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TRANSCRIPT OF PROCEEDINGS

PRODUCTIVITY COMMISSION

INQUIRY INTO ENERGY EFFICIENCY

DR N. BYRON, Presiding Commissioner
PROF M.C. WOODS, Commissioner

TRANSCRIPT OF PROCEEDINGS

AT MELBOURNE ON WEDNESDAY, 24 NOVEMBER 2004, AT 9.51 AM

Continued from 22/11/04 in Canberra

DR BYRON: Good morning, ladies and gentlemen. Welcome to the public hearings of the Productivity Commission's inquiry into energy efficiency. My name is Neil Byron and I've been appointed the presiding commissioner for the purposes of this inquiry, and my fellow commissioner is Mike Woods.

This inquiry started with reference from the Australian government on 31 August this year and covers the potential economic and environmental benefits offered by measures to enhance energy efficiency. We've already talked to a wide range of organisations and individuals with an interest in the issues. Submissions have been coming into the inquiry following the release of our issues paper in September.

These hearings are part of our transparent process for collecting evidence that provide an opportunity for any interested parties to present to the commission any evidence that's relevant to our terms of reference on the public record. We've conducted public hearings in Sydney and Brisbane last week, and in Canberra on Monday. We'll be having video-links to people outside of Melbourne, on tomorrow's program, I think. We're working towards completing a draft report for public comment by end of March, early April next year. We'll then undertake further public consultation with interested parties after they've had time to read that draft report.

We like to conduct all hearings in a reasonably informal manner, but I remind all participants that a full transcript is being taken. For this reason, comments from the floor are not helpful, but at the end of the day's proceedings I will provide an opportunity for anyone who wishes to do so to come forward and make a brief presentation. Participants are not required to take an oath but they are required, under the Productivity Commission Act, to be truthful in their remarks. Participants are welcome to comment on any issues raised in other submissions or in oral presentations.

The transcript will be made available to participants for verification and then will be available from the commission's web site as soon as possible following the hearings, and the copies can also be purchased using an order form that's available from the staff here today. The submissions are also available on the web site or by order form.

I'd now like to welcome Mr Rick Brazzale from the Business Council for Sustainable Energy. Thank you very much for the submission. If you'd like to briefly summarise the submission, take us through the PowerPoint presentation, and then we'd like to ask you some questions about the issues you've raised. I'm allowing about 45 minutes for this, before the next presentation. So thank you very much.

MR BRAZZALE: Thank you very much, commissioner. What I'd like to do is go through a brief presentation, but I thought what I might do is just quickly explain

who the Business Council for Sustainable Energy is. We are a not-for-profit industry association representing the broader sustainable energy industry, but also including suppliers of energy efficiency products and services, and that will include cogeneration project proponents, energy performance contractors, solar water heater industry as well as insulation industry and the like.

Your inquiry is extremely important to our industry and, I suppose regretfully, we have only just recently put in our submission. Part of the reason for that was, because of its importance we were keen to make sure that it was substantive and we commissioned Allen Consulting Group to do quite a bit of work, and it took a little bit longer than we'd like. We've actually formally tabled it, and I have another copy here if you want it, but you have it there. What I'd like to do is quickly go through a bit of an overview of why we think it's important and then touch on the key issues out of the Allen Consulting Group report that we think are important for your deliberations.

The content of my brief presentation is as I have it there. I'd like to just quickly touch on the energy and greenhouse framework that we're all working in, talk about what we consider to be the very limited scope of the Productivity Commission inquiry, look at the energy efficiency gap and then policy options to close the gap.

To put energy supply and demand into some sort of context, this is a chart from the Commonwealth government's energy white paper that was released in June. It shows the power demand and supply shortfalls. You can see the top of that line is the expected growth in electricity consumption, and by 2050 it's expected to be more than three times greater than current electricity consumption, and you can see the green component there is an indication of the new generation investment required. We're talking about a substantial increase in electricity consumption and we're talking about substantial increases in new generation investment. This doesn't even pick up the transmission distribution.

