off, low nutrient environment, and the committee suggested strategies to prevent nutrient-rich sediment-laden water from entering marine systems. Aspirational targets aimed at protecting marine systems were recommended and included sewerage and stormwater discharge targets.

The elephant in the room for the inquiry was climate change and sea level rise in particular. The committee recommended that Intergovernmental Panel on Climate Change [IPCC] projections of sea level rise be incorporated in coastal planning. Over the past 12 months the committee has considered many development plan amendment reports. Changes are planned in the near future to try to reduce red tape. Recently, the Government stripped Adelaide City Council of approval powers for projects over $10 million—a pretty controversial thing to do.

Aquaculture is a growing industry in South Australia. Aquaculture policies are referred to the committee for consideration. These policies specify the boundaries of farming areas, zoning for specific aquaculture species, and buffer distances and limits on the number of animals per unit area. Last year the committee undertook a site visit to view and discuss the industry. We have some busy times ahead and we look forward to reporting our activities to the next environment and public works conference.

No report from South Australia is complete without our container deposit legislation [CDL] policy, and we also want to see how other States are responding. This is the thirteenth time that this issue has been discussed at this forum, and the process is slow, to say the least. I am pleased to report that, as at 1 September, South Australia will double its deposit legislation to 10¢ per container right across the State. We know that that will be a cost to industry, but we are prepared to live with it. How about you?

Mr THOMAS GEORGE: Thank you, Ivan. You just issued us with a challenge. I now call on the representative from the South Australian Natural Resources Committee.

Mr JOHN RAU (South Australia): I will quickly explain what our committee does. This relatively new committee, which was established in South Australia, has two primary statutory functions. Its first function is to oversee the Natural Resource Management [NRM] Board structure, which was established under the Natural Resources Management Act 2001, and its second function is to oversee the River Murray Act, which for those of us in South Australia is a particularly sensitive and important piece of legislation. Those are the committee's two primary focuses.

In addition, the Parliamentary Committees Act has generously given us an opportunity to take an interest in and review the protection, improvement and enhancement of the State's natural resources, which are defined as including soil, water resources, geological features, landscape, native vegetation, and so on. Basically, we can do whatever we like, but we have to deal with the Murray River and we have to deal with NRM boards. Referring to

NRM boards, I note that various jurisdictions have been dealing with the question of natural resources boards in different ways. Our solution to the perceived problem was to amalgamate the old soil, plant and pest control, and water conservation boards into single regional areas. That has not been without its difficulties.

There are perceptions amongst communities, in particular, non-urban communities, that all we have done is establish bureaucracies, which are good at feeding themselves but not much good at doing what they are supposed to do. I emphasise the word "perceptions" because I am not entirely sure whether that is the reality. The regional NRM boards also have an issue with consultation. Our committee is keen to get across to these boards that their annual increases, which we as a committee have to review if they exceed the consumer price index, may be entirely well received by our committee if they have gone out and sold it to the communities on which they are attempting to impose them. If they talk, as many of them have done, to local government agencies, who are only collectors and not the payers of the fees—and many of them have done that—their answer is, "We talked to the councils." Our answer to that is, "So what. They are just collecting the money; they are not paying the money."

Our committee has a continuing educational position—I think that is a neutral way of putting it—with the boards. They have to get out there and talk to the communities from which they are extracting money. The second important thing is that, unfortunately, the boards have issues about fund raising. Because they are raising money in different local government areas, different levy rates are struck across the board for people who live virtually across the road from one another. That is magnified when you cross from one board to another. For example, the Eyre Peninsula in South Australia, which covers a vast area of the State, is confronted with many problems. Because of the establishment of the present structure people on Eyre Peninsula basically fund all the work in Eyre Peninsula without any cross-subsidy from the Adelaide metropolitan area.

There are some big issues about cross subsidisation and equalisation within NRM board areas. By and large I think the committee has done some useful work with basically criticising some of these boards to the point where they have started consulting with communities, and they have improved. In fact, although we cannot stop a levy increase we have the power either to send a request for an increase back to the Minister for review or, if we want to, we can say "no" and the Minister then has to take it to Parliament to get the review approved. We have not yet said "no" but on four occasions—twice last year and two this year—we have sent it back and in every instance the Minister has agreed with our recommendations which has seen the requested increase by the boards reduced below what they were asking for. In all of those cases that was largely because there was a failure to consult on the part of the board so their communities had no idea what they were doing or why they were doing it. Quite frankly, the committee just did not think that was an appropriate way to go about doing business.

In terms of other matters, I suppose the most important inquiry we have been involved in in the last year is to do with an area called Deep Creek. I doubt whether anyone here would have the first idea of where that is. Adelaide is near what is the Fleurieu Peninsula which is the area heading out towards Kangaroo Island. That is one of the few relatively high rainfall areas in South Australia, certainly adjacent to the metropolitan area. It has been recently the focus of a lot of plantation forestry activity. This I believe is being driven across the country and I am sure we are not the only people with this issue, partly by managed investment schemes where people are sinking huge amounts of money into forestry, largely for the tax concessions that were involved and also I fear some people who are trying to get in ahead of the play on carbon trading are using every opportunity they can to buy up high rainfall areas and put plantation forestry into it.

Leaving aside the impact that has on the communities that live in that area and the displaced other activities like dairy farming and goodness knows what else, there is also the question of water allocation planning. We have discovered, and many of you may find this to be the case in your jurisdictions as well, that if a landholder decides to put a dam on their property they have to account to the NRM board for the allocation of water involved in that damming activity. But if they decide to cover it in blue gums or radiata pine the whole scheme is completely silent on water allocation planning. So, in fact, these people are getting a free ride on the system and, at the same time in the case of Deep Creek which is adjacent to a high value conservation park, they have planted right down to the stream edges, and effectively turned what was a perennial stream into something that only runs for three or four months in the winter time.

Now our recommendation in that case was that they introduce buffer zones 20-odd metres either side of the stream, and in the convergent area at the head of the stream, that it be perhaps 100 metres back. I have to say the government department we were dealing was not very sympathetic. It told us the Minister had no power to do it, which was wrong on two counts—one was the NRM Act did give the Minister the power to do it, and the other was it was a State Forest. So two good reasons why that was poor advice, and we have spent the past six months asking the department why it gave us that advice, and indeed, why it gave the Minister that advice. So that has been entertaining us quite a lot.

I think the main message that I would like to bring from what we have been doing lately is in everyone's jurisdiction please have a good look at forestry because whilst I am certainly not an opponent of forestry per se, the implications of forestry for communities in which forestry is rapidly taking over, the implication for Australia in terms of the need for substitution of the agricultural products that would otherwise have been generated in those areas in terms of trade issues, and the implications in terms of water allocation, and the fact that there is an absolute conspiracy of silence, it seems, on the question of whether forestry should account for what it uses. Anybody else would, but for some reason forestry is an invisible player in the scheme. I think they are really the highlights and we will continue to explore the forestry issue over the next 12 months. Thank you.

Mr THOMAS GEORGE: John, I can assure you there are a lot of Deep Creeks about. The next representative is the Hon. Sheila Mills, representing Western Australia. She is the chair of the Environment and Public Affairs Committee. Welcome, Sheila.

Ms SHEILA MILLS (Western Australia): Good morning. We are a very unusual committee actually. The Standing Committee on Environment and Public Affairs was appointed by the Legislative Council on 17 August 2005. The functions of the committee are to inquire into and report on public or private policies, practices, arrangements or projects in Western Australia which affect or may affect the environment, as well as any bill referred by the Legislative Council. An important function of our committee, and one that demands an extraordinary amount of time and resources, is to inquiry into and report on petitions. The House of Representatives, I understand, are setting up a petition committee but the Legislative Council of Western Australia is still the only State Parliament that actually does have to deal with petitions.

A considerable number of the petitions referred to our committee relate to environmental matters and the committee expects this trend to continue, if not increase. The recent Green Paper on the Federal Government's Carbon Pollution Reduction Scheme is illustrative of the broad impact that environmental issues now have on every level of society. In 2007 the Western Australia State of the Environment Report describes the need to address environmental issues as "urgent" and cautions that the "health, prosperity and sense of place of this and future generations depend on our ability to stabilise and even reverse major environmental problems". The report gives Western Australia an environmental report card, which notes a downward trend in the condition of inland waters, biodiversity, heritage places and the effects of unsustainable human settlement with its "increasing demand for land, water energy and increasing waste generation".

Our terms of reference actually are much broader than just simply environmental issues. We are also briefed to report on broader planning issues of sustainability and things such as transport orientated development, and that sort of matter, such broad policy implications. Most of these issues are reflected in petitions referred to our committee over the past 12 months, and the committee is currently conducting an inquiry in relation to waste disposal and recycling issues. All petitions tabled in the Legislative Council are referred to the committee. The committee's usual process is to initially write to the tabling member, and the principal petitioner, inviting a brief submission to provide further information on the issues. The committee may also write to the relevant Minister seeking his or her comment. The committee will also conduct preliminary investigations with relevant government agencies, private organisations and individuals as necessary.

Following consideration of submissions and other information the committee will resolve to either finalise the petition, that is, not to inquire, or further inquiries into that petition, or formally inquire into that petition. In many cases where the committee finalises a petition there has been some resolution of the matters or issues that have been raised in that petition. Petitioners might not like the end result of our inquiry but they generally accept it because they see themselves as part of the political process and they have actually had their issues heard by a parliamentary committee, which is important to a lot of our people. If the committee resolves to inquire into a petition it may arrange hearings at which discussion occurs on the various issues, gather additional information or prepare a report on the petition for tabling in the Legislative Council.

From August 2007 to 10 July 2008, 37 new petitions were referred to the committee. As at 10 July 2008 there are 19 current petitions before our committee. While petitions referred to our committee cover a broad range of matters, a large proportion of them do concern environmental or public works matters. For example, petitions finalised between September 2007 and July 2008 included: opposition to expansion of a landfill and concern about its continuing environmental impacts; the need for a road upgrade in an area undergoing increased residential development; opposition to a proposed train station car park on nearby bushland; opposition to the development of foreshore land in Busselton; concern about the proposed site of the new Busselton Hospital; and opposition to the development of bushland owned by the University of Western Australia.

Petitions currently before the committee include: opposition to proposed transmission lines in the south west based on concerns that include the environmental impact on the landscape, devaluation of farmers' land and efficacy of the proposed route; opposition to the rezoning of an A-class reserve for high-density living; concerns about the sustainability of jewfish and snapper stocks in Western Australia; opposition to a proposed site for an electrical substation in a water catchment area; and opposition to the export of lead through Fremantle Port. You may not be aware that lead was exported through Esperance and there was a lot of environmental impact on not only the birdlife in the town but also children and adults who got lead poisoning. Now they want to export lead through Fremantle. Other petitions include: support for the conservation of remaining bushland at an estate in the south-west; support for the long-term protection of one of our national parks; and opposition to design scenarios for the Fremantle Harbours policy.

In addition to the current petitions we are formally inquiring into a resource recovery centre in the south metropolitan region of Perth. It stems from a petition expressing concern by local residents regarding odours emitted from the recycling plant. We have made a site visit and have received submissions from interested parties and we have started the formal inquiry process. The residents would prefer to have the recycling plant closed. I do not think, and I do not believe the rest of the committee would think that that is a viable option because the plant does reduce greenhouse gases and it has received a special award for that process. The recycling plant has put in $2.4 million to improve the process, which to a large degree has been successful, but the residents are still opposed to the plant so we are continuing our inquiries.

As a consequence of the huge number of petitions that the committee receives we have instigated our own inquiry into our petition process because it takes up such a huge amount of time. It is an own-motion inquiry and we are looking at the current practices and procedures for referring tabled petitions to the committee; the committee structure, operations, process and procedures; and community expectations of the committee petitions process. We are looking at electronic petitions, which the Scottish Parliament has, and any other matters in relation to the committee's effective operation.

Unfortunately the petition process reduces the amount of time the committee has to look at broader issues relating to environment and planning and government policy on those issues. We need to refine the process because I am of the view, and I think other members of the committee are of the same view, that petitions to the Parliament are a last resort. Unfortunately, what we are seeing is that petitions are a first resort. Under standing orders we are obliged to look at them, but they take up a huge amount of our time. That is the state of play with our committee at the moment.

Mr THOMAS GEORGE: Thank you, Sheila. I invite Tony O'Gorman to speak. He is the Chair of the Community Development and Justice Committee.

Mr TONY O'GORMAN (Western Australia): Good morning, delegates. It is great to be here again. This is my third conference in the four years I have been on this committee and I have found it to be very useful over those four years, not so much because our committee does a lot of inquiries into the environment but because we learn a lot from our sister States around Australia. We have not conducted an inquiry this year into any environmental issues. As you have heard, our upper House committee has done quite a bit of work and has come up with some substantial recommendations.

I will explain the committee system in the Legislative Assembly in Western Australia. We all like to get involved in committee work. Our committee has 16 portfolio areas and that is probably one of the main reasons we have not tackled too much on the environment as yet. We have had a number of requests, which were considered, and I think we will be doing some significant work on the environment in the next session of Parliament.

The Community Development and Justice Standing Committee has responsibility for citizenship and multicultural interests; Attorney General; justice; electoral affairs; indigenous affairs; police and emergency services; community safety; community development; women's interests; seniors; youth; disability services; culture and the arts; sport and recreation; local government; and the environment. It gives us a very broad scope in what we can deal with. With that in mind the committee took into account the fact that we probably could not conduct an inquiry in a term of government on each and every one of those areas. We decided to conduct an inquiry on collaborative approaches to government to try to look across a number of those areas. We have embarked on that. I think we are fast coming to the end of our term in Parliament and there may be an election before Christmas. In fact, Bruce and a couple of others were taking bets on whether it is 18 October, 1 November or 15 November. We will probably not finish that report before then, but since we have started this inquiry it has opened up a lot of issues for us. We will probably table an interim report in the August session so that the Government will have to respond to it. Then it can be picked up by the committee once the new Parliament is sworn in.

We have undertaken a report that was referred to us by the Parliament on the prosecution of assaults and sexual assaults. It was an 18-month long inquiry and we drafted three other members onto the committee to help conduct it. I think other members of the committee would agree with me that it was probably the most difficult inquiry we have ever done. It was emotional and it was torn with different views, with some people wanting to put people against the wall and shoot them and others wanting to put supports in place for women, principally, who are abused. We handed down a report earlier this year containing 38 recommendations. We are still waiting on the Government to respond to those recommendations, but the indications I am getting from the Ministers involved are that most of the recommendations will be responded to positively.

Another matter has been referred to us in the last couple of weeks relating to community development and child protection. It is essentially an inquiry into legislation governing body piercing for people under 18 years of age. It was raised by an Independent member of the Legislative Assembly who obviously has quite a strong concern about it. There is also concern in the community about the effects of body piercing, particularly on teenagers. We are in the process of that report at the moment and we are expected to report in late August or early September, which we will do.

Ivan, I have one for you relating to container deposit legislation. We have enacted some enabling legislation.

Mr IVAN VENNING: Hallelujah!

Mr TONY O'GORMAN: The Western Australian Local Government Association has been very supportive of that and a number of councils are looking at ways and means of bringing in container deposit legislation in their local government areas. While we have not put the legislation as such in place, the enabling legislation is there.

As Chair of the Community Development and Justice Standing Committee, on behalf of the committee I would like to thank the hosts of this year's conference, the Public Works Committee and the Natural Resources Management (Climate Change) Committee, for their hospitality.

Mr THOMAS GEORGE: Thank you, Tony. We will now go to Tasmania. I believe the Hon. Greg Hall is going to deliver that report. Welcome, Greg.

The Hon. GREG HALL (Tasmania): Thank you, Mr Chair. Good afternoon, everyone. I have to say that the Tasmanian delegates are basking in the relative heat of Sydney at the moment. A couple of places in Tasmania went down to minus-10 yesterday; indeed, the main highway between Launceston and Hobart was closed. I have to say, it is almost as cold as Melbourne has been.

It would appear that—it will be determined at the end of this conference, of course—that it is Tasmania's turn to host this annual bunfight, if you like, next year. I would suggest that perhaps September would be a more conducive time than July in Tasmania. I am not going to get into the forestry debate here; we have had enough of that down there. It is largely politically driven—surprise, surprise—but it may well be that when delegates come down to Tasmania we will be able to show you a sustainable forestry industry. I have to say that perception and reality are somewhat different and that what is sometimes perceived in the mainland press is quite a long way from reality.

Since my last report to this conference, the Tasmanian Joint Standing Committee on Environment, Resources and Development has had a reasonably full agenda—particularly considering the current amount of committee work in progress—in the context of a very small Parliament. I will not be nearly as verbose as Mick Gentleman from the ACT was; we have a lot of select committees in our upper House which cover a lot of those areas that perhaps other jurisdictions get involved in.

In addition to finalising its inquiry into alternative vehicle fuels, the committee has progressed its terms of reference on coastal erosion. Earlier this month the committee's report on alternative fuels was tabled, and it contained three recommendations. Two of those recommendations may be of interest to delegates. The first of our recommendations was that our Minister for Energy and Resources immediately place the development of a national fuel strategy on the agenda of the Federal Council on Energy. During the course of our inquiry we were concerned to learn that there is currently no national fuel strategy. It was also unfortunate that the issue was not addressed, to our knowledge, at the recent Australia 2020 Summit—when all the best and brightest were there!

The second of our recommendations suggests an amendment to the Metro Tasmania Act 1997, which currently requires the operator to provide road passenger transport services in Tasmania "in an economically responsible manner". Our committee recommended that this operational mandate be broadened to require operations to be run in a manner that is socially, economically and environmentally responsible, by reference to quantifiable international benchmarks for public transport systems.

The final recommendation relates to Government responses to previous committee work done on the potential of CNG and LNG as vehicle fuels. That report was tabled in 2003, and it had quite a lot of input from the Department of Economic Development. As yet, I am sorry to say, there has been no response from the Government. We have asked for an urgent response to the report. I understand that a dedicated LNG facility for heavy vehicle use is soon to be established in northern Tasmania, which may well be an Australia first. That initiative is to be welcomed, because we have a lot of heavy transport—as other States do, of course—particularly in terms of log trucks, B-doubles, milk tankers, and so on.

The committee has also held its first round of public hearings on a "coastal erosion" term of reference. We were fortunate to hear from leading geomorphologist Chris Sharples, author of the explanatory report entitled "Indicative Mapping of Tasmanian Coastal Vulnerability to Climate Change and Sea Level Rise". Chris has comprehensively audited Tasmania's coastline and has identified coastal erosion hotspots for the State Government. He is now working with the Federal Government on a national plan to replicate the major features of his audit for the coastline of mainland Australia.

As we heard earlier, with Australia's major population centres crowding the coastline, and vulnerable coastal areas expected to face between 100 and 800 metres of coastal erosion by the end of the century, the committee anticipates this term of reference to dominate its agenda in the short term. We also expect that the inquiry will generate a great deal of interest and debate within Tasmania, and more widely within the Commonwealth. We also have on the radar an outstanding term of reference relating to wildfires.

Some members might also recall that when I reported last year on a waste management report tabled by this committee, the Hon. Ivan Venning, as already mentioned this morning, became frightfully excited when I noted that amongst several other recommendations Tasmania instituted a container deposit levy, similar to that of South Australia. We have heard from the Western Australian delegate that that State also has enabling legislation going through. Well done. I have to say: Alas, Ivan, nothing has happened in Tasmania yet. However, all I can say in regard to that and some other issues is that, as the old adage goes, all will be revealed in the fullness of time—said the monkey as he spat in the sugar and covered it up. Thank you.

Mr THOMAS GEORGE: Now we will travel up to Victoria. Please welcome the Hon. John Pandazopoulos.

The Hon. JOHN PANDAZOPOULOS (Victoria): Thanks very much. Firstly, on behalf of the Victorian delegates I thank the New South Wales committees for hosting this year's conference. It is my pleasure to be here. I was on this parliamentary committee between 1992 and 1999—and I remember Ivan—in my opposition days. Then I went for the Ministry, and since I have finished with the Ministry I have come back to chair the committee. So I have a longstanding interest in it. May I say, it was the leadership of those environment committees around the country back in the early 1990s that led to the environment committees meeting as an annual conference. I think it was important that we bolted onto the public works conferences where there was some mutual interest between environment and broader public works. It is good to be here to report.

I will tell you a little about our committee. We are an eight-member committee, four from Government, three from Opposition. Our Opposition is a coalition between the Liberal and national parties, so there are two Liberals, one Nationals member and our only Independent MP, who is the deputy chair of the committee. The committee has interesting dynamics: the chairman does not want to use the casting vote in all situations, but we try to work on a consensus model. We are a committee for administrative purposes with the Legislative Council; that is where our resources and management come from. Whilst we have the ability under the Parliamentary Committees Act to conduct our own inquiries, the trend and culture in Victoria has been predominantly for either government references or references from the Parliament.

Since the report by my colleagues in Darwin last year we have finished an inquiry into public land management as it relates to practices on bushfires, and we have commenced an inquiry into supplementing Melbourne's water supply. With regard to government responses to committees, once they table their reports under our Parliamentary Committees Act the Government is required within six months to report to Parliament on its view of committees' recommendations as set out in their tabled reports.

On 14 March 2007 the committee received terms of reference from the Legislative Council to inquire into and report by 30 June this year on the impact of public land management practices on a frequency scale, and on the intensity of bushfires in Victoria.

For the benefit of our Tasmanian colleagues who are investigating wildfires, I mention that we have produced a report—which means that they might not have to do much work on their own, but rather can adopt some of our recommendations. As we all probably know, there have been a lot of inquiries into bushfires, including a federal parliamentary inquiry. Rather than repeat the same exercise, cover the same ground and make a hundred recommendations, we wanted to be very narrow and specific on the key points of the findings. Our terms of reference were very broad. I want to go through the terms of reference because they reflect the detail of the committee's considerations:

(1) the extent, timing, resourcing and effectiveness of prescribed burning on both Crown and freehold land;

(2) the manner in which prescribed burning is conducted, including how applicable codes of practice are employed;

(3) the impact of prescribed burning and recent wildfires on Victoria's biodiversity, wildlife and other natural assets including water quality and quantity;

(4) the reporting process applicable to prescribed burning programs;

(5) the legislative and regulatory arrangements for prescribed burns and bushfire management;

(6) the effectiveness of maintaining permanent, strategically placed fire breaks and containment lines throughout public land areas;

(7) the provision and maintenance of large water points on Crown land to assist with bushfire aerial taskforce operations;

(8) the impact of traditional land uses such as timber harvesting, grazing, four-wheel-driving, hunting, camping, mining and prospecting on the scale and intensity of bushfires and the ability of relevant agencies to respond;

(9) the provision and maintenance of serviceable access tracks and signage to assist with recreational and emergency requirements;

(10) the impact of climate change on bushfires and public land management practices;

(11) whether additional measures are required to provide a mechanism for the skills, knowledge and interests of local communities, and appropriate scientific expertise, to be better represented in the management of bushfire risk on public land;

(12) the involvement of local communities in the management of fire;

(13) any other matter that impacts on the scale and intensity of bushfires in Victoria …

As you can see, the terms of reference are very detailed and broad. The context of those recommendations was that we had had very large wildfires or mega-fires in the summer of 2002-03 and in the summer of 2006-07. On 18 July additional terms of reference were added for us to also consider the consequent impact of bushfires on the June-July 2007 Gippsland flood. That included the post-flood effects of bushfires fuelled by all that material that was left up in the hills.

In that context you may not be surprised to know that there was an inquiry that attracted an exceptional amount of interest across the State and resulted in receipt of a record number of submissions compared to other parliamentary inquiries in Victoria. That led us to perhaps a record number of inspections and public hearings in regional areas of the State. This continent is one of the most fire prone—it is one of the top five wildfire-prone areas in the world—so we heard from every part of the continent that had an interest in the matter, ranging from people in the high country in the hills areas to those in grassland areas. Everyone had a point of view to express about fire.

Our report was tabled on 26 June. It produced 17 findings and 20 recommendations which the committee believes will significantly contribute to mitigating the effects of future bushfire events and promote ecological management of public lands and ensure improved community engagement of bushfire management processes. Predominantly the committee concluded that for over three decades since the 1970s there has been a culture—despite Australia being a very dry continent and fire being important to the regeneration of vegetation and providing environmental benefits in the long term for biodiversity, our ecology and the nature of our landscape—to reduce the amount of fire introduced in a planned way into the environment.

A lot of the submissions said that that trend really began in the timber industry with scarred trees in an increased number of public reserves. In that time many more national parks moved in and there was an increase in Crown land. Then there was the influence of the 1970s around the resource requirements of the timber industry and maximising the value of potential logging material as well as the growth of the environmental movement. Smoke and fire were seen as bad, and added to that was the confusion about how to manage landscapes. All of that led basically to massive underburning at the same time as rationalisation of the public sector work forces in agriculture, the timber industry and in regional offices. Added to that was a de-skilling of regional communities that had fire knowledge. It was of value for us to go back and talk to some of the old-timers about the way things used to be done. We found local knowledge was very valuable in terms of how we could reintroduce that to public policy. The view we took was that to protect the landscape that we all love about the Australian environment, the reality is we had to burn a lot more of it in a planned way.

What we have seen since the 1970s around Australia is a big sea change and tree change that is occurring in all of the communities where planned burns and prescribed burns are hard enough to do in any jurisdiction and where there are very few and narrow windows of opportunity in autumn and spring. Climate change is adding pressure to that but may provide some additional windows of opportunity, possibly in winter over time. But that tree change and sea change also have meant that, for lifestyle reasons, people have not wanted to see smoke in their regions. There has been a growth in the vigneron sector, which is something we are all very proud of and something that is very important from an export point of view, but that complicated fire controls because of the amount of smoke involved, whether planned or unplanned. Generally there were all sorts of dynamics to be taken into account. The view we tool is that climate change is forcing us to set targets.

