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REPRESENTATIVES**

STANDING COMMITTEE ON ENVIRONMENT AND HERITAGE

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SYDNEY

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON ENVIRONMENT AND HERITAGE

Thursday, 28 April 2005

Members: Dr Washer (*Chair*), Mr Broadbent, Ms George, Ms Hoare, Mr Jenkins, Miss Jackie Kelly, Mr Kerr, Mr McArthur, Mr Turnbull and Mr Wood.

Members in attendance: Dr Washer, Mr Broadbent and Mr Turnbull

Terms of reference for the inquiry:

To inquire into and report on:

Issues and policies related to the development of sustainable cities to the year 2025, particularly:

The environmental and social impacts of sprawling urban development;

The major determinants of urban settlement patterns and desirable patterns of development for the growth of Australian cities;

A 'blueprint' for ecologically sustainable patterns of settlement, with particular reference to eco-efficiency and equity in the provision of services and infrastructure;

Measures to reduce the environmental, social and economic costs of continuing urban expansion; and

Mechanisms for the Commonwealth to bring about urban development reform and promote ecologically sustainable patterns of settlement.

WITNESSES

GLAZEBROOK, Dr Garry John, Private capacity..... 18
JACOB, Mr Peter Henry, Director, Marsden Jacob Associates Pty Ltd..... 1
MARSDEN, Dr John Sidney, Director, Marsden Jacob Associates Pty Ltd..... 1
NEWMAN, Professor Peter William Geoffrey, Private capacity 18

Committee met at 8.57 a.m.

JACOB, Mr Peter Henry, Director, Marsden Jacob Associates Pty Ltd

MARSDEN, Dr John Sidney, Director, Marsden Jacob Associates Pty Ltd

CHAIR—I declare open this public hearing of the House of Representatives Standing Committee on Environment and Heritage inquiry into Sustainable Cities 2025. This morning we will have two briefing sessions. The first will be on water issues, and I welcome Dr John Marsden and Mr Peter Jacob from Marsden Jacob Associates Pty Ltd. Thank you for agreeing to brief the committee this morning. Thank you too, Malcolm, for the efforts you have put in. At 10 a.m. we will move onto transport issues with a briefing by Professor Peter Newman, whom we met in Perth at Murdoch University, and Dr Garry Glazebrook. Dr John Marsden and Mr Peter Jacob, do you have anything to say regarding the capacity in which you appear?

Dr Marsden—We are consulting economists with a strong financial edge. Peter and I have worked together as a team since about 1991. We have a dozen or so people and we have offices in Melbourne and Brisbane but we work nationally and also in New Zealand and PNG on occasion. We are currently working in New Zealand, in Auckland. One of our other major roles at the moment is standing in for the economic regulatory authority in Western Australia where we are evaluating the comparative merits of a desalination plant at Esperance and piping the water up to Kalgoorlie, which is a proposal from the private sector—United Utilities—vis-a-vis extending what is known as the goldfields agricultural water supply scheme, which is the old CY O'Connor pipeline, and taking that through. So we tend to work right around. We will draw on some of that as we go through our discussion.

A PowerPoint presentation was then given—

If we are talking about water supply anywhere, this particular diagram, which shows stream flow in the south-west of Western Australia, is a wake-up call to most cities, water authorities and water businesses around Australia. This slide shows the long-term pattern for stream flows into scheme dams in the south-west. When we take long-term averages there have been some very marked steps down in the stream flow—in particular, the fall which occurred in approximately 1975-76, which was an over 50 per cent fall in stream flow. That is brought about by an approximately 20 per cent fall in rainfall and a multiplier effect coming through with the dryness and increasing temperature so that the rainfall run-off relationships change and you get a 50 per cent fall in flow. It is a big wake-up call to Western Australia and they have been addressing it by spending billions of dollars to expand their sources.

The important point also shown on that chart is that since 1996 there has been some evidence of a further step down. This means that the water corporation is probably more focused on this issue than any other water business in Australia and is looking very hard at these issues. Their planning now is not based on the old method of taking 100 years and talking about reliabilities; it is saying what happens if the future is based on the mean experience of the last eight years or so? You get a very different outcome and a very different sense of urgency. This chart relates to Western Australia but we can see the same sorts of effects happening elsewhere. This is Ballarat. The slide shows rainfall, not stream flow, but you can see the same sorts of changes in the means

as they step down. The point we want to make is that this is happening right across southern Australia and it is not limited to southern Australia.

The chart on this slide divides Australia into four major climate zones. Most of Australia's cities are on what is termed the frontal passage in the zone, which is where the weather comes in essentially from the west. That picks up Perth, Adelaide, Melbourne, Hobart and Sydney. It does not necessarily pick up Brisbane, but we know that there are similar impacts occurring there. Essentially the down step that you could see so clearly in Western Australia in the mid-seventies appears to have occurred right across into the Eastern States, but it was disguised in the Eastern States by the impact of the El Nino effect, which was going the other way at the time, so you could not see it as clearly in the raw data.

This means that we need to be quite concerned about our growth right across the spectrum. It is not just a matter of our cities growing and people needing water for growth, so that the demand side is changing, it is also that the supply side is changing, with a down step in the reliability of the systems. So Western Australia had to go back and reassess the yield of all their dams as a result of those down steps, and they are going through that a second time now.

We were talking before about being on cliff faces. The point is that the Western Australians had more than 20 years to see what was going on, and they initially were a bit slow to respond. As you go across the country you find that the analysis of those sorts of patterns becomes less sophisticated, if it is done at all, as you move east. That is simply because the pattern has been less obvious and they have not started to think about it. That has major implications for water supply to all Australian cities, particularly those in the south, so we need to take these things very seriously when we think about what we can do to address these issues.

I would like to move now to another slide which shows some options. These options happen to relate to a particular city, which we do not need to record in *Hansard*. They show a range of possibilities. The lowest cost thing you can do is to price, to educate and to put on restrictions—but there are some hidden costs in restrictions. You have gardens and people who garden are not actually wallies. We may be moral about it, but gardening is a legitimate activity and there is a very large garden industry, which gets swept under the table in much of the debate. The Western Australians have in fact looked at this and as a result have said that we cannot really contemplate moving to full sprinkler bans every 20 years; we have to push that out to 200 years because our garden industries are so important to the state—whether it is turf growing, nurseries et cetera—quite apart from the fact that a lot of people, particularly retirees, spend a lot of time in the garden. They have actually addressed this. So this idea that we should take a moral stance and say that anybody who has a garden is a waster is a very silly attitude. We do not take that attitude in regard to many other things. Demand management is a cheap option.

In this particular case we then started to look at what else you could do—for example, trading water and getting water from other people. Most Australian cities have some other dams sitting around them that belong to others—for example, irrigators or hydroelectric schemes. The Snowy hydro scheme is a classic case. The ability to trade water has been very aggressively explored by the Western Australians. We have been involved in facilitating a major trade with the south-west irrigators out of Harvey Water. That added 40 gegalitres in the Western Australian case. This is a very aggressive trade. It is a large amount of water—it is as important to the Western Australians as a desal plant. They are all about 45 gegalitres: a desal plant, the south-west trade or the south-

west Yarragadee aquifer, which is rather bigger. They are all very large scale. This is not mickey mouse stuff. It makes a huge difference to Perth and potentially, as this chart shows, it could make a difference to major cities in the Eastern States. It is also possible to use other people's dams. We have irrigation dams but we also have hydro dams. There is the ability to use hydro dams. The third column on the slide is basically taking water out of one of the hydro dams, which again would require trade and the necessity to buy release rights. There are a whole set of complex issues here. So, instead of just building another dam of your own, if times are tough then you can actually make much better use of other people's facilities, other people's dams and other people's water. That particular case would involve buying release rights. It might require buying water from irrigators downstream—from, say, the Murrumbidgee.

The other thing there is a column headed 'Advanced recycling'. It has been called euphemistically 'the farm,' because we understand that not all Australians are necessarily ready to start drinking recycled or reclaimed water. But it is a huge possibility and, in this case, it is a low-cost possibility. Our preliminary estimates show that it is about as cheap as getting water out of other people's dams. This was done a few years ago and, when this whole suite of options went forward, advanced recycling was taken out and never presented to the public, because the judgment was made that the public was not ready for it yet.

Mr TURNBULL—There is such a big demand for water for non-potable purposes, for non-drinking purposes: isn't the debate about drinking recycled sewage a nonissue, because you recycle the sewage, produce recycled water and then use it to water gardens, parks, turf farms or whatever?

Dr Marsden—If you get the recycling done at an early stage, at a greenfield stage, then recycling of third-pipe systems can be done for effectively the same cost. We can talk to you about some work on the Gold Coast where there is a major development, which you may already be interested in, known as the Pimpama Coomera Waterfuture project. There are 150,000 people there and, for the development, 6,000 hectares. They are talking about bringing in third-pipe systems right from the beginning. When they did the costings on that they suggested that, if you do it right at the beginning and trace all the advantages right back, it is basically lineball in terms of cost. But that is doing it in a total greenfield situation; trying to retrofit is very expensive. When you go to retrofit, keeping the potable and the non potable separate becomes incredibly expensive. We do not want to retrofit. If you want to deal with the problem in Melbourne, Sydney or wherever, you start to move toward saying, 'Gee, if we could just get it to the next stage and tweak it up and pretend that we are Singaporeans or Europeans, then the economics would change overnight.' It is just a switch on the economics.

CHAIR—Does that apply to local governance—parks and gardens—though, as well?

Dr Marsden—The amount that they take is limited.

Mr TURNBULL—What John is saying is that the problem is that there is no third pipe. The first two pipes are fresh water going in and sewage going out. The third pipe is recycled non-potable water coming in for non-potable purposes, and you are saying that the lack of that dual triple reticulation system is a big problem. In Israel, where I was recently, I looked at some of these water technologies. In all the agricultural areas of the country they have two pipes, two big mains. They have a blue one, which is the fresh water, potable water, mostly from the north,

from Galilee. They have a red one, which is the recycled water. One plant I visited produces 125 gigs—125 billion litres of recycled sewage. That one plant produces about a third of the country's sewage on 43 hectares, which is interesting. It is not a lot of land.

Dr Marsden—But the third pipe issue is critical. We need to distinguish what you can do about new cities or new major developments and what you can do for existing cities.

Mr Jacob—Or if you have a customer group close by so that the reticulation costs for that customer group are relatively low. There are two prime examples in Australian cities. One is the Virginia scheme, out of Adelaide. It was formerly a groundwater horticultural area which is now all recycled water with some groundwater. From last December, there has been utilisation of recycled water in the Werribee irrigation district. The Victorian government missed a grand opportunity to substitute a lot of potable water with recycled water at that stage. There were about 5,000 megs coming out of the Werribee irrigation district and supplementing surface water.

Mr BROADBENT—Of course, if the farmers accepted the quality and standard of the water, there might not have been the same angst, with the government finally backing down. There are many small areas of previous sewerage authorities that are recycling the water, but even going on to a turf farm we are asking for grade 1, grade 2, grade 3 water systems—either of you might like to comment on that. We are interrupting your flow here, I am sorry.

The third pipe issue is that you can put a major source pipe back from a sewerage plant—inside the existing sewerage pipe, back to the development. But as you have pointed out, even though it is a brand new development that you are going back to, it was not put in in the first place and to go back and rip up the whole estate and put in a new pipe system all the way through is very expensive—because those sewerage pipes that then go to the house are not big enough to take an inner core pipe to run it back into the house. Would you like to comment on that?

Dr Marsden—I will not comment on the technical aspect but you might like to pick up some of the recycling issues.

Mr Jacob—There is a market perception issue—in the case of Werribee it was that their competitors were on the eastern side of Melbourne and were not using recycled water, so initially they saw that they could use a market force and say, 'We are using clean water but now they are being hooked up to the eastern treatment scheme as well.' So it is a market perception issue. It is one of learning and of confidence that the quality is there. In fact, the quality of class A water coming out of the treatment plant is a hell of a lot better than most of the river water that they are currently getting.