When we look at what's required even over the next 20 years or so, again from the Commonwealth's energy white paper, $37 billion of new investment. A lot of that is also going towards meeting a significant growth in peak power demand, which is putting pressure on infrastructure. That's caused by a significant increase in the sale of airconditioners. Just as an example, over the next five years New South Wales alone will be spending $5 billion on network investment; that doesn't include generation.

Looking at greenhouse emissions, this is a chart from the Australian Greenhouse Office. It shows pretty well where the government thinks we are at the moment. Existing government greenhouse measures have resulted and will result in what is a significant reduction in greenhouse emissions. So the point here:

greenhouse gas is important, climate change is important, the Commonwealth government is spending considerable efforts to deal with it, as are state governments and local governments for that matter.

The maroon part shows the current trajectory with existing policy measures. As you can see, we're on target to meet our 108 per cent Kyoto commitment, but we've got a problem thereafter because we still have an upward path on greenhouse emissions. You might not be able to see that too well, but we need to change the trajectory of that line, and there's a significant additional abatement task that we need to meet.

Under the Clean Energy Future study that we've also provided to the commission as part of our submission, we looked at how we could significantly reduce greenhouse emissions from the stationary energy sector and we targeted 50 per cent reduction. I won't go into the detail of the study now, but we're happy to do that if the commission feels the need. But the important point there was that energy efficiency was going to have to play a significant role in actually bridging that emission gap, so we're going to be talking about an energy efficiency gap but there's a significant emission gap that Australia is facing, and energy efficiency will be critical, as will fuel, switching away from coal-fired generation which accounts for 80 per cent of Australia's power generation and we'll need to switch that to gas-fired generation as well as renewables.

As part of the Clean Energy Future study we looked at the major energy consuming sectors, and we've looked at where we are at the moment, which is the blue bar; under a business-as-usual approach, where we would be in 2040, which is the maroon bar; and then adopting what we consider to be medium-type energy efficiency measures, which is the light-coloured bar. Importantly, the residential commercial sectors in particular show the greatest scope for energy efficiency improvement. Energy-intensive industry: by definition, energy costs will be much more significant to their bottom line, therefore it will be a greater focus. We don't see as much improvement over time. However, there's an important caveat there. In this analysis we looked at cogeneration as a supply-side measure, not a demand-side measure, and there's significant scope for cogeneration, which could be considered an energy efficiency option as well.

Turning to the limited scope of the Productivity Commission review, we think this is a real problem with the task the commission has, and unfortunately the commission has to deal with the scope that it's given, but we think that it's critical for the commission to articulate the effective limited scope of its review. So we believe the commission will probably only consider that small yellow component, which is looking at market failures, addressing market failures which are cost-effective for individuals. It probably won't look at the potential for cost-effective energy efficiency for individuals and firms, where addressing barriers that may not be

market failures and then finally including externalities such as the cost of greenhouse emissions would mean that the potential for cost-effective energy efficiency is much larger.

So we think it's important that the commission clearly articulates the limited scope of its review. Just to put that in some context, I mentioned that there are significant Commonwealth and state government measures to deal with greenhouse. We have programs like the Mandated Renewable Energy Target. We have minimum performance standards for residential homes at the state level, let alone the Australian Greenhouse Office spending a billion dollars on greenhouse. Other government agencies, including AusIndustry, will be spending another half a billion dollars on greenhouse support for technology developments.

We already have the New South Wales benchmark scheme, which creates a value for carbon, up to $15 a tonne. The point we would like to make is one of the Commonwealth government's preferred options to dealing with greenhouse is geosequestration, which is the capture and burying of CO_2 underground. We estimate that that will be a significant cost above the cost of producing the power, and it could be more than $40 a tonne. So there's a massive loss of community welfare if we don't take steps to capture the cost-effective potential of energy efficiency.