In recent years the Victorian Department of Sustainability and Environment has set targets of 130,000 square metres to be plan burned every year. Those targets have been met in the past couple of years. The committee has said, in effect, that if you have a proper cycle of planned burning—for example, if each area was burned every 20 years—basically it means we need to triple the amount of prescribed burning we do in our State. That is a very radical thing for any of us to do and for governments to do, especially when you have an extra decentralised population, when your metropolitan areas are bordering on urban fringes, where you have treed areas or high fire risk prone areas, and where you have other regional assets, such as winery and tourism facilities close to Crown land, forest reserves and national parks. It is a very awkward matter for government. We also have an ageing community, which is much more strongly focused on the respiratory issues in the environment.

Basically we are saying that we have to do this if we want to protect the environment. We have to trust firefighters much more and people who make decisions around bushfire controls. We have to equip them with more resources to be able to do planned burns rather than firefighting. We have a look at the carbon effects of wildfires, which are much greater than those of planned fires. Yes, there will be smoke in the air, but from climate change point of view an unplanned approach means more carbon in the air than if it is burned in a planned way. It also means it is a much for expensive way to go and to do recovery than if you put recurrent resources into planned burns.

The key point is to take the community with you. We made a number of recommendations about that because taking the community with you is a key challenge. That raises questions of how you make information transparent and accessible, how performance measurements are undertaken and shared with communities, how some planned burns will not be very successful in the sense that they will not burn as well as you would like because of different climatic conditions, and how some will go out of control resulting in a large escaped fire. They are risks that you must have the community take with you because the alternative is basically a continuation of what we have been doing for the last few decades—not burning off and having to fight mega-fires. Our last fire went for 62 days in 2006-07. In 2002-03, the fires went for 55 days, and they were much bigger than the biggest fires Victoria had seen at that stage. They were bigger than the Ash Wednesday fires in the 1980s and bigger than the Black Friday fires in the 1930s, which are hallmarks in the lexicon of firefighting.

Our report is an interesting one to examine. It was very challenging for us as parliamentarians and particularly challenging for government in getting Treasury to spend more money on undertaking planned burns. Predominantly we suggest moving to full-time resources rather than seasonal firefighting resources. A core job is doing planned burns but we include in off-seasons, in parks and Crown lands, property management to control weeds, tracks and trails and all the sorts of things that require more work to be done. On 19 September 2007 we received new terms of reference from the Legislative Council to also inquire into and report on the relative merits of supplementing Melbourne's water supply by some or all of the following means: further water savings that can be achieved by increased conservation efficiency efforts; the collection of stormwater; the reuse of treated waste water; the use of groundwater; small locally based desalination plants; and any other optional water source which appears to the committee to be appropriate. So we are currently inquiring into that. We have advertised; the terms of reference and solutions have not closed, but we had to report to Parliament by the end of the year. So, it will be a tight reference but, obviously, it is another topical area in which we are all interested in water. I am happy to talk to you informally later as the days proceed on this issue.

While I have parliamentarians in the room, I take the opportunity when I can in wearing another hat. I am also of the Commonwealth Parliamentary Association Executive Council. I am one of the Australian regional representatives, along with Richard Torbay, who is the Speaker of the New South Wales Parliament: his term concludes in a few weeks time and he will be replaced by the Deputy President of the Tasmanian Parliament. The other person soon to retire is Senate President Alan Ferguson, who is retiring from the Senate Presidency but his term on the Executive Council is until 2009. If anyone wants to talk about the Commonwealth Parliamentary Association [CPA], I am your representative as well. I take that role seriously and I am happy to talk to you over the next couple of days also. Thank you very much and I look forward to our deliberations.

Mr THOMAS GEORGE: Thank you John. I suggest you buy a copy of yesterday's *Daily Telegraph*, which has an article about State members from all sides of Parliament taking their annual CPA trip! I ask you to join me now to welcome Karyn Paluzzano, the Chair of the Standing Committee on Natural Resource Management (Climate Change).

Mrs KARYN PALUZZANO (New South Wales): We are a standing committee in New South Wales. We have six members. You have met Thomas George, who is chairing the session. The committee also has Ray Williams, Liberal member for Hawkesbury; Gerard Martin, who is the Government Whip; Michael Daley, who was here earlier and is Deputy Chair of the committee; and Rob Oakeshott, who is an Independent and member for Port Macquarie. Those of you who have been reading the daily newspaper over the past few weeks will know that the Federal member in Rob's electorate is retiring, so decisions are being made in his area.

As a standing committee our terms of reference were signed off last June after the election last March. Those who attended the conference last year in the Northern Territory would have heard my report on our committee's plans. 12 months on we had our terms of reference signed off. We are undertaking to inquiries. The first inquiry was to put out our general terms of reference, which are looking at the issues of sustainable natural resource management with particular reference to climate change. They are very broad terms of reference and we put them out to the community. As you know, it is a pretty dynamic area of policy and decision making at all levels, whether it be the container deposit legislation or looking at emissions trading schemes and the policies and programs in between.

Our first inquiry was just to put out our broad terms of reference to key interest groups, local government officials in other State jurisdictions, the academic world and the general public. We have received over 52 submissions, we have had three days of public hearings and have heard from 26 witnesses. We have conducted also three inspection visits. The first inspection was to Black Coal, the biggest exporter in New South Wales. We looked at the biggest open cut coalmine and to an underground coalmine. We also went to the biggest power generator, Bayswater, and looked also at Liddell power station to look at some innovative low emission technologies. Dr Nikki Williams will be making a presentation this week, so the committee was able to look at the biggest coal exporter and the biggest emitter of carbon and see what they were doing with their low emission technologies.

In June we were the guests of CO2CRC and went to the Otway Basin to look at the Otway Project in Victoria and also looked at the research facilities at the University of Melbourne. We also looked at a natural asset being the Hawkesbury-Nepean river system when we were guests of the Hawkesbury-Nepean Catchment Management Authority. We looked at the impacts of estuarine fisheries on that system. We looked at user groups and the plans that the catchment management authorities are rolling out. The Hawkesbury-Nepean system has many tributaries, some of which is very high agricultural use. Most of it is in Hawkesbury, the electorate of my colleague Ray Williams.

Last year we had a vessel go to Newcastle and it arrived quite unexpectedly at Nobbys Head during a large storm. Major flooding occurred in the Newcastle area, but what was interesting was that the flooding came backwards down the McDonald River into the Hawkesbury-Nepean river system. The flooding did not run the normal way. We were able to experience what the Department of Primary Industries has done in relation to the catchment management plan and getting farming and agricultural practices changing because of either climate change or impacts on farming technologies. We also had a briefing from the European Investment Bank [EIB], which was quite interesting. The EIB is the biggest bank. It is based in Sydney but has many euros to spend in the South Pacific and Africa to alleviate the impacts of climate change on those communities. It was interesting to hear how it can introduce euros into Pacific and African communities.

The second inquiry we have started is emissions trading schemes. We commenced that inquiry in March this year. We are looking particularly at the effect of emissions trading schemes on natural resource management in New South Wales. It is particularly a hot topic at the moment considering the draft Garnaut report and the Federal Government's green paper on the carbon pollution reduction [CPR] scheme, which hopes to establish a national emissions trading scheme by 2010. In 2003 New South Wales established the greenhouse gas reduction scheme [GGAS], which was the world's first mandatory emissions trading scheme. It aims to reduce greenhouse gas emissions associated with the production and use of electricity, and to develop and encourage activities to offset the production of these emissions.

We commenced that scheme in 2003 and we have major companies and major users of carbon in New South Wales waiting to see what the transitional arrangements between GGAS and the carbon pollution reduction scheme will impact. We are interested in understanding the costs and benefits of natural resource managers both nationally and internationally, and we also are looking at the transitional arrangements for the GGAS scheme. The committee's *Hansard* transcripts and documentation are available on the New South Wales Parliament website by clicking on "committees" and then selecting "Natural Resource Management (Climate Change)" for a selection of the available submissions. We hope to table the report of the first two inquiries by the end of the parliamentary session this year. We hope to work with our communities within the general terms of reference.

I thank all Chairs of committees who have delivered the jurisdictional reports this morning to Thomas George, who stepped in. When the Premier says there is an announcement for western Sydney, you have to go. I can announce that if anyone is travelling on a train in the middle of August from western Sydney during off-peak hours, there will be a 50 per cent reduction in the cost of the ticket. Western Sydney commuters will have 50 per cent off their ticket price. So, if like me you are from Penrith, you will save $36 per week. That is where I was for that hour earlier. Thank you on behalf of my committee and also the public works committee for the jurisdictional reports.

(Session B—Environment Committees—concluded at 1.03 p.m.)

Session D—Improving Energy Efficiency in Public and Private Buildings

Environment Committees

Mr RAY WILLIAMS (New South Wales): Good afternoon. I am standing in for my colleague, Gerard Martin, who has been waylaid. My name is Ray Williams and I am one of the members of the Standing Committee on Natural Resource Management (Climate Change). Our first speaker for the afternoon is James McGregor. James is the Energy Systems Manager, CSIRO and currently manages business development and projects such as key areas of carbon capture and storage and solar thermal technologies. James is here to discuss the current trends of this technology for sustainable built environments and speculate about what sustainable development will look like in 2020. Our committee was very fortunate three weeks ago when we toured to the Otway Basin, as mentioned previously by our chair Karyn Paluzzano. The geo-sequestration that is occurring there is amazing technology.

Mr JAMES McGREGOR: Thank you for the invitation to speak today. What I will be talking about is more the built environment. I will not probably touch on carbon caption storage but I am happy to discuss that when we get to questions. I am really going to be looking at buildings in the built environment and what sort of technology we might see. The original brief was to talk about energy efficiency opportunities for public buildings but rather than talk about things like efficient lighting systems and approved air-conditioning, and all the things we have heard about before, I thought I would try and create a vision or a picture of what we might see 10 to 15 years from now,

what sorts of technologies are being developed at the moment and what sort of design features we might see in buildings of the future.

I will cover two key areas: energy efficiency and energy generation. In any building these are the two key areas. Energy generation is very capital sensitive and very expensive. The key focus is to reduce the amount of energy we consume in the first place. Therefore we need less investment in the generation capacity to meet that demand. I will talk about a number of technologies and design processes. I will set this in the context of the CSIRO Energy Centre. Some of you may have visited the facility which has been up and running for about five years now. The centre was designed to demonstrate what you could do with commercially available off-the-shelf technologies today to build a building that was self-sufficient from an energy point of view, as well as high performing from an energy consumption point of view. I will talk about some of the key features of the site as I go through the presentation.

I will talk about the design features of the centre, in terms of what we called passive solutions and active solutions. Passive design solutions to energy efficiency are those things we have known about for thousands of years. So orientation of the building, use of thermal mass, utilising the free resources—whilst it is not very sunny out there today—use of natural light and use of natural air movements to provide climate control within the building. These are things you can find in buildings that are hundreds of years old without any air-conditioning systems or any technological solutions built into them, yet they are quite comfortable buildings and they are quite functional facilities. These passive design features are things that I think over the last hundred years we have forgotten how to do. In the 1920s with air-conditioning becoming commercially available you could build a glass box and stick it in middle of the desert with cheap energy and a big air-conditioning system and you could make that space inside the building quite comfortable. A lot of those passive design features of buildings I think we will see a resurgence of and they will become key features of the buildings of the future.

I will then talk about some of the active solutions. These technology solutions to energy efficiency, whether it is efficient air-conditioning systems, smart management control systems and those sorts of things. I then go on talk about energy generation and the types of technologies we might see into the future. I think buildings in 2020 will no longer just be there to house us. They will actually be an integral part of the local community. They may be the local power station with excess power going back into the grid with smart grid concepts. We have all these organic materials with organic beings coming and working in our buildings all day and they leave a lot of organic matter behind through the sewage system. So that is actually a resource that can be utilised locally in the water system. The buildings may not actually just be there to provide shelter; they may form a functional part of the utility systems of our communities of the future. I will talk about some of the particular technologies we are developing at the Newcastle Energy Centre and I will set them in the context of this building of the future.

When we look at opportunities—this is a cost abatement curve produced by McKenzie and Company, a management consultant firm—for Australia to reduce our carbon emissions by 2020. I will not go into the detail of the graph but taking this at face value, if you look at the light blue areas that effectively represent opportunities for buildings. All of the free hits and significant cost reduction or greenhouse gas reduction options that are by far the cheapest out of all of those particular options relate to building services. So they relate to air-conditioning systems, installation in buildings and all these very simple things. So all the low-hanging fruit relates to the built environment and what we can do with out existing building stock as well as future building stock.

The Hon. PAUL LLEWELLYN (Western Australia): Which is the blue? It does not come up on the screen.

Mr JAMES McGREGOR: Sorry, it is not very clear. These bars across here represent all the buildings and this one here and up in here. Then up in here we get to the carbon caption storage and those sorts of things.

The Hon. PAUL LLEWELLYN: What is the bottom axis? You have got to tell us.

Mr JAMES McGREGOR: The bottom axis is—

The Hon. PAUL LLEWELLYN: What are the two axes?

Mr JAMES McGREGOR: The two axes are the cost of CO2 abatement. On the left axis a negative CO2 abatement means it actually pays for itself or is an income generator. So if you invest in retrofitting say a lighting system in your building over its life cycle it will actually generate or save you more than it has cost you. Above means over its lifetime you will not actually get your money back in terms of dollars but you do get greenhouse gas savings.

The width of the columns represents the quantum of CO_2 reduction that can be achieved with those various technologies. Those are the energy efficiency options. Most of those opportunities for buildings relate to ventilation and lighting systems. Those are the energy efficiency technology options that we have. One of the other big areas is power generation. Buildings of the future may, in fact, be generating the bulk of their own power. I will talk shortly about the Newcastle Energy Centre, which demonstrates that. We are working on what we call a distributed energy model. At the moment we have a big schematic of centralised power stations reticulated through electrical networks and out to the end consumer. The distributed energy model effectively is a two-way grid.

Every home, shopping centre, hospital and commercial building has some form of power generation distributed across the grid; it does not necessarily have to produce 100 per cent. The idea with a distributed grid is that you get pluses and minuses. In certain times on the grid, when there is higher production and consumption that flows back to the grid and other consumers use it, you get a balancing act occurring. The difficulty with this model or a future model is that at the moment, from an engineering point of view, it is easy to synchronise lots of little generators to one massive generator from an electrical quality point of view.

Going 50 years or 100 years down the track, when we are no longer building coal-fired power stations and we have 5,000, 10,000, or 200,000 little generators in the Sydney central business district area alone, how will we control all those various power generators and sources? We connect it to an interactive grid to ensure that the electricity quality we require to operate our appliances, lights and computers is of sufficient quality to match those appliances. It is difficult task. It is more of an information technology and instrumentation control issue. We are doing a lot of research in this area. We are already seeing distributed energy models. A photovoltaic system installed at your home is an example of a distributed energy model.

This sort of technology and things such as gas turbines are the things that we are seeing today. Fuel cells are still a little way off, but we are seeing renewables such as cogeneration and tri-generation systems. These are all examples of distributed energy. Two key areas for buildings of the future that we are looking at are reducing, from a design point of view and using passive systems as well as technology solutions, the amount of energy that we consume. We are also providing the energy we need to run those facilities on site—be it from local renewables, or fossil fuel type technologies.

Moving on to energy efficiency, there is a tendency for a cookbook approach. We end up with a list of activities that we want to do. Typically, engineering will target engineering solutions, so engineers will look at efficient variable speed drives and efficient lighting systems rather than looking at a development in a holistic way. The new design process is referred to as front loader design. Our conventional design processes is very linear. A financier offers money to a developer to find a site. The developer finds a site and maximises the yield for his return and he then supplies electricity either for the public sector or the private sector. The architects then come in and are given a brief, "We want this amount of floor space. Get the maximum out of the building on the site."

The engineers, who have all the systems, go into that building and come in right at the back end of the process when, effectively, the building envelope is locked in and all the passive design opportunities to use natural light and ventilation effectively are lost. We need to shift the focus on our design processes and frontload our design efforts. Before a pen goes to paper engineers should be looking at the ventilation systems at the front end of the design process. They can be providing advice on building fabric and orientation and on the use of solar gain to reduce the amount of air-conditioning plant at the end of the day. As clients to these engineering firms one of the things of which we also need to be aware is that that comes at a cost, or at a higher risk.

Once you develop your project to a concept design stage and the costs do not come in, that project gets shelved. If you have done a front loader design process, effectively you have spent the vast majority of your design costs upfront for a project that might never happen, so there is a bit of toing and froing. Another key feature of future developments is utilising the local natural resources that you have available—whether it be ambient lighting, the use of vegetation, the use of topography on the site, and taking advantage of natural resources such as sunlight or wind. That comes into your power generation. I will talk later about designing for human needs, that is, designing for people in the building. I will give an example of that shortly when I deal with air-conditioning systems.

The next slide shows an example of our current use of natural lighting, or passive design solutions. This slide shows a cross-section of our site in Newcastle. On the northern facade of our office we have a series of light shelves. A piece of fibro cement sheeting is painted in matt white on the outside of the building but it is located about one-third down the window height. The idea of a light shelf is that it reflects the sunlight deep inside the building footprint. Effectively, we use the sun as a lamp. The sunlight lights up the surface of these light shelves, the sunlight reflects onto the ceiling, you get an indirect lighting system using the sun as a lamp and you get a nice diffused, natural light system coming into the office space. You can see that significant energy savings can be

achieved simply by taking advantage of local resources that are available. Sunlight is available virtually on every site, unless you are getting up to the arctic regions.

This example on the slide is of 67.5-megawatt hours. If we use exactly the same light, that is, T5 fluorescent lighting throughout the office, so we have quite high efficiency lighting, this assumes that people come into the office at 9 o'clock in the morning, turn the lights on, and at 5 o'clock they go home and turn the lights off, except for about 10 per cent of the light fittings. On our site we would consume about 67.5-megawatt hours of electricity. Basically, if we allowed natural light into the building and we used photovoltaic cells and some motion detectors we would reduce the amount of energy that we consume through artificial lighting by about 90 per cent.

The true cost saving is not necessarily realised in the costs of electricity—it is in the cost of the electrician who has to replace those lamps. It costs $55 an hour for an electrician to change light globes in an office. On the northern side of our office building—the site has been up and running for five years—we have not changed a single lamp within the building. For a conventional office building that runs lights coming on 9.00 to 5.00 you would be changing those lamps every 18 months. So the pay-back period on this particular solution, taking into account the light shelves on the front of the building plus the active technology solutions to automatically control the lighting within the office space, is about two years. So it is a bit of a no-brainer. However, lots of new buildings go out there with a flat glass façade and basically try to keep the sunlight out of the building as much as possible. And obviously greenhouse gas savings are a significant component of these sorts of options. So that is using natural light.

One of the other design features of the site in Newcastle operates in a natural ventilation mode so for about 100 to 150 days a year we actually operate with no air conditioning whatsoever in the office building. The way the system works is on the northern façade of the office building we have the two fire stairs and they are actually clad in glass. The idea is we actually want the air to heat up in those stairwells, and we actually use them as solar chimneys. The idea is the air heats up in the stairwells, hot air rises up through the front of the building, escapes out through the building. As that air leaves, it generates a negative pressure inside the space, and actually sucks fresh air in from outside. So we actually use solar energy to generate air movements through the building to create quite comfortable conditions within the space.

We use that for about 150 days a years, so that is probably a 30 or 40 per cent of our working days on the site and save about 110 tonnes of CO^2 simply by turning off the air conditioning on that one level system. All the windows are able to be opened on the site so people can hear the birds outside, get fresh air into their office: it is just doing it a little bit smarter. One of the things that we have done to validate some of these systems on our site is we conduct what we call "comfort surveys". When this building was built about four years ago it was fairly unique. There was virtually no equivalent example anywhere in Australia, and there was a bit of a doubt over the performance of some of these systems. So what we did was we conducted comfort surveys three or four times a year. In those surveys we ask staff to record every hour over a one week period their temperature comfort. They record zero if they are quite comfortable, minus 1, they are a little bit cold, minus 2 they are cold, minus 3 they are freezing and vice versa in the other axis.

We do not tell the staff what we are doing. We actually change the set points of the building. We will ramp the air conditioning up and down and we will actually change the internal conditions without telling them what we are actually doing. So they do not know whether it will be hot or cold. They just record their true comfort in that particular situation. What we did to validate the natural ventilation system on the site, is on this graph we have two identical days during about November we ran this test. The temperature warmed up to probably 26, 27 or 28 degrees Celsius by 3.00 o'clock in the afternoon on each of the days. One day we ran on full natural ventilation for the entire day, and the other day we ran on full air conditioning.

The graph on the left as you can see basically sits on zero virtually all day. That means that everyone in the building was quite comfortable on that particular day: there were no real indicators of discomfort. The graph on the left you can see that at about 2.00 o'clock in the afternoon we start seeing this rise up into the warm. So we are up towards plus 1 so people are starting to feel a little bit warm and a little bit stuffy within the building. When we saw this data intuitively you think that the graph on the right hand side where people are getting a bit hot and uncomfortable must have been running on natural ventilation because there was no air conditioning in the building. In fact, the opposite was true. People under air-conditioning mode actually felt more uncomfortable than they did under natural ventilation conditions for identical outside air conditions. So that the rise in temperature outside was the same, about the same amount of rain, and the wind direction was virtually the same.

So we produced about 650 kilograms of CO^2 from the energy we consumed on the day with air conditioning, and we produced no greenhouse gases from the energy we consumed on the day we ran natural ventilation and people were actually more comfortable. That tells us there is a psychological component to this

which we have not quite pinned down. It is like the idea of you sitting outside on a hot day under a tree: you are actually quite comfortable as a result of a concept called "adaptive comfort". Your body will adapt to those changes because you do not get a homogeneous constant air flow. The air conditioning in this room at the moment is coming through X-amount of litres per second at a constant temperature and it is very homogeneous. When you are outside in the natural environment you get random air movements, random gusts, the temperature fluctuates as you move between shadows and you get direct sunlight on you. Under natural ventilation conditions those similar sorts of air movement patterns and random patterns are what the actual occupants feel.

When we got this data we were somewhat surprised by it. It allowed us—in the first year of operation the site only had about 60 days we operated on natural ventilation conditions—to almost triple those number of days where we can turn off the air conditioning based on people's true comfort. What we found is that when we operate under air conditioning people really want the temperature to be 22 degrees plus or minus 1½ degrees Celsius. Outside that sort of band people start to complain of being hot or cold or indicating degrees of discomfort.

When we run on natural ventilation we can run the building as low as 17 degrees, as high as 26 degrees and people are actually quite comfortable in those conditions. They can hear the wind and the birds outside. There is a psychological component to that level of comfort and people can open up their windows and adjust the airflow that they get throughout the site.

Mr PAUL LLEWELLYN: Were the windows open in the air conditioning trials?

Mr McGREGOR: No, the windows were shut. Since we have implemented this system to improve the performance of natural ventilation, what we found is the office building is basically across three floors. The middle floor is the senior management. Originally we had an email system that used to come out telling them when natural ventilation was on or off and what we found is the guys on the second level were really busy and did not really read their emails so they would not open up their windows and then we would get complaints about temperature because we were not getting cross-ventilation. It has now changed to a voice activated system over the PA, BMS automatically plays a voice message and staff open up their windows to allow that cross ventilation to happen. In air-conditioning mode the windows are shut. I will talk about the air conditioning in a moment. You can open the windows in your office during air-conditioning mode. It has very little effect on the system because we use a displacement type air-conditioning system but I will talk about that shortly.

The key thing about our developments for the future is that we are sort of going back to designing for human needs, rather than providing these homogeneous flows which the engineering text books say people will sit within this band, they are quite comfortable, human beings do not sit within those defined parameters. So there are actually a lot of smart and passive things you can do with your buildings to actually improve your energy performance as well as the comfort and people's wellbeing within the building. One of the other key areas is looking at enhancing natural systems. I think there is a tendency in today's best practice for sustainable developments on harm minimisation. We are always talking about minimising harms in the environment rather than actually enhancing the environment and utilising waste streams to actually improve the local environment where these buildings operate.

At the site you can see in the picture on the left-hand side is like a courtyard space so that sits in between our office and laboratory buildings. We have a whole lot of vegetation and planting in there. What the vegetation achieves is that during the summer when it is a lot warmer those plants will transpire so they will sweat effectively. We end up with this natural evaporative cooling system in between the buildings as well as being in the shade. So we end up with this air temperature that is 3 or 4 degrees cooler in between the buildings than it is in the surrounding environment. In winter we have the opposite effect because the plants are deciduous. They drop their leaves which allows the sunlight in the space but those leaves start to break down during the winter so you end up with composting vegetation, generating basically a hot bed of vegetation breakdown. So that actually provides localised heating. Whilst it is not super comfortable on a freezing cold day, it is 3 or 4 degrees warmer in there during the winter periods. We draw on that air for our natural ventilation system. So that is why we can run the buildings up to days when it is 28 or 29 degrees Celsius outside because the air we are drawing into the building is 4 or 5 degrees cooler than that from that central space.

The diagram on the right there shows Council House Q down in Victoria. I do not know if they actually went with their green wall. I have not been down there to see the completed development. Their idea behind the green wall, on the northern façade of the building using deciduous vines, during summer there is lots of foliage protecting the heat gain on the building and during the winter they drop their leaves and they allow direct heat onto the building to passively heat the building during the day. The wastewater systems and the grey water systems collected were used to feed the plants. So there is this relationship between the natural environment and the

building where one gets something from the other. When we start looking at buildings of the future we need to be conscious of what are the waste streams of our buildings, what use can we put to the local environment to both improve the performance of the building and also to improve the local environment.

As I mentioned before, I think there is a tendency we have got away from designing for human needs. We have designed buildings based on engineering text books, forgetting that the systems and things in the building are actually there to support you and me. I will give you a really simple method that we have utilised on our site, which has achieved this and given us significant energy savings. A conventional air-conditioning system, which is what we have in this room here, provides air conditioning from diffuses down in the ceiling space, down at the work space where you and I operate. The fact is I could not care less what the temperature is from the top of my head up to the ceiling space. I do not really care what the temperature is behind the screen. I do not care what the temperature is over there where that table is because I am actually not physically in that space right now.