Mr BROADBENT—Mr Chairman, on that specific issue of water quality and demands—not only of the public, as you have raised previously, but of farmers and the perception of their product and competition—the actual competition to vegetable growers across Victoria is now coming from China, not from their opposition on the other side of the city. Is there a case for governments to intervene with regard to the provision of recycled water at a major level and then gradually increase the cost of the recycled water according to the public reception of that process? The user being the farmer or the—

Dr Marsden—A sort of start-up situation.

Mr Jacob—The big public policy issue in pricing recycled water is whether recycled water is seen as a new resource or as one of a suite of disposal options available—how governments and policy makers view those two situations will have fairly significant impacts on pricing.

Dr Marsden—Recycling has a huge advantage in that you can do a substitution with the existing sources—that is the point. If you can do it on a large enough scale it makes a big difference to the total water demands of a city and its larger localities. So the Werribee case is a good one. In this particular case up here it was about playing the game of ‘let’s fly a kite’. Unless we fly kites and challenge people’s thinking—if we all say, ‘They wouldn’t accept it; I didn’t think you’d want to hear about it so I didn’t raise it’—then we are not going to progress the debate. That is the issue. There is a distinct timidity in all forms of recycling—that is, ‘It may be class A water, but if we put it on lettuces and our opposition hear about it they may sledge us.’ Then you have it on the other side as, ‘They wouldn’t accept it so we shouldn’t suggest it.’

CHAIR—I know you use raw chook manure back home on vegetables. I wouldn’t have thought recycled—

Mr BROADBENT—They do not spray it on—

CHAIR—No, no, they spread it around and the wind blows it.

Dr Marsden—This slide shows greenfield and brownfield. The point is that, if you really want to do something about third pipe and you want to reuse stormwater, the best time to do it is in the greenfield situation, where the developers can get in there right at the beginning. Companies like Delfin are being quite innovative in this area. It is not just government that is involved at Rouse Hill. People like Delfin have proposed it and have tried to get it through. One of the issues is that sometimes the costs are higher and you are saving the water business, or the state, money because they will not need to build a new dam. You are delaying a dam and you can downsize the rest of your pipes, which is what the Pimpama Coomera Gold Coast example comes through with. This is a very important stage.

As you move through to home owners and home occupiers, you have fewer and fewer options to deal effectively with water. So there are huge savings in the greenfield situation. As we move through to the brownfields, we are dealing with the homeowners. The suburb is already built, the house is already built and the occupiers are there, so there is not much else you can do. You can put in efficient showers and you can mandate a water tank and a front-loading washing machine instead of a top loader. But compare that to the huge savings that you can make by catching stormwater and recycling through third-pipe systems right at the beginning. Those options are no longer available in the brownfield situation. Most of our cities are described in those bottom three categories of builders, home owners and home occupiers, because they are already built. We do not have as many options and it is much more difficult to deal with. So the issue is that we must make the best advantages of the greenfield situation and we need to think hard about what we do in the brownfield situation.

Mr BROADBENT—What reception have companies like Delfin—you raised the name—had from the state government in helping them to fund water reuse? They have just done a large

development on the east side of Melbourne, but there are other ones going on. Whilst they have been excellent in their use of stormwater to enhance the environment, I would not expect that they would be received very well by the government if they asked for support with regard to water reuse.

Dr Marsden—It is not a subsidy. There are developer charges which are taking account of the costs that a new development imposes on the total system. So if you do something which is clever, such as third pipe et cetera, you are reducing the incremental costs that are imposed on the system. The question then is: should the developer charges be charged at the old rate, which were based on it being traditionally done, or should you get a rebate, taking account of the cost savings that your innovative actions have allowed?

Mr BROADBENT—So there needs to be a rebate on head works charges?

Dr Marsden—Yes.

Mr Jacob—It is not really a rebate. The calculated head works charge takes into account the benefits of cost savings to the water authority. That has been happening and has occurred, I think, in the Sandhurst development in the south-east and is occurring in the development to the west of Melbourne at Eynesbury.

Dr Marsden—But it did not occur in Caroline Springs because the government wanted to protect the revenue and they wanted the carbon rate charge, not the reduced rate that would have been appropriate.

Mr BROADBENT—It is a heck of a price to pay over a 50-year period.

Mr Jacob—Yes. It was short-term thinking.

Dr Marsden—It was short-term thinking on behalf of the state Treasurer. It is the same point: everything we do in the greenfield situation is bigger. I will now turn to Sydney. I want to talk about the supply side for Sydney. The information in this slide is from the Hawkesbury-Nepean River Management Forum. It shows that Sydney appears to be subject to the same sorts of patterns as we saw in the west or in Ballarat. The prewar period was a lower period of average inflow. Most of the post-war period up to about 1990 was higher and then there was a substantial step down. Sydney's water planning at the current time, as we understand it, is based on the 95-year record, which takes the long-term average right through the middle and does not take account of any possibility of a down step, which appears to have occurred in most other areas. As a result, we are very concerned that Sydney's safe yield calculations are out of line and might be overstating the level of the safe yield—that is, Sydney's supply situation is likely to be more tenuous than the official figures show. The implications are—

Mr TURNBULL—What is Sydney's safe yield calculation as Sydney Water claims, and what do you think it actually is?

Dr Marsden—We have not done our own estimate. That would require some very detailed hydrological simulation models. We do not pretend that we are hydrological specialists but we believe that we can pick where base assumptions are important. We have talked to relevant

people, we have read as much as we can in the public domain—not all the documents are in the public domain—and our firm understanding is that the calculation is based on the 95-year records, a very sophisticated interpretation of the 95-year records. So we would characterise it as a Rolls Royce 1998 but it is not a Ford Falcon or Commodore 2005, when you might know you need to have a 2005 model. So we think that they have mischaracterised it. If that is the case, the situation is much more tenuous than has been admitted.

You do not have to believe in climate change; you only have to believe in long-term shifts in climate patterns, and there is lots of evidence of that. Any climatologist or meteorologist who understands climate variability, even if they totally discount climate change, would have to say you can have long-term sequences of 20, 30 or 40 years where we may be way below the previous experience or way above the previous experience. If we are in one of those sequences then we are in dire straits for water planning.

Mr BROADBENT—Could you go back to the previous slide and explain that further to me, because I do not understand. Looking at that slide, from 1905 up to 1945 there is that long-term average and then you bounce up. That is a dotted line, two dotted lines, and then you bounce up. If you drop that middle dotted line—I am not saying it has been dropped—and raise the other, aren't we back where we were?

Dr Marsden—You may be down here on the slide. This is the pre-war period. If we were doing our water planning on the basis that we believed that there were long-term sequences—we do not believe in climate change; we just believe in long-term climate sequences of variability—should we be planning as if it were going through the middle here or, even worse, going through here, or should we be planning on the basis of 'Gee, based on the evidence from other states, other parts of Australia, based on advice from the Bureau of Meteorology, it would probably prove the plan for down here'? That is not what they are doing; they are taking the whole 95 years of records. Then, when you simulate your data, you are simulating it from the means up here, not down here, and that is absolutely critical in terms of—

Mr BROADBENT—Can you explain the three down steps there to me, please. I do not see three down steps; I see a line with a step up and a step down.

Dr Marsden—There is a line that is not drawn on this slide, which is the average of the pre-war period, then we step up to this and maybe step down here. The importance of this is that when you go to assess safe yield you are taking account of all the probabilities for containment here, but it is a probability distribution which is centred on a mean. And if the mean is down here rather than here then we will not be able to have even three years in a row like that—that would be a one chance in a million event. You shift those probabilities slightly and you shift this distribution down. That one chance in a billion becomes one chance in a thousand, and that one chance in a thousand becomes one chance in twenty. And we have done that. On the next slide, there is a paper that we did with James Risbey, who is the lead author there, on the ACT data, showing the effect of small changes in those means. It really shifts the probability of extreme events around—for example, what is the probability of getting three years of extreme drought in a row, the worst ever? That shifts dramatically, and that is what you need for water supply planning. The situation is that the safe yield therefore changes quite dramatically.

Mr TURNBULL—And MWP is the Sydney Metropolitan Water Plan?

Dr Marsden—It is the Metropolitan Water Plan. The Metropolitan Water Plan is based on all the work that has been done to date by the Sydney Catchment Authority. They have had very clever, very smart modelling done, set up for them in the late nineties, but in our view it has not adapted to this other insight which we get from the Western Australians—from the work that we and others have done for the ACT. This is just how they define it. It is the maximum quantity that can be guaranteed by the system, but if that is different you then get a very different set of outcomes. We might move on from that.

The current estimate is that it is around 600. I think we will move on from this—it is all background. We think that it is behind best practice and leads Sydney, the Sydney public and decision makers, to misread the severity of the situation. This next slide shows the base case if we do not invest. Everybody is talking about investment. You can see that Sydney is already in a severe gap—that is, there is a gap between what they can supply and what the city's demand is already—and that will increase over time. We have taken the Metropolitan Water Plan and their announced increments of supply and effectively put them on the same chart, as you can see. The Metropolitan Water Plan, by the way, is basically more of the same. The Sydney system is a very simple system. You get the water on the scarp, on the mountains. You harvest it, you pass it through pipes and kidneys and you dump it out to sea to the east. It is basically a west-to-east transfer system through pipes and kidneys.

Mr BROADBENT—And the sewage bounces off the coast at Bermagui.

Dr Marsden—It is a very simple system, so we will not go into it too much. The Metropolitan Water Plan essentially does more of the same, but it says, 'We can't really get any more water out of the Sydney basin'—the Hawkesbury-Nepean—'so we will take it from the Shoalhaven.' That then has an impact on the Shoalhaven. The basic plan is that it is more of the same, except that we will now do a bit of robbing Peter to pay Paul or begging the neighbour. It just shifts down the catchment.

The Services Sydney waterworks scheme is based on very large-scale reclamation, which is basically collecting the 400 gigalitres a year or more that goes out through these three major outfalls, running them through a gigantic pipe which collects them all. The pipe runs down the coast. Then there is advanced treatment using ultrafiltration or microfiltration and RO, where applicable. You could sell water to industry and possibly return it to the Hawkesbury-Nepean system using catchment authorities, dams, storage et cetera. You can use RO if required in some areas where it would be easier, to treat it as potable supply and then bring it into line with Singapore or Europe when the community is ready for it. So it is a long-term plan. Basically, instead of just being a west-to-east transfer system, where it gets dumped into the ocean, it is closing the loop. That is the advantage of it, and that is why it makes a lot of sense and has a lot of potential environmental advantages.

CHAIR—If you use reverse osmosis, how do you look at the cost factor? On one of the original slides we were looking at a reasonable cost of about \$1 per kilolitre. Or would it be less?

Dr Marsden—Peter and Ian Law—he is an engineering consultant who has substantial international expertise on RO—put together a model. We estimate that the ex plant cost is about \$1.17. Indeed, the water corporation have just revised their estimates up from \$1.17 to \$1.18. So we are pretty chuffed at that.

Mr TURNBULL—So you are \$1.17 ex plant, but then you have to pay for transport back to the west.

Dr Marsden—Yes. To get the environmental advantages you have to transport it.

Mr Jacob—No, the \$1.17 was taking the desalination cost, not the Services Sydney treatment cost.

Mr TURNBULL—What is the Services Sydney treatment cost?

Mr Jacob—It depends on what you are going to do—whether you are treating it and then putting it back as environmental flow which is, basically, class A water, or whether you are putting it through an RO plant, which would then be a potable cost.

Mr TURNBULL—I recently visited the desal plant in Ashkelon that IDE Technologies are commissioning. That is twice as big as any other desal plant in the world. It is twice as big as the plant in London, which is 50 billion litres. This one is 100 billion litres. They said that the cost at the gate, ex plant, for desalinated water was US52c a kilolitre, based on the 3.9 kilowatt hours of energy required per kilolitre. Of course, you can change your assumptions about the energy cost and obviously that US52c can go up. But they have a power plant fuelled by natural gas, so they are not using subsidised or waste heat. Is that \$1.17 a realistic cost? That is a lot more than US52c.