I might say this point is effectively recognised by the Productivity Commission already in its recommendations on the National Competition Policy. Just a point that's worth noting - and again the commission stated that water pricing should reflect environmental externalities, and there should be national coordination of greenhouse gas abatement policies. I did want to just take the opportunity to quote to you one of the points in the commission's report.

PROF WOODS: We are passingly familiar with the documents, but proceed anyway.

MR BRAZZALE: Okay. But I think it's worth pointing out.

> While practices should as much as possible reflect the so-called externalities or the true environmental costs of delivering water -

and there we could also read "energy" -

> the commission acknowledged that pricing alone was not enough to ensure allocation was efficient.

Again, we think that's an important point for energy efficiency as well.

> As in the energy sector, full externality pricing is at best a longer-term goal. Governments should therefore consider other ways to manage water use, such as developing trading regimes and even introducing regulatory controls.

We're down that path with energy, just looking at schemes like BASIX and others, so we think if we don't price externalities then that will lead to a suboptimal level of investment in energy efficiency. Again, this is an important consideration for the commission.

I would now like to turn to some of the specific points that were covered in the Allen Consulting Group report, where we sought to look at the energy efficiency gap. In other words, start to look at the market barriers. Again, we believe there's a suboptimal level of investment, due to market and organisational barriers, and we can break those down into two sectors: barriers in the market for energy efficiency, which we'll touch on, but also barriers in the market for energy itself. The energy market effectively competes with energy efficiency.

The point we would like to make is that we believe that policies are available to actually reduce these barriers, increasing welfare, and to that extent we can consider those to be market failures and worthy of consideration. Looking at the energy market, there are really two areas. There are incorrect relative prices, and again there are two components of that where we see energy prices are set below incremental costs. That's particularly relevant for meeting peak load, and also relevant for rural energy use.

In addition, there's inadequate consideration of alternatives to network augmentation, where there are numerous case studies of how the current regulatory arrangements work to just continue to reinforce existing supply-side options rather than looking at demand-side options. Finally, the point we've already touched on is there's no incorporation of a cost of carbon, but there is in fact a cost of carbon in New South Wales, which is through the New South Wales greenhouse mechanism.

We can look at barriers in energy efficiency, I suppose, through a continuum. Some barriers can represent market failures, some may represent organisational failure, and others can just represent rational behaviour. But all of those work to actually limit the uptake of energy efficiency, and we believe need to be addressed, and there are certainly policy mechanisms to address those and deliver improvements in economic welfare.

The commission may limit its consideration to the top part of that continuum, but from an overall policy perspective, if we don't address even the bottom ones - even the barriers that may represent rational behaviour - we are sort of leaving economic welfare on the table, and other sectors of the economy are going to have to

bear additional cost in reducing greenhouse emissions. I won't go through all of the detail. These are discussed at length in the report.

Looking at policy options, we think it goes without saying that we should aim to close the energy efficiency gap and address market failures at source. We can do that through ensuring we have appropriate relative prices, overcome information failures and then also deal with organisational barriers. The reality is that for political reasons, or other reasons, that may not always be possible, so we will also need to consider what we would call second-best options.

We've put forward a five-step process that we believe will start to address the barriers and market failures as we've articulated, and seek to deliver the potential that energy efficiency has. Just the key five points there: we need a cost of carbon, and there's a couple of ways we can do that; we need to address some of the energy market barriers, particularly in the electricity market, and those are through the price issues we talked about, but also distribution regulatory arrangements; we think it's critically important to regulate for minimum energy performance in the built environment. That's for residential and commercial buildings. Whilst we can say that a broad based carbon price will start to drive investment in energy efficiency for energy-intensive energy, where energy costs are relatively low for residential and commercial customers, we'll need other measures like regulation.

To reduce transaction costs and support a more market-oriented approach to energy efficiency, we need to develop an energy efficiency industry, or an energy services industry, or some such thing. We also need to drive much more efficient energy use in manufacturing, and that can be done through support mechanisms that have proved successful to date, like the SECA Building Energy Innovation Initiative, as well as pursuing more aggressively some of the mandatory approaches like, again in Victoria, with the EPA requirements.