They are the air-conditioning systems that will keep you and me comfortable. In a conventional system such as here, I would say 60 percent of the energy that has gone into air-conditioning this room has gone to waste because we are occupying only about 40 percent of the space. With a conventional system on our site we would consume about 445 megawatt hours of the electricity. We use what is called a displacement system and when this was built it was probably one of the first in Australia. We actually use air conditioning from under the floor, so what we have is a false floor and all the data cabling and power runs underneath the offices. We have a series of relocatable air conditioning outlets within the floor space and where each of those outlets is we create microclimates—a little pocket of conditioned air comes out of each of those diffusers. The idea is the staff relocate those outlets to suit their workspace. If this was our office and the desk was over here and we had filing cabinets over this side, all the outlets would be relocated to where our desk is because we spend the vast majority of our day sitting there. We create a microclimate around where we sit and we do not actually provide any air conditioning where the filing cabinet and bookcases are located. Who cares if the books get hot? The air conditioning system is not there to keep them cool.

You can see that by air conditioning just the people in the building we have actually reduced the amount of energy we consume in the building by about 74 per cent. When we first moved into the building it was a real problem because people did not understand how it worked and did not know they could relocate the outlets. With time and education the staff have understood that they need to finetune their own workspace to create these microclimates using the system. It is what is known as a displacement air conditioning system. There are a number of examples going in around the country using these types of things. They are very good for places where staff are static. Displacement systems do not work very well if there is high throughput. If there is a thoroughfare where lots of people are walking through and the air is constantly being mixed, displacement systems do not have an application. In typical office environments where people are sitting still for the bulk of the day you can make massive energy savings by air conditioning just the people. Greenhouse gas savings are a significant component of those savings. We have about 260-odd tonnes of $C0_2$ per annum simply by just air conditioning where air conditioning is not needed.

Mr PAUL LLEWELLYN: And the payback period?

Mr McGREGOR: I can send you the figures if you come and see me afterwards but it would pay for itself in about three or four years. The thing to remember is that by air conditioning those little pockets of air we are air conditioning only about one-third of the air volume of the building. It is like shrinking your building by two-thirds. Your air handling units are not quite two-thirds smaller, they are about half the size, so all your variable speed drives are half the size and cooling requirements for chillers are about half the size, so your actual upfront capital cost for the air conditioning plant is much less. You do pay for the elevated computer floor to go in so those two costs tend to balance themselves out.

That is looking at some of the passive and active design opportunities that we might see in the future. One of the areas of active solutions is energy management systems. One of the areas of research we are working on is what we call self-learning smart agents. You might have heard of terms like "intelligent grids". This is a major research area or focus for us. The basic concept behind agent-based technologies—the best analogy for an agent is an ant. An ant is a pretty dumb little creature. It can follow another ant, dig a hole and pick up a leaf. Agents are the same sort of thing. An agent might be measuring temperature in this room or the amount of power being generated by a photovoltaic system. It might be measuring the amount of traffic or counting the number of people going in and out of the building. The concept is like an ant colony. When ants get together as a colony they can solve quite complex problems because of the way the networks work. Agent-based technologies work on a similar principle—lots of little very simple devices working together to solve complex problems.

The diagram on the left-hand side shows a future concept of a residential village using these multi-agent networks. You can have an agent in your air-conditioning system and in the photovoltaic systems on the roofs of all the buildings, agents in local wind farms and in the playgrounds and parklands, and agents on hot water services. These agents work together to optimise the amount of energy that is being consumed at a particular time depending on how much power you are generating. They are also referred to as "secure grids". You may recall the Newcastle storms in the June before last. I am from the Energy Centre in Newcastle and I had no power to my house for about five days during those storms. It was not because the power stations were not working; it was because four doors up a tree had come down and disconnected the piece of copper that went from one pole to the next. It was not because there was no power available, it was just that the piece of copper connecting my house to the network was not there. In the future, with secure grids or smart agent-type technologies, if we had had this sort of network setup with all the homes having some form of power generation, whether solar or wind or a little gas turbine out the back, a little fuel cell, and agents in the fridges and the air conditioning systems, the agents could have worked together to get that little node up and running on a minimum amount of energy based on the amount of power we were generating and allocated a central load to refrigerators and general lighting. They could do that automatically without the need for any intervention, so the network would have been up and running quite quickly.

When we look at climate change scenarios, we will get increased frequency of storm events and major damage to infrastructure, and these sorts of multi-networks and smart agents can basically self-repair individual nodes. They are the sorts of things we might see in the future. I will give you an example of how these agents might work. The pictures on the right-hand side are of a demand management agent. This particular agent's job is to try to reduce demand on the grid when the network is stressed. This particular agent is connected to a coolroom on our site. This agent looks at the electricity pool price on the Internet in real time and tries to forecast spikes in the electricity pool price. When the electricity pool price starts to rise it generally indicates growing demand for energy on the network. When you get big spikes at $8,000 a megawatt hour it means the networks are under great stress and that the generation capacity cannot match the demand. This particular agent tries to identify when the network is under stress and if it sees a spike in the electricity pool price coming it pre-cools the coolroom. The coolroom normally sits at about four degrees Celsius. The agent will drop the temperature in the coolroom before the spike hits to about two degrees Celsius and chill the coolroom right down. When the spike hits, the agent turns the compressor off and allows the temperature to slowly creep up. Effectively what it does for the coolroom is that it turns itself off the grid but still uses thermal storage to perform its main function of providing a coolroom.

This is an agent we have operating on our site. We have other agents that are looking at renewable systems and energy storage and talking to weather stations around the region and making decisions as to whether they should put their energy into the grid or into storage. It is a really basic example but these are the sorts of things that these agents might be able to do.

So that is the energy efficiency side of things. On the energy generation side, we will talk about energy distributive models. We will see distributive renewable energy systems being incorporated because most of the natural resources we have available are renewable, whether they be solar, wind, air movement or a micro hydro source if you are next to a river. Buildings are very well suited to integrated renewable-type systems.

The Energy Centre in Newcastle is an example of this distributive generation. We use both renewable and fossil fuel-based technologies. In an average year we will consume about 950 megawatt hours of electricity on the site. We generate that through a number of technologies. We have conventional fossil fuel-based systems, where we use a number of micro gas turbines as a cogeneration plant. A micro gas turbine is basically a jet engine in a box; that is the best way to describe it. You can see air bearings spinning at 90,000 revolutions per minute, so they virtually are a little jet engine. These micro turbines' main job in life is to generate heat. It is a 10,000 square metre laboratory and office facility.

During winter they will provide 100 per cent of the heating for the site as well as 100 per cent of the electricity requirement. On a day like today we will be producing all our own energy just off those micro turbines as well as all waste heat. For those who are not familiar with what a cogeneration system is, it is basically using a waste heat stream from an engine that is burning a fossil fuel. A conventional coal-fired power station burns coal and produces electricity but the vast majority of the energy, a little over half, goes out through the stack in the form of waste heat and is wasted. Cogeneration is about burning a fossil fuel to produce electricity but then you will also utilise the waste heat for some other function. In this case we use it to heat the buildings. The reason we do that for cogeneration is that if we just use these turbines to produce electricity their efficiency is only 26 per cent; that is, 26 per cent of the energy in the natural gas we burn is captured as useful electricity. If we capture the waste heat, which is what we do, we can heat up a big hot water system and pump hot water around the site and the buildings. We get our efficiency up to about 85 per cent. So we are producing about one-third of the greenhouse gas emissions per unit of energy compared to coal-fired power.

We have used a little over half of our electricity from the gas turbines we run. Also we have a whole range of renewable systems on the site, mainly photovoltaics and wind. These are all building-integrated photovoltaics: they are not there just to generate power and actually perform some of the functions. We have a façade-integrated system from outside the process base. If you ever get an opportunity to come to the site, the only what we call bleeding-edge technology, which is the first installation of organic photovoltaic array in the world—and I will talk about organic photovoltaics in a little while—has given us a few teething problems, but it is the only thing that you currently cannot buy off the shelf that you will see on our site.

In our library we have a glass-encapsulated array. Again it is conventional silicon, but it has a waterproof membrane and is the ceiling for the library's space. It is not just there to generate power. We have the two biggest arrays on the side on the roof, on the northern side of the roof, on both the office and laboratory blocks, and we also have a poly-crystalline array on the roof of our auditorium. We generate approximately 130-megawatt hours of electricity from the PV program. We also have a micro-wind system with three small 20-kilowatt wind turbines scattered around the site to take maximum advantage of wind directions on the facility. We get 120-odd megawatt hours of energy for those, and we have space for a future 100-kilowatt facility. Whether that ever goes in will depend on what research program we have and whether funding is available.

The key thing about utilising enough resources is that, during summer, you can set your watch by when the wind turbines start up in the afternoon when the afternoon sea breeze comes in at about two o'clock, and that is a natural characteristic of the site. Doing this short presentation today, I do not have graphs, but you can actually see—you can almost predict—the amount of energy you are getting from the wind turbines in one afternoon period, just based on the site's natural characteristics. With the 100-kilowatt wind turbine, if we ever go ahead, we anticipate it will produce approximately 180-megawatt hours based on the wind speeds for the site. We have been a net energy producer over a 12-month period. We are not quite there yet, but we are aiming to actually be an energy neutral facility. Over time as new research programs and projects are implemented in the facility, we will continue to reduce the amount of energy we are consuming.

The Hon. PAUL LLEWELLYN: What payback period are you looking at for the photovoltaics?

Mr JAMES McGREGOR: It is a long time.

The Hon. PAUL LLEWELLYN: Would it be 15 years?

Mr JAMES McGREGOR: No, it is more than that. It was based on electricity prices. When we did the installation, it would have been 30 years plus. After we did the installation, electricity prices went up quite a lot, so it is probably around the 15-year mark, I would think, for PV, excluding any carbon price that might go into it. That changes the scenario quite drastically. We did not put in the PV systems on an economic basis. There was no business case to install the system. It was more to demonstrate how you generate power and make an energy effectively disappear off the grid from an energy perspective.

On the research program, some of the renewable systems we might see in the future are a research program around organic photovoltaics. "Organic" is a chemistry term. When we say organic photovoltaic, it is virtually a plastics polymer-type photovoltaic system. The big advantage of these organic particular PVs is that you can see it in an internal picture of the one we have on our site in Newcastle. It is a 6-kilowatt organic PV array, so it is the first commercial-scale installation in the world. The big advantage of these organics is that it is low cost. They operate significant cost reduction compared to conventional silicon, and the cost reduction is in the order of about 90 per cent.

The main reason for that is that, for conventional silicon cells, you require very high purity silicon wafers to manufacture the cells. That is a very expensive and arduous manufacturing process, whereas these organics are effectively mixing up polymers. It is not quite as rural as mixing it up in a bucket, but it is done at room temperature and they are very robust chemicals. They are very low cost. Efficiency is lower so you have much bigger surface areas to produce the same peak output, but that big surface area is much, much cheaper. The other advantage of organic PVs is that they are not necessarily susceptible to overcast conditions. With conventional silicon cells, one of the big problems they have is reflective losses out of the actual solar cells. When the sun angle gets very low, a lot of the light reflects off the surface of the cell and escapes back into the sky, and you do not get to harness that energy.

I am showing a picture of the organic PV. You can see that the sunlight passes right through the material. It is opaque. The organic PV is not necessarily susceptible to sun angle, so on a diffuse day when your entire sky is

your light source, they will produce almost as much power as they will on a bright, sunny day, unlike silicon where you get about 80 per cent reduction on a cloudy day compared to bright sunny days. In areas that do not have very high sunshine hours, particularly in parts of Europe and even right down to Tasmania and southern parts of Australia, these organic PVs have good opportunities.

Another unique area of research we are working on at the moment is vibration energy harvesting. One of our clever young scientists has come up with a semi-conductor material which, as you apply compressive forced to it, generates a charge. It is similar to the materials you have in your barbecue at home. The piezo electrics, as you start at the barbecue, create a high-energy spark. It is a very suped-up version of those same materials. We have a demonstration on our site as you walk down level three of the office building. We have replaced one of the stands underneath the floor so that, as you walk past, you see a voltmeter going up and down from energy generated from your pedestrian traffic up and down the site.

If we take the Sydney Harbour Bridge as an example, at any given moment in time there is about to 6.6 megawatts of vibration energy going into that structure. That is mainly being lost in the form of heat and noise. That is caused by wind gusts from vehicles and trains and pedestrian traffic over the bridge. If we ever get our efficiencies to be able to capture just 10 per cent of that, we could generate 660 kilowatts of power and that would power 220 homes for 24 hours a day, seven days a week, just off the vibration energy of that structure.

We have a project with the Department of Defence where we are developing materials in boots and weapon systems and backpack harnesses. As soldiers patrol, they will charge up all the batteries for night vision gear, radios and those sorts of things. In 10 years time you might be able to buy your Gucci set of Nikes, plug your iPod into the side of your shoe and charge up the iPod as you go for a jog in the morning. These sorts of technologies are a long way off and this one probably will not be around until about 2020. There are lots of opportunities that we are looking at.

One of the other major areas of research we are looking at is solar thermal technologies. We have a project which you will see in Newcastle because we have this facility up and running. We basically use a high temperature solar reformer where we concentrate the sun's energy to generate temperatures in the order of 1,000 degrees Celsius. We use that energy to create a chemical reaction to take place between natural gas and water. Effectively what we do is smash those molecules apart and produce a hydrogen rich synthetic gas. The big advantage of this technology is that the solar gas that is produced has 26 per cent more energy than has the natural gas that we provide into the front end. It still utilises fossil fuel and there are still greenhouse gas emissions associated with it, but what we are doing is converting the solar energy into the form of chemicals.

Conventional renewables, such as wind turbines and photovoltaics, have one of the big drawbacks that is often cited about these particular technologies: they cannot provide baseload power because the storage options for those particular technologies are batteries or super capacitors. They are very expensive and they are not practical on a large scale. With this technology we are effectively converting solar energy into a form of chemical bond in the hydrogen molecule, which is a gas. In other words, if we have gas bottles and pipelines, we can store that gas forever and a day and liberate that energy on demand. We can have solar energy on demand. This is what we refer to as a transitional technology. It couples onto the back of existing gas infrastructure where we can actually provide a blend of solar gas down gas pipelines. But, over time, as we transition off fossil fuels, you can reverse this chemical reaction and make it 100 per cent renewable.

You reverse the chemical reaction to produce methane and water and you liberate the heat to produce steam through a conventional steam turbine in exactly the same way as does a coal-fired power station, but you can do it on demand. This technology can provide baseload power using renewables. There is no demand for it at the moment, but the technology is there. For our next development we are currently doing one module in Newcastle. There will be a 4-megawatt solar thermal plant that will go into Queensland over the next two years with the support of the Queensland Government. We are currently going through the initial engineering works for that particular power station using this exact technology.

One of the other advantages of these solar thermal type technologies is integration to urban settings. I do not want to say that we have mobile phone towers because that raises connotations for our own good, but they blend into the urban settings seamlessly. You can see an image of the solar tower and a local car park. By 2020 you will be driving around in your hydrogen fuel cell hybrid vehicle, you will drop off to the local shopping centre, park your car, go and pick up your organic vegetables, and your car has been recharged with solarised hydrogen while you wait. Also we have integrated wind systems on high-rise buildings where you are getting very high wind speeds because the buildings are so high. This does give you a vision of what you might see the future.

Mr RAY WILLIAMS: Thank you very much. That was fabulous. Without further ado, ladies and gentlemen, I introduce Robin Mellon, who is the green star Executive Director of the Green Building Council of Australia.

Mr ROBYN MELLON: I shall give you a very brief run-through of exactly what green star is and what the Green Building Council does. It is very difficult to disconnect the energy or the energy efficiency part of green star from the rest of it because it is all a question of balance; it is all interrelated. So, we cannot disconnect energy without looking at the indoor environment quality. I will give you a quick run-through of what we do. Rather than talk you through great lists of credits, I will give you some case study examples from our certified buildings.

We have been operating now for just over five years. We are based in Sydney but we now have offices in Perth, Brisbane, Canberra and Melbourne. We are there really just to try to drive the property industry towards greater sustainability and better practice, but through market-based solutions. Rather than just being concepts, we are trying to push the practice as well. We have a range of rating tools, which I will talk you through very quickly, that reflect nine different categories. So, we are trying to provide a very holistic look at how efficient and how sustainable a building can be. Energy is probably the most important category within that. There will be time for questions at the end, but if you have questions as we go through, please call out.

We are fairly representative: we have 643 members now across the industry. These are architects, government bodies, private developers, builders, manufacturers, suppliers, designers. When I say that we are trying to speak for the property industry, we are representative; we are trying to represent all of them. What we do is really have a constant dialogue between the industry, between our stakeholders and the people using the rating tools. That is just a very brief slide showing the makeup of professional services on the left. It includes all of the smaller professions: the architects, manufacturers and suppliers. So, we can have that constant dialogue to try to inform what we do but, most importantly, to keep it relevant. Our three buzzwords are robust, relevant and scientific. It has to be strong and easy to use, but it also has to be based on science.

These figures scare me every time I see them. We now have 689 registered projects. These are all developments—buildings that are registered to go through the green star process. They are all going to submit documentation. We have 74 certified projects across the whole of Australia. That has doubled in just under a year, which is very encouraging. We are seeing more and more projects registered across Australia because they understand now the need for a holistic view of their building's environmental attributes.

These are the tools we have already. We started with office: it is perhaps the most homogenous type of building. We have tools for office design—that is, the design phase and as built, for the first 24 months from practical completion. We have a tool for interiors—so, the things the tenant has much more control over. Just recently we rated probably the smallest project, which was 140 square metres, and they managed to get a rating. For us, that is a really big thing: we need to be encouraging more small projects.

Office existing building is going through an extended pilot. We are testing that out with the market, but that is for all of the existing office stock. That is the whole body of the iceberg bobbing around underneath the water. We then have tools for health care, health care facilities, shopping centres and education for schools. I will be touching on those a little later when it comes to energy efficiency. Multi-unit residential is in pilot format at the moment—that is for developments of six units or more. Industrial is just entering pilot form at the moment. Convention centre or public building will be coming out later this year, beginning of next year. We have already rated the Melbourne Convention Centre. Many of you will have seen that receiving a lot of press late last year. It received a six-star rating and we will be refining that to make it even more relevant over the next few months.

Rating tool development is a process where we try to draw on that constant dialogue. We need to find out whether the environmental impact of a particular building type is worth producing a rating tool for. But then we gain sponsorship and we form a technical working group that is again representative. So, we try to get engineers, architects, designers, materials, all sorts of people on that group. We will draft the pilot tool and then we will rely on feedback from the people using it from the ESD consultants, from the manufacturers, to say, "Yes, that is achievable, but it's bloody difficult" or "That's completely off the wall, nobody is going to try to go for that credit unless you make it a bit more achievable." So, we rely on that constant dialogue.

The key messages are still remarkably simple. It is reduce: reduce the demand for things, reduce the demand for energy, reduce the demand for raw new materials. Reuse as much as possible from the buildings, from the facade, from the structure. Why waste all that embodied energy in knocking something down which you could use the structure or the facade again. And recycle as much as possible. This is the same message we teach to primary school children as to boards of directors; the majority of time the primary schoolchildren are getting it a lot quicker as well.

Lastly is attributes: attributes rather than performance I cannot stress enough. NABERS, formerly ABGR NABERS, energy is there to assess performance. They are looking at operational energy. We are looking at the attributes of the building. We assess that in a variety of different ways, but we are always looking at attributes. There are core categories throughout every single tool. Every single tool is formed in the same way with different categories and credits that are common. We look at asbestos, whether there are hazardous materials. That is the same no matter what the property type. But then there are credits that are particular to each property type. They have to reflect the peculiarities.

Perhaps most importantly, there are conditional requirements. You cannot go for a green star rating unless you have achieved these. The first of those is about operational energy. In the case of offices, can your building achieve less than 110 kilograms of carbon dioxide per square metre per year? It is a conditional requirement. You have to be able to achieve that. Green star is aiming for the top 25 per cent. These are the risk takers, the innovators, the people who are prepared to go that bit further to make sure that their building is sustainable—can be truly called green. So, we are targeting greenhouse gas emissions there, the operational energy of the building, and land use and ecology. You cannot go for a green star rating if you are located close to a wetland or if you are putting a building on land of high social or agricultural value. So, we are trying to encourage sites being redeveloped, not just greenfield sites being developed.

I am going to talk about some of the certified projects because they are probably the best way of finding out what we do. All of these are on our website. If you want to find out more about exactly how and what projects have been achieved, have a look at our website. The first is RAAF Richmond in New South Wales. This is the site for two RAAF squadrons. They registered very early on in the project because they knew what they wanted: they wanted a sustainable building. But after coming up with a design that was yay big they went back to the drawing board because they were faced with the costs and all the implications there. They looked very carefully at what they were doing. Who was going to be using the building? Were they all going to be there at the same time? Were they all going to be on the phone at the same time? Were they all going to be using a computer? Were they all going to be having meetings? They actually ended up in a building that was 78 per cent the size—they redesigned. They looked at a lot of hot-desking and a lot of different factors.

They ended up with a smaller building that will obviously use less energy, less water and less materials in its construction. They have ended up with a building that we love because they got three different Green Star ratings, which is great. They have ended up with a smaller building that fits the purpose. So there is a great message here and you can find out more, if you want to, about the recycled timber they used and the recycled content of steel but they are using a much more energy-efficient building because they looked very carefully at the management process.

This slide is CH2 in Melbourne, which we heard about a moment ago. They do have their green wall installed, which is the one on the exterior—on the wall opposite the shower tower wall. They do not have one inside but the one on the exterior is working well and working well for a number of reasons. But from an indoor environment quality point of view this is a great building. It is a pretty ugly building. I do not actually like it very much but I cannot deny from walking around inside it that it is probably a great place to work. They have satisfied a lot of the ventilation, a lot of the temperature, a lot of the fresh air circulation, the daylight glare control and a lot of these issues which are very difficult, or seem to be very difficult, in modern buildings. They have actually reported productivity increases of 10.9 per cent, which is massive when you look at the number of people and the average salary bill. These measures are paying back within a couple of years, not just a 20 or 50-year life cycle. It is a great example of indoor environment quality. They have put in a passive chill beam and they have natural ventilation and a lot of measures involved here.

The next slide is 8 Brindabella Circuit, Canberra. This was completed just over two years ago. It is out by the airport on the circuit road around the airport. When it came close to documentation submission for Green Star they were really struggling for a five-star rating. What it came down to was the owner saying begrudgingly, "Yes, we will put in cyclist facilities"—which is one of the things that is rewarded by Green Star—"but it is out by the airport and who is going to be cycling out to the airport?" They put them in, they put in lockers, the shower, the change room facilities that are required—you can get two points for those—and provided visitor parking—for one of the credits—and they have recently had to expand it because it has been full every single day. I am not saying if you build it they will come—it is not quite that easy—but I am saying that if you encourage the alternatives and provide people with alternatives then you are starting to see a lot of the very good outcomes.

The metropolitan fire brigade headquarters over in Burnley, this is where they have a lot of the fire fighting practice and this is the headquarters. It is another great example because they use that massive roof space to first

collect water and then they have an elaborate system of gullies and gutters and ravines to channel all of that water from fire fighting practice back in again. So they not only save water and collect it but they reuse everything that they possibly can. Not only have they got a great looking building which is big and red, which is all you can ask of a fire headquarters, but it is also a great building because they are having a positive effect. This is not just about minimising harm: this is about making a building a positive effect on the ecology, on the environment.

40 Albert Road was one of the first Green Star buildings to be certified and certainly the first-six star building. It was a pretty daggy 1980s building with a very narrow floor plate down in Melbourne. They have done a complete refurbishment and ended up with a great building at the end. They have used a lot of recycled timber, a very high recycled content of steel and of concrete. They have reused the facade and the structure. So a lot of embodied energy has been saved there and, again, a really nice building inside to work in.

30 The Bond, Sydney, which many of you will know if you have not already been to many times, is a great example of urban land use and ecology. There is a credit there for contaminated land and reuse. This is a great example because they decontaminated the land in a very elaborate process—this is just opposite a dockland area. The land was contaminated with gas, with fuel oil. They have renovated that. They have decontaminated and ended up with a site with water views, very close to the city, and an iconic site. So we are trying to encourage and reward better practice here.

I particularly like talking about the Quad 4 building at Homebush, Sydney Olympic Park, this is a GPT development that was finished late last year. This is a really standard building, a really ordinary building. They achieved pretty much a maximum score in emissions. So they are managing to reduce watercourse pollution, no light pollution, all of the emissions, the refrigerants, and the ozone depleting potential and things like that, but is a really ordinary building. They have not gone for all the bling, all the bells and whistles, the black water, the photovoltaic on the roof; they have used passive design solutions or sensible solutions and they have achieved a really great outcome.

Energy—I guess why we are here today. This is 500 Collins Street. Our offices are actually up on the 17th floor. This building was refurbished extensively over the last few years and they did it floor by floor so they would not have to move everyone out. Yes, they have captured a lot of the embodied energy and they have not had to rebuild but they have installed a lot of measures. They now have passive chill beam, which a couple of years ago was a great innovation but now is—I will not say standard—becoming a lot more accepted.

The Hon. VICKI DUNNE (Australian Capital Territory): Would you like to explain passive chill beam?

Mr ROBIN MELLON: I would. I shall use a slide to do it in just one moment. No, actually I will do that now and then I can go back and talk to this slide. That is a shot of the raw passive chill beam on the roof. What they are doing is essentially chilling that concertina piece. So as the air around it cools it then sinks naturally and the warmer air rises up around it and gets cooled. So you are having a natural effect—that is passive chill beam. The beam is really the length of chilled apparatus. You can also get active chill beam, which is when the same effect happens. You get the air cooling and falling and the hot air rises but then you essentially blow that around. So active chill beam is when you have a blower to help the circulation. There is a shot of it installed. You can see those banks up along the ceiling of passive chill beam once it is installed. So 500 Collins they did floor by floor and it is a really good solution for what was essentially quite a short floor plate. They had a very small area to work with. So it is a great solution where they could not put in false ceilings and duct work all around. They have made the best of it and our offices are there and it really is a good indoor environment quality to work in.