Dr Marsden—That cost is in line with the Water Corporation's costs, which were totally independently derived. Ian Law has given us all the technical parameters based on best practice in Singapore. Singapore is probably the lead practice at the moment, at least in our region. I will not comment on the Israelis. The cost of desal, taking sea water, is certainly higher ex plant than the cost of reclaiming sewerage or brackish water, because the salt adds to the cost dramatically. Our own plants cannot be made to work at all once you get to 50,000 parts per million, whereas sea water is 35,000. The costs go up with the level of salinity in the water.

In Western Australia the proposal is to basically desalinate brackish water out of, say, the Collie Dam—again because it is quite cheap to do because it is brackish water, not sea water. We estimated the cost ex plant to be \$1.17 in Sydney City. If we did an ex plant calculation on reclaiming—that is, through sewerage, and I am not sure if Peter can give us that—I would expect that to be, say, 60c, which is not far away from your number, but it is differently based.

Mr TURNBULL—With the Services Sydney scheme some formidable engineering feats are required. You have to build a tunnel under the coast that picks up the sewerage from North Head, Bondi and Malabar and then takes it to a plant located in the Sydney area. Then, it having been treated, it runs it out to the west. So there is a lot of tunnelling.

Dr Marsden—There is, but the cost of the alternative proposal—and we have costed both—

Mr TURNBULL—Is this the desal proposal?

Dr Marsden—No, the total Metropolitan Water Plan. They are lineball. We will go on to that slide in a moment. The demand and supply balance under the Metropolitan Water Plan, as

specified in the government's documents, can be seen on the current slide. You still have gaps. There is virtually nothing that can be done under any scheme to get rid of Sydney's deficit in the next five years.

Mr Jacob—That is assuming that total demand is meeting the specified environmental flows of 117 gigalitres a year, which they are not doing at the moment.

Dr Marsden—They can meet the buffer at the moment because they are ignoring all the environmental responsibilities.

Mr Jacob—Services Sydney has about the same time frame, but once you have it in place you have massive excess capacity. So you might not actually build it all, but you could. It gives you a big supply reliability buffer. We have kept it at one module running out, which takes us out to about 2035. But there is excess base capacity in their pipelines so you can add another module of supply to keep that well above the demand line.

Mr TURNBULL—In the brown spotted area on the current slide, in the plant output section, how many gigalitres does that assume? Is it about 250?

Mr Jacob—It is based on an 800-megalitre per day plan.

Mr TURNBULL—Which is 250 gigalitres a year, roughly.

Mr Jacob—Yes.

Dr Marsden—If we just move from that—we will have to fly through this, otherwise you will throw us out before we have made enough important points—you get a very different demand and supply balance. Just looking at the gap, you can see that the red is the Metropolitan Water Plan, and the Services Sydney without any extension is the pale blue. We can kick out that line through incremental investment at around 2030 or 2035. There is plenty of scope. It is actually a very long-term solution.

You were raising questions of cost: let us go to the total cost—and I think we might skip this; this is just saying that there are a lot of problems. The assumptions of costs are roughly lineball. You have got Services Sydney on the left-hand side with just over \$6 billion and you have got the other scheme coming from Metropolitan Water Plan at a higher cost. Frankly, they are all estimates at this stage and we were simply saying that there is not much in it: 'Don't be put off by the high costs of'—

Mr Jacob—One is meeting requirements and the other one is not meeting requirements and that is the big difference. There are also the costs—shown in yellow—which are very conservative assumptions on our part of what the integration costs are; in other words, what costs currently incurred by Sydney Water would continue to be incurred. We believe that there would be some efficiency savings, but for the purposes of the cost-benefit analysis we adopted very conservative assumptions in terms of any of the cost savings through the integration that might occur.

Dr Marsden—As a result of that, I would look at it and say that the sort of attack on the Services Sydney proposal made by Sartor under parliamentary privilege a month ago is just scurrilous because it is not supported by analysis of the facts.

Mr TURNBULL—He totally misrepresented the nature of your proposal—

Dr Marsden—He totally misrepresented the nature and the costs of the proposal, saying that it would not work.

Mr TURNBULL—But he said that Services Sydney was seeking a \$500 million a year subsidy from the government.

Dr Marsden—We cannot see how that happens under these cost comparisons, so we are a bit surprised. There are lots of sensitivities to playing around with it and so on. Most of the sensitivities, particularly if you change the safe field estimates and things like that and many of the other assumptions, and how you value the surplus or deficit of water, tend to all work in the favour of the alternative proposal from the private sector. So I think that we can move on from that. Essentially, we have done quite a lot.

We have then tried to pull this all together in what we call a sustainability scorecard. This was a major piece and we are giving you a top line as we run through it. The issue is that when we do this evaluation we find the Metropolitan Water Plan to be deficient in terms of achieving reliability both in the short term and in the long term, particularly since it ignores the environmental flow needs. If the Hawkesbury-Nepean matters to Sydney, then it ought to matter. It is not just there to be put aside as nice to have.

There is no buffer against any downward revision in the sustainable yield under the Metropolitan Water Plan, whereas there definitely is in the case of Sydney Waterworks. There is a lot of spare capacity. We do fear that the sustainable yield really ought to be lower. There is improvement in 2010 but the Metropolitan Water Plan can deliver at all times. Depending on how we cost the deficit in environmental flows, it could be \$1.5 billion or \$0.9 billion, but neither can supply water to the environment in the short term. So that is where you get a cost on both sides. As for the direct economic costs, depending on how we estimate them, they are reasonably close but generally lower for the Waterworks when we do a more comprehensive costing, which you saw on that other slide.

Concerning economic activity, the Metropolitan Water Plan can only survive on the basis that there are going to be continued restrictions and reductions in agriculture, horticulture and gardens—gardens are nasty under this plan. Whereas, the other one says: ‘Look, you can have your gardens. We have got the water so we can have the activities.’ Relying on restrictions even in normal years leaves no low-cost response available in the drought years. If you have told everybody to tighten their belts, you cannot get them to tighten their belts when it gets really tough. ‘Demand hardening’ is the jargon for that.

Under the Metropolitan Water Plan the environmental flows are not seen as an obligation. They are a way of saying, ‘When we have got a bit of spare water we will give it to the river.’ There is virtually no ability to mimic the natural flows. Environmentalists are always concerned—and rightly so—about the ability to get pulsing flows and natural flows through a

river. That cannot be done under the Metropolitan Water Plan. It can be done under the Waterworks plan. Both systems use a lot of pumping and the greenhouse effects are not sharply different; they are roughly in line. But the other environmental benefits are substantially greater.

On habitat and diversity, the Metropolitan Water Plan depends very much on robbing Peter to pay Paul and taking water for Sydney out of the Shoalhaven. That has an impact on the Shoalhaven and shifts the freshwater-saltwater interface and will cause sedimentation and shallowing in the Shoalhaven.

Mr BROADBENT—Does the Shoalhaven have to be pumped into the other catchment?

Dr Marsden—Yes.

Mr BROADBENT—So without power it is—

Mr Jacob—It is a 600-metre head.

Mr BROADBENT—Really?

Dr Marsden—Yes, it is pretty high. The blue-green algae risk in the Hawkesbury-Nepean would be reduced under the Metropolitan Water Plan, but at the cost of increasing the risk in the Shoalhaven. It is really just transporting problems from one catchment to the other. The coastal discharge would essentially remain unchanged under the Metropolitan Water Plan, and it would be slightly better in terms of quality. In the Waterworks proposal from Services Sydney, the dry weather volumes are reduced by 70 per cent. There is still some water going out but it is dramatically reduced. There is a major reduction in blue-green algae benefits as well. It goes from being better to being virtually impossible.

There is going to be a reduction in open flows under both, but it is greater under the Waterworks proposal because the interconnection proposed gives much greater synergy in the use of the storage that is in the sewerage system. The costs and equity are basically much better because the robbing of Peter to pay Paul is avoided under the Waterworks proposal. There will be increased viability as a result of improving the river—the Nepean system. There will be increased stocks of flathead, whiting and school prawns—this is all based on research papers done by the Hawkesbury-Nepean river management forum.

On consumer welfare, the Metropolitan Water Plan relies heavily on restrictions and it is not really justifiable any longer. The current policy position around Australia is that taking water out of rivers is bad for the environment—‘You are putting it on, you are using it excessively, we should charge you more and the restrictions can be justified because we are getting rid of these externalities.’ Under the alternative proposal you can water as much as you like, because the water is going to be available.

Mr TURNBULL—It is just going around in a circle.

Dr Marsden—We are just going round in a circle, and it is a sustainable circle. So the restrictions are not justifiable any longer now that that option is available. We can estimate as

economists what that reduced consumer welfare is, but it is a very large figure. State treasuries ought to take note of those things in cost-benefit studies, because it is very standard economics.

In terms of efficiency impacts, the Waterworks proposal is heavily dependent on demand management. We have assumed on all the estimates we have shown you that whatever Sydney Water has said or the state government has said is gospel. We have taken their case—we have not gone through it and said, ‘Their case is not as good as they say.’ But the fact is that it is totally dependent on getting demand management 100 per cent successful, whereas the other is not. You can run it under another set of assumptions which say that demand management in Sydney does not actually work too well. Under the Waterworks proposal you have still got to buffer, which you do not have to do under the Metropolitan Water Plan.

We did the work on the budget impacts before the Sartor statement. You will see no statement in our work about the need for a subsidy—we did not even think that was a possibility. We believe that this would be giving the Sydney water business a higher revenue stream and a higher dividend stream. You do not need to rely on restrictions and therefore drop your volume and end up with funding crises every time you have a few years of restrictions. We do not see any problem with private sector funding. It is compatible with the costs. It is stand-alone and there are well-developed models for getting the private sector involved. Overall, we can see major advantages on the other side. The long-term legacy is that the Waterworks proposal from Services Sydney has a very sharp and sustainable improvement in the demand and supply balance and it can go through until at least 2035 without further major investment. But there is a platform for further investment which can kick it up. It gives you high-security environmental flows from 2011 onwards and gets us away from dumping sewerage into Sydney’s beaches.

Just to recap: I think we might go back and discuss where we are up to or take any questions. The question is: where has Sydney gone wrong? Sydney has not realised the impact of declining supplier reliability. The diagram I showed you on the step changes in stream flow in the Hawkesbury-Nepean system was part of the Hawkesbury-Nepean work but was never entered into the modelling of the safe yield calculations. It was just put aside as a curiosity. So there are major issues in the Sydney situation. The Metropolitan Water Plan has a bit of recycling around the edges. So it is not true to say that there is no recycling but it is limited. I think they are talking about a maximum of 80 gegalitres as opposed to a minimum of 400 under the alternative proposal. It is just a different order of magnitude. It is really two sharply competing strategies. One is more of the old and the other would be closing the loop and doing it differently and on a long-term sustainable basis.

Putting it in a wider context, this supply gap issue is occurring in most Australian cities. The climate risk and the long-term climate variability issues will affect them all. The strategic responses across Australian cities are highly variable. They are probably best in Perth. The analogy that we have been discussing is that Perth knows that it is on a cliff. In fact, it is on the cliff face, it has its ropes on, it has its mountain climbing boots on and it has all the gear. It knows it is there and it is scaling it, whereas in Sydney I think up until very recently it has been wandering around in a fog denying that there might be a cliff anywhere. There is an institutional inertia on a number of options: trading—using other people’s dams and assets—and recycling and reclamation. There is a view to not do it just yet or to do more of the same because it is all a bit radical and it might have to get the lawyers involved, negotiate a contract with Snowy Hydro or somebody else, and this could all be a bit difficult.

Our view is that recycling and reclamation is not an issue of ‘whether’. This will happen. It is really just a question of when and on what scale, and about what opportunities we take up earlier and what opportunities we miss out on and leave on the side. Desalination costs are falling—there is no doubt on that—but they are critically dependent on energy costs. As energy costs rise, desal and any RO process will become more expensive. One of the critical issues for Sydney in particular is where to put it. North Head has been mentioned. That is clearly one option, but there are not many other options around Sydney. Sydney has very limited options, being the most expensive for real estate and the most heavily settled capital, whereas Perth has got lots of options. Reclamation at the plant level is cheaper, but a lot of that cheapness gets closed out when you add on other bits like getting it to places where you can actually use it, like getting it back into the rivers or getting it to the market gardens.