These are some of the things that we reward and encourage within Green Star: energy improvement is one. What we ask for is a lot of detail and there is an energy calculator where you can start to put in all your building details, you can put in what the fixtures and fittings are, what you have, what your needs are and you score points thereby being as efficient as possible, by trying to improve on the standard or benchmark as much as possible. Similarly electrical sub-metering and tenancy sub-metering, we are going back to the old: if you can monitor, you can manage. When you have a 16-floor building like ours on the other side of Hyde Park to be able to monitor energy use week by week, month by month, year on year, floor by floor or even tenancy by tenancy and for large loads, means you have much more control over what is going on. Level 2 might be using twice as much electricity and that may be because they have an arc welder there, I do not know. You can actually start to monitor the situation and work out what is going on. That is the same for banks and chillers or condensers or lifts as well. Once you have control of that information you can start to see where the inefficiencies are and how they can be trimmed down.

Peak energy demand reduction, there are points within Green Star for looking at the peak energy demand of the building. The need to build energy infrastructure around New South Wales to cope with the 100 per cent maximum or peak energy demand does not necessarily make sense if you are only reaching that 100 per cent a few times a year or a month, then if you can provide that top 15 or that top 30 per cent from within the building through maybe co-generation or tri-generation you are building an energy infrastructure that is only coping with 70 per cent say, not the whole 100 per cent. It is reducing the demand on the energy infrastructure and encouraging the building to do that. Ultimately we would like people to look at buildings as energy producers, not just energy consumers. Going back to a whole not just reducing the negative but also actually having buildings as a positive effect on their surroundings.

Energy efficiency is another one which is picked out by Green Star; the efficiency of particular appliances and lighting equipment and lighting zoning, so having big rooms, big floor plates where you only have parts of it which are on when there is somebody working there. I am not talking about one person working with one cone of light from a single light bulb; I am talking about banks of lights that come on in areas of more than 100 square metres, so you are not lighting the whole floor. Similarly, I refer to lighting power density so that you are not over-lighting an office. You are not lighting the corners where no-one is working; you are being efficient with the lighting that you are providing. That is just a close up of the facade of CH2, which we heard a bit about today. It shows the louvres and the fact that they provide good environmental quality lighting. They shield people from direct glare. They still have daylight and they still have views but they are being shielded from direct glare. They do not have to roll down a blind and switch on a light, even though there is daylight outside; the louvres shield them from that direct glare.

A lot of solutions are not necessarily efficiency solutions, but a lot of design solutions can overcome these problems. Earlier I dealt with passive chill beam and we heard a bit about green roofs. Within Green Star there is no credit for green roofs alone. They are rewarded in a couple of different ways—certainly within energy and energy efficiency and also within land use and ecology and you start to see positive effects. In this case you can see that the heat is not penetrating through and you can see that the water is not running straight off. There are points there, within land use and ecology, for minimising watercourse pollution.

If you put a building on a block that previously was not developed, the water will run straight off twice as fast and it will wash off all those pollutants, cigarette butts, oil drips, and particulates. We need to try to slow that down and minimise it. Green roofs have a lot of good benefits, not just because they look nice and encourage a positive working environment; they also act as good insulation, reducing the need for heating, and they act as a very good cooling system. We are now looking at a slide from the United Kingdom where there are planted areas across the roof. Roofs can be used as roof gardens, such as the Solaire in New York, or larger areas.

This slide reflects the Messe headquarters in Stuttgart where there are massive green-roofed areas. A lot of concrete will go into that, but when you increase the recycled content of concrete you start to balance out some of the negatives. You can slow down the water leaving the site, use the cool air and the water filtration. A lot of positives come out of roof gardens. Earlier we dealt with a similar slide to the one that I am now showing, so I will not go over it again. A lot of these slides show the simple solutions. We are trying to encourage people to look at simple, passive design solutions and then to build on them. They should not automatically go in for the latest in technology when a lot of the time they could use the simple things that have been done for 100 and 200 years.

I refer to innovation—the ninth category that is rewarded. We are trying to reward and encourage these innovative strategies and technologies—people who have exceeded the benchmarks, who have gone a little further and who have come up with some good design initiatives. I will talk you through three quick tools—education, health care and retail—just to give you an idea of how we try to flex and change with property types. Education will be going live. The tool, which will be released in the next couple of months, has been on our website for free, as are all the tools, but there are points there for maintainability.

It is easy to maintain a school using the school buildings as a learning resource. This is not rocket science. We are trying to encourage children to learn about where they are learning. We are encouraging people to put in clear drain downpipes so that they can see where the water is coming from when it is raining and where it is going to, and they can work out why that water is being captured. It is being very clear about where energy is coming from, what are the benefits, and how the building was designed. An obvious one for schools is the storage of hazardous material and encouraging the use of stairs. We might not think that this is difficult but we are trying, as much as possible, to encourage people to put in well-designed and well-located stairs. A lift should not automatically be the first choice; you can encourage people to use an alternative.

In unoccupied areas there is a need to heat, light or cool those areas. There must be sensors and ways of turning off these things automatically. Lastly, I refer to safe pedestrian routes on and off school sites. This is probably the best way of explaining what it is that we do every day. The next slide shows Williamtown High School in Victoria. Blocks A and B of the school are located side by side. This school, which was built in the early 1980s, looks pretty much like the school that I attended. Block B has been finished for a few months and students have moved in, and the block on the slide is located right next door. This is what we are trying to do and this is where I would have wanted to go to school if it had not been a girls school.

We can look at these two blocks and say, "This is what we are doing." It is not difficult. We are looking at daylight, natural materials and natural ventilation. The energy use in this building is down to about 22 per cent of building A. These are not difficult measures. Again, this has been achieved in a number of easy ways. They have natural ventilation and night-time purging to flush out all the hot and dirty air that has accumulated. They have louvres along the side, as we saw, and thermal chimneys to allow the heat to escape. We heard earlier about the headquarters in Newcastle where the thermal chimney encourages the heat to escape. They have sun shading designs and blinds on the northern facade and minimal east-west glazing to minimise the glare in the morning and in the afternoon.

In health care we are trying to encourage better tailored health care building management systems. They have a difficult set of parameters within which to work. These buildings are operational 24 hours a day, seven days a week, so they need different building management systems. We need solutions 24 hours a day and seven days a week to try to cope with a lot of different things. For example, we need to stop the spread of microbial infection from ward to nursing station, so they have very different demands. Places of respite provide somewhere for people to sit outside and get some sunshine.

I refer to medical equipment efficiency when these buildings are operational 24 hours a day and seven days a week. As I said earlier, they are important, so we need to reward people and encourage them. We also need to focus on the adequate provision of stairs, as I referred to when I dealt earlier with education. I refer, next, to retail centres. There are points there for having proper waste management plans and reducing the need for multiple trips. We must locate shopping centres in sensible places where they are closer to residential and industrial areas and to the people who will be using them.

This slide refers also to disassembly and adaptability, which are more about the use of materials, how they are made, and energy management systems, so that you can start to subdivide, look at retail tenancies, and look at their energy use day by day during different periods. The needs of shopping centres are very different from the needs of offices. They have vast atriums and big spaces, but they need only to condition the bottom two metres where people are; they do not need to cool all the air. We are trying to put in place energy management systems that reflect this. That is all I have for you today, but please ask questions. Have a look at the rating tools that are on line.

At the very least we try to encourage developers, builders and architects and to use them as guidelines. A lot of people will never achieve a Green Star project, which is fine. We are not aiming for global domination as perhaps others are in the United Kingdom; we are trying to provide guidelines for people. Those who are in the top 25 per cent we would love to see come online, register and certify for Green Star.

Mr RAY WILLIAMS: Our next speakers will be Dr David Butcher, Chief Executive of Greening Australia, and Mr Tim Beshara of Greening Australia. Mr Mellon, many of the examples to which you referred today require pretty simple solutions. My question, which I do not want you to answer now, relates to the building sustainability index, or BASIX, which has been incorporated in New South Wales. I do not know whether other States have put in place similar programs. That means that all our new homes now have to have water tanks, energy efficient devices and things like that. My question to you is do we as leaders now have to take a forward role in implementing this technology into our new urban design buildings and retrospective demand for industry, commercial, retail places to implement this sort of technology. I will not ask for an answer now but you might just think about it and advise us. Do not worry, just because we are pollies we can take it. We are big enough and ugly enough. I will introduce our last speaker. I have heard Tim Beshara before when he gave this committee a briefing. It is something that is very close to my heart. He represents Greening Australia and without further ado, please welcome Tim Beshara.

Mr TIM BESHARA: I hope you are all still awake. I will try to keep this as quick and simple as possible. It is little known in the public sphere that there are two forms of human induced climate change. One we hear about every day on the news. I used to get really excited when I would go home and hear about climate change on the news. Because what I learned is what I work in, now I just turn off the news: it is too much for me. So there is global warming which is the enhanced greenhouse effect, which has got to do with carbon dioxide and other

greenhouse gases going into the atmosphere. There is something else that meteorologists have known about for a couple of hundred years now where you get quite local restricted warming in and around the urban areas, and that is called the urban heat island effect. So there are these two human induced warmings: global warming and local warming.

Almost universally, cities are several degrees hotter than their surrounds. For example, year in and year out Tokyo is 3 degrees warmer than its surrounding areas. In the world's worst case, on some particular days some of the suburbs in Athens are 16 degrees hotter than others. So this urban heat island effect can be quite significant. The three causes of urban heat island effect are quite simple to understand. I will paint a scenario. It is a really hot day and you are standing in the middle of a car park. You can actually feel the heat radiating off the asphalt on the ground. Asphalt can get up to about 80 degrees in temperature. All the changes to the urban surface—increased asphalt, concrete and tile rooves—retain heat, store them and release them at ground level. So that is enough to actually increase temperatures in cities and suburbs.

The other one is loss of vegetation. We have heard a bit about vegetation and its cooling effect—one thing it provides is shade and the other thing is trees, grass and shrubs, when they draw water up from the ground it evaporates from the surface of the leaves and it has this cooling effect like an evaporative cooler. A lot of studies in the United States show that vegetation can actually reduce temperatures by up to 5 degrees. So vegetation has a significant cooling effect. As we build cities we tend to lose our vegetation. The other one is heat production. We all know that air conditioners have this cooling. They pump the cool air into the house and they also pump the hot air outside and that, combined with industrial waste heat from industrial processes and car exhausts, is enough to increase temperature as well.

So those three things combined can actually make cities much hotter than their surrounds. We know that some parts of the city are much hotter than others. It tends to be the leafy green areas that are cooler areas, and even within a suburb there are hotter and warmer areas. It seems to be the park and bushland that is the cooler area, and the urban or city centre that is the warmer area. We actually have quite a bit of academic study around this in Australia. We know, for example, that Melbourne and Brisbane on average are between 1½ degrees warmer than their surrounding areas. We also know that this sort of hides the true magnitude of this phenomenon. When circumstances are right, for example, you have had a really hot summer's day, everything is really hot and heated up around you, at 9.00 o'clock in the evening all those concrete and asphalt surfaces are radiating heat. So the park down the road could be 6 or 7 degrees cooler than in or around your residential or city area.

From my work in Western Sydney we are starting to get a picture that temperatures can be up to 6 degrees, even during the day, warmer than you would expect. Western Sydney, you might not all be aware, is a little bit of a distance from the coast, but it is also situated in a bit of a basin where this hot air gets trapped. Western Sydney does not get this sea breeze. In coastal Sydney you would expect, it is all built up, there is a lot of concrete around, but because it gets this regular sea breeze through summer, it tends to obliterate this effect but in Western Sydney without the sea breeze it is actually quite exposed. The parliamentary committee earlier had Professor Andy Pitman give evidence to it in a hearing. Professor Andy Pitman is one of the world's most foremost climatologists—probably in the top two or three within Australia. His job is to look at all the climate models around the world, and he either puts a big tick or cross against them. The IPCC is constantly turning to him for advice. He said if you wanted to locate a population in the most vulnerable region possible for global warming and urban heat island and air pollution you would put them in Western Sydney. It is a pretty powerful statement.

Mr RAY WILLIAMS: Especially when you live there.

Mr TIM BESHARA: Yes, and work there. I have looked at some of the climate record through all the Bureau of Meteorology stations in Sydney and it paints a bit of an interesting picture. If you look at coastal Sydney, actually taken from the central business district where that sea breeze buffers the effect of the urban heat island, the number of hot days per year has basically remained constant. So this is 1965 and basically now. This is the number of days per year over 35 degrees. And you look at what has happened in Western Sydney there has been this really sharp increase. No matter how I look at it, whether it is average temperatures, maximum temperatures or summer temperatures the gap between Western Sydney temperatures and coastal Sydney temperatures have widened dramatically.

This is a bit of a best and worst case scenario for why the urban heat island is significant in Western Sydney and why there are some suburbs closer to the coast where it is a bit cooler. You are probably all from cities where there are new suburbs springing up like this. You can see that looking from space almost the entire land surface is either taken up by asphalt, concrete or tile rooves. There is practically no vegetation, no green space, nothing. So you can imagine the heat radiating from the ground after a really hot day. You look at some of the leafy

green suburbs on the North Shore closer to the coast. These suburbs may actually even be cooler than what that area would have been in the past because we are now watering our gardens, the vegetation is producing more evaporative transpiration. They could actually even be cooler than what it would have been before the suburbs went in. It shows you the value of keeping trees and trying to increase vegetation in that urban area.

What does it all mean? There are these two warming effects: global warming on one hand and urban heat on the other. The thing is they are additives so 3 degrees of global warming and you add 2 degrees of urban heat island effect, makes 5 degrees of warming. And we actually know that in a warmer world urban heat island will be more intense so it is actually probably closer to 6 degrees of warming. Australia can definitely contribute to a global solution for global warming, but the other half of the equation, the urban heat island effect, we can control 100 per cent of that solution. So we are shifting our entire economy for 1 per cent of a global solution, but what are we doing for the other half of the equation? Fighting the urban heat island effect is not going to save the Great Barrier Reef but it will make our cities much more liveable in a warming world.

Urban heat island action is being taken in cities across the world at the moment—Tokyo, Los Angeles, London—and it is primarily being driven by concerns over peak energy reduction and also by the health impacts of heat waves. The health effects of heat waves are very significant. Heat waves kill more people than any natural disaster put together in the Western World. In America, Europe and Australia those figures are quite solid. You may remember the 2003 heat wave in Europe. Urban heat island is quite significant in that. Approximately 20,000 to 30,000 people died across Europe in an unprecedented heat wave. What generally happens is that impacts heavily on the elderly. In France, what happened was that everyone went away for holidays and they came back and they found their grandmother who was looking after their house while they were gone was no longer.

This is a graph taken from a study compiled by the Bureau of Meteorology looking at an Australian city—I cannot remember which one. This is the number of deaths of elderly people in nursing homes on this equation. Here is the temperature of the previous day. One can see that deaths in nursing homes basically matches directly to temperature. It has quite a significant effect. A lot of the medical associations are starting to talk about climate change impacts of health, and the urban heat island effect.

Another more interesting but subtle social effect can be seen on this graph, which shows mean weekly temperature and the number of police call-outs to domestic violence. You can see that with an increase in temperature there is an increase in the number of call-outs to domestic violence incidents. So the urban heat island effect and the impact it has on urban areas is actually quite a significant problem.

I work for Greening Australia, a not for profit environmental organisation. We care about biodiversity, healthy rivers and sustainable land use. The reason this is of interest to me is that I have been working for the past five years in Western Sydney on a whole range of environmental programs and Greening Australia as an organisation has been working in Western Sydney trying to restore natural woodlands and river systems in that peri-urban environment. This issue is a real threat to some of the things we have been looking to preserve. We all know about the impacts of climate change on biodiversity and climate systems. This is like a souped-up version of climate change.

In terms of energy, the equation is pretty simple: higher temperatures mean more air conditioning use. From studies in the United States it has been found that for every one degree Fahrenheit increase there is a two per cent increase in energy load. They have worked out that up to eight percent of the power used in the residential community is to compensate for urban heat island effects. This is one of the things that are driving urban heat island policies in California at the moment. I am definitely not taking an antidevelopment stance; I am advocating a smart development approach that takes into account the urban heat island effect. While some things can be retrofitted into existing communities, the most cost-effective approach is to build urban heat island thinking into new developments and redevelopment. There are four simple but scientifically established solutions that would be effective in the Australian context. Street trees are quite simple and obvious—they shade the road and provide an evaporo-transpiration cooling effect. It is not a particularly high-cost solution but it is something that many people are in favour of. Obviously when you are rolling out greenfield developments on the outskirts of Australian cities there is quite a lot of pressure from the development industry to minimise the amount of bushland they have to keep, whether through threatened species laws or environmental laws. There is a strong push to maximise the urban footprint and minimise the bushland footprint. This issue shows that bushland has another value beyond, say, the threatened species it holds. It has a major cooling effect on the region. The bushland that is out there now is actually a cornerstone for building a cool city in the future.

There are a range of urban designs that can be incorporated into developments, and some of them have been mentioned today. We have heard about green roofs and in California they are promoting light coloured or

cool roofs that reflect the energy back to space. California has a cool roof rating council and there are compulsory laws requiring larger buildings to have cool roofs installed. Water is a particularly interesting subject. Vegetation does not provide that evaporo-transpiration effect if there is no water. Although we have water restrictions at the moment and people are not encouraged to water their gardens, in the future as more and more people have access to recycled water or have water tanks the ability to water a garden will keep the house much cooler. I have had the experience of being on a sheep station north of Broken Hill. I have been out in the baking sun and saltbush and have come back to the homestead to find they have connected to the dam to water the garden around the homestead. When you get into the area around the homestead you can actually feel it is much cooler. It is almost like being in a different country. Then you take a few steps 10 metres out onto the baking soil and you feel the heat radiating off the ground again. Being able to water a garden will be an important aspect in the future.

In the past we have engineered stormwater to take it away as fast as possible. The water goes from the roof into the stormwater system, into a concrete channel and out into the nearest river or ocean. If we can retard that flow and make it move more slowly through the system, all vegetation in urban areas and along the creek lines can draw up that water much more effectively and provide a greater cooling effect. Water will be a very import aspect of reducing the urban heat island effect.

Who else is actually doing something about this? I would say that most of the world's major cities are either in the planning phase or have well-developed and established policies on this issue. I am surprised it has not taken hold in this country when we are probably much more exposed than many other places. California has a range of cool roof policies and Japan has a national policy framework on this issue. I have read that the city of Osaka is investing up to $1.5 billion on this issue. They are genuinely concerned about this and it is incorporated in a lot of their urban planning policies. For example any new building over a certain size has to have either a cool roof or a green roof. These are compulsory. These two places are probably leading the world in research on this issue. New York is genuinely concerned about the health effects of heatwaves and it is going through a process of increasing vegetation in green space and increasing the number of street trees.

You would not think that London of all places would need to do something about this but they are very concerned about the impact of heatwaves on the urban population. In the recent mayoral election, there were duelling press releases about who was going to do more about the urban heat island effect. So all these places around the world are genuinely concerned about this issue and doing something about it. It is also quite prominent in the international development sphere. The International Energy Agency, which is no slouch on these matters, said that the urban heat island effect was one of the major barriers for pursuing sustainable society in terms of quality of life, public health, environmental impacts, power reliability, social security, material degradation and all the related costs. This is an internationally renowned and powerful organisation and it is saying that the urban heat island effect is a major problem and we have to deal with it.

In summary, I see that mitigating the urban heat island effect is actually quite a simple proposition. It is something I think the public will easily understand. For example, I was in a leadership forum in a local council in Western Sydney recently and we were asked to name one big idea that the council should be doing over the next three years. Everyone had one minute to give a presentation and I got up and spoke on this topic. At the end everyone had to vote on what the two top priorities should be for Penrith council. The number one priority was improving public transport and the number two priority that everyone voted for was reducing the urban heat island effect. They had only heard about it 10 minutes before. It is something that the public will be able to cotton on to. There are a whole lot of ancillary benefits from doing this. Cities will be more resilient to climate change, there will be cleaner air and we will keep the biodiversity of things that I care about. There will be cleaner rivers and improvements in the beauty of cities and suburbs, and there will be healthier people. In my view it is one of the best climate change and adaptation strategies for our cities. Thank you very much.

Mr RAY WILLIAMS: Could you just turn back to the photo you have of Woodcroft and the North Shore? I am not going to beat on about this because it really is one of my bugbears. Tim asked the question: how many people in your various suburbs have developments such as this? Did you happen to see on the graph the number of days over 40 degrees relating to this area of Woodcroft in Blacktown? This area has been developed over 20 years. I am glad the chair, Karyn Paluzzano, has just come back into the room because she represents an area in Western Sydney. The number of days over 40 degrees is enormous. If you look at this area that has been developed for so long, you will see there is no way any more green space can be put in there. All the natural vegetation has been wiped out because the blocks of land are so small and no further growth can be implemented to take it back. It is the case that we have too many houses on our blocks of land. The urban density is great and we end up with a completely hard-surfaced area. I think this is one of the most important aspects. However, we live in New South Wales and you guys probably live south of our border. Is there anyone here from Queensland? The interesting thing I have noticed in Queensland is that their densities are the same. I do not know whether you have

explored the urban heat island effect. The interesting thing in Queensland is that they have those wonderful trees that grow very quickly in that climate and give great foliage coverage. If you look at the density from Brisbane through the Bruce Highway to Caboolture you can see the foliage coverage is quite substantial. It has bypassed the areas that have been developed for 20 years. Thank you, Tim, for a wonderful presentation. We will pepper these guys with questions for about the next 40 minutes.

Mr TONY O'GORMAN (Western Australia): One of the big things I noticed in Europe, and something which is talked about a lot in Western Australia, is tiled roofs and the effect of tiled roofs. Nobody has mentioned double glazing and the benefits of double glazing. You mentioned tiled roofs, but are metal roofs a much better alternative to tiled roofs for our climate?

Mr JAMES McGREGOR: On the double glazing issue, there is a whole suite of passive solutions out there, including the paint colour you choose, the facade, the size of your needs and the fixed shade structures. Double glazing is just one of those solutions. You can get low-lead glass that has high performance as well, so there is a whole suite of options. Double glazing is just one of the tools available through designers. I guess on the issue of tiled roofs, as we get more efficient building, embodied energy becomes a big issue. At the moment I guess embodied energy probably represents only 10 per cent of the total life-cycle energy content of a facility, but as those buildings become more efficient, the embodied energy stays fixed almost. The energy comes down, so therefore it becomes a much higher percentage.

With the energy content of steel roofs, you have to start weighing up between those and the level of performance. I think it goes to the point that there is not one size that fits all. It depends on the location. A steel roof in a cold climate is probably not such a big issue as is installation in a hot climate. Typically in a warmer climate you go through heavy higher thermal mass materials to improve the installation and in a moderate climate you go for more lightweight materials where steel roofs are a benefit.

Mr ROBIN MELLON: Similarly I would probably echo that by saying that there are some really great opportunities out there. The one thing we try to stay away from is being prescriptive by saying, "You should use this method to achieve this outcome." We are very outcomes focused and that may be mean energy efficiency or it may mean energy improvement. What we try not to do is recommend particular issues. What we are going to start struggling with even more over the next few years is the different materials issue and saying that steel roofs are better. All of them mask environmental impacts. We have not been able to evaluate them but we are now starting to look at them against steel, timber or concrete. Now that there is more evidence available, we will start to produce some life-cycle analysis to look at the different benefits of using these materials but also the different environmental impacts.

Mr DAVID BUTCHER: This is a mass issue, and with the urban heat roof timer effect, I think the ratio is 8 to 1. Tiled roofs are about eight times the mass and weight of a metal roof, so if you are heating up eight times the amount of mass, it radiates effectively eight times longer. From an urban heat timer effect point of view, a lightweight metal roof that reflects will still warm up, but it is eight times less in mass to radiate heat through the day.

Mr RAY WILLIAMS: Thank you, David, who is part of Greening Australia. What about some of the things that both Robin and James raised earlier—James in particular—about the innovation with air-conditioning? I liked the idea of localised air-conditioning in the office. I thought that was good. Earlier I asked the question whether we as leaders need to take that on board. Are we the drivers now? We have the technology, so are we the ones who need to put that into practice, similarly to the way we did with BASIX and implementing that in urban design?

Mr JAMES McGREGOR: I think what has been echoed in both our presentations is the focus on passive design solutions. They are going back to the future. They are free hits—orientating the building, getting the building envelope right as well as the depth of your floor plate and the roof orientations, and selection of materials. These things are all things that cost virtually nothing in construction costs of a project. If you do not incorporate them, that is just lazy design, and that comes down to the regulations and what sort of targets people are being set by sections of the Building Codes of Australia. It is good that we have something in there now, but it is a really tiny tots entry level target for innovation and technology.

In a retail space I have seen people do work-arounds on lighting by putting in joinery such as glass display cabinets with lighting in them because it is not counted as lighting for the space. People are getting around those requirements. I think a lot of the passive design is just good design practice. If they do not do it, it is just lazy design. It is a mixed building approach: we know what it costs, we know what it looked like last time, we know it is not going to be great, and we know what the price will be. It is a sausage-factory style of approach to building.

Mr RAY WILLIAMS: I think that is right when you encourage something, such as BASIX. Whereas with the implementation of a ban on rainwater tanks 20 years ago and when water was put into suburbs councils demanded that water tanks be removed from households, here we are, 20 years later, demanding that they be put into new households. One of the very positive side-effects of that is that people see the tanks. Now there are so many people who want to put tanks on their properties. It has that psychological effect. The perception is out there. Everyone can do something about it, and that seems to encourage it.

Mr ROBIN MELLON: If we look at some of the certified buildings that are coming through already and the ratings, 4-star is best practice within the industry, 5-star is Australian excellence, and 6-star is world leadership. Some of the 4-star buildings I referred to are really good examples and are coming in, if not cost neutral, then below. The 5-star buildings are coming in around cost neutral with perhaps a 1 or 2 per cent increase. There are 6-star world leadership buildings and, yes, they are seeing an increase in costs.

A lot of the 4-star and 5-star buildings are showing increases in energy efficiency of 60 or 65 per cent, decreases in potable water consumption of up to 80 per cent, and increases in productivity of 10.9 and 11 per cent. These are figures that can be measured within the first year. We are looking already at massive savings. As I have said, they are not the really complicated end. They have looked at simple design solutions—the things that people should be doing, such as shading, thermal chimneys, louvres, and natural ventilation—and they have built on that. A lot of the time how far you go with that means that you can then start to build in the grey water and the black water treatment with the PVs and the more complicated things. But if you start with the simple and good design things, you will be way ahead already.

Mrs VICKI DUNNE: Following on from your point, is it now time, as part of making everyone educated about this, to start educating financial institutions—the people who are investing in these buildings or investing in housing estates—about the importance of the whole-of-lifecycle of buildings? If I go to a bank and say that I want to borrow X dollars to build a home, they look at how much money I have now and never look at what it will cost to run the house. Is it time to talk to the institutions about the whole-of-life cost of running a home or a building, an office block or a school? Is it time to talk to people who are financing these buildings?

Mr ROBIN MELLON: Definitely. We have a lot of these institutions as members and some of them joined within the last 12 months. We are starting to educate them face to face. We run green-style courses and property professional courses, and we are just getting that information out there and saying what improvements can be achieved in life-cycle savings. We are also talking to facility managers because a lot of the time buildings are designed and built and it is a great concept, but they end up virtually carrying the burden, trying to make them work. Educating facility managers and the users of the buildings about what these buildings actually mean and why they work as they do is a process of education that is just as important as educating the owners and institutional investors, developers and designers.

Mr JAMES McGREGOR: I think one of the barriers or hurdles is the Corporations Law whereby directors and company owners are liable to the shareholders of their business only for their economic performance. There is no penalty for poor environmental performance other than that which is investment driven. The big stick does not exist to drive financial institutions to make investments. They are being driven by consumer demands and socially responsible investments or sustainable investments. To get mass change, that driver needs to be in the boardrooms.

Mrs VICKI DUNNE: My point is that a lot of those can have kick-on effects through energy efficiency in cutting the costs of running a building. That is still part of a financial institution's chief financial responsibility. Perhaps there are some people we do not talk to about environmental responsibilities and perhaps we have to go through the hip-pocket nerve.

Mr JAMES McGREGOR: Yes. I think the cost of energy at the moment with our carbon price does not factor in the environmental impacts of the production of that energy. For most businesses it is probably less than 1 per cent of their actual costs. The bulk of their costs are in salaries and staff. So, in a labour-short market if they can improve in progress and productivity, then they get bigger gains than trying to reduce their energy. So I think those drivers also do not exist strongly enough, other than it is being driven by their customers demanding that they improve their sustainable energy performance.

The Hon. PAUL LLEWELLYN: I am interested that we can set standards for new buildings, but the real challenge is to retrofit the 97 per cent or 99 per cent, whatever it is, of old houses and buildings. I want to know if there was some rule of thumb index for the capital cost of retrofitting and the payback periods for various frames of

retrofitting? I do not know whether there is a capital cost per star rating increase or something. I am wondering whether you have any kind of sense of the return on investment for retrofitting?

Mr ROBIN MELLON: To a certain extent, yes. Existing buildings probably are going to be our biggest challenge because for every Lend Lease headquarters there are another 99 buildings that you do not see that are continuing with business as usual and they will be leaking water and wasting energy. The challenge is with those. We have a rating tool up and running for that and, obviously, ABGR and the NABERS tools will be very relevant to those. Probably the best place I can direct you towards is the Property Council of Australia's new document that ARAP has put together, which talks about the payback periods, the direct payback periods for different measures being implemented. Again, they span transport, water and energy.

It is very important to note the potential for incremental change by talking with the facility managers, the owners, of these existing facilities and talking about the things they can do immediately, things they can do now, things they can do within the next 12, 24, 36 months and things that have to wait until the next refit. Not just educating them but giving them the ability, putting them in touch with the different measures so that they can make incremental changes in energy efficiency, a lot of which can be made now.

Mr BRYAN GREEN (Tasmania): The whole question of distributed energy, I have tried to understand the large-scale renewables for wind and how the inertia affects the inability to be able to develop wind beyond what your base load can cope with. How do you manage that in a distributed energy situation, given that you said if the copper failed then we would be able to get our system up and running a lot quicker? Is that by battery banks?

Mr JAMES McGREGOR: Yes. The focus of the research program is to try to come up with methodologies that work for that. One of the models we are looking at is similar to an open market. So you have agents that are sellers of power, so a solar panel becomes an agent and it is selling power to the network and then you have agents that are purchasers, consumers, of power, so, air-conditioning units, fridges and lights. Each one has an agent that controls them, say, in your house: you have an agent that controls your lights and your air conditioner and they all have different purchasing power. So, your fridge has a higher purchasing power than the air conditioner, and the lights have a higher purchasing power than the air conditioner.

They all bid into the network and they turn themselves on and off, depending on what they can afford to buy and what they cannot. That is in one model. But then you have to take into account, obviously, the fluctuations, particularly the renewables. You know, cloud comes over and you will lose your solar. How do you forecast the wind? The research is focused on trying to come up with solutions for that sort of model. That is one example of a model we have looked at, which is simulating an economic market. The solar panels are selling a product and the fridge is a consumer of the product and they buy and sell between themselves to regulate the network.

Mr RAY WILLIAMS: You mentioned things about net gain. To people who embraced this technology, like renewables, how hard is it for them to get that net gain and then put their excess power back into the grid?

Mr JAMES McGREGOR: I do not like giving answers that say "That depends" but, that depends. Renewables are very much site based. It really comes down to the individual site characteristics. In Australia we have the best solar resource of any country and it is an abundant resource. One of the nice things about solar is that it is very predictable. If you have a sunny day, you can forecast exactly how much power you are going to produce from your system each minute of the day. You can use satellite imagery to forecast cloud cover and predict when you get dips in the system and those sorts of things. But in any of these systems it really comes down to your local site. The focus is really on reducing the amount of energy you need upfront and then you really do not have to worry too much about the power generation. If you do not consume any energy, if you have a 100 per cent naturally lit and naturally ventilated building and everyone comes with their laptops that they have charged up on their solar panel at home, then you do not need to worry about your generation. The focus should be on reducing the energy we consume and then the power generation is a tack-on to the back end just to top up to meet what we cannot actually eliminate through efficiency measures.

Mr RAY WILLIAMS: I would like to ask about the urban heat island effect. Is everyone aware of the heat island effect? You have all studied that?

Mr IVAN VENNING (South Australia): In South Australia we have moved to ban the installation of electric hot water services. It is coming in. Are other States doing something similar? How do you promote the use of solar? Are we the leaders?

Mr JAMES McGREGOR: I think in New South Wales, especially under BASIX, you cannot put in electric hot water systems and meet the BASIX. You cannot get the points. Whilst it is not legislated that you cannot put in an electric hot water system, you cannot get it to work with BASIX. I think in some areas, by default that has been achieved. You are right, electric hot water services, a big kettle, a very inefficient way of doing things. The only reason it has stacked up historically is that we have our peak loads usually during the day. So we have all these power stations churning away at night with very low load. So you have your off-peak electricity, but as our base load capacity is absorbed, that will become more of an issue because that off-peak electricity just will not be available if you are using gas turbines for a top-up at night just to meet hot water demands.

Mr IVAN VENNING: The problem is that some of the rural people who cannot afford solar are then forced to go gas, and that is more expensive if you are on bottled gas. So, there really has to be a way of trying to make solar viable, particularly for people who have no other choice. They are expensive.

Mr RAY WILLIAMS: We had a good rebate scheme after until recently.

The Hon. BRUCE DONALDSON (Western Australia): I noticed that you kept well clear of the use of nuclear power for energy. Everyone talks about climate change and global warming. One of the great factors of being able to use nuclear power for the supply of energy is well known around the world, yet you all stayed very clear today from that subject. I just wondered why?

Mr JAMES McGREGOR: I will answer that. The CSIRO does not have an active role in that. ANSTO is the organisation looking at nuclear power for Australia. The CSIRO has included it in some of its modelling work, particularly its economic modelling of particular technologies in the future. My personal view is that Australia has so many other energy resources, why? There are so many other options we have available to us here, we are such a resource-rich country. We do not have the skills to build a nuclear power station. Around Australia we just do not have the industry. We would have to import that expertise to build one and run it. So, there is a whole skills issue, when we have such an abundant resource of all other abilities.

The Hon. BRUCE DONALDSON: Are you talking about coal?

Mr JAMES McGREGOR: We have coal, gas, geothermal, wind and solar.

The Hon. BRUCE DONALDSON: We have plenty of gas in Western Australia but we cannot get any.

Mr JAMES McGREGOR: We are on the world's biggest island surrounded by waves. There is a whole stack of availability and a fairly small population as well, relative to the rest of the world. Certainly I think we have an important role, given our resource we have in uranium. There will be countries where nuclear has a good fit from a sustainability perspective. But there is no silver bullet in any obvious. It will be a mix of solutions with efficiency through renewables, but I do not think nuclear is the one and only.

Mr RAY WILLIAMS: You just brushed on waves. Something that has always fascinated me when we live on such a coastal continent is that we do not embrace wave electricity or initiatives. I understand that Scotland at the moment it is embracing new technology at Aberdeen. It is planning to be the first country to become completely renewable-energy based. Is anyone doing anything like that in Australia?

Mr JAMES McGREGOR: I know there is a pilot project down at Port Kembla. I am not sure how that one is travelling. It is a very innovative design. The wave energy is harnessed by using the blowhole effect. So it has a big parabolic collector, which focuses the wave to a point and blows air up through a tube with a wind turbine. I am not sure where that is going. The difficulty with wave is it is a very harsh environment from an engineering point of view. You can harness energy—there are a number of systems available. It is just getting the power back to land. It is a very tough environment, which means expense to try and build it. You can stick a wind turbine on the land and the power is supplied for a fraction of the cost.

Mr RAY WILLIAMS: I just thought when you mentioned that before in your presentation about the vibration factor and extracting energy from vibration. I believe in Aberdeen what they are doing with the wave technology is that they are actually not trying to produce the electricity but they are actually using it like a pump—pumping the water to a height and then back, which makes good sense.

Mr JAMES McGREGOR: Yes.

Mr RAY WILLIAMS: Sorry, Robin, I interrupted you.

Mr ROBIN MELLON: I was just going to go back to the gentleman's point about nuclear power. It is not that we are actively avoiding dealing with it, at the moment when we are evaluating the environmental impact of a building we apply State-based ratings, and that includes where the energy is coming from. So Victoria may burn a lot of brown coal compared with other States. Tasmania has traditionally had a lot more hydro electricity but at the moment they are down so much on their water levels that they are importing a lot more from Victoria. We re-evaluate things the whole time, so we are looking at where the electricity is coming from at the moment. Until there is nuclear power within Australia that is not something that we can look at building and say that is where that power is from.

Mr RAY WILLIAMS: It is interesting Bruce, given that they have used it successfully. It runs 30 per cent of the United Kingdom's power and they have run it for 50 years and never had a problem with it. So I am with you.

The Hon. BRUCE DONALDSON: France is over 70 per cent of their power.

The Hon. JOHN PANDAZOPOULOS (Victoria): The guidance that has been given to us there is by the panellists—that is the reality. Some of the stuff about nuclear or other things—as politicians, we are still in the climate of the big-fix solution, which is the most expensive solution and often the most disadvantageous solution rather than mix-solution strategies. From a return on investment, it is a really expensive way to go to have either nuclear power, have our water solutions fixed up by the huge and largest desalination plants in the world, or put all our eggs in one basket in clean coal technologies and that is going to be the answer. They maybe some of the answers in the future when you are exhausting other solutions but it is around the mix use areas. The problem for a lot of the community, and for government, is that there are all these different ideas around and where do you start? I think the clear area that you start is around the basic principles about the environment: reduce, reuse and recycle. That is one of the things that we heard about.

The problem for owners of properties who are large energy users is often, despite all these things around us—and the Green Building Council of Australia is a relatively new organisation having expanded around Australia, it is really a relatively new phenomenon—is how you rate your buildings and then how you use that tool to then get good advice to make decisions about what are your technology solutions to reduce your personal footprint. For governments the reality is that we have to target obviously the large energy users and a lot of programs are around that. But government is simply the biggest energy user. We conveniently talk about schools and hospitals as if they are all individually owned and managed businesses. We are pretty lousy at government saying all government buildings will be audited—the energy requirements on all new building— what are our requirements when we go and lease buildings or renew leases? As the single biggest energy user in Australia, combined governments, we actually do not have those. It is really about our leadership.

The other is targeting those industries that have a need for them to be seen to be reducing their emissions all being clean and green, for example, the power industry and the tourism industry. Having been a former Minister for Tourism, where we have wanted to sell ourselves as Australia a clean and green destination there are various tools. Which one do you pull off the shelf? They do not all interrelate with each other. But there is not a clearly guided system as to how you guide a tourism industry, that could be accommodation or attractions or a whole lot of other things, for them to be able to generate their own rating: whether they are four-star tourism, five-star tourism or six-star tourism. We do it in five-star hotels in terms of the quality of service but we actually do not do it in relation to the greening. There are some measures but they are all over the place. I think high energy users, all government buildings being audited, with local plans being developed and targeting those sort of sectors that have a need to be identified as being cleaner and greener. That is my view.

Mr ROBIN MELLON: It is really encouraging when you get some governments—the Housing and Works Department of the government over in Western Australia has said, "We will not be building or occupying less than a five-star green star building." You get the Queensland Government and Brisbane City Council, which understands what is going on and offer incentives—whether that is a pot of money, $10 million for the first green star building through, or people just offering simple incentives. If it is going for a green star rating then expedited planning procedures. That can make the difference of 12 months to some developments, which is a huge thing. It does not cost anything; it just means they go to the top of the pile. These incentives are now coming through. We are having whole governments who are saying, "Yes, we understand what you are trying to do. We will sign up to a minimum level of four-star or five-star green star." That is very encouraging.

Mr RAY WILLIAMS: Would you like to make a comment on the way forward?

Mr JAMES McGREGOR: I think governments have a significant purchasing power to effect change in the market. I think sending those sorts of targets and leading by example is a key area. Particularly with some of the high-risk activities, I think the public sector is probably in a better position to take on higher risk than the private sector in trying new things because of the diversity of the asset base that is there. I think the goal of "back to the future"—I think you summed that up with that phrase quite well. Doing the simple things well is what needs to be done. It needs to be driven from a building's point of view. For new buildings it really needs to be driven at the design level, so the engineers, the architects and the clients have to be the ones that drive it because the bulk of your energy and your environmental impacts in that first 10 per cent of the work on any project. Once you pass that you are committed for the next 50 years.

Mr ROBIN MELLON: Echoing James, I would say keep it simple. We have a lot of the solutions already historically looking at some of the older buildings, with shading, with natural ventilation. We have a lot of the solutions already and we know these things. We need to encourage the simple design solutions but also share the information that we have and encourage the education process. Going back to Vicki's point earlier, encourage that education process throughout the industry and encourage people to find out more about this and use buildings as a learning resource as well.

Mr TIM BESHARA: The solutions are really simple but what it is actually going to take is for government leadership to start getting change within the development industry and understanding within the community for us to actually make that genuine difference.

Mr RAY WILLIAMS: That is a great point. There are no other questions. I acknowledge my co-chair Gerard Martin. Thank you Gerard for making yourself available. Ladies and gentlemen, would you please thank James, Robin and Tim. We have a small presentation gift for you.

(Session D—Environment Committees—concluded at 4.19 p.m.)

Friday 25 July 2008

Session F—The Energy Challenges of Climate Change

Environment Committees

Mrs KARYN PALUZZANO: Good morning and welcome. As you know, my name is Karyn Paluzzano and I am Chair of the New South Wales Standing Committee on Natural Resource Management (Climate Change). I welcome you to today's session on the compelling topic of energy challenges of climate change. We have a distinguished panel to address us today with representatives from the Wentworth Group of Concerned Scientists, the New South Wales Minerals Council and the Climate Change Institute.

The first speaker is Dr Nikki Williams, the Chief Executive Officer of the New South Wales Minerals Council. Dr Williams has had a distinguished career in the coal, oil, gas and chemical industries around the world as a marketing and business development manager. She has a doctorate in international relations in the field of terrorism and has served on a wide variety of international boards and government advisory panels. She is also an accredited energy expert for the United Nations Economic Commission for Europe. I welcome Nikki. There will be a change of schedule this morning. Questions of Dr Williams will be after her presentation as she has to leave for another engagement.

Dr WILLIAMS (Chief Executive Officer, New South Wales Minerals Council): Good morning ladies and gentlemen. Oscar Wilde once said that an idea that isn't dangerous is hardly worth having, so hopefully I will have a few dangerous ideas today. I also have a personal belief that there is no such thing as truth; they are only facts from a perspective. So, I want to cover a range of perspectives this morning. I am going to discuss emissions trading and the coal industry in the context of both Australian and global politics and economics, and I am not going to give you what you might expect is a conventional coal industry response to the emissions trading scheme, et cetera.

I am also, importantly, going to discuss the European Union's carbon trading scheme, which, I think, is a perfect embodiment of the national interest sold as global leadership in the name of a climate change response. I am going to talk about it as one of the biggest cons in modern times. Unlike the hype promulgated by the European Commission, Professor Garnaut's proposals represent a very economic purest response to changing the world as we know it to start to avert unmanageable climate change impacts. On the other hand, the Rudd Government's green paper has been criticised for failing to go far enough, and there has been much talk of freebies for our largest polluters, dismay over the petrol excise rebate, which Guy Pearce described as a procrastination subsidy, and the exclusion of agriculture and forestry until at least 2015. Bernard Keane wrote in *Crikey* last week that when you see the decisions they are about as tough as custard.

I do not share that view. Between the lines of the Green paper lies very fundamental change in our consuming behaviour, our quality of life and values that we as Australians take for granted. The potential economic and social consequences of the Federal Government's proposals are so great, so real and so far in advance of anything contemplated in the European emissions trading scheme that I think it is positively breathtaking. Australian industry and thus jobs, of course, are highly trade exposed, and given that we contribute less than 1.5 per cent of the world's greenhouse gas emissions, if we go with some of the Federal Government's proposals without other major emitters and trading partners playing by the same rules at the same time, or similar rules at similar times, Australia is likely to face economic dislocation on a major scale. Sadly, all that pain, if we were to go ahead with it, would not make even a momentary contribution to solving climate change.

I will also be discussing this morning the concept of leadership and Australia's options, given the genuine desire of the Government and the people of Australia to seriously address climate change. Of course, I am going to keep the best bit for last. Finally, I am going to describe why I think Australia is well positioned to have its cake and eat it too. If it is not animal or vegetable, it is mineral. Despite some misconceptions, Australia did not grow on the sheep's back. Quentin Dempster remarked to me a year or two ago that Australia grew on the coal conveyor belt. David Burchell wrote last week in the *Australian*:

> Most modern economies—even America—were born vegetable, so to speak, and turned mineral later on. We [being Australia] were born mineral, and have had minerals in our nation's veins ever since.

It was coal that destroyed the traditional organic economy and with the development of a minerals-based economy the productivity of agriculture was transformed. Local markets turned into national and international ones through, of course, the marvels of the steam train. Coal-powered industry dramatically reduced the cost of life's essentials and turned the luxuries of one generation into the necessities of the next. Coal is the dominant source of electricity in the world and it holds that place for some very good reasons. The fact that it is available from over 100 countries globally means that it is not only highly price competitive, despite the current spike in prices, its very diverse geography provides security of supply.

That is no trivial point in an era when we have reached peak oil and when 70 per cent of world oil and gas reserves are located in the Middle East and Russia. Importantly, as the World Bank points out, electrification is inextricably linked to the alleviation of poverty. So, when you consider the desire of the two billion people on the planet who still do not have access to a humble electric light bulb to rise above subsistence, it is easy to see why the International Energy Agency predicts that global net electricity consumption will more than double between now and 2030. Carbon dioxide emissions will grow by 55 per cent over the same period and more than 70 per cent of that growth will come from the emerging powerhouse economies of India and China alone. Indeed, China is now the world's largest greenhouse gas emitter, and you have to consider if it is 1.3 billion people, 800 million are still not connected to the electricity grid at home.

Furthermore, there are going to be, it is projected, 800 new coal-fired power stations built around the world over the next 10 years, and 500 of those are going to be built in China alone. So, if you do not have an answer to coal used in China you do not have a solution to climate change. For the purposes of further context, while carbon dioxide emissions from the world's coal-fired power stations account for approximately 30 per cent of global carbon dioxide, 20 per cent of carbon dioxide emissions come from deforestation, 15 per cent from transport and aviation and around 10 per cent from households, and the rest from agriculture and other industry. As I said, our current quality of life is intimately related to the mining industry. Those minerals generate the electricity that heats and cools our homes, prepares and preserves our food and powers our plasma televisions and all our other toys—mobiles, stereos, iPods and PCs. They all need electricity to run and are made with the steel, alloy, copper, zinc, lead and the rest of the endless list of minerals.

When we talk about an emissions trading scheme to reduce our greenhouse gas emissions we are talking about very radical changes to the industrial sector, major structural change to our economy, and, indeed, because 1.1 million Australians works in energy intensive industry, to the jobs of many millions of Australians. We are talking about much more expensive food supply chains, more expensive power bills and higher inflation rates. We will need to focus on what really is a luxury rather than a necessity. We are talking about radical philosophical changes to the way we live our lives and how we view the quality of those lives.

At least in Australia we are starting to have that conversation. The same cannot be said of Europe, which has long touted its moral virtue as the global leader because it was the first to introduce a carbon trading scheme. The European scheme began in 2005 with the second phase commencing this year and the third planned to commence in 2013. Like the proposed Australian scheme, it is a cap and trade. The cap is the amount of pollution allowed to be emitted and the trade is the buying or selling of permits depending on whether the operation is above or below its emissions cap. However, carbon emissions in Europe are not going down. Kevin Smith wrote recently that industries are not switching to new forms of energy. Countries that introduced renewable or increased nuclear power generation have simply met their increased energy demand; they have not reduced electricity consumption.

Furthermore, renewable sources of energy have been introduced with gargantuan public subsidies—$6 billion in a year in Germany alone. The industries included in the European Union's first phase were limited to energy generation, iron, steel, glass, cement, pulp, paper and board. Their permits to pollute were provided free and they were given more permits than their total greenhouse gas emissions. In fact, in the first year of operation the affected European industries emitted 66 million tonnes of the carbon dioxide less than they were allocated. So the carbon cap was a complete fiction. In 2006, 93 per cent of 10,000 sites, or installations as the Europeans call them, involved in the emissions trading scheme still emitted less than their carbon quota to the order of about 30 million tonnes. Those industries had a lot of free permits to trade in the marketplace, and they did. The carbon cap was in fact a licence to print money. The German environment minister stated that the four largest electricity generators in Germany made somewhere between $14.4 billion and $19.2 billion in profit in the first year of the carbon trading scheme alone. These industries also on charged consumers the imaginary cost of the permits, which added something like 1.6¢ a kilowatt-hour to the price of electricity.

Even the European Union has gently acknowledged that things have gone rather wrong. A press release in June of this year stated that, "the environmental benefit of the first phase may be limited due to excessive allocation of allowances in some member states and some sectors due to a reliance on emission projections before verified data became available." Whilst some apologists describe these as design faults, I suggest that they are actually calculated tools for protecting the national interest of individual European Union members and the union as a trading bloc. For example, in the second phase of the scheme auctioning of some permits is in fact encouraged, but only 10 of the 26 countries have selected this option, and of the 10, four will auction less than 1 per cent of available permits.

The level of subsidies in the second phase is also so high that eminent Cambridge professors have calculated that the construction of coal-powered power stations under the European emissions trading scheme is greater than it would be without a scheme. Stunningly, while the European Union will introduce European-wide rules to control some of these excesses, it is stated:

> Taking into account their ability to pass on the increased costs of emission allowances, full auctioning should be the rule from 2013 for the power sector. In other sectors allocations for free will be phased in progressively resulting in no free allocation in 2020. However, an exception will be made for installations in sectors judged to be at significant risk of carbon leakage, meaning that they could be forced by international competitive pressures to relocate production to countries outside the EU that did not impose comparable constraints on emissions. This would simply increase global emissions without any environmental benefit.

I could not have said it any better. However, the EU goes on further to protect its national interest by saying that installations, sites and operations in internationally competitive sectors will still receive up to 100 per cent of their allowances for free for good, even past 2020.

The Rudd Government has been much more honest and a lot less generous in its proposals. Australia's planned scheme has much more ambitious targets, it covers more sectors, has a stricter permit allocation system and, what is more, will be developed and implemented far more quickly than the European scheme. Under the EU scheme there will be no full auctioning of permits until 2020, and even then trade-exposed sectors will get 100 per cent of their permits free. In 2013, only the power sector will in fact be subject to full auctioning. Industries outside

the power sector will still receive 80 per cent of their permits free. That 80 per cent will apparently be phased down over the period to 2020, although conveniently there is no detail on the rate of such a phase down.

In contrast to this measured approach, the Rudd Government wants to go in guns blazing with full auctioning from the start of the scheme on 1 July 2010. The EU scheme currently covers only 40 per cent of emissions. This will expand to 60 per cent, but will not cover transport except aviation, housing, agriculture or the waste sectors. Here in Australia the Rudd Government proposes to cover 70 per cent of emissions from 1 July 2010. In the first and second phase of the EU scheme, the only greenhouse covered was carbon dioxide. From 2013, the EU scheme will cover five of the six greenhouse gases under the Kyoto Protocol. That means that even in 2013 methane, which represents 20 per cent of emissions in Australia, for example, will still not be covered by the European Union. The Rudd Government proposes to cover all six greenhouse gases, including methane, from day one of our scheme.