Mr TURNBULL—I would like to explore that with you. I was just reading in the *Daily Telegraph* today about having a desalination plant at North Head. I would have thought the Kurnell Peninsula would be a much better place, for a variety of reasons, than North Head but let us say it is at North Head. The *Daily Telegraph* says it is going to cost \$2 billion, which is about five times what they would need to spend on it, I would think. They are talking about just putting the water, there and then, back into the Sydney mains—so not sending it back out to Prospect. Is that the critical advantage desal has over Services Sydney—that you do not have to transport it back to the west for either the purposes that are in the current Services Sydney plan or, if you go the potable route, putting it into Prospect Reservoir to be treated?

Dr Marsden—There is no doubt that you can bolt a desalination plant on the coast and, since most of our cities are on the coast, there will be relatively small piping costs to get the water into the system. There is no doubt that that is an advantage. But what it does not do is get you any of the environmental benefits. We have not talked about the environmental downside of desalination plants. What comes out of the end of a desalination plant is a supersaline sludge, which is a major issue for the Quinana plant, say, because Cockburn Sound is boxed in and shallow. It has Garden Island and the naval base on that side and it has a relatively narrow piece of Point Perron at this end. Unless it is well mixed—you need sea breezes and wave motion to mix it—you have this supersaline sludge.

Mr TURNBULL—That would not be as much an issue for Sydney, though, because the water is very deep off our coast.

Dr Marsden—You may have a point there, but there are issues there. A desalination plant allows you to bolt into the local system.

Mr Jacob—The other issue, though—which is an engineering issue—is this: what is the capacity for doing that? It is a networked system. You have most of your water coming through it. There would be some hydraulic issues, I would imagine, about the extent that you can utilise desalinated water in various water mains—unless you scatter them throughout Sydney.

Mr TURNBULL—Yes. Presumably if you had one at North Head, for example, you would switch much of that side of Sydney Harbour onto the desalinated water and—

Dr Marsden—And desalination produces its own particular sort of water. Water ain't water. There will be boron and all sorts of other things I do not pretend to know about because I am not a chemist. But there are all sorts of issues.

Mr TURNBULL—Do you want to explain what boron is?

Dr Marsden—Peter will do that.

Mr Jacob—No, no!

Dr Marsden—The issue is that they have to deal with the water qualities that come of desalination plants. You cannot just put it straight into the system at the end of the RO.

Mr Jacob—There needs to be a lot of finetuning in a desalination plant to actually get acceptable taste qualities in the desalinated water.

Mr TURNBULL—I will summarise to see if you agree with this. There are two techniques used for desalination: reverse osmosis and, in effect, distillation—broadly speaking. Distillation requires about twice as much energy per kilolitre, or megalitre or whatever, as RO does and is generally used only in circumstances where either the energy is free—as it is in the Gulf States—or sometimes if you can co-locate with an existing power plant where there is a lot of waste heat. The advantage of distillation is that it is a much simpler process. It does not require as much maintenance and in particular the water does not need to be prepared before it hits the system because there are no filters. It does not have to be pre-treated as it does in a reverse osmosis plant where there can be enormous problems if the water hits the filters—the membranes—for example with organic material still in it. There is that example of that big desalination plant in Tampa Bay in Florida which basically failed because of that. Is that a fair summary of the situation?

Mr Jacob—Yes.

Mr TURNBULL—What I was told in Israel was that boron was an issue for agriculture. There may be a taste issue but it was not a problem for humans. But if the water was going to be used on agriculture boron was a problem. They have a technology for removing that. Boron is a chemical that is in seawater.

Dr Marsden—It is certainly an issue. As we mentioned, we are evaluating, on behalf of the regulatory authority in Western Australia, the United Utilities proposal to build a desalination plant at Esperance and certainly boron has been mentioned in their discussions. That is why I referred to it. It is certainly an issue that they are having to deal with, and that water is going to towns and mines rather than to agriculture. I confess I do not understand precisely why it is an issue but it seems to be an issue that they think is important enough to raise in our evaluation as something that they are dealing with.

The higher cost of the piping to get it back into rivers is partly offset by the lower cost ex plant—because you are using about half the energy to clean up or reclaim water through an RO process where the water is fresh but has got other stuff in it, being sewage—compared to desalinating 35,000 parts per million. There are puts and takes. Our assessment of the two

proposals is that the costs are lower under the waterworks proposal. They are in the same order of magnitude—they are both a lot of money—but, when you look at the costs straight out, they are lower and there are very substantial benefits because you are getting more deliverable water. You are getting much greater reliability out of the waterworks proposal—from Services Sydney—than you are out of the Metropolitan Water Plan.

Mr BROADBENT—Have you seen a shift in the frontal passage and a wider drying of the whole of the centre of the Australian continent? I think the CSIRO had a map in the early nineties that said that the rangelands were moving further and further out towards the coast. You mentioned before that the data was not as strong for your research in the East as it had been in other parts, because there was no need at that time for that data to be gathered. Did I misunderstand you when you said that? I also have one other question on the issue of money: have governments been requiring from water authorities a dividend over a long period of time that should have perhaps been returned to the industry for development of these services?

Dr Marsden—The basic story of climate change is: the wet get wetter and the dry get drier. That is a very glib answer; we are actually putting together a document for the AGO at the moment. We are not, again, climate experts; our job is to synthesize and get the strategies right. The wet get wetter and the dry get drier means that all the dry parts in Australia are getting drier—that has been quite distinctly observed. I refer you again to the first diagram we put up: under the tropical area is where the world's deserts are, and that area is going to get drier, Australia is going to get drier and every one of the world's deserts sitting just beneath that subtropical band is going to get drier. That is a very mainstream proposition, but the regional patterns may differ around the edges. That is a big, high-level generic statement, but it is true, so that is changing. The CSIRO did some work on the Canberra region and detected a down-step around 1980 but, as I have said, it is disguised. If you talk to the Bureau of Meteorology, they call Western Australia the 'clean signal' because it does not have the El Nino perturbations going on around it, which the East does. But the same pattern is occurring, basically, right across, and we can certainly see distinct shifts.

So that is the frontal shift. You have also asked: where is everybody looking at this? All the authorities around Australia tend to pay dividends. Sydney Water is a big cash cow for the state Treasury; the Western Australian Treasury takes dividends out of the Water Corporation. The general pattern is that the dividends are really paid by the city slickers, not by the country people, and you can see that in Victoria, where the metropolitan retailers pay dividends and so does Melbourne Water. Most of the others, such as Central Highlands Water, which looks after Ballarat, and its counterparts in all the other regional towns, basically, do not really pay big dividends. So the dividends in the water sector are coming out of the cities, which is where most of the demand is and where the costs are lower. How do people look at this? It is a question of standing back and saying, 'How do we reassess this at a strategic level?' The Western Australians were forced into that by a major change which occurred in the mid-seventies. They had had restrictions around that period. Western Australian demand stayed low and they substituted into bores—taking water out of the ground around Perth or Perth gardens; I am talking about home gardens. It was not until the early nineties that the Western Australians suddenly said, 'We cannot do any more substitution into bores' and 'Gee, we do actually have a problem.' So Western Australians did not actually adapt. Even though that change occurred, it was not until they had 15 years of data that they said, 'This is undeniable and we cannot pretend it is a short-term aberration.' So Western Australians have adapted to it.

It is not so much that the funding has not been there to take a strategic look at water supply and demand; it has been the urgency and the question of focus. It is a matter of record that in Sydney you have had a rapid succession of CEOs at Sydney Water, which could not have helped any CEO or senior management take a strategic view of their business. It has been much more one of short-term survival and of one catastrophe—like the treatment plant and all that sort of stuff—after another, which has caused a focus on the short term and the eye to be taken off the big issues. That is what has largely happened. The situation with Services Sydney is that they have come in as a very small team. They are very focused and have looked very hard at the situation and they have come up with a more pointed, and probably more accurate, analysis of the situation.

Mr BROADBENT—Is it Echuca or Yarrawonga or one of those towns along the Murray who have put in a completely closed-circuit \$40 million plant? Do you know of that one?

Mr Jacob—Echuca has got a recycling plant. It used to discharge into the Murray. It has taken all of the discharge out of the Murray and it is being reused, but basically on agriculture. It is actually going back into the existing irrigation channel system.

Mr BROADBENT—And all of the reused water is being used by the community. Is that the understanding?

Mr Jacob—That is correct, yes.

Mr BROADBENT—There is no effluent going into the Murray. So we have already got an example of a closed-circuit water system.

Mr Jacob—Yes.

Dr Marsden—What is being proposed by Services Sydney for Sydney is not revolutionary on a world scale or even on an Australian scale. It just has not been part of the standard thinking inside Sydney.

Mr TURNBULL—You are saying Sydney should really do what Echuca does.

Dr Marsden—Yes, or what Israel is doing. What is being proposed is not revolutionary on a world scale. It is just different to what is being done in Australia's major capital city.

CHAIR—Dr John Marsden and Mr Peter Jacob, thank you very much. There are a million questions still to be asked, I guess. I thank you for your time. It has certainly been very interesting and worth while.

Mr BROADBENT—Do we have access to the presentation that was given today?

Dr Marsden—I will email a copy to you.

[10.16 a.m.]

GLAZEBROOK, Dr Garry John, Private capacity

NEWMAN, Professor Peter William Geoffrey, Private capacity

CHAIR—Welcome. Our second briefing this morning is on transport issues. It is nice to see you again, Peter—we had trouble getting off a plane last night. Thank you for both agreeing to brief the committee this morning. Before we get under way, I will say that we would like to have the option of including the information you provide us with today in our report on the sustainable cities inquiry. You will note that Hansard is here today to provide us with a record of proceedings, and the committee would like to authorise the publication of the record so that we can refer to it in our report. I would like to add that the proceedings are covered by parliamentary privilege. Do you have any comments on the capacity in which you appear here today?

Dr Glazebrook—I am a private consultant in the urban and transport area. I was invited here to talk about transport issues. I have a particular bent on Sydney.

Prof. Newman—I am Professor in City Policy at Murdoch University, which is my main role here. I am also a New South Wales sustainability commissioner, so I will have things to say about Sydney as well.

CHAIR—I invite you to make an opening statement.

Prof. Newman—I will speak first and just quickly outline the basis for a better evaluation of rail in our future cities, particularly to give what I call a business case for rail.

A PowerPoint presentation was then given—

Prof. Newman—There is a tremendous amount happening in America with rail again. About 100 cities are building rail systems. Even conservative bodies like the Free Congress Foundation have said that it is very important that we see that rail leads to economic growth in a city. In city after city, new rail transit lines have brought higher property values, more customers for local businesses, and new development.

I have six reasons why good transit and rail in particular benefit city economies, which outline the basis of my presentation today. The first one is that it reduces the proportion of wealth spent on transport. We have collected a lot of data on cities—we are up to 100 cities now for which we collect this data, and that was our first sortie—and these are the cities in it. If you look at the wealthy Asian cities—Tokyo, Singapore and Hong Kong—and the European cities, the Australian cities and the American ones, the hard line there is the wealth of the city, the gross regional product. You can see there that the European cities are in fact higher in wealth than the American cities but have half the car use, and that Singapore, Tokyo and Hong Kong are 10 times wealthier than Manila, Jakarta, Surabaya and so on and have less car use. There is no correlation between wealth and car use. There are enormous variations in the amount of public

transport. Some cities are dominated by it; others have very little. It depends on the kind of infrastructure that they build.

When you look at the proportion of wealth going into transport in a city, it is a very important indicator. How much money do we spend just getting around? In Australian and US cities it is very high: 13 or 14 per cent. It is up to 17 per cent in Perth. But the European cities, the wealthy Asian cities and Toronto—these cities with good public transport—actually have less of their wealth going on transport.

We work an extra day a week for our car dependence compared to many cities. You can see it quite starkly now in some of the outer suburbs. We are very car dependent. Some families are using 40 per cent of their income on transport. If you save one car in a family, it has been estimated in Australia you get \$750,000 in superannuation equivalent. The second factor is that it reduces the external costs and this is mostly the way rail has been portrayed—not so much the importance directly for business but all of these other factors. They are important in any public considerations, particularly in health factors relating to obesity and depression due to our lack of walking. Things like the greenhouse effect and transport deaths all correlate to the amount of car use in a city. And now we have the problem of oil, which I believe is the biggest threat to sustainability in our cities with the rapid move towards declining global production that we are now feeling.

Mr TURNBULL—This is the peak oil argument.

Prof. Newman—The peak oil argument which I have been talking about since the seventies when I first discovered it at Stanford. It has been a recurring nightmare to me and I believe it has got to be faced. The ‘coalition of the willing’ cities—US and Australian cities—have the highest oil consumption. We have these hundred cities, and I want to very quickly go through this to show the difference between strong rail cities and weak rail cities. Strong rail cities have about four times more rail. You can go through all the different characteristics—in terms of speed, less parking, more transit trips, lower number of vehicles, lower car ownership and less car travel. The important one is this: the strong rail cities are 45 per cent more wealthy. They spend two-thirds of their wealth on transport. They have 34 per cent less road expenditure and are four per cent more cost effective in transit terms. So it does save money overall.

Saving time, though, is the big transport task and it drives the city. Those cities that I showed before that are wealthier and do well in public transport terms do it because their public transport is faster than their traffic, so 39 to 34 is the relative speed of transit compared to the traffic. In Australian cities it is the other way around—it is a lot quicker to get around by car—and so it does make it hard. When we consider the travel time budget—and Marchetti defined the travel time budget as about one hour—around the world it is the same. Everyone fits roughly within this, so you get about half an hour for the journey to work in every city in the world. It does mean that cities have always kept within that kind of one-hour-wide budget, so walking cities like this one, you can walk across in an hour or—

Mr TURNBULL—Which city is that?

Prof. Newman—That is Shibam in Yemen. It is a third-century Manhattan made from mud brick. It is an extraordinary place.

Mr TURNBULL—It is amazing.

Mr BROADBENT—They are not all straight!

Prof. Newman—No, but there are not too many cars there. Places like Christie Walk in Adelaide can afford to build without any parking because they are within the walking city area of Adelaide. The transit cities that are spread out 20 or 30 kilometres are based on rail but they are still one hour across. Stockholm and places like that were built that way, and most Australian cities were built in that form until the car came along and we could travel 50 kilometres and still be within that one hour Marchetti limit. So our suburbs have gone out like this. They have reached limits, and Los Angeles is coming back in. It is not sprawling any further and it is firmly within that limit. The one-hour-wide size is a very clear market determining factor in cities. Road rage is one of the factors that you see and can measure when you go beyond that limit.

I think it is what is driving the reurbanisation of our cities, bringing them back in, and driving the rail projects that are happening right across American cities now. You have things like the Melbourne 2030 strategy, which is reurbanising their city, and the reurbanisation that has occurred so dramatically in Sydney in the last 10 years, where 20,000 flats and 8,000 houses have been built. I think the driving force there, as Adele Horin says, is the Marchetti principle. I believe that the future city is going to be rebuilt along transit lines and in centres. It does not mean that you have to touch the suburbs. The suburbs can relate to those centres much more effectively for local needs but can reach around the city with effective public transport. That is the key to making a city that is very car dependent into one that is less so. I think that Marchetti is forcing us into this new city form, and every Australian city is facing up to this with new planning schemes based on centres and corridors. Everybody is talking about it and everybody is saying, 'This is what we need.'

But the key to that is a good rail system. These centres that are seen to be the future of Sydney are all going to need effective rail. The interesting thing is that you can now see how Sydney could become a series of transit cities again: 20 to 30 kilometres across the one-hour wide city, based on transit, within a car-dependent form. So the idea is to rebuild around public transport so that you have far more transport options available. The high-density and medium-density centres are the key.

The fourth thing is saving space. This is a dramatic thing. The reason that freeway lanes fill up so quickly is that you can only carry 2,500 people an hour down a freeway lane. You can carry 20 times that down a train line. In between, light rail and a bus lane make it considerably better as well. But that is the problem. That entire freeway system is not equivalent to one rail line. The space considerations when you put people into light rail, compared to cars, are dramatic.

Mr BROADBENT—Can we go back to that slide showing the space taken up by cars, buses and railway carriages to transport the same number of people? That is sensational.

Mr TURNBULL—Great picture.

Mr BROADBENT—That is incredible.

Prof. Newman—That shows the equivalent space used. It was set up in one of the Scandinavian cities. If you took out the train link to the CBD in Sydney you would have to replace it with 65 lanes of freeway or 782 hectares of car parks the size of the MCG, which would be a multistorey car park 1,042 floors high. It is very hard to imagine those few rail lines carrying 200,000 people a day. It is a lot of people, and you would not manage it simply any other way.

Mr BROADBENT—Regarding the picture that we asked you to go back to a minute ago, do you have a cost comparison on cars, buses and trains as well, or have we seen that and I have not related the two?

Prof. Newman—That picture was purely showing the space.

Mr BROADBENT—Is there a cost comparison for the space taken up by the people in the bottom of the photograph as compared to the people in the top left-hand side of the photograph?

Prof. Newman—I could compare it to Perth, where we now have the northern suburbs railway, which carries the equivalent of three lanes of traffic in the morning and three lanes in the evening. There is also a six-lane freeway. The cost of that freeway was more than the railway line and yet they carry the same number of people, and the railway takes up considerably less space. If you took that railway out, if it had not been built, it would be impossible to put another six lanes in there. You just would not have the space. So the cost becomes less important because you just do not have the option. Space is a problem.

Mr TURNBULL—I am being the devil's advocate here, because I agree wholeheartedly with everything you have said. Let us assume that the rail line is better than a freeway for all the reasons that you have articulated. If I go from Central Station to Hornsby on the train, I then have to get to my house, which is, say, five kilometres away. I am going to need my car or some other form of public transport. It is often that connection between the rail hub and where people actually live that is the biggest difficulty—and parents going cross-country, taking kids to school or going shopping or to the doctor and so forth, and not running into the city on those commuter grids.

Prof. Newman—The way it is meant to work is that, for those local trips, car, bike, bus or walking are the simplest, because they are much more flexible and easily done. Quickly moving large numbers of people down a corridor is best done with a rail system. If you are constantly trying to do it with roads, you will destroy the other end: where they come out will be very difficult. You have to have an integrated system, and it is extraordinary that Sydney is one of the last cities in the world without that—integrated ticketing, for example. We have had that in Perth for 15 years or so. If you get out of a train in a northern suburb, you can get off and immediately transfer to a bus. You do not have to do anything else. The buses are waiting. The European cities do it like clockwork. When the train arrives the buses then go out in every direction, and just before the train comes in they come back in again. You get a pulse flow system, so you can quickly make a transfer.

Mr TURNBULL—Peter, you have been a sustainability commissioner here for a while, so you have had a fairly close look at the scene here. Why has the state government been so resistant to integrated transport? It seems to have a policy—you might comment on this—that is

determined to drive people away from rail at the moment. The neglect of the rail system has become a bit of a scandal. How would you comment on that?

Prof. Newman—There is a long history to it. It is clearly a management problem that rail has become distasteful within politics and is seen as not providing the options they are looking for. It is seen as a bottomless pit of money that does not produce much at the other end. They have not had the kind of success we have had in Perth, where the rail system has been dramatically able to pick up passengers and do all the good political things that a good rail system can do: it is very popular, it is managed well and its on-time running is 98 per cent. Here in Sydney we do not seem to get more than 50 to 60 per cent on-time running. These are management issues, they are union issues, they are questions of sorting out an older system into something that works better. And while it is like that it is very hard to invest in. So the longer term issues have been put on the side in dealing with that. But, at the same time, the need for this integrated approach is there. The new Department of Infrastructure, Planning and Natural Resources is set up to provide an integrated approach.

The other side to Sydney is that it has enormous silos of government agencies, and even ministerial traditions, that are very independent. Sustainability challenges all that and says we need a much more integrated and holistic approach—and you know what it is like, in any form of government, to have to deal with that. I spent 2½ years dealing with these silos in Perth while developing a sustainability strategy there. The culture of difference between agencies is very big. But you can do it—you can get people talking together and getting common, good outcomes. But it is a struggle. I think yesterday's announcement about the M4 was very symbolic of trying to show that an integrated approach was needed, and the politics of that is now pushing them in that direction. I greatly welcome that, and I hope that we can go further along those lines. But it is a very big struggle in Sydney.

Mr BROADBENT—Do you think people should be allowed to build a new private school, for instance, that is not close to a tram, public transport hub or drop-off point and that really only has access for motor vehicles and buses?

Prof. Newman—I do not think we should be able to do that. We have had a period of planning where we have increasingly allowed that. That is car dependence and we rue the day because the road system is not usually able to cope. Then they blame governments for not rebuilding the road system and so on. But the planning decision to start with is the poor one. It will increasingly become harder and harder to do that.

Mr BROADBENT—I am from a Victorian outer urban country or rural electorate called McMillan. However, I have been involved in the restructure of rural communities in the past. The train and transport links that went out to country areas in Australia that were closed from the 1950s through to the 1970s chopped off the spider's legs and brought back the train services to the cities. When there is pressure on the community for a sustainable city, do you think there is a case for taking some people out of those cities and putting them in large liveable rural or regional country towns for lifestyle purposes, if nothing else?

Prof. Newman—Yes.

Mr BROADBENT—How does that relate to transport opportunities?

Prof. Newman—I can tell you how it relates and I have only recently worked this out.

Mr BROADBENT—Was there any experience in Perth?

Prof. Newman—No. We have not done that but we are going to need to. It is dramatically possible to demonstrate now in New South Wales. What has happened here is that spatial constraints have meant that the development of Sydney is now constrained and so most of the development is high and medium density. This has meant that those who do not want that have left and you have the sea change coastal phenomenon occurring or people going to other cities, like Perth, where they can get lifestyle oriented larger blocks and so on. The problem with the coastal developments is that they are also now spatially constrained. There is a huge political movement saying that we cannot continue this scatter and sprawl along those coastal areas. Up and down the coast of New South Wales new planning schemes are coming in saying, 'We have to create centres.' This is just what they are saying in Sydney: 'Centres, centres, centres; that is where we have to do all the development.' That is important for viability. They need centres for services, amenities and jobs in those coastal locations to stop that kind of sprawl and scatter that has been happening.

In the same way that that will mean there are spill-over effects, it will now mean that people looking for lifestyle opportunities will find them less and less on the coast and they will want to go inland. There is no problem with that. I believe the inland really does need people, and planning can provide a mechanism for us to once again repopulate inland towns in a way that enables people who want that lifestyle option to have it. They do not have to be in Sydney or on the coast; they are looking for a lifestyle. So the 'tree change' phenomenon, as they are calling it, is happening now and I think they will go further inland as well.

Mr BROADBENT—For example, a regional centre?

Prof. Newman—Yes. That will be the next movement of population. But critical to it is that we make our coast and cities more sustainable by building more centres and public transport systems.

Mr BROADBENT—How many regional centres have access to rail transport?

Prof. Newman—I think it is less now. Country rail will get a big boost as oil prices start to bite. We will have to concentrate on that as well. I see that as less important at this stage compared with the massive problems in our cities, but they will have to be addressed. To quickly finish this: that is 50,000 people an hour travelling for the Olympics in Sydney. It shows how it could be done. They save time and space.

The fifth point is that people need to meet in cities. The new economy is really based on these centres where people meet. So these kinds of centres are the key to future cities. That can happen anywhere. The new economy jobs tend to be in the old tram areas of Sydney because they are meeting places. The problem with 9-11 was that it stopped people meeting. Reclaiming that is essential to our economy.