Professor Garnaut went even further, arguing for no compensation for electricity generators. Of course, we believe that that poses serious energy security risks for Australia. Professor Garnaut has also a somewhat optimistic view of international negotiations because he suggests that given the difficulties of reaching a comprehensive global agreement on emissions reduction in the near future Australia could perhaps reach sectoral agreements in areas like metals, liquefied natural gas or sheep and cattle production with our major competitors as some sort of interim measure, but he thinks that we will be able to achieve that by 2012. That optimism ignores the reality of how nation states protect their interests.

The European Union has also introduced the clean development mechanism—the CDM. This allows investment in emissions saving projects overseas to compensate for emissions within the EU. Apparently it is not a bad scheme because climate change does not recognise national boundaries, nor does it differentiate between those working to combat it or those choosing to ignore it. As Kevin Smith reveals, the CDM projects are supposed to bring developmental benefits to local communities and create incentives for investments in low carbon energy infrastructure. However, almost two-thirds of the 1,534 CDM projects in the pipeline have not involved either the generation of clean energy or carbon dioxide reductions. In addition, 30 per cent of CDM credits have been generated from the destruction of HFC23, which is a greenhouse gas created in the manufacture of refrigerant gases. He goes on to point out that the value of these credits—that is, $11.3 billion for the destruction of the refrigerant gases—is twice the cost of the gases themselves. The cost to capture and destroy the gas was only about $240 million. I am not a mathematician, but that is a profit of more than $11 billion for the manufacturers of those refrigerant gases and the project brokers.

Ladies and gentlemen, I think that can only be described as a rort, certainly not the intention of the EU, but clearly the absence of clearly defined rules and objectives has meant exploitation on an appalling scale. Do you know how the EU actually has met its Kyoto greenhouse gas reduction targets? Firstly, East Germany was closed down. Secondly, the other restructured economies of the former Warsaw pact countries—and I used to live in Russia—are nowadays mere bleeps on the production and consumption radar but their pre-economic dislocation emissions profiles form part of the EU's package, so it is a very high emissions level, but in fact countries like Bulgaria, Russia and Poland are not emitting at those levels because the industries have simply carked it, basically. Finally and importantly, Britain burned 40 years of natural gas in just eight, and obviously natural gas is a less intensive source of CO_2.

The idea that the EU has engendered some sort of major structural change in its electricity consumption and greenhouse gas profile is simply, at this point in time, a fiction. The European Commission countries of Europe argue going solo in terms of an emissions trading scheme is not an act of leadership and is contrary to the national interest. Even for major greenhouse gas emitters it also does not materially contribute to climate change solutions because of the term "carbon leakage", the movement of energy intensive production offshore.

On the other hand, if a large number of emitters play by the same rules of a carbon market, we all endure equivalent pain, but at least we face the prospect of perhaps generating enough change in the way we produce and the way we, as individuals, consume, that we might start to make a bit of a dent in our greenhouse gas footprint. If developing companies, particularly the Chinas and Indias of this world, also join that carbon-reduction club, then we actually may have a chance of reaching the 60 per cent cut in CO_2 emissions that the Intergovernmental Panel on Climate Change says we must achieve by 2050.

Tim Flannery stated in the *Age* earlier this month that the issue of climate change and emissions in emerging countries is "so complex yet so urgent that we have no choice but to learn on the job". I guess the European Union could be said to have learned on the job but it has done so at no economic cost—no job losses and no economic dislocations, other than those of the collapse of the Soviet Union, which were not associated with

its carbon reduction scheme. I think that Dr Flannery is right to point to that complexity but the "suck it and see" model is a very dangerous one. We would not allow our toddlers generally, if we were a responsible parent, to go anywhere near the sorts of chemicals that we keep in our bathrooms, kitchens and garden sheds on the basis that they can suck it and see because the results clearly could be fatal.

Trying to strike a realistic balance when introducing an economic change this big, as is being proposed, is a Herculean task and the Rudd Government has tried to strike a politically and socially acceptable balance, hugely controversial though it is. Once in government, as you all know, it is much harder to make decisions that you know are going to materially and often prejudicially affect the individual interests and lives of citizens. Look at Al Gore. In 1998 Al Gore signed the Kyoto protocol. The United States Senate at that time voted unanimously on a resolution that said, "We are not going to ratify that protocol unless all countries are developed or are developing and that we have binding targets", and Vice President Gore promised that the United States would not ratify the protocol until that was achieved.

As we know neither the Clinton administration nor the Bush administration did ratify the Kyoto protocol. That is not to say that Al Gore is not seriously worried about climate change. *An Inconvenient Truth* was and is a compelling argument but even Al Gore accepted the social justice and political realities when he was in government, despite understanding the magnitude of the problem that the world faces. And those realities are not lost on Professor Garnaut or the Federal Government either. That is why compensation for lower income Australians and transitional arrangements are being mooted. That is why not all sectors are proposed for inclusion when the scheme begins.

Whilst we at the Minerals Council have long argued for a suite of technology solutions to climate change, including advanced renewables, carbon capture and storage technology deserves specific attention. Once deployed, carbon capture and storage could contribute—and these are International Energy Agency statistics—up to 55 per cent of global cumulative mitigation of greenhouse gases. The International Energy Agency, the Intergovernmental Panel on Climate Change, Al Gore, Sir Nicholas Stern, Ross Garnaut and even Tim Flannery and Bob Brown—the latter two are definitely not friends of the mining industry—all agreed that carbon capture and storage technology is an essential response to climate change and the commercialisation of carbon capture and storage will of course be money, and lots of it. Anthony White for Climate Change Capital, an investment bank focused on low carbon emissions states:

> The renewable industry—referring to the renewable industry in Europe—has had billions spent on it and technologies like wind power are now becoming mature. Carbon capture and storage has not had its billions yet.

Whilst our green paper acknowledges that as a major coal exporter Australia needs to develop carbon capture and storage technology, it is strangely silent on the very important subject of investment dollars. In contrast, Professor Garnaut recommended that by 2013 Australia should commit a minimum of $3 billion per annum towards low emission technologies. We need to think of the commercialisation of carbon capture and storage and other advanced technologies as a nation-building exercise. It could be the Snowy Hydro for a carbon-constrained world.

Finally, if the emissions trading scheme is to commence in 2010, it is imperative that the details of the scheme are released as soon as possible. This includes the scale of interim emissions targets, in particular, the medium term 2020 target range and details on the sorts of investments that need to be made for industry and, of course, compensations for households. These details will allow businesses to respond by making an assessment of the cost, the returns and the risk, and, importantly, to plan for the scheme consequences to best manage the economic effects.

The absence of the data and the rules at the start of the European Union's scheme largely accounted for its flaws. We must not repeat that mistake in Australia. In our view, it comes down to this: We can have our scheme in 2010 or we can have the right scheme in 2012 or 2013. In its current form the Federal Government's carbon pollution reduction scheme becomes an industry reduction scheme and that is not what any of us want. No society has never willingly reduced its standard of living. No government has ever been elected on a mandate to kill an economy, although a few have made a pretty good job of it. Australia needs to be very, very careful.

There is no silver bullet for climate change but I think we can make a material difference. There are a whole suite of practical responses, ranging from low and zero emission coal technologies, advanced renewables and things we need to do right now, like demand management, energy efficiency buildings, appliances, industrial processes. Our State and Federal governments have the largest car fleet in the country. Why do they not ban the

six-cylinder car? These are really straightforward, basic, low-hanging immediate things we should all be doing, and I like to call that the hamburger with the lot.

A practical response by the Australian coal industry is the COAL21 fund, which is a world first—a voluntary industry levy—and it is a partnership between coal producers, State and Federal governments, the electricity generators and, most importantly, the research community like the CSIRO and the CRCs, and research entities overseas as well. That billion-dollar fund is being spent on fast tracking development of low-emission technologies obviously for coal-fired power generation, and it also leverages several billion dollars of funding that had either been spent or has been committed by government and by individual companies to these projects.

It is important because this funding commitment was made well before climate change became a mainstream issue in terms of the conversation with the general public and well before Al Gore's film or the Stern report. I am saying that it indicates that the coal industry in this country takes this problem extremely seriously and has done what no other industry—not the coal industry—has done. No other industry in the world has made such a commitment. We need to be cognisant of that because obviously we do receive quite a bit of criticism.

In Australia there are eight demonstration projects either committed or underway, including the CO_2 CRC's storage project in the Otway Basin in Victoria, the Gorgon natural gas project in Western Australia and HRL's project in Victoria—its integrated drying gasification combined cycle [IDGCC]. It is an important technology because it deals with brown coal, of which Victoria has a lot. It is important for Victoria because brown coal is very inefficient and there are very high emissions associated with the combustion of brown coal, but it is very important globally because, in fact, countries like China, India, Poland, Russia, the Ukraine and Germany burn lot of brown coal. So if we have technologies that reduce the CO_2 footprint of the combustion of brown coal we are making some very important technological headway.

The CSIRO's post-combustion capture project here in New South Wales involves retrofitting an existing coal-fired power station, and retrofitting technologies—and that is why I wanted to focus on this one a little bit—are going to be key to delivering those 60 per cent cuts in emissions that the inter-governmental panel on climate change says are necessary because trillions of dollars are currently invested in a power generation feed all around the world, which probably has a useful life, on average, of at least 30 years. So you are not going to close all those power stations down, because obviously you need the electricity and you are not going to strand that investment. So technologies that can be, as it were, bolted onto the existing fleet are going to be an important interim measure in terms of at least slowing the growth in our CO_2 emissions globally.

There are also some interesting projects that have just very recently been announced. The CSIRO and China's Hua Neng group—Hua Neng is the largest electricity producer in China—have jointly launched a post-combustion capture pilot project, where apparently it is capable of recovering more than 85 per cent of the CO_2 from the flue gases released by the power station, and that demonstration is taking place in China. China, by the way, is also involved in a number of joint ventures. Some of the projects that I have referred to and others that are going on in Queensland and elsewhere involve both Chinese and Japanese partnerships with Australian companies and governments that are involved in that. And that is very important because clearly global deployment of these technologies is going to be key.

But Australia is going to have to keep pace with global developments because countries like the Netherlands announced in April this year a multibillion dollar commitment both to coal-fired power generation and to becoming the European hub for carbon capture and storage technology. The Dutch government has said that they will not invest in further nuclear power, that they will close down their existing nuclear power stations, that they believe that carbon capture and storage is the way forward and coal use in their economy will in fact increase.

A lot of people are very concerned about the reality of carbon capture and storage; there is a lot of confusion about that and I just want to make a couple of comments. The actual capturing and storage of carbon is, in fact, an established technology. The oil and gas industry have been using it for more than 20 years, basically capturing CO_2 and injecting it into oil and gas wells as part of an enhanced oil and gas recovery, and they have been storing it. Technically it is not all that complicated to capture CO_2 from the flue gases that come out of a power station, the challenge is economic because CO_2 is very diffuse in the flue-stream gases. So how you concentrate the CO_2 and thus make it more economic to capture it is a key part.

There are big challenges, obviously, around the distribution network that would be necessary to pipe whether it is CO_2 or anything else from one location to another, particularly if we are talking in the Australian context where we have a huge continent and a small population. They are some of the challenges. But there is a very interesting project that has been going on in Norway since 1996, 1997 called the Sleipner project. They have

been capturing and storing a million tonnes of CO_2 every year since 1996 and storing it a thousand metres beneath the seabed in the Utsira aquifer, and that formation is apparently large enough to store all of Europe's 600 billion tonnes of CO_2 emissions for the next 600 years. They have been monitoring the movement of CO_2 within the aquifer since the year 2000 and to date there has, of course, been zero leakage. The Norwegian scientists and government predict that the CO_2 will remain in situ in that aquifer until at least the next ice age, which I understand is some 5,000 or 10,000 years away.

There are 20 or so projects of this type up and running or in development across Europe, in Algeria, in India, China and North America. The technology, as I have said, is proven through the oil and gas project; the challenge for us is getting the economics right. Professor Jeffrey Sachs, a sustainability special adviser to UN Secretary-General Ban Ki-moon who was out here recently in Australia, said that Australia, as a major coal user, should concentrate on carbon capture and storage technology at coal-fired plants as its number-one strategy, even more important than carbon trading scheme or tax. Sachs argues that this approach would not only allow Australia to manage a relatively low-cost transition to a lower emission future but put it in a good position to market those technologies to China, India and other major coal consumers around the world.

So, in terms of Australia's reliance on coal—and let us remember, 85 per cent of Australia's electricity is generated from coal and 95 percent of New South Wales' electricity is generated from coal—is it the case that the party is over or can we have our cake and eat it too? I hope that this presentation has given you some ideas that perhaps we have some very real options. Australian investment in carbon capture and storage and its rapid deployment if adopted globally could make a huge difference to climate change outcomes. Going solo with an emissions trading scheme is not going to be the key driver; it is important we are going to have a scheme; we need to move forward; we need to have the schemes; we need global markets, regional markets developing.

We are not saying we should not have schemes, but in terms of the huge reductions we need schemes as market drivers, as commercial drivers, the price of carbon, et cetera. But we need the technologies, and carbon capture and storage is going to be key because there are 5.5 billion tonnes of coal burned around the world at the moment and 2 billion of them are in China alone. So we have to deal with coal use. I think Australia's cake is carbon capture and storage, and the widescale deployment of carbon capture and storage is how we all get to eat the cake as well.

Mrs KARYN PALUZZANO: It is now question time for Dr Williams.

Mr GERARD MARTIN (New South Wales): As to the issue of carbon tax, Professor Sachs when he was out here was a very strong advocate of that being a much simpler, less complicated emissions trading scheme. Does your organisation have any thoughts on that?

Dr NIKKI WILLIAMS: Our organisation basically accepts that a well-constructed emissions trading scheme is, in fact, the way to go. The reason I gave such a detailed examination of the European scheme was to show that if it is not properly constructed it does not achieve the objectives it sets out to do. We believe the scheme is appropriate because that is how we can engage with trading partners within our region and ultimately globally, or the linking of schemes. That is a very important thing. There have to be key principles that are agreed at an international level about how schemes should be constructed and what their objectives and timing should be so that those schemes ultimately can be linked and we ultimately create a global market place for the trading of carbon. Our view is that is the preferred mechanism, notwithstanding the fact that there are clearly a lot of complexities associated with constructing one.

Mr PAUL LLEWELLYN (Western Australia): You covered a lot of landscape. Once the carbon genie is out of the bottle, clearly it is very expensive to bring it back in. I would like to challenge you about the actual costs of capturing all that carbon and putting it back in the ground. We have seen quite a pew projects fail over time, like the FutureGen project in Western Australia.

Dr NIKKI WILLIAMS: FutureGen has just been resurrected.

Mr PAUL LLEWELLYN: Like Lazarus. We have to base this whole scheme on the actual science and the science tells us to reduce carbon emissions. How do you deal with the fact that renewable energy technologies and energy efficiencies with very short payback periods are going to beat carbon capture and storage hands down? We may be able to make a complete technological transfer in the way we generate and use energy and coal becomes irrelevant.

Dr NIKKI WILLIAMS: There are some very important points there. Things like energy efficiency, as I think I referred to, should be things we are doing right now. These are obvious things to reduce our carbon footprint. The fact is, however, that our transition to the next generation—a hydrogen economy, or whatever it is that we use to generate baseload power for the world—is going to be a transition period of, I do not know, 50 years, 100 years. I am not really certain what the length of time is, but there is a transition. That is why I referred to the International Energy Agency, Al Gore, Nicholas Stern and the World Bank. The reality is the world will use coal. If we do not deal with that in the interim period we definitely do not have a chance of constraining that carbon output. We have to deal with the use of coal. It does not mean that we do not deal with other things as well—for example, advanced renewables. The fact that some of those technologies are becoming maturer and are appropriate in certain locations is because of massive investments that we have seen in Europe. But those investments are not competitive if you want to use it. They have only been made possible because countries like Germany have spent $6 billion a year to promote them. That is important. Those sorts of monies will also need to be spent, I guess, on carbon capture and storage technology development for global deployment as well.

Mr PAUL LLEWELLYN: What happens if those technologies effectively eclipse the relevance of coal? That was my primary consideration.

Dr NIKKI WILLIAMS: They may well eclipse the relevance of coal. I do not know what is going to happen in 100 years. What I am saying is at this point in time for the next 30 or 40 years we will not meet the IPCC targets for greenhouse gas reduction without carbon capture and storage. It is as simple as that. What happens in 30 years' time I do not know. We have to focus on what we need to do now to achieve that 2050 target, which might even be a more ambitious target if the science keeps moving.

The Hon. BRUCE DONALDSON (Western Australia): As methane gas contributes to 20 per cent of carbon gases in Australia, do you see the necessary event in years to come of eliminating livestock in Australia?

Dr NIKKI WILLIAMS: It is a very important point because, in fact, the burping of cows, rice paddy agriculture and deforestation are the primary drivers of methane. As I understand it, different pasture and different technologies associated with how you feed livestock can reduce or control livestock emissions of methane. Clearly, as a major producer and innovator in that particular area here in Australia, that could be a major contribution to make. How you deal with rice paddy agriculture, which beats half the world's population, certainly in Asia, is an enormous challenge. I do not think it is the end of cattle production in Australia. As I say, I am not an expert in that area but I know that is the case. We are going to have to look very carefully at how we feed our animals around the world so that we can control those sorts of emissions. Deforestation is a major one. There is a lot of discussion about it. I have lived in Africa, Nigeria and elsewhere where you see the terrible consequences in terms of the desertification and poverty across Africa. Most of that, most of the drought, most of the famine has been heavily influenced by war and by the fact that most of those governments divert sometimes around 50 per cent of the very small national income to armies and weaponry rather than investment in the necessary social infrastructure. It is of enormous concern what happens there as well.

Mrs KARYN PALUZZANO: Thank you very much, Dr Williams. Your presentation was very informative. Every time I hear you speak it is another briefing. Please accept this small token from our conference. I know you have commitments that will well and truly take more time then there the hours we have left here today.

Dr NIKKI WILLIAMS: Thank you.

Mrs KARYN PALUZZANO: Our next speaker is Professor Bruce Thom, Emeritus Professor at the University of Sydney and former Vice-Chancellor of the University of New England. Professor Thom is a member of the Wentworth Group of Concerned Scientists. From 1998 to 2002 he chaired the Australian State of the Environment Committee and the Coastal Council of New South Wales between 1999 and 2004. He is going to address us on planning and managing coastal and urban resources. Welcome, Professor Thom.

Professor BRUCE THOM: Thank you very much for the opportunity to present to you today, particularly to join with John Connor, whom I have presented with on various platforms along the coast of New South Wales in years gone by. My talk will be somewhat different from the approach taken by both John and Dr Williams. I hope you will bear with me. It will give you some different dimensions about some of the problems we are facing in the climate change world. I have just returned from a visit to Iceland. That country has a history and potentially a future with many elements in common with Australia. Iceland was settled around 900 AD by Vikings who were farmers. They encountered a part wooded and part grassy landscape which they thought they could use in ways similar to what was being used in Western Europe at the time. Very, very quickly they ravaged that fragile landscape and set in motion soil erosion for many centuries to come.

Until recently the Icelanders have fought this desperate struggle against forces of nature. They have learnt, however, to adjust, creating a society that is not only restoring its degraded lands but also capturing its natural resources in a sustainable way. Geothermal and hydro energy provide them with the foundation to innovate and become a society with minimum use of fossil fuels. Hydrogen-powered cars and boats are being developed in Iceland, and 98 per cent of buildings are heated by geothermal energy. Tourism is booming, and large-scale aluminium smelting is being fuelled from renewable sources. All this is producing jobs, increased wealth and influence for this very small nation. The parallels with Australia are quite intriguing. Their population, like ours, hugs the coast. Sheep grazing is important and soil degradation is part of its history. However, most importantly, both nations are potentially well endowed in sources of renewable energy. A big difference, of course—as we all know—is that we have more accessible and relatively cheaper sources of coal, oil and gas, which we continue to use to our economic advantage.

I dwell on these parallels for one reason: innovation has provided that small nation with the capacity to exploit its renewable energy sources. Have we? The answer up till now is surely no. I know personally of scientists and engineers in solar energy who have emigrated from Australia to the United States and the United Kingdom. Many research and development interests seek more and more support for renewable energy endeavours. Yet our Government continues to favour funding ways to clean up fossil fuel products—of course, we heard from Dr Williams today good reasons why that should continue. But of interest to me as a coastal scientist is the relative lack of assistance to those struggling to innovate and develop technologies that utilise our vast wave energy resources on the southern flanks of Australia.

The incessant beat of the Southern Ocean swell is there to be captured, and an estimated 500 gigawatts of energy—many, many times the energy that we use today—is available around the southern coast of Australia. We need to be able to support those endeavours that are going on at present. We have already started with some innovative work on ocean links in Port Kembla and the CETO project in Western Australia. The resource there is renewable and it is there to be invested in. Also I understand from the work being done in Taiwan and their use of the Kuroshio current that the east Australian current is equally as strong as the Kuroshio. So if the Taiwanese can invest in current energy studies, so should we. Our oceans should be seen as friendly. But to many of us the sea is seen in climate change terms as a menace and a threat to Australian communities—perhaps not in such ways as the catastrophic earthquakes and volcanoes of Iceland but still in ways that will continue to adversely impact on public infrastructure and on private property.

Oceans are linked intimately to atmosphere and hence to climatic conditions, both globally and regionally. Australia is a continent girt by sea and located in the middle of low latitudes. So we are damned by the influence of El Niños, of the Pacific decadal oscillation and the Indian Ocean dipole—three phenomena that operate to give us a climatic disadvantage in terms of droughts and flooding rains. Ocean temperatures are rising, and they will continue to rise for centuries to come. Warmer oceans lead to rising sea levels—not evenly because of the variation around the flanks of the continent by the current patterns, but by 2100 we could have a sea level one metre higher, plus or minus 0.3 metre, around most of the Australian coast. Higher sea and air temperatures will produce more intense cyclones and, along with higher sea levels, will clearly lead to more shoreline erosion. But, more insidiously, the sea will creep into low-lying lands and more and more frequently on higher and higher tides. This I call the "Venice effect", and over the next 50 years or so, as the rate of sea level rise accelerates, more and more critical infrastructure and low-lying properties will be flooded on the high spring tides.

Now there are levels of uncertainty attached to these various projections—the climate change projections, sea level, ocean temperature, whether they are atmospheric, and whether they relate to storm incidents or intensity. However, the trends look clear enough to warrant strong adaptation action by governments in land use planning, in the provision of public infrastructure and in environmental management. At the Prime Minister's Science, Engineering and Innovation Council in 2006 the insurance industry gave an estimate of around 700,000 coastal properties likely to be affected adversely by the current projections of sea level rise. Most are in Queensland but there are also increasing numbers in New South Wales and Western Australia. The impact will be severe for ports, jetties, electrical and sewerage works, roads, railways and public amenities. An example of major infrastructure at risk is the third runway at Sydney's airport.

We hear a lot about the potential environmental impact for reefs and wetlands of sea level rise and the effects of warmer and more acidic seas. Near our great cities beaches will erode, thus driving demand for sand nourishment to protect amenity and property. But which beach and what property will receive periodic additions of sand, and from what source? Priority decisions by governments will have to be made, with unpleasant consequences in some places. In other words, what are the tipping points that will lead decisions for properties and infrastructure to be abandoned, relocated or protected? At one extreme, when will we see Sydney Harbour, Port Phillip, Moreton Bay or the Swan estuary requiring tidal barrages similar to those that currently protect London?

Many countries are facing these decisions now. We have already done something like this by investing millions per year in nourishing Gold Coast beaches. New South Wales participates in funding the protection of Queensland's Gold Coast beaches because Queenslanders have, quite justifiably, argued that a lot of the sand that is needed to nourish those beaches comes from New South Wales, so New South Wales generously contributes to helping the Gold Coast. But in the United States, the Netherlands and the United Kingdom coastal protective works or coastal retreat decisions are impacting severely on local communities and local economies. For instance, the Environment Agency in England is taking powers away from local councils and allowing the destruction of century-old dykes and sea walls to permit rising tides to invade agricultural lands while putting millions of pounds into protecting selected towns and cities, such as Hull, from flooding. So they are making those choices now—and there is certainly a lot of community angst associated with those decisions being made by the Environment Agency.

When I arrived back in Australia a couple of weeks ago there was a headline "Adapt or perish". The Garnaut report made strong reference to the national imperative to plan for the impacts of climate change. Water security is clearly high on the agenda. Drought can no longer be seen as an indignant surprise. Both our arable and urban lands will increasingly be exposed to water deficiencies, adding to the social, economic and environmental burdens for many towns, cities and regions. The need for a portfolio of demand and supply measures becomes obvious, but history tells us that the planning and management of water resources is often throttled by a confusion of Federal, State and local responsibilities.

The coast is no exception. Many Federal and State parliamentary inquiries have highlighted the dysfunctional nature of governance and administration of matters related to coastal planning and management. I will quote from the 1991 House of Representatives inquiry, entitled "The Injured Coastline". It said, "Existing ad hoc, hodgepodge pattern of development slowly nibbles away at our precious and beautiful resource: the natural coastline … Existing coastal management arrangements are fragmented and poorly coordinated … There has been a tendency in coastal management to focus on specific issues, such as a perspective has been revealed as too narrow". And all these findings were made before we began to appreciate the likely consequences of climate change on 80 per cent of Australians who live in coastal areas.