The sixth point is about investment and certainty. Rail is fixed, therefore it is attractive to investment. What we are finding in America is that these rail systems are being built in a way to

attract development around them. That, I think, is the future we have to go towards. We have looked at how to make that transition. Essentially, we need to get a public transport system which is faster than cars in all main corridors and then build centres around it. It is beginning to happen in Perth. This is a picture of the Northern Suburbs Railway. Subiaco has redeveloped the area around its rail station. It is a very effective, transit oriented development.

In the past, we have had a lot of money going into roads. The federal commitment has been that way—there has been \$25 billion for roads in that 20- to 25-year period and \$1 billion for rail. AusLink will now balance that. But it is still regional; it is not urban. Most of the rail systems have come about through political intervention. This picture is of our minister for transport in Perth.

CHAIR—He looks much better in the picture!

Prof. Newman—The new southern rail line that we are building is entirely a state government funded exercise. It is unusual in Australia because of that commitment.

Mr TURNBULL—Where is it going to?

Prof. Newman—Just to Mandurah—about five kilometres. But it will get there quicker than a car. Immediately it is attracting development. A Sydney developer has come over to spend \$90 million to invest around rail stations anywhere in our network.

Mr TURNBULL—What does TOD mean?

Prof. Newman—Transit oriented development. He says he can make more money out of TOD than he can anywhere else—an extra 15 per cent. In Sydney in the last 10 years, \$10 billion worth of private tollways have been built. They are very effective. What I am asking is: why can't we use public-private in the same way to fund rail? The reason I was so enamoured with the western fast rail model—that is the 11 minutes to Parramatta project—is that it was entirely privately built. It was a Leightons proposal. It was based on the tollway model. It is doing for rail what they have been doing for roads. It has been viewed with great cynicism and so on, but when I talked to Leightons I found they have a very persuasive approach. If it is saving time, people will use it. They will come in droves.

The other thing that can happen is that light rail can use land value capture around their stations to help pay for it. I have talked to Hastings and so on about that. This next picture is an example. This is Seoul in Korea. There is a river under the road in the picture. There was an election held and one mayoral candidate responded to a public demand that they get rid of this and he got elected. They have actually rebuilt and restored, in the centre of Seoul—

Mr TURNBULL—That is a photo, not an artist's impression?

Prof. Newman—Yes, it is actually a photo. It has happened. It is extraordinary to go there. The railway underneath that is taking all of that traffic. It was built from the value capture associated with those buildings along that line.

Mr TURNBULL—How is the value captured? You and I have talked about this before. I think this is the key issue. How do you capture the value from real estate which is improved by mass transit? How are they doing it there? Is it a tax?

Prof. Newman—I do not know how they did it there, and I am not an expert on it. I would really love it if we could get a very good financier who could help us work through these things.

Mr BROADBENT—Those silos are very deep.

Prof. Newman—You can do it through the rating system; you can put an extra rating on it. What they are doing in the new land release areas in Sydney is to put a levy on every new block to pay for new rail, new services, conservation areas and so on. They are charging \$50,000 minimum per block in that new area, and that will be collected by a development corporation.

Mr TURNBULL—Looking at the big picture: there is a gentleman I know very well, Jack So. He used to run the MTRC in Hong Kong which, as you know, is their subway system. I asked him how they fund their new lines. He said that it is terribly simple: they work out what it is going to cost, they work out what the fare box will deliver—which is obviously less than it will cost—they work out how many square metres of property development they are going to need to make up the difference and then, of course, with Hong Kong being a wonderfully efficient state—it does not have all the issues that we do; the government owns most of the land—they just go to the government and say, ‘Give us this land around the stations.’

Prof. Newman—That spectacular finance centre building in Hong Kong was built by the railways. It helps to fund their rail system.

Mr BROADBENT—You talked about the rating system. Did it happen here?

Prof. Newman—I do not know the mechanism there.

Mr BROADBENT—Are you saying the easiest way is through the rating system, because the value of those buildings changes? That is fine: I can see how you could gain the income stream from that, but then in this country you have to transfer that income stream from one authority to another.

Prof. Newman—And that is the silo jump. But that should not be beyond us, should it?

Mr BROADBENT—I would suggest to you it is beyond this nation at this time.

Prof. Newman—There has not been any evidence so far. I remain hopeful. Vision cities can bring about these changes, and they are possible. But we have a long way to go. I hope your inquiry can help to raise these issues, because they are the fundamental ones. Sustainability gives us the opportunity to cross these silos and say, ‘Let’s find a new way of doing it.’

CHAIR—Before Mr Glazebrook talks to his slides, I have one comment to make. Toki Corporation is a big rail builder in Japan, and they have a massive development in the west. It builds hotels—cities, literally—on all the spare land around rail. We could do that in the west, because there are quite large areas of gazetted land along rail lines—urban infill.

Mr TURNBULL—That is how they built the railways in America: they are all property deals.

A PowerPoint presentation was then given—

Dr Glazebrook—Thank you very much for the opportunity to brief the committee. A lot of the things I will be saying today will be fairly parallel to the things that Peter has been talking about. What I thought I would do is talk more or less to the terms of reference as I understand them for the committee, a little bit about the environmental and social impacts of transport and the relationship with settlement patterns, about ecoefficiency and affordability issues, something about policy measures, and a little bit about what the Commonwealth might do in this context.

Peter has talked about some of the very extensive multicity studies that he has done right around the world. I believe we need to get even more detailed analysis in the Australian context of how the different modes of transport within our current urban areas perform. I will show you some information I have on Sydney, but I think we need a full-blown study across the whole country. We need to get a good handle on trends over time as well, because things are moving all the time. We need to consider the difference between what it costs the individual user on a perceived cost basis to use various forms of transport, because that is what goes into the decision as to the mode choice for a particular trip. We need to compare that with the overall social cost—the total cost—to society of our transport systems, including all those externalities.

We also need to consider that the type of travel undertaken on different modes in our cities varies quite substantially. I will show you some data on that. The costs to the users for public transport are not only a function of the transport system but also of government social policy and how much they are prepared to subsidise it. The key external costs include things like congestion and air pollution. One externality that is coming to prominence now is the whole issue of parking. Another one that needs more work is the whole issue of noise. I have estimated that, in Sydney, if we add all these various congestion costs together, it is at least 25c per passenger kilometre. I will show you what that means in terms of the total costs for transport.

The NRMA has a very extensive summary of about 500 different cars and all the various costs of running those cars, including the depreciation costs, registration, insurance, petrol and maintenance. The costs range from about 40c per kilometre for light, small cars up to over \$1 per kilometre for luxury vehicles. You will see that the SVUs—the urban assault vehicles—range from about 63c to about 87c, depending on the size of the vehicle.

I mentioned before that the type of travel undertaken in our cities varies a lot. The average car-driver trip in Sydney is about 10.8 kilometres; the average car-passenger trip is about nine kilometres; the average train trip is nearly 18 kilometres; the average bus trip is about 7 kilometres; and the average walking trip is about 1.4 kilometres. We need to consider not just the total number of trips but how long those trips are when we look at what contribution the various modes make to our transport networks and transport systems.

When you add it all up and you look at the perceived costs by different modes, in Sydney it is about 6c per passenger kilometre. That is what the average person perceives when they get in their car. They are really only thinking about petrol costs. They jump in their car and they drive with an average of about 1.5 people in the vehicle across the whole week. They think it is going to cost them about 6c for every passenger kilometre. If they were to travel on the train system,

the average perceived cost, taking into account all the subsidies that go into it, is about 11c per passenger kilometre. On the bus it is about 20c per passenger kilometre.

You can see that from the point of view of the individual it would appear to make sense to use your car. If, however, we look at the remaining costs—the costs in the case of the car are not only the registration and the insurance but the cost of all those externalities that I talked about—all these things would add up to about another 60 cents per passenger kilometre. That is 10 times as much. In other words, when you get in your car you only perceive one-eleventh of the total cost. On the other hand, the costs for train and bus, including all the various subsidies, is about 20c to 30c a passenger kilometre.

Mr TURNBULL—Is the ‘other’ basically the subsidies? Say, for trains, 11c is the fare. Is the rest government subsidy?

Dr Glazebrook—It is government subsidies plus the externalities, because even rail uses energy and produces pollution and all the rest of it. It includes all the externalities’ costs. Overall it is costing us at least one and a half times as much per unit of travel to use cars rather than public transport. But that is not the way the individual perceives it. We have this mismatch between the individual’s response and society’s response.

The problem we have seen in Sydney, as shown by the red line in the graph, is the on-time running. That was running close to the target of 92 per cent up until about 18 months ago, when it plunged to about 49 per cent. It has recovered just slightly since then. That is called peak hours. To be honest, I think that is really an appalling performance when you compare it with, as you mentioned, the MTR in Hong Kong, which has an on-time running performance of 99-odd per cent.

As a result of that we have seen the patronage on the rail system decline somewhat from its peak of 284 million in the year of the Olympics—not counting the extra 19 million carried as a result of the Olympics—to about 273 million last year. So we have seen a decline in the total patronage on the rail system in the last three years. During the nineties, as you can see from the graph, there was a very substantial lift in patronage. That was as a result of the changes in land use, the increased population density in Sydney, the increased number of people living in the inner suburbs and near rail stations, and the big growth in jobs that occurred in the CBD, particularly during 1990.

Peter mentioned speed. Unfortunately, our rail system in Sydney is not performing the way it should be; we have a very slow system. This graph compares the speeds for Sydney, Perth and Brisbane for similar stopping patterns. Irrespective of whether you are talking about trains that stop every 1.1 kilometres or every 1.6 kilometres—it depends on the line and the stopping pattern—trains in Sydney are about 25 per cent slower than those in Brisbane or Perth. We have an antiquated system—from the type of rolling stock we use, to the way the unions run the trains, to the signalling system et cetera. For a whole series of reasons our rail system in Sydney is not as efficient as it should be.

Peter also mentioned that \$10 million has been spent on all the various motorways in Sydney. Three more are currently under construction. The Cross City Tunnel has just been finished. There is the M7, which the federal government is putting money into, and the Lane Cove

Tunnel. For the first time in Sydney's history, three major motorway projects are under construction and more are being planned. What this construction over the last 10 years has done is basically hold the line as far as traffic congestion and traffic speeds are concerned; it has possibly even increased speeds on the roads. Meanwhile, the state government is bringing out a new train timetable in September, which will slow down the trains even further, in an attempt to improve reliability. We have cars speeding up and trains getting even slower and less reliable. So it is hardly surprising that people are making the sorts of choices that they are.

As Peter mentioned, the people running the railway system here do not understand the concept of speed or travel time. They just do not realise that the motorways are working from a financial point of view, because people are prepared to pay for travel time savings. For some reason the railways just do not get it. I do not know why. If we look at settlement patterns, we can see that places like Sydney and to a lesser extent Melbourne grew up around the rail and tram networks during the 19th century and the first half of the 20th century. In the fifties, when the trams were taken away in Sydney, during the peak year about 400 million passengers used the tram system. Even today the state transit buses, which operate in an even larger area than the trams, are still carrying only about 193 million, which is less than half of what the trams carried at their peak. However, there was a period during the sixties, seventies and eighties when Sydney was getting less dense. There was a lot of urban sprawl going on. But in the last decade we are finding that densities are increasing right across Sydney—inner suburbs, middle suburbs and outer suburbs. As a city, we have to fix our public transport system. There is a major mismatch between our transport priorities and what is happening in a land use context.

Mr BROADBENT—Is the infrastructure there to speed up the trains? Are there three lines on each—

Dr Glazebrook—I will come to that with a long-term plan—

Mr BROADBENT—It is one thing to criticise it, but it is another thing if the infrastructure is not there for it.

Dr Glazebrook—As you saw earlier, the problem is the growth in the nineties from 220 million to 270 to 280 million. That was achieved by jamming so many trains on the tracks that the train system was running like a congested freeway system. The problem is that we need more infrastructure. In my view, a key to understanding cities is accessibility—it underpins the relationship between land use and transport. I have just completed a doctorate on that subject. The dark areas in the slide illustrate the highly accessible areas by public transport. You can see how they follow the rail lines. You can see that the whole urban structure of Sydney was built around the rail lines. The most highly accessed areas basically follow those red rail lines out into the suburbs. The intense area in the eastern suburbs has a very high frequency bus service.

Mr TURNBULL—Could I just interrupt there. For the benefit of Mal and Russell in particular, not being from Sydney, all those beaches on the eastern suburbs were connected by trams. Bondi, Bronte, Tamarama and Coogee were all built in circumstances where they had a reliable light rail network.

Dr Glazebrook—That is right.

Prof. Newman—It stands out as not having it now, though, doesn't it?

Dr Glazebrook—Yes, it sure does.

Mr TURNBULL—Yes, indeed. That is why you cannot park.

Dr Glazebrook—On the subject of how we can make our cities more eco-efficient and affordable, we need to look at the whole issue of access to public transport and access in general as a key factor in people's housing choices but also in the environmental outcomes for the city. That is also going to affect housing affordability. We have to face that head on. Basically, land tends to be more valuable around stations, as Peter mentioned, or around public transport nodes. We need to redefine our housing affordability concept to include not just the cost of the house but the cost of accessing all of the various urban services that you want from that house. That means that, if you are right out in the outer suburbs, you can get a cheaper house but you have to run two or three cars, so your total cost of living, including accessing all those things, may well be higher than in the inner suburbs.

One reason why people go out there—partly it is lifestyle related; if you have kids you want a bit of space and all those kinds of things—is that when you go to the bank and you get a loan they look at your income and say, 'This is how much you can have.' Then you look at the housing prices in Sydney and say, 'Well, I can't afford the inner suburbs.' In America they now have new kinds of mortgages which take into account whether you are near a transit station. If you are, you can borrow more because they know your repayment capacity is higher because you do not need to run as many cars.

This slide relates to another bit of research I did for my PhD. I looked at how much people valued accessibility versus other issues in their housing choice. It turned out that location and the ability to get to things—which is another way of saying accessibility—is actually the most important factor. It is even slightly more important than price and affordability in people's overall housing choices. The least important issue for them was the amount of private outdoor space. So we have seen a change in housing preferences from the old days, when you wanted the barbecue and the pool in the backyard. Yes, some people still want that, but fewer and fewer people want that; more and more people want access. What teenagers want these days is to be able to get to the movies, see their friends and go out. It is the cafe society, if you like.

Looking at the environmental side of it, the further away you are from public transport and the less accessible you are, the more energy you will use, principally by car but of course even by public transport. So the red bits there show the energy used by public transport and the brown bits show the energy used by car. You can see that this rises dramatically when you move away from areas of very high public transport access to areas with very low public transport access.

This next slide relates to something Peter mentioned. Strategically, where will our cities be in 10 or 15 years time if oil starts to get very expensive? We have already seen the huge growth in the demand for oil in China. I have just come back from Shanghai. When you look at the 1.3 billion population and look at the rates at which they are building cars over there at the moment, you think, 'What's the world going to be like in 20 years time in terms of demand for petroleum, and what is the supply situation?' We need to think very long and hard about the structure of our cities.

So what do we need in policy terms? We need a fully integrated urban strategy, as Peter mentioned. I think Sydney is really struggling towards this at the moment. It is a bit of a battle. There is a real reluctance by Treasury to fund public transport at the moment in this city, especially rail based public transport. We really need a longer-term vision and we need to be quite clever about using the right mode for the right task. There is no point putting heavy rail into things which do not require it. On the other hand, trying to rely on buses to do things which we should be using light rail for is also not terribly sensible.

We need a fully integrated ticketing information system and fully integrated interchanges. We need to integrate our land use around nodes in the public transport network. We need to use accessibility based zoning, like the Dutch do, to ensure that those activities that need a lot of space but do not generate a lot of people movement can be located near the freeways, but the things that generate a lot of people movement should be near the public transport.

We also need to look at parking policies, road pricing and other measures which can help determine how people choose their mode of transport. A 777-page book called *The High Cost of Free Parking* has just come out of the United States. In it the author has estimated that the total cost of subsidised parking in the US is equivalent to what they spend on their defence force. In fact, there are about three parking lots for every car and, when you look at the land value of all of that, it is quite enormous.

In Sydney alone, there are 135,000 essentially free parking spaces provided by major retail centres. That is a 50 per cent increase in the past 12 years. Virtually all that is free. As you know, if you go to the shops for less than three hours, you get free parking. Essentially, what is happening is, if you are silly enough to walk there or use a bus, you are subsidising the person who drives there. Those multistorey car parks cost Westfield a lot of money to put in but, if you drive there, you do not have to pay for them. Everybody pays for them in the price of the goods, but the point is that, if you go by public transport, you are subsidising the car driver.

We need to move to real-time road pricing to cover the environmental congestion and other external costs. London has broken the ice with the congestion-charging scheme. A lot of cities are now starting to look at that kind of approach. This graph is care of some of Peter's excellent data. It shows about 40 cities in advanced countries around the world, looking at what sort of densities they have and whether or not they have full-blown metro systems like London, Paris, New York or Moscow. You find that, generally, there is a threshold above about 60 in activity density, which is the number of people plus the number of jobs per hectare. Above that level, almost all of those cities tend to have full-blown metro systems.

Sydney's metropolitan-wide activity density is sitting on about 24, so we are pretty low density on a world scale. You can see on this slide that Sydney is the red line in that list of cities. The yellow lines represent the other Australian cities, which are even less dense again. So, in a world context, we are very much low-density cities. If you look at light rail systems, however, you find that all the way down that spectrum there are cities with an activity density of well under 20 with light rail systems, so you do not need as much density to justify a light rail system as you do to justify a full-blown underground metro system.

What do we need for Sydney? In my view, we need a high-speed rail network for the outer areas, given that it is 60 kilometres to Penrith and it is 80 kilometres to the Central Coast. People

have been commuting these sorts of distances for a long time. What is happening now is the rail system is slowing down, people are building parallel freeways or motorways, commuters are transferring from those rail lines across to cars and it is creating major congestion problems. We need a modified metro-style service for the middle suburbs which operates at very high frequency. The issue when you are not travelling so far is not so much how fast you go but how long you have to wait. If you are only going five or 10 kilometres, there is no point having a fast service if you have to wait 20 minutes until the next service.

For the inner suburbs, we need a light rail network. We also need cross-regional and local demand-responsive bus services. With regard to the issue you raised before about how we get to the transport hub, we need these new kinds of demand-responsive services. Some of you may know that in Canberra they are about to replace the fixed route ACTION bus services in the evenings. They have created 19 zones in Canberra and at night you will be able to be driven to the nearest bus stop in your suburb or, if you ring up, you will be able to be picked up at the nearest bus stop. That is one stage away from full door-to-door delivery. That is quite an innovation in Canberra, but there are quite a few places around the world where they use demand-responsive multihire buses and taxis to pick you up at your home and drop you at the nearest station. The Netherlands have had a system for many years—

Mr BROADBENT—While you are talking about those issues, why haven't central Melbourne, central Sydney and central Brisbane—not so much Perth—made public transport totally free in those areas? The cost of subsidising it in the inner-city area relative to the whole process would reduce the number of cars. The ticket value price coming in as compared to the cost of running the system for a day is chicken feed.

Dr Glazebrook—State Rail generates about \$560 million a year from fares.

Mr BROADBENT—From commuting fares, not from inner-city fares.

Dr Glazebrook—Do you mean just in the city itself?

Mr BROADBENT—I am talking about the inner-city—the CBD of Melbourne.

Dr Glazebrook—That is what they do in Perth. They have done it for years. They subsidise it.

CHAIR—Yes, but that is a free bus or boat trip.

Dr Glazebrook—And also all other buses and trains. They have subsidised that from parking for probably at least 15 to 20 years. They could possibly do that. That would need to be looked at in terms of what the actual revenue costs would be, but it would run into several hundred million dollars a year.

Mr BROADBENT—But as a transport expert, wouldn't you then say, 'Hang on, there is a consumer benefit here, there is a retail benefit here, there is a tourist benefit here, there is an international tourist benefit here'? Wouldn't you have to equate all those costs back against it that are currently not taken into the equation?

Dr Glazebrook—Provided you can then find a way to fund the public transport. What we probably need to be doing is increasing the price of cars, like London with their congestion tax, and using that money to cross-subsidise public transport. But money does not grow on trees; you have to find some way to fund things. I will talk in a minute about the likely costs to build a world-class public transport system in Sydney. It is not going to be cheap. It will probably cost—over and above what the government is spending now—an extra \$500 million a year for 30 years.

Mr BROADBENT—Can you answer this question: in Sydney specifically, is there infrastructure in place that allows for stop-at-every-station transit plus express transit from outer areas?

Dr Glazebrook—There is not enough. I will show you a map in a second that will perhaps explain that. Just to continue: we talk about accessibility zoning. We need affordable housing policies. In the US, for example, they have approaches that say, ‘Yes, we’re going to have transit hubs and development around transit but, as part of that, we’ve got to ensure there’s some affordable housing in those transit hubs as well.’ Of course we also need to look at pedestrianisation, cycling strategies—the sorts of things that Europe is very good at—and, as I mentioned, metropolitan-wide road pricing. We have not got clear enough ways in which people can see where the money is going. There have been big surveys done in Sydney that show people are prepared to spend more money on transport, but they do not want general taxation as they do not know where the money is going. They cannot see it. We need to identify funds so that people can say: ‘This is a sustainable transport fund. It is going to be spent on these things, and we can actually see where the money is coming from and where it’s going to.’

This slide shows the rail network in Sydney and my proposal for where we should be in 30 years time. The green lines represent the high-speed rail overlay, which is essentially what they did in Paris with their RER system. Some of those routes are new and some of them are extensions or the quadruplication of existing systems. Essentially there are the long lines out to the west, to the north-west, and there is a new high-speed line to the north, and the green line to the south-west is using two of the tracks that are part of the existing East Hills line. They are long-haul corridors for which we need to have a high-speed rail system. The orange lines indicate the shorter haul, all-stations, high-frequency metro style services that we need, and the remaining black lines represent the traditional double-decker suburban carriages that we have in Sydney.

That network will service the big new areas in the north-west and south-west of Sydney, the big new growth zones, as well as areas like Macquarie and Macquarie Park, which are going to grow very rapidly; the areas around the airport; some of the key centres—Parramatta, Burwood, Chatswood, Liverpool and so forth—and other areas like Homebush Bay. It is a network to service the growth areas of Sydney but also to increase the capacity of the total system. That total network, if built in the next 30 or 35 years, would ultimately give you about an 80 to 90 per cent increase in capacity on your total rail system. It goes well beyond what the current plans are, although some items are included in the current plans. In the inner suburbs the distances are much shorter. We are talking about less than 10 kilometres. What is proposed there is a network of light rail lines—some of them similar to the old tram networks; some of them a little bit different—feeding back into the city itself and allowing efficient transport up and down the main spines within the CBD. Melbourne is very lucky in that sense; it has a very good tram network

right through the CBD. Sydney used to have it, but of course it was all taken away, so the city is now jammed with 7½ thousand buses a day travelling through it.

Mr TURNBULL—I want to ask you about the light rail that you propose. The eastern corridor is running down Bondi Road to Bondi Beach. Isn't there a problem, though, with having a light rail service at grade—that is, at street level—in streets where there is already a fair amount of traffic? Even if you take the buses off, there is still likely to be fairly high car traffic, given the density of the population. Is it really feasible to have light rail? I am old enough to remember when we had trams in Sydney, as you probably are too. They took them off partly because of traffic congestion. That was one of the arguments anyway. Won't you have the same problems if you have light rail at grade?

Dr Glazebrook—The stretch from Bondi Junction down towards Bondi Beach?

Mr TURNBULL—Yes.