Another coastal inquiry by the House of Representatives Standing Committee on Environment is under way to address again many of these issues that confronted previous inquiries, including population growth pressures—the so-called sea change phenomenon—and climate change is now front and foremost to that House of Representatives inquiry. A similar inquiry, as I understand, is being conducted here in New South Wales by a Legislative Assembly committee. What worries me, given the possible climate change scenarios, is the threat posed to coastal communities, economies and ecosystems by these existing institutional arrangements. Nothing much has changed since 1991 when the House of Representatives committee noted that "The fragmented nature of decision-making by public agencies operating within coastal management arrangements is reflected in the following organisational problems: One, the multiplicity of public agencies; two, the existence of arbitrary administrative boundaries; and, three, the failure to consider cumulative effects of decisions."

From my perspective, many things have got worse since 1991, especially the decline of staff levels and expertise in critical agencies across the country. There are also the differences in legislation, regulations and administration of the coast, between and within States, allowing for grossly inconsistent responses to the various

challenges of coastal management and climate change. To balance these negativities there have been some intergovernmental agreements, coastal investments and policy initiatives supported by new science. These have raised the awareness of the need for action in assessing coastal vulnerability on ecological and geomorphic impacts of population growth and the impacts of unconstrained development, and how we can best improve governance. The ideas are out there; the will to accept them and take them up is another issue.

What can you do as legislators? First is to be briefed on the signs of climate change, the potential impact on your communities and what will be the local tipping points requiring government intervention as new information emerges. The intergovernmental panel on climate change reports, CSIRO and other studies will help you to understand future adaptation needs for areas of population growth and existing coastal settlements and urban areas. So, the emphasis there is on the importance of information for adaptation. The second area is the need, as legislators in the way you perform in your committees, to question Ministers and senior bureaucrats on how they are addressing the complex interagency issues of coastal management and planning. Agency silos can lead to bureaucratic inertia or conflicting decisions. Knowledge will help probe those responsible for planning new developments or investing in or maintaining the existing protective works or in providing adequate staff resources to manage precious coastal assets. New South Wales, for example, has 18 kilometres of sea walls. There has been very little investment in the past 20 years in maintaining those sea wall protections.

To what extent, then, are future liabilities such as compensation for property owners or investment in hard and soft engineering works being considered by the various agencies involved in coastal management? These are some questions that need to be asked. The third area of concern to me, and which I think should also be of concern to you, is the need to understand how State and Federal agencies interact with the third level of government—local government. This level has been progressively underresourced to meet the demands of growing coastal populations. Some councils continue to make ill-informed decisions which create potential liabilities by allowing developments in areas where coastal vulnerability is very strong. Other councils seek to protect themselves from adverse climate impacts, incurring the wrath of property owners and ending up defending themselves in the courts. Recently we had that experience in the Wellington shire in Victoria, at a place called Honeysuckle, where the property owners sought to sue the council because of its attempts to limit development in that area.

Finally, there are the opportunities to examine existing legislation and tort law in relation to climate change. In New South Wales we amended the Coastal Protection Act in 2002 to create a statute covering the common-law doctrine of accretion. Only if a landowner can prove now that accretion will be indefinitely sustained will new land title be granted. This amendment is designed to prevent ad hoc construction of sea walls on beaches undergoing temporary accretion as sea levels rise. In 2002 many speakers in the Assembly rose to support the amendment. Here is a case where parliaments can help to sort out complex property rights issues that bedevil coastal management.

In conclusion, the negative impacts of climate change on Australia will potentially create enormous divisions and tensions in our society. We must avoid a plethora of court cases and conflicting demands on the public purse that may arise from afflicted parties. One solution is to look at ways to improve institutional arrangements in legislation in order to create a better environment for coordinated decision making while also encouraging innovation in adapting to new conditions. We need to stimulate the growth of employment in adaptive practices, not a growth in lawyers to fight for the rights of those who cannot adjust to changing conditions.

I believe in strong Federal leadership in cooperation with State and local governments that will stimulate and provide consistent national action and resources to address climate change adaptation. It will not be easy, as there will be losers; there should also be winners. Our intellectual resources need to be harnessed and you should be aware of any impediments that prevent innovation from proceeding. Priorities must be set. Planning cannot wait. Transitional arrangements are needed now to address the emerging world of higher sea levels, less water, destructive storms, more bushfires and stressed ecosystems—all at a time when Australia's population on the coast will continue to grow and grow. Parliamentary committees must do their bit to question and find ways to make Australian communities more sustainable. Iceland is well on the way; so should Australia.

Mrs KARYN PALUZZANO: Thank you, Professor Thom, for an interesting address in relation to the coastal implications of climate change and our roles in our respective jurisdictions. We will move on now to our third speaker and take questions at the end. I now introduce our third speaker, Mr John Connor, the Executive Director of the Climate Institute. Mr Connor is a lawyer—what did you say in your speech about lawyers; he is an exception—who has worked as an environmental consultant to business. He has worked for the Nature Conservation Council of New South Wales, the Australian Conservation Foundation and for World Vision. Today

he will speak about the crucial policy question of how clean energy and low carbon technologies can be deployed commercially and to achieve necessary carbon emission reductions. He will discuss some of the Climate Institute's research in this area and make some recommendations. Welcome, John.

Mr JOHN CONNOR (Executive Director, Climate Institute): I also worked for the Independent member for Manly, Peter Macdonald, during the balance of power, which was a lot of fun getting to know political processes. One of the joys of coming last is that often you get a bit time constrained but you do get the final word and can present facts from your own perspective as well. Today, I want to give a couple of key messages. The Climate Institute is a non-government, non-partisan organisation funded primarily by a one-off grant that allows us to be non-partisan and independent.

Some of the key messages I want to give today are about the urgency of the challenge; the fact that we are in the midst of a range of emerging—if not booming—carbon and clean energy markets; that best practice is not just price signals but also investment incentives; that Australia is in serious catch-up mode in policy and economic perspectives; and that we need to be linking our domestic and international policies more strongly than we are currently.

Delegates may have heard about the parts per million of the greenhouse pollutants. These are driving the climate change and the targets to which we ultimately set our global policies will cause critical impacts for Australia and globally. The bottom two blue areas are for 400 or 450 parts per million. They are graphed against the degree rise. Many scientists are now talking about two degrees as being the dangerous level for climate change above which we get a whole series of kick-on and perhaps even runaway climate change impacts. The top blue line is the 550 parts per million. Professor Garnaut was asked to look particularly at the 450 and 550 level. Many groups and scientists are saying that we will ultimately need to target our policies at 400 or 350 to avoid many of the runway climate change impacts.

There is a significant risk profile in each of these that there may be much higher impacts for each of those scenarios. The dotted line shows that if climate sensitivity—the forcing from the greenhouse pollution and the blanket around the planet—is stronger than we think it is we might be in serious trouble. Even at best—at the 450 level—we have a 50:50 chance of getting that two degrees of warming. It is a toss of the coin, but it might be much more severe. Professor Garnaut has characterised some of those impacts in a slightly different way. Clearly, being interested in urban issues, water, heat and other factors are significant to you, but of course there is a range of others.

I will now go through what that means in terms of global negotiations. To get to that 400 level—which is not particularly different in the early years from the 450 scenario—the world needs to peak by 2020. Developed countries or industrialised countries need to do so much sooner, by 2015, and be down to 30 per cent below 1990 levels by 2020. We certainly need developing countries to peak by 2020. We need stronger action and engagement from them. Deforestation is also a key issue and we spoke about it earlier today. It is contributing 20 per cent and we must find a way to turn it around fairly promptly. I am trying to present a picture of the urgency of the timelines. The climate industry believes that developed countries like Australia should be reversing their still rising pollution by about 2012 down to significant cuts by 2020. We think that about 25 per cent, at least, is doable and achievable.

We need to drive new technologies and investments in those technologies. This chart demonstrates a range of the technologies, including fossil fuel with carbon capture and storage, hydrogen from renewables, wind power and buildings. We must improve our buildings and develop more efficient vehicles and introduce other energy efficiency initiatives. The climate industry stood up with the Australian Coal Association and the CFMEU arguing for policies that accelerate the deployment of capture and storage to put an end to the hope or promise of that technology and to ensure that we have significant plants in operation by 2020.

Another way to look at this is in terms of the productivity of our economy. McKinsey recently put out an interesting paper that characterises a good way to look at this. The productivity increases we got from the industrial revolution are the kind of increases we need to get from our economies, but we need to do it three times more quickly. Of course, we are starting from a much higher platform with much more educated and technologically competent economies throughout the world. Mitigation potential exists and it highlights the importance of buildings, urban infrastructure, energy supply and industry. We earlier dealt with agriculture and forestry and I am happy to answer questions about that later. This highlights the importance of looking at the built environment, particularly in our cities, and how we supply their energy.

We are in the midst of emerging carbon markets around the world. This is not Australia seeking to go it alone or to go first. Significant markets are being established. This slide is supposed to have a linkage showing the CDMs and other flexibility mechanisms and to demonstrate the emerging linkage between the schemes and driving major investment. I take issue with what Dr Williams said about the CDM scheme. It actually leveraged some $55 billion in investment in clean technologies in 2006. There has been an issue around HFCs, but that is coming under better governance and scrutiny. It is a major leverage of investment in those countries and is a particularly important part of the global negotiations as we try to get stronger commitments from developing countries.

We will see 10 per cent to 20 per cent of the contributions from annex one, which are the Kyoto nations coming in from international linkages. There is still some major policy uncertainty to work through in terms of where those countries are and what the United States does. A particularly important issue from our perspective is technology transfer and the finance that goes into the developing countries. What will swing the global deal—which is in Australia's national interest as the developed country most exposed to climate change—is not only commitments to targets but also the financial flows. How we are going to help clean up their development is important not only for climate change but also for our recent economic prosperity. We are arguing that the revenues from the trading scheme should have a stronger linkage and a certain proportion should be dedicated to cleaning up development pathways and to help them to prepare for the unavoidable climate impacts that have been caused mostly by developed countries to date.

In Bali it was historic that the developing countries agreed to the monitorable, verifiable and reportable commitments. We seeing emerging leadership from South Africa, China and others beginning to be aware that they need to make commitments. They are keen to see the developed world honour its promises, acknowledge its responsibilities and come up with targets. Unfortunately, the United States—which as Dr Williams said went to Kyoto—made clear commitments without any clarity about the political backing at home. Obama and McCain—both of whom have strong climate policies—will need to get something through Congress. They will need at least some framework to carry that in Copenhagen.

The global clean energy market is booming and there are significant opportunities. Some 30 per cent of the energy investment in 2007 was in clean energy technologies alone. The international energy agencies have said that we need some $45 trillion to halve our emissions by 2050. Of course, that is a relatively small percentage of global GDP over that time. Focusing investment and economic growth into these clean energy areas is the challenge for policymakers such as yourselves. Of course, significant economic opportunities will come from that for countries that take the lead.

In some ways you have to look at the news today and yesterday in terms of the car sector. The fact that Ford is struggling and European car manufacturers making smaller cars are actually increasing their profitability is just one example of the shifts that will happen with technology and the consequences of delay. We have done some modelling with Monash University and CSIRO in terms of the Australian economy and greenhouse gases. We have looked at a couple of scenarios about the economic consequences for those shifts and looking at 50 per cent and even, indeed, being carbon neutral by 2050.

These figures back up the work that others have done but we can get significant pollution reductions but also grow the economy. This is tripling the Australian economy over that time whilst having those sorts of reductions. It is important to bear this in mind when you hear some of the scare campaigns about the price rises and the cost impacts. People often talk about the $200 slug on households that might happen by 2030 or 2050 from some of these technologies, conveniently forgetting that wages growth, particularly for average households, will have well outstripped some of those price increases.

We have done a whole separate paper, if you are interested in this, on energy affordability, which actually looks at the proportion of income that is spent on petrol, gas and electricity and its impacts. It shows, on models we did with high carbon prices and higher world oil prices, that low-income households will need some extra affordability payment, but with extra energy efficiency strategies, for most the proportion of your income that is spent on the bundle of energy will either plateau or decline over time.

Just last week we released a paper on energy efficiency as well, highlighting the fact that Australia is well below the developed world. The Australian Labor Party, prior to the election, came out with a promise to be at the forefront of the developed world in terms of energy efficiency improvements and I have been pleased in the last week or so to hear a greater commitment to a coming energy efficiency strategy. That will be a very important part of our package moving forward and preceding the emissions trading scheme. The paper highlighted the actual opportunities that we have in the various sectors of our economy and the policies that are made will drive whether

you are on the left hand or the right-hand side of those columns of opportunities. It is very important that we pick up as many of those and assertively as possible.

We have some further work coming out in a couple of weeks' time. We have been looking at the work that the electricity sector has to do and there have been some modelling on the front pages and other pages of the papers today from the Electricity Supply Association. I am pleased with the way in which the Electricity Supply Association has framed that research. It is about what investment is needed to achieve the outcomes. They say we can achieve those transformations in the energy sector but we need to look at the investment climate and investment policies that drive that.

We are looking at what the difference is once you put the extra policies on top of the emissions trading scheme. Over the time to 2050 this would get an 80 per cent cut from the electricity sector, which provides about 30 per cent of our power, so you are saving $20 billion if you just add on energy efficiency and a further $5.5 billion if you put on the renewable energy target—we call it a clean energy target scheme. We are open to other technologies into that. The reality is that in the modelling, carbon capture and storage is not brought forward, even if you have it as a clean energy target scheme. We want to see full exploration of that promising technology, so we thought we would have a look at the costs in bringing forward 1,000 megawatts of capture and storage and another 500 megawatts of solar thermal and with policies that bring that forward: it might be a mixture of depreciation, public-private partnerships or feed-in tariffs—we still have to work out the best mix for that—you still get very significant savings on top of the emissions trading scheme.

I have a couple of slides on the green paper. First of all, I love the name: Carbon Pollution Reduction Scheme. We will look like right gooses if it takes a number of years to actually stop increasing pollution and actually reducing pollution. I think it is important that we are still sending the signal that we are starting in under two years. There is a very welcome focus on the low-income households; let us take those who are struggling with us on this journey. Auctioning is a strong commitment to that and to phasing out some of the free permits to be given to the trade exposed intensive industries, now being called ITEIs, which are intensive trade exposed industries. It rolls off the tongue better as an acronym and is an important policy decision.

I agree partly with Dr Williams. I think this is a tougher but fairer scheme for the trade exposed, particularly when some of our competitors are not moving. One of our significant beefs is that it is not geared to world's best practice in terms of the energy intensity and the carbon productivity outcomes. It has been linked to what we believe is an Australian average in the way the system works. There is a lot of work on that. There is a question as to whether the two-tiered approach will drive some perverse incentives and we need to look at that.

The generators is obviously one of the big questions. We have said if there is to be assistance, it needs to be linked to outcomes, not compensation for the past but investment in clean energy technologies in the future. As to governance, I am not looking forward to the annual slugfest. The Government has proposed having an annual disallowable regulation, which would be very unhelpful. It is interesting in Europe the proposal for phase three, which has been broadly accepted, is that the European Commission drives this over longer time periods, and is seeing those countries, contrary to Dr Williams' view, giving up some of their national interest, partly because it was a horrible slugfest and they actually do not want the trouble anymore of that. If they have clarity on the targets, they have a better scheme. We are certainly in favour of the Garnaut approach, which would see the five-year targets being approved by Parliament but a stronger independent carbon bank driving the annual decisions.

I understand the politics of the petrol excise, but I am desperately disappointed by the way in which that is being done. It will rip billions of dollars out of the investment fund that the Government could have to put into some of this other infrastructure—public transport, more efficient car manufacture, not to mention the clean energy low emission technologies, for minimal impact on something that will benefit richer households three times as much as poorer households because richer households use three times as much petrol.

As to international financing, as I said at the outset, it is important that we link that into the emissions trading scheme and it is not explicit, as yet. Again, this is not just about price. We actually have to have clean technology engines coming off the top of this price scheme. It is not just about stopping the bad; it about promoting the good. We have to have clean energy deployment incentives. The renewable energy targets are a very important part of that. Carbon capture and storage, and solar thermal. Geothermal is very much caught up in the mix, but whether that will actually be caught up in the renewable energy target or the other incentives remains to be seen but I met with Geo Dynamics a couple of days ago and they are going very well in their projects. It is quite exciting.

There are a range of other breakthrough technologies that we need investments in, such as wave, better solar batteries and a whole range of other things. Work in energy efficiency found that we need, particularly if we are to have soft carbon prices, stronger financial incentives, something like the white certificates that many States are engaging in, much better standards for all of our appliances and buildings. Also, much better information is a critical foundation of that. The attitudes of Australians are very strongly behind action on this. I have been very impressed by how this is held up. We did figures on this in March and while we have had intense debate over the last few months since then, similar figures are being revealed in Nielsen, Newspoll and other polling.

I think Newspoll were out over the weekend doing a bit more and we are doing it a little bit as well. We want to support those voices in the Coalition which are looking for a proactive policy on these issues. Once again, it is urgent; we have got to get cracking. We probably have dangerous climate change levels right now; we have got to get that carbon pollution going down. There are very significant multi-billion clean energy and carbon markets and there are trillion dollar opportunities. Australia should be at the forefront of those. It is about making our economy competitive in that emerging global low-carbon economy. It is not just about price; we need to have investment, and let us be a part of the global solution and not be standing on the sidelines as we have for the last decade and a half under Howard and Keating. Thank you very much.

Mr GERARD MARTIN: Thank you, John, for your very thoughtful presentation. I apologise for the absence of our Chair at the moment: she is attending to some local member's duties. We will now open up for questions to either of our presenters, Professor Thom or John Connor.

Mr DAVID PISONI (South Australia): I am just interested in the implications for manufacturing. There are some countries, of course, that will not be involved in the carbon trading process but may very well be beneficiaries of manufacturing closed here in Australia and moved to those countries. How would you deal with that without offending the WTO?

Mr JOHN CONNOR: How would you do that without offending the WTO?

Mr DAVID PISONI: By free trade obligations. Putting carbon taxes on distance and travel. Although that product may have been produced in China, for example, when there are free trade negotiations on the loan from China, is it fair and reasonable then for Australia to say that those carbons that are being produced in China we will tax them when they come to Australia?

Mr JOHN CONNOR: The trade policy is pretty complex but the short answer is that putting on tariffs selectively is in breach—

Mr DAVID PISONI: Take standards for motor vehicles, if you do not meet emission standards you cannot bring them in.

Mr JOHN CONNOR: And in fact China has standards for its motor vehicles. Most of the American car fleet would not actually be able to be sold in China because of the car standards that they have, let alone, of course, Europe. So there are some issues there. But I think the border tariffs are less justifiable in a trade regime, and there have been issues around whether we do tariffs or border price adjustments. I guess that is why the scheme that has been proposed for emissions intensive trade exposed industries is one where we try and ameliorate those competitive differences by the issuing of either free permits or financial assistance. That is one way in which they are trying to get around that, whilst we also engage in trying to bring the other sectors and other competing countries into the fold.

Mr DAVID PISONI: What I am having difficulty with is why cannot imports be brought automatically into our carbon trading system? Just because you are a manufacturer overseas why are they exempt?

Mr JOHN CONNOR: Border price adjustment is incredibly complex; you have to go back and chase the actual provenance. People think about doing that for the Australian products as well. The Green Paper actually goes into some of the problems of this in one of the chapters of its 500 pages; that it is a very and administratively complex way to go about that.

A slight digression: interestingly, I was reading in the *Economist* just recently about the way the fuel mile stuff is starting to now flip back with world oil prices being so large. In the US, for example, they are starting to build the factories again because the actual fuel price for shipping stuff is now overcoming the difference of the manufacturing elsewhere. So there are some surprising things when we actually factor in some of the transportation fuel as well.

Mr KEV LINGARD (Queensland): I hope that was a genuine smile on the professor's face when he talked about New South Wales donating sand to Queensland beaches, but I ask him about the future of walls on the eastern coast of Australia to replenish beaches all the way up the Australian coast? When you see the success of the freshwater on Stradbroke Island, and there is just so much freshwater there, is there any future in allowing sand to build up in the mouth of the Tweed, like it has on the southern bar, and close off the Tweed completely to seawater so that you are virtually creating an inland lake like you have got at Stradbroke Island, for the future of freshwater in Australia on the eastern beaches?

Professor BRUCE THOM: I will tackle that question. I think the Gold Coast council and the tourist industry of the Gold Coast would be mighty upset if we started closing off the Tweed again. I think the years and years of battle that took place between the two governments as to what was a sediment deficiency—about 500 cubic metres of sand annually moves through the northern New South Wales coast into southern Queensland—and because over the years New South Wales took the decision to continually expand its breakwaters at the Tweed to allow the efficiency of flow to our boats that come in and out—which did not work because sand continued to enter the entrance—the Gold Coast was deprived, and with the 1974 and 1978 storms the Gold Coast suffered enormously. The current model is for the indefinite future—I think it is a 20-year agreement that was made, but for the indefinite future—to allow that sand to continue to flow on to Queensland beaches.

The Gold Coast can justify that in terms of the economics of the tourist industry in supporting a national effort, because it is two States agreeing to support this program: a national effort to invest so much money into that by-passing scheme and also the other scheme that is used by the Gold Coast to come in from the Broadwater and feed it from the northern end as well. So the opportunity to continue to keep the beaches going at the Gold Coast is going to be there into the indefinite future, irrespective of sea level rises. The same will probably be true of beaches around Port Phillip Bay and some of the Sydney beaches, but whether it is true of a lot of the beaches where you might have only 100 homes, beaches which would be at risk, is going to be a big issue for governments to consider.

Take Byron Bay, for example, which is a very controversial one, of whether or not we nourish that beach or protect it in some way with sea walls. You are talking $100 million plus for about 30 or 40 homes. That is why I say there are going to be trade-offs. We cannot, I do not think, as a coastal nation, afford to be protecting everybody. We cannot use the Dutch approach to protect everybody; we are going to have some losers and we are going to have to do some selections as to where those protections are going to go.

The Hon. BOB SUCH (South Australia): Perhaps I am a bit of a cynic but I am not convinced that we are going to compensate the so-called poor, and I have yet to find anyone identify themselves in that category: we have the working family, we have the battlers, and everyone is wanting compensation. It means that a section of the community is going to have to compensate everyone else. I think you would be naive to believe that we are going to compensate the poor, because we have never done it before. Why are we suddenly going to compensate poor people for environmental reasons when we have never done it before and we have even had increasing gaps since 1900 between the rich and the poor? Why is it suddenly going to happen? I am being a bit of a devil's advocate here.

Mr JOHN CONNOR: About three weeks ago we split up with the Council of Trade Unions, ACOSS and ACF about that just as a way to show that this is a very significant part of this journey. We have got to make sure that we can do that. Our key role is not only just the actual cash payments but it is putting insulation into public housing, doing all the energy efficiency, doing a whole range of those things to buffer some of those households which, particularly because of landlord tenant arrangements and the like, are not being in a great place to address what might be some of those intakes. But it is also about political sustainability. The GST almost foundered because Howard actually stuffed that up to some degree. But I think this Government is pretty conscious of that.

Mr RAY WILLIAMS (New South Wales): Would you like to explain that?

Mr JOHN CONNOR: There has been a lot in the papers recently about promises to compensate and the way in which they defined the impact of the GST, particularly for poorer communities, the inflation spikes and the timing of that. It was analysed on an averaging process over a number of years, rather than on some of those initial impacts. So at the time of the election around the GST there was considerable uproar about what those estimates might be, what they might mean. It is important that we address some of those things up front. In the Garnaut report I think it was surprisingly that 50 per cent would more than adequately cover that. The sort of work we have done on the energy affordability shows that particularly for energy that might just be a claim of up to $100 or so a

year for some of those households. It is much better to do that through the transfer payment system rather than the flat tax approach of the petrol excise cut, for example.

Mr GERARD MARTIN: Professor Thom, would you like to comment?

Professor BRUCE THOM: I will comment briefly on particularly low-income property owners who are in flood-prone areas or areas that are likely to be insidiously inundated as the sea level starts to rise. The work that is being done now using airborne laser scanning around parts of the New South Wales coast is clearly identifying lots of property owners in vulnerable areas. We do know from history that lots of low-income families live in flood-prone areas. There are programs now to protect those particular properties through dyke works or whatever. I understand Brisbane City Council is looking at relocation programs to be able to take parts of these areas that are flood prone or vulnerable and convert them into open space and relocate the families into higher lands. That sort of investment in the future protection of low-income families will have to go on into the future.

The Hon. BRUCE DONALDSON (Western Australia): Professor Thom, you talked about the risks of rising sea levels. What concerns me about the ad hoc planning of coastal strips is the setbacks. Some of the setbacks are reasonable when you look at the terrestrial hard interface, but a lot of it is not that way and developers have been able to build on the beach. We have all seen the results of that in the United States where insurance companies will not insure many of the properties. Do you believe setbacks should be debated as to the position? You will probably find examples in Western Australia as well.

Professor BRUCE THOM: The setback issue is again a particularly difficult one in terms of the whole issue of planning reform. In New South Wales, for example, in introducing recently the new standard templates for local environmental plans, I helped devise to try to create a greater degree of flexibility to allow local councils to permit setbacks which would take the building lines much further back than many councils would want them to be—in other words, to create a standard. We ran into problems with the Parliamentary Counsel who were concerned about sterilisation of an existing property owner's right to be able to use the block of land adjoining the beach. So the Parliamentary Counsel advised the department that we had to be extremely careful as to how we defined the setback issue. Queensland, on the other hand, has a land surrender policy under its coastal Act. I do not think it has been used all that much in recent years, but it enables the government to actually take without compensation a section of land for the purposes of a setback. "Without compensation" is the critical issue here.

As I said in my talk, the environment agency in the United Kingdom is now taking over owned agricultural land and allowing it to be flooded without compensation. So there are going to be these awful difficult issues of how does an existing property right play out against the potential liability of a government or a community to protect that particular piece of land when the crunch comes, when the tipping point occurs and that particular property starts being affected. To what extent does the government come in and dump rocks on the beach to protect that, or does it take the view of "owner beware"? You are going to live there as long as you can, then once the erosion hits bang, you are gone. But you will have a consequence on your neighbour. So you have a multiplicity of flow-on effects, which are concerns.