Dr Glazebrook—You are right; there is a bit of a congestion problem there. However, I think the issue is that we have to start getting some priority space for public transport. As Peter was saying, we will only get people to use public transport if it is time efficient for them to do so. We have to find ways of reducing the amount of space for cars in Sydney. We are currently trying to solve the problems as though we are treating someone who has heart disease—we keep going for another bypass operation. But how many bypass operations can you have? You really should be changing your diet. We really need to be changing the way we get around our cities. If it is going to become a little bit more congested by car, I am sure that people right down on Bondi Beach would think that was a good thing—it will keep some of those dreaded tourists and others away from Bondi Beach. There is enough space from Bondi Junction into the city, though. It is mainly a six-lane road.

Mr TURNBULL—That is the one running along Anzac Parade?

Dr Glazebrook—That is one bit of it. The other one from Bondi Junction would be Oxford Street.

Mr TURNBULL—It has been put to me by some engineers that it is actually cheaper to build a tunnel for light rail than to put it at grade on a street, because of the cost of digging up and relocating so many services. First, is that right? Second, is there a drop in patronage if the light rail service is underground as opposed to being at grade?

Dr Glazebrook—On the first point: in general no, it is not cheaper to build it in a tunnel. There may be some situations where it might be. For example, you may be able to see that that network on the slide has a little orange bit called 'W2'. It is a very short tunnel under Piermont, which is only a few hundred metres. It would cut out the big loop around and make things much faster for people coming in from the inner west. There are certain situations where a tunnel might be the best thing. You need to look carefully at the engineering in each case. If you look at the cross-city tunnel that has just been completed in Sydney, it is 2.1 kilometres long. That is \$680 million for two lanes in each direction plus associated connections to the Eastern Distributor. A two-lane road tunnel is \$150 million per kilometre.

Looking at rail tunnels, the airport rail link was 10 kilometres and cost \$900 million, including stations. Again, you are looking at around \$100 million per kilometre. Tunnels are very expensive. It is true that services in the ground are expensive to relocate. That is one of the reasons why light rail is obviously not as cheap as buses—but, having done it, it lasts for 60 to 80 years or beyond. It is just that you have to be prepared to put some money into the system. The total network there is estimated to cost \$1.5 billion, which is not a huge amount in the scale of things.

Mr TURNBULL—You didn't answer that other question of patronage at grade versus underground.

Dr Glazebrook—One of the big advantages of light rail as opposed to an underground metro system is that you are close to the shops, close to where the people want to be, and there are stops every 600 metres or so. When you go to underground metros, they are suitable for very high volume movements. All the big cities around the world have metros that tend to move 20,000, 30,000, 40,000 and even 50,000 or 60,000 passengers per hour. It is interesting that in Hong Kong, the MTA used to handle over 50,000 to 60,000 passengers per hour per direction. However, because of the growing affluence of people in Hong Kong, they are not prepared to crowd into the trains the same way and they have found that there has actually been a reduction in the amount of people they can carry per hour on their trains. But they still carry very large numbers. If you are carrying 40,000 people per hour, or even 20,000 people per hour, then an underground system is probably the way you want to go. If you are carrying 4,000 to 8,000 then on-street systems are probably the way to go.

In England they have done a series of studies on the seven light rail systems there and have found that light rail is cheaper than buses overall, including operating and capital costs, for routes for more than 2,000 passengers per hour per direction in the peak. As Peter mentioned, there are now 100 cities worldwide that have built or have reintroduced light rail systems since 1994. I have just come back from Shanghai, where they are building a huge network. Some cities are also building bus based systems, but the issue with buses is what do you do with them when they get into the centre of the city. Some cities have now stopped building freeways and have even pulled a few of them down. We are falling well behind, particularly in Sydney, with our competitors in the Asian region in terms of efficient overall urban transport.

Here is a list of some of the cities around the world that are building new, light rail systems and a few that have put in guided buses. This slide shows the Maglev system in Shanghai which is the fastest rail system in the world. You can see there: 1,640.000 kilometres an hour—that is just before the thing started; 1,643 in 17 seconds—it is doing 431 kilometres an hour. Basically the thing speeds up for three minutes, cruises at 430 kilometres an hour for a minute, slows down again for three minutes—

Mr TURNBULL—Where does it go?

Dr Glazebrook—It goes to the airport from the Pudong area, but the problem is that it does not go right into the city. It stops about six metro stops short of the actual city. I think the Chinese are still working out whether the cost of the transrapid type set-up is worth it or whether they will go with conventional high-speed rail such as Taiwan and Korea have. I suspect they will probably do the latter because it is cheaper. But the Chinese are not only building

conventional long-distance rail. The metro in Shanghai will be twice the size of the London metro by 2020.

Mr TURNBULL—It took the Brits 100 years to build, and the Chinese will do it in 25 years.

Dr Glazebrook—It is just amazing. So what do we need in Sydney? I have estimated that we need \$500 million per annum extra—over and above the amount of the government subsidy for the public transport system at the moment—over 30 years to build a full-blown, world-class public transport system. But how do we fund it? Let us have a look at that. In 1999 2½ billion car trips were made in Sydney—billion. Imagine that you had a system in which every time you turned on your ignition it cost you 10c. The government could collect that 10c, and that would give \$250 million per annum. That is halfway there. That is only 10c every time you turn on your engine.

In the last few years in Sydney we have been building about 22,000 extra houses and units every year. Even if we went back to a levy of only \$10,000 a lot, rather than the \$50,000 they are talking about, we would raise \$220 million per annum. That is only two per cent of the cost of housing in Sydney. The median price is over \$500,000 in Sydney. We have 135,000 free car parking spaces, as I mentioned. And that is just in retail centres; I am not talking about office blocks or anything else. If we had a daily levy of \$5 per space, which would probably be only about \$2 per customer, that would generate \$240 million annually. If we were to put a 20 per cent increase on the public transport fares for the rail system we would get another \$52 million. So there are lots of ways of getting that \$500 million; it just requires a bit of political will.

The Commonwealth could really come in here. They are already pumping money into the M7 freeway in Sydney, which is ostensibly to carry trucks but, of course, it will also carry lots of cars. There has been talk about the freeway in Melbourne, but I do not know whether that has been finally sorted out.

Mr BROADBENT—It is a way; it is just not free.

Dr Glazebrook—There is no funding really at the moment coming from the federal government for urban rail transport—none whatsoever. There are all sorts of things that the federal government could do. They do not have to fund the whole of these systems. In the US they traditionally fund at 80 per cent of the capital cost of new systems, and they are talking about reducing that to 50 per cent.

Mr TURNBULL—Could you say that again, Garry. Are you saying that, in the United States, new light rail networks are typically funded by the federal government at 80 per cent?

Dr Glazebrook—That is as it used to be. They are now talking about reducing that percentage, I think to 50 per cent, with the remaining money to be raised by city governments or state governments.

Prof. Newman—It is usually raised through sales tax.

Dr Glazebrook—Usually it is through sales tax, but in some cases it is through fuel taxes. In some cases it is through zero based bonds. They will say, 'Here is a district around the station'—

it might be an 800-metre radius—and they value all the properties in that district. Then they say, ‘We will issue bonds, raise money off the markets, and we will repay those bonds by the increase in increment in land value that occurs in that zone around that station.’

Mr TURNBULL—But the land does not belong to them so how do they get that value?

Dr Glazebrook—As the land goes up in value the rate increase goes up, so the rates derived from the increase in value get put into the fund and are used to repay the bonds.

Mr TURNBULL—I understand.

Dr Glazebrook—But there are also other things the federal government should do. In particular, if they were prepared to put some money into public transport then they could actually leverage that money by saying to the state governments, ‘Look, we’ll give you some money, but let’s have a nationwide smartcard system for all public transport, so if you live in Sydney you can get off the plane in Brisbane and use the same smartcard.’ At the moment we cannot do that because all the systems are different.

They could have—as they do in the Netherlands, in Germany and in other countries—a nationwide public transport information system where, for example, you get out your mobile phone and you can find out when the train is going to take you from A to B. They could have demonstration projects to fund demand-responsive transport, including projects in rural centres, or they could have new types of PRT systems. They could look at the introduction of road congestion pricing. Federal Treasury is always very interested in economic efficiency. We know that the fact that roads are cheap or free to the user in these congested cities is not an efficient way to price road space.

So, basically, there are a lot of things the federal government could do. If it were prepared to put some money in, I think it would have some bargaining leverage with the state governments. We have got to remember that our cities are predominantly places where not only people live but also a lot of the wealth is generated, and for cities like Sydney, Australia’s world city—Melbourne might like to differ—essentially we have to be competitive in a world sense. If we are going to continue to attract tourists, incoming investment dollars and all the rest of it, we have to have a very attractive city. We cannot just rely on the fact that we had the Olympics here in 2000 and we have a nice harbour; we actually have to have an efficient city to do business in. Thanks very much.

Mr BROADBENT—The debate over transport and the use of transport in capital cities has really been held by the environmental extremists—bike riders, hippies, train buffs and those sorts of people—hasn’t it? That is my first question. My second question is to do with social issues. Professor Newman raised earlier the issue of road rage and how it is affected by distances travelled. We have gone to a place of car based shopping centres and we have dropped them from local strip-shopping centres, which were more socially interactive. Mr Turnbull raised the issue of light rail being more approachable for locals—which you raised, Dr Glazebrook. The third thing I want to say is that some close and dear friends of mine drive V8 motor vehicles, and something the federal government could consider is providing a \$1,000 subsidy for all people driving four-cylinder motor vehicles—of course, it would be very hard to tow a boat.

Dr Glazebrook—Your first point was about the lobby, I guess, for public transport. I think to some extent that is right; it has been talked about in environmental terms, social terms and so on for years. But the sort of research that Peter has identified is: what is the full cost to a city? We are talking in economic terms here. What is the real cost of running a transport system, of providing accessibility in your city? We need to look at that and, again, I think the federal government has an interest in that. There are an awful lot of things the federal government has done in the last 10 to 15 years looking at the efficiency of the economy, be it competition policy, deregulating pharmacies or whatever. It is always interested in how we improve the efficiency of the system. We need to take that global view about how efficient our cities are as cities. To do that we need to take the integrated approach: ‘How does our transport work, how does our land-use work and what is the most efficient way to run our city?’ That is a real economic issue.

Mr BROADBENT—I am trying to get you to make the point that the arguments and the issues have not been owned by engineers and economists and professors and doctors like you.

Prof. Newman—And the specialist community. That is shifting—rapidly shifting.

Mr BROADBENT—And the social question on the light rail?

Dr Glazebrook—Were you asking: ‘Would light rail help these strip-shopping settings’—is that what you were saying?

Mr BROADBENT—I am really talking about basic social interaction between people, and how they interact. What we have done to date is move a lot of people from that point to that point. We get them to drive their car to go to what is described as a regional shopping centre, which is far less interactive for people than a strip-shopping centre and light rail once were.

Dr Glazebrook—I think that is a good point. After all, we are social animals. Why do we live in cities? It is not just about their economic value; I think it is also about the social interaction, and that is going to become more important with our ageing society and with more and more people living on their own. I think that is one of the reasons why the cafe society, if you like, has taken off. More people live in apartments, as they have for years in Europe, and in smaller housing units they are very isolated. They need to get out and interact at that local community level. It is terribly important to build up local community in our cities. There are huge social benefits in that. Isolation is a big problem and it will become a much bigger problem. So I agree with you on that.

CHAIR—We had better wrap up. Dr Glazebrook and Professor Newman, thanks very much. It was a great presentation and we enjoyed it immensely.

Prof. Newman—We appreciate being asked to appear. It means a lot to us.

CHAIR—Before we conclude, could a committee member move that the presentations given today by Marsden Jacob Associates, and by Professor Peter Newman and Dr Garry Glazebrook be accepted as evidence and incorporated into the committee’s records as exhibits.

Mr TURNBULL—So moved.

Mr BROADBENT—Seconded.

CHAIR—The motion is carried. We also need a motion for publication of evidence.

Resolved (on motion by **Mr Broadbent**, seconded by **Mr Turnbull**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 11.32 a.m.