Mr GERARD MARTIN: In relation to your comments about wave power in the Great Southern Ocean, is the problem that the major market is much of the east coast? Is it a distribution problem?

Professor BRUCE THOM: No. The interesting thing about wave power, and this is where Australia is uniquely positioned, is that from virtually the Queensland border, southern Queensland, all the way around to the arc of the Australian coast going up towards Geraldton you have this incessant beat of the Southern Ocean. It is estimated that over 90 per cent of the time you could get wave-generated power. It could be a good renewable baseload source—unlike wind, which cannot be guaranteed as a baseload source. Waves could be. The development of the technologies from the two sources that I mentioned is embryonic, but they are starting to come to grips with how to handle the energetics of the sea but also, and this is the sort of double benefit, the benefit of using that water that is being pumped onshore to go through the turbine for desalinisation purposes. So you can use the reverse osmosis technology to help with desalinisation. So for Perth, Melbourne and certainly along the east coast it is a goer.

Mr GERARD MARTIN: Thank you, we have heard three interesting presentations this morning. On behalf of our Committee we present a token of our appreciation to each of you.

(Session F concluded at 10.50 a.m.)

Conference Conclusion

Chairs of Public Works and Environment Streams report back on key issues and points of discussion raised in sessions and 2009 Conference Discussion

Mrs KARYN PALUZZANO: In our final session I will give a briefing on the environment strand and Mr David Borger will give a briefing on the public works strand. Due to the wet weather we will hold our briefing on the innovative sustainable principles in Parliament House in the Jubilee room. What has been happening with the three environmental stream sessions and the field trip to Penrith and Penrith Lakes and in the Blue Mountains? A number of sessions were held and chaired by the Mr Thomas George, Mr Ray Williams, Mr Gerard Martin and myself. There were three sessions: session B jurisdictional committee reports, session D on improving energy efficiency in public and private buildings held on Wednesday, and session F on energy challenges of climate change. I will also talk about the field trip to Penrith yesterday.

From the jurisdictional reports eight committees made presentations: the Australian Capital Territory Standing Committee on Planning and Environment; the South Australian Environment Resources Development Committee and the Natural Resources Committee; the Western Australian Environment and Public Affairs Committee and the Community Development and Justice Committee; Tasmania's Joint Standing Committee on the Environment, Resources and Development; Victoria's Environment and Natural Resources Committee; and finally the New South Wales Standing Committee on Natural Resource Management Climate Change. Transcripts will be available on discs.

In relation to session D, three experts spoke on improving the energy efficiency of buildings. First, James McGregor, the Energy Systems Manager of the CSIRO Division of Energy Technology, Mr Robin Mellon, Executive Director of the Green Building Council of Australia and Mr Tim Beshara from Greening Australia. Mr McGregor gave a detailed and fascinating presentation on cutting edge renewable energy work done by the CSIRO and how to improve the energy efficiency of office buildings with such things as cold beam air conditioning—only heating and cooling air where the people are and using natural ventilation. Yesterday we saw an example of that the at the renovated Q Theatre at the Joan Sutherland Performing Arts Centre which does not have a conventional air conditioning unit. The theatre draws in the air and heats or cools it. John Kirkland said it is an automated system that can be overridden manually. He said he looks at the actions of the 300 people in the theatre to see whether they are demonstrating being hot or cold and then he can override the system to use the cool air beam technology.

Robin Mellon has a passion for sustainability and has many years experience in the international property market and in landscape management. He spoke about the Green Star program for rating buildings and how he was trying to get the top 25 per cent of industry to apply for accreditation as leaders. While it was one thing to develop new buildings with improved energy and water efficiency, it can be more difficult to retrofit solutions to existing commercial buildings. Robin is currently steering the development of green rating tools for existing commercial, institutional and residential buildings. He also teaches the Green Star accreditation professional out forces held around Australia. Finally, Tim Beshara gave a presentation on how to address the urban heat island effect. Yesterday in Parramatta or Penrith in Western Sydney the Public Works and Environment committees saw the area that attracts the heat island effect which is caused by hard surfaces, road or rooves, or by the reduction in the number of trees. The Hawkesbury, where my colleague Ray Williams lives, suffers the same effects. Members would have noted the number of houses in the Rouse Hill development from Richmond to the M7.

Probably 10 years ago—Ray will correct me if I am wrong—that was farmland. There has been a sudden and massive change and it is increasing the temperature. As a resident of Penrith I know that on New Year's Day two years ago the temperature reached 47 degrees and rising. It was a shocker. We just sat there watching the temperature from the airport weather station. It was a horrific day in Penrith but, as Greening Australia outlined, solutions can be rolled out. We have had a response from a major roof manufacturer, Bluescope Steel, about what they are doing with their roof colours and paints in relation to heat absorption and retention. They are doing research to find out whether, even if the roof is a darker colour, it might reflect more heat than absorb it. There is still more work to be done but groups such as Greening Australia are bringing that phenomenon to the fore and making policy makers aware of it so that we can increase sustainability. This aspect promoted a lot of discussion in the group.

We had a field trip yesterday to two councils, Penrith City Council and Blue Mountains City Council. Both groups of delegates went to the Blue Mountains City Council. Penrith City Council has a sustainability program and I said to my colleagues last night that these two councils that adjoin each other have similar as well as different passions about sustainability. Penrith City Council looks at strategy and programs and Blue Mountains City Council has practical programs relating to its gullies and swamps. Penrith City Council is excellent at strategy and picking up programs and getting grants to deliver those programs. The impact of both councils can be the same but the community passion might be slightly different. My electorate covers both those city councils' boundaries and it is interesting to see how the constituents of both areas respond to climate change and environmental programs. It is quite good to have strategy development but we also need those works on the ground—those models—to show schoolkids what happens with such things as runoff in sensitive urban areas. As you know, all the towns in the Blue Mountains are straddled by the World Heritage listed area. As was noted yesterday, only two cities in the world have that—Banff and the Blue Mountains. They are totally enclosed by World Heritage listing. That is an important aspect. We also visited the Joan Sutherland Performing Arts Centre at Penrith City Council, which is a $14 million upgrade using sustainable principles in the building. John Kirkland outlined not only the environmental sustainability but also the cultural sustainability of the area. Making the Q Theatre larger allowed more programs to come to Penrith and saved people from having to spend their cultural dollar outside Penrith.

We also visited Penrith Lakes, with Colin Gibbs and Amanda Walmsley. As those who were on the bus will attest, Penrith Lakes is a large hole in the ground at the moment. Lots of rocks are being dug up by really big machines. As they outlined, about 85 per cent of Sydney's sand and gravel is taken out of those holes in the ground. One part of Penrith Lakes is not a hole in the ground—the Sydney International Regatta Centre and the Penrith Whitewater Stadium. We had a look at the regatta centre and it was quite different from what was across the fence. We were driving around in a 12-metre pit and right next door, across the fence, Olympic athletes were training. It is quite an interesting phenomenon for the community to have 10 per cent of a lakes system developed. At the moment there is no urban development on site. The Penrith Lakes scheme is still in private ownership but the deed of agreement signed in the 1980s stated that it would be given back to the people of New South Wales. The planning is in process now for what will go on the 20 per cent that is not lake. What is the balance of urban development? Will it be commercial, retail, or whatever? Those decisions are being made right now. The quarry has about five to eight years of life remaining, so we have five to eight years to make the right decisions for Penrith Lakes. The lakes scheme is as big as the area from The Heads to the Harbour Bridge. It is a huge water mass visible from the Blue Mountains. Unfortunately the mist made it impossible for us to see anything from the Skyway, so we must return on a bright day.

During the last session today we heard from Dr Nikki Williams, who is the chief executive officer of the New South Wales Minerals Council. She outlined her organisation's view of the European Union's emissions trading scheme, the biggest con, as her response to the green paper. She also gave us the coal industry's response to climate change, which is carbon storage and capture. We also heard from Professor Bruce Thom who spoke about the challenges of climate change for coastal councils and coastal erosion. He outlined the challenges of climate change and made recommendations on what he thinks committees should do. His comments will be available in *Hansard* and we will be able to read what he thinks we should do to improve coastal areas of Australia, our mitigation efforts, and our reduction in our need for non-renewable energy.

Mr John Connor, who is the chief executive of the Climate Institute, spoke about adaptation to a low carbon economy and discussed the institute's response to the Federal Government's green paper on emissions trading. He examined the concerns associated with emissions targets and referred to the need for investment in renewable and low emissions technology. He also advocated linked research in those areas. I now invite any of my colleagues in those sessions to add to the report.

Mr MICK GENTLEMAN (Australian Capital Territory): I might draw members' memories back to the first presentation we had by Martin Butterworth on planning for buildings and commercial zonings while thinking about pedestrian and transport issues at the same time. He mentioned Trafalgar Square and told us about the work that was done there in providing a better thoroughfare through it. I was one of those people who walked to the traffic island in the middle of the road to get a better view of where I was in London. I thought his was a fantastic presentation. If you were to follow those guidelines and get Space Syntax in to do some of the planning before we put buildings in our cities or regional areas, we would be one step ahead of the others. I really wanted to just draw members' memories back to that presentation, which I thought was fantastic.

I was excited about the presentation by Mr James McGregor from the CSIRO on renewable energy and the different ways in which we can reduce our use of energy. I was excited to hear about organic photovoltaic arrays: I had not heard of those before. Colleagues to whom I have spoken over the past couple of days will be aware that I brought in a renewable energy law in the Australian Capital Territory—a feed-in law, which is probably the most

generous feed-in law we have in Australia. I am very keen to see new and exciting ways to develop photovoltaics or renewable energy systems. I thought the presentation from CSIRO was great. I thought all the presentations were very good. I also enjoyed the trip very much.

Mrs KARYN PALUZZANO: As there are no other aspects of the Environmental Session to discuss, we will move on to Public Works.

Mr DAVID BORGER: I will recap some of the things that happened in the Public Works Session to confirm the presentations in people's memories before we open the forum for discussion again. As Mick Gentleman mentioned, the first presentation was quite impressive. I have seen it quite a few times. Martin Butterworth from Space Syntax spoke about the importance of building and movement economy in towns, centres and neighbourhoods that we are all trying to improve and provide good government for. He mentioned just how important those movement patterns are to creating economy and safety, which we are also looking for.

His studies have been informing a whole bunch of public and private projects across this country as well as in Europe and the Middle East. Mick Gentleman is right: he would argue that that layer of information and knowledge needs to be fed into any consideration of expenditure on public infrastructure, particularly at a spatial dimension. The second speaker was Mark Kirkland, who works for the General Property Trust which developed the Rouse Hill town centre. I do not know if our Queensland friend has had a chance to see that yet.

Ms BARBARA STONE (Queensland): No, not yet. We are going tomorrow.

Mr DAVID BORGER: Rouse Hill is an amazing new shopping centre that delivers on a whole range of environmental outcomes in a much better way than has been done in the past. It is very interesting how they have been able to deliver in effect a fully intact town centre within a four-year or so period whereas it might take 50, 60 or 100 years traditionally to build that up. It is interesting to look at that project in the context of the first speaker because although it is a much better shopping centre and it has some civic elements to it and could save public spaces within it, I think it is sort of a hybrid between a traditional town centre and a shopping centre. It is not quite there with all the benefits that you get in terms of being able to walk around and people being able to move into there—one of the main streets stops in a cul-de-sac—but I think there are some other opportunities that could have been utilised at Rouse Hill, and you might have a look at that when you go out there.

Mr RAY WILLIAMS (New South Wales): It is only the first stage.

Mr DAVID BORGER: That is right. It is certainly much better than what has been done in the past. The company involved is now moving to Newcastle. The development has a pedestrian mall but unfortunately it has lost economy. It has high rentals and high vacancy rates, and in the evening it has a lot of crime issues with lots of licensed premises. They are now looking at transforming that city centre by opening up that central passageway.

We also heard from Professor David Richmond, who is the Coordinator-General of Infrastructure in New South Wales. He reminded us of some useful points. One is that unfortunately the community or the world at large has come to believe that very major transformative infrastructure projects can happen in very quick time frames. That has probably never previously been the case. He said that if we engage the private sector appropriately at certain points, we can accelerate the timeframe of delivery for major infrastructure, but there is probably a gap between the expectations of what is possible and what can be delivered.

He also reminded us not to underestimate ourselves in Australia. We are doing quite well in a whole lot of areas concerning sustainability and infrastructure delivery, but there is a tendency to knock everything continuously—which those of us who have tabloid media in our electorates would be aware of. He also reminded us of the importance of thinking through issues in terms of environmental, economic and social sustainability and how there is probably a tendency for experts and advocates in each of those individual areas to believe that each particular sub-issue is the most important issue when determining public policy, infrastructure and the delivery of it. They were all issues to be taken into account, but they have to be balanced by discretion, judgement and good governance. That is an important point not to lose sight of. He mentioned that the public sector is not generally good at an end-to-end approach starting with broad policy and strategy and then moving to a more detailed planning phase. Unlike the private sector, the public sector does not focus enough on the opening and delivery of a project.

We had jurisdictional reports, and Vini Ciccarello from South Australia gave a very detailed report highlighting some of the problems of their particular committee, such as the $4 million threshold for the examination of public works projects which probably has not kept pace with inflation. That was interesting because New South

Wales and one of the other States—possibly Queensland, although I am not sure—does not have a project approval role for committees. Essentially we are there to inquire into matters that we think are important, according to broad terms of reference—matters that, in a sense, affect the policy for delivering various infrastructure projects—rather than actually signing off on scrutinising individual projects.

Mark Butler from the Commonwealth spoke about the $15 million threshold that applies in the Commonwealth and the unusual distinction between defence projects that happen on land and defence projects that are equipment purchases and procurements. They deal with latrines, but not the acquisition of military hardware—and there is some irony in that. Barbara Stone from Queensland talked about the issues of project time frames, consultation with end users and post-occupancy evaluations, and how it is important for committees not to lose sight of those things.

Paul Harris, Chair of the Tasmanian Joint Standing Committee on Public Works, raised the issue of having plenary sessions rather than jurisdictional report presentations. I think Paul and the others found it quite useful to have a discussion in a roundtable format rather than presentations like I am doing now. Tasmania has a threshold of projects over $2 million, which is extremely low and presents many challenges for the role of the committee there. Also, the Tasmanian Economic and Social Infrastructure Fund is used to bypass Public Works Committee scrutiny. It is a problem that, once the committee has approved a project, there is no ability to revisit cost overruns. So there is accountability at one level but perhaps not on the other side of the equation.

Public works committee members then discussed common themes, such as cost overruns and the perennial problem of division between the executive and parliamentary oversight and scrutiny. We did not make too much progress, but we all agreed. All committee delegates present then passed a motion to try to make these conferences more meaningful and to get more out of them. We agreed that before we meet next year detailed papers about issues of interest and concern, cost issues in various jurisdictions, the challenges we face and issues that we would like to highlight to other delegates should be forwarded to the secretariat of the host State. By getting that information in advance we will be able to absorb it and perhaps have more interesting and meaningful discussions.

The final session on Wednesday was about finance and public infrastructure, and we had three speakers. Mike Schur, the Deputy Secretary of the Office of Infrastructure Management in New South Wales Treasury, talked about the strategic context of infrastructure in New South Wales and outlined the way in which New South Wales makes decisions about whether to enter into public-private partnerships to deliver infrastructure. Dr Patrice Derrington, a Queenslander who had worked previously on the Penrith Lakes scheme and the lower Manhattan redevelopment project, talked about funding options and, in a detailed and comprehensive manner, mentioned some of the cautions that governments, Parliaments and departments need to recognise before they enter into wholesale privatisation of their functions in terms of delivering infrastructure. She gave lots of examples, good and bad, that governments should be mindful of. She said that it must be remembered that continual outsourcing actually reduces the leverage to come up with a viable alternative as you lose internal skills and corporate knowledge. Finally, Greg Incoll, who has been an adviser on many major redevelopment projects across Australia, and particularly in New South Wales, talked about PPPs, his experience of them and his suggestions for the future.

Yesterday Public Works Committee members went to Parramatta to look at a city that is renewing itself. Much of the urban renewal has essentially been spurred on by government. There has been a planning policy for about 30 years to try to encourage the growth of Parramatta as a second city in order to alleviate congestion and pressure on Sydney but also to try to connect people more closely with jobs near where they live. We looked at a few major projects, such as the $105 million redevelopment of Parramatta railway station. That was interesting not just because it is safe and attractive but because it has been sleeved into one of the oldest railway stations in the country. Parramatta station was the second station built outside Sydney 153 years ago, so during the build phase they had all that history and historical buildings to work around as well as the difficulty of maintaining the fourth busiest station on the network.

If people visit Rouse Hill in future they might meet at the station to jump on a bus at the interchange. Another interesting feature of that station is that they have incorporated the new bus interchange—quite a lot of buses come to Parramatta. Before the station upgrade, buses would come in at various points of the city but now they are centralised. Not everyone thinks that is a good idea, but it is certainly convenient for commuters, who know where to go. The final dimension of that station upgrade is the linkage that has been created between the station and the Westfield shopping centre. Most commuters find that very useful—although there are always issues with the big black box shopping centres sucking life off the streets of traditional town centres, from activities and so on.

We then went for a walk and looked at the Parramatta Artist Studio, which is a State and locally financed project to provide opportunities to 20 full-time professional artists to develop their skills and their trade. They each have a small room in the centre and there is a small gallery at the front of the building. We heard from a local artist who told us how great it was to have a space in which to develop his art and keep noxious fumes away from his children, his family and his local area. We then walked through the newly opened pedestrian mall, and there was some explanation about how closing the main pedestrian and road arterial 23 years ago led to some safety issues at night, and certainly a loss of trade and economy in shops. But new development applications have been lodged and passed, and the community certainly believes it is a safer place.

Then we arrived at the Parramatta Justice Precinct. The planning policy that the Government has had in place for a long time is now being backed with an infrastructure plan that is being rolled out to try to relocate government offices and public facilities and services in order to encourage private investment in that town centre. We looked at the new trial courts located there and visited a courtroom. That was most interesting. We looked at some of the environmental benefits that have been incorporated into the design of the building, and the challenges the project faced of separating the jury, staff, members of the public and the accused from each other at various points in the building—not an easy job. We also visited 1,100 employees of the Attorney General's Department of New South Wales who have been moved from the CBD to Parramatta. There were mixed views about that among staff. People who live close to the facility think it is great, people who live a long way away were not so convinced, and there is a big group in the middle who remain unconvinced. But many who have relocated there realise that it is a great purpose-built facility and certainly accommodation much superior to their former location.

We then walked past Church Street to the town hall, where we were met by the Lord Mayor of Parramatta, Councillor Paul Barber, who gave a presentation about Parramatta and its history—it has the oldest building in the country, Elizabeth Farm Cottage—and some of the major new projects that are starting to renew the economy of the city. These are not just big public sector projects but also major private investments in high-rise residential developments. Some financial services have also moved to the city in the past few years. I did not join delegates on the bus trip to the Blue Mountains—sorry Karyn!

This morning we heard briefly from Chris Johnson and Angus Dawson. Chris is the former government architect in New South Wales and now works in the Department of Planning. He was one of the chief architects, along with Professor Ed Blakely, of the Sydney Metropolitan Strategy. He talked a bit about that and about polycentric cities. For many years Sydney was a city that grew to its outskirts and beyond without a great deal of thought. The Metropolitan Strategy for Sydney is a plan to try to impose an urban structure on the city so that people and jobs do not grow like Topsy in unsustainable locations. There is a focus on centres and being close to public transport that is connected, and so on. Angus Dawson is head of the Growth Centres Commission, which is a new government commission responsible for delivering a bunch of new land releases in two very large major growth portions for the city in the south-west and the north-west. He talked about his experiences as a private-sector developer and how he was using them as a government manager in that process. He talked also about the various issues of trying to get infrastructure in place prior to the land release that is taking place.

Mr Dawson explained how, because most of the land in that particular area is privately owned, the private sector was being utilised. As there is quite a lot of up-zone value—300 per cent in some cases—some of that value is being used to offset the cost of providing infrastructure, although not all the infrastructure. The Government has decided to pick up the bill for all traditional developments in centres. Schools, hospitals, ambulance stations and police stations are not being paid for by the private sector, but roads and that type of land-based infrastructure are.

There was a strong flavour, I guess, of urban planning and how infrastructure projects are needed to stimulate job and housing growth and get the economy moving, but also to try to shape the pattern of the growth so that it is more economically sustainable. If anyone wishes to provide further comment on any of those sessions, you are welcome.

The Hon. PAUL HARRIS (Tasmania): Karyn has invited me to give a bit of a snapshot of what we believe might happen next year. Clearly, it is a fair way off. Obviously, it depends on sitting schedules, but we are thinking either the week commencing 14 September or the week commencing 21 September might be a window. Obviously, it is all problematic and involves coordinating the various State sitting schedules. We have not even addressed our minds to broader issues of the theme the conference might take, but we have a few thoughts.

There is much discussion around the country about the sustainability of forest practices generally on environmental impact and the like. There is a lot of misconception as to what happens in various jurisdictions. We believe we have a lot of cutting-edge material we can showcase in one area. That is just one component of environmental/public infrastructure development and the like, coexistence of tourism with our forest industry and so

forth. If we can pool together some components of our conference centred on that, we believe we can provide some fairly interesting opportunities for you—the sorts of opportunities you might not get elsewhere.

I guess the challenge for us is to grab the right time. We are thinking that maybe around September at the commencement of spring would be just a little more pleasurable for you than in the middle of winter. So, we will try to swing it around them. There is not too much more we need to contribute at this stage. With other jurisdictions in the past couple years being prepared to jump into the loop—we have had a couple of conferences in the Northern Territory in the past seven or eight years—we are back to our rotation and we are happy and look forward to hosting the conference next year.

Mrs KARYN PALUZZANO: Thank you. That leaves us with those members wishing to look at our buildings sustainable program, our green program, for the New South Wales Parliament. We will now return to the Jubilee Room. Lunch is that 1.00 p.m. in the Members' Dining Room.

Mr GERARD MARTIN: If anyone wishes to look at our very modest members' facilities, I am happy to make my office available on level 12. It has a good view of Sydney Harbour.

(Report back concluded at 11.55 a.m.)

(Conference concluded.)

Appendix Two – List of Delegates

PARLIAMENT OF NEW SOUTH WALES

Standing Committee on Natural Resource Management (Climate Change)

Mrs Karyn Paluzzano MP
Chair

Mr Michael Daley MP
Deputy Chair

Mr Thomas George MP
Member

Mr Gerard Martin MP
Member

Mr Robert Oakeshott MP
Member

Mr Ray Williams MP
Member

Standing Committee on Public Works

Mr David Borger MP
Chair

Mr Ninos Khoshaba MP
Deputy Chair

Mr Craig Baumann MP
Member

Mrs Dawn Fardell MP
Member

The Honourable Grant McBride MP
Member

Mr Donald Page MP
Member

Mrs Karyn Paluzzano
Member

PARLIAMENT OF AUSTRALIA

Parliamentary Standing Committee on Public Works

Mr Mark Butler MP
Chair

The Honourable Peter Slipper MP
Member

Dr Narelle McGlusky
Research Officer

Dr Mark Rodrigues
Inquiry Secretary

AUSTRALIAN CAPITAL TERRITORY LEGISLATIVE ASSEMBLY

Standing Committee on Planning and Environment

Mr Mick Gentleman MLA
Chair

Ms Mary Porter MLA
Deputy Chair

Mrs Vicki Dunne MLA
Member

Ms Nicola Derigo
Secretary

PARLIAMENT OF QUEENSLAND

Public Works Committee

Ms Barbara Stone MP
Chair

The Honourable Kev Lingard MP
Deputy Chair

Mr Rob McBride
Research Director

PARLIAMENT OF SOUTH AUSTRALIA

Environment, Resources and Development Committee

Ms Lyn Breuer MP
Chair

The Honourable Bob Such MP
Member

Mr Ivan Venning MP
Member

Mr Philip Frensham
Secretary

Natural Resources Committee

Mr John Rau MP
Chair

Mr Patrick Dupont
Research Officer

Mr Knut Cudarans
Executive Officer

Public Works Committee

Ms Vini Ciccarello MP
Chair

Mr David Pisoni MP
Member

Mr Keith Barrie
Principal Research Officer

PARLIAMENT OF TASMANIA

Joint Standing Committee on Environment, Resources and Development

The Honourable Greg Hall MLC
Chair

Mr Bryan Green MHA
Member

The Honourable Tania Rattray-Wagner MLC
Member

Joint Standing Committee on Public Works

The Honourable Paul Harriss MLC
Chair

The Honourable Sue Napier MHA
Member

Mr Shane Donnelly
Secretary

PARLIAMENT OF VICTORIA

Environment and Natural Resources Committee

The Honourable John Pandazopoulos MP
Chair

Ms Joanne Duncan MP
Member

Ms Tammy Lobato MP
Member

Mr Nathan Bunt
Research Officer

PARLIAMENT OF WESTERN AUSTRALIA

Community Development and Justice Committee

Mr Tony O'Gorman MLA
Chair

Ms Katie Hodson-Thomas MLA
Deputy Chair

Ms Jovita Hogan
Secretary

Environment and Public Affairs Committee

The Honourable Sheila Mills MLC
Chair

The Honourable Bruce Donaldson MLC
Deputy Chair

The Honourable Kate Doust MLC
Member

The Honourable Paul Llewellyn MLC
Member

The Honourable Robyn McSweeney MLC
Member

Dr Vincent Cusack
Advisory Officer (General)

Miss Linda Omar
Committee Clerk

Parliament of New South Wales Committee Secretariat Staff

Standing Committee on Natural Resource Management (Climate Change)

Ms Vicki Buchbach
Committee Manager

Ms Kylie Rudd
Senior Committee Officer

Mrs Cheryl Samuels
Research Officer

Mr Leon Last
Assistant Committee Officer

Standing Committee on Public Works

Ms Catherine Watson
Committee Manager

Ms Carrie Chan
Senior Committee Officer

Ms Amy Bauder
Committee Officer