I've just got a couple of slides on setting an energy efficiency target, which we think is really important. Out of the Clean Energy Future study, we've identified that we could readily halve the rate of growth of energy consumption to 2040, and we believe that could make for a realistic target. We would need interim targets, and we would also need sector-specific targets, particularly for electricity. The reason for that is that electricity is much more greenhouse intensive than gas, and we need to be very careful when we just add petajoules of gas and petajoules of electricity - very important. So we need sector-specific targets.

We've just tried to quantify the sort of value we might be looking at, even if we were able to reduce energy consumption by 1 per cent per annum over the next 20 years or so, and tried to get a handle on the sort of level that would be, and it's about 36 terrawatt hours, divided by 20. Based on current average electricity prices to customers, it would be building up to an annual savings of $3.5 billion in 2020.

So that just gives some sort of feel for the scope and the potential. But I might add there are other groups that have sought to value what the potential for energy efficiency is , and I refer you to the National Framework for Energy Efficiency analysis there.

I have another suite of slides that are going through our policy recommendations in more detail, but I'm not sure whether it's worth going through those or stopping now.

PROF WOODS: We will probably come across them in our conversation.

DR BYRON: If we don't cover any of these things, I'll give you another chance to come back to them later.

MR BRAZZALE: No problems.

DR BYRON: But I think we'll probably be exploring most of those anyway. Thank you very much. I probably should respond first to the two points about the terms of reference. They are what they are, what we were given. We have explained on a number of occasions that although we will be looking firstly at measures which are cost-effective for individual consumers, the reason for doing that is to understand what these barriers are. The assertion has been made repeatedly that there are billions of dollars of savings out there, things which are cost-effective today purely on a commercial basis for the individual and, for whatever reason, individual businesses and households are not doing these things which seem to be self-evidently in their own best interest.

My understanding is that before we move to the second, much more difficult question of how to get people to do things that aren't in their immediate self-interest, let's explore that first question of: if there are all these savings, why aren't they being adopted? What are the barriers to that? If we can understand those barriers, we then will be in a far better position to go to the more difficult second question. But we're not going to get anywhere with the second question of trying to get people to adopt measures which will cost them, for the sake of the environment or the broader society, if we can't get them to even adopt measures that will save them money. So that's my understanding of where the terms of reference take us. I'm not sure at this stage how far we'll go into exploring other measures which are not immediately cost-effective, but maybe if you include social and environmental issues - but we were planning to at least have a look at that. So I think your fears are a bit exaggerated there.

The other point, just on your introduction, was that the quote about water market is not from our National Competition Policy report. It's about our National Competition Policy report. The commission has also recently published a research

paper on the difficulties of using prices to incorporate environmental externalities in rural water use. Anyway, those are just two points of clarification. Mike, did you have another introductory question?

PROF WOODS: Yes, just on the terms of reference. You actually had three sort of ellipses. The first one was what's cost-effective for producers and consumers focused on market failures. But then you had a brown group which was sort of still beneficial to individuals, but relating to other barriers. I wasn't quite sure of why you drew that distinction. I mean, if it's still cost-effective, and we can solve it through information or mechanisms or by removing the worst-performing components out of the marketplace, through mandating some other regulatory behaviour - I'm not sure what point you were trying to make by just distinguishing 1 and 2. I understood 3, and Neil has addressed that quite well.

MR BRAZZALE: I suppose the issue as we saw it - and it could be that we are needlessly concerned about the scope of the commission's inquiry - but we've distinguished between barriers that were market failures and barriers that weren't market failures, and - - -

PROF WOODS: Based on the terms of reference?

MR BRAZZALE: Yes. There were two distinctions, and then also, if you like, addressing barriers that were beyond the individual; ie, there could be net benefits to the economy.

PROF WOODS: Yes.

MR BRAZZALE: And then there are net benefits by including the externality. So we've probably combined a couple, but the two aspects were the barriers that may or may not be market failures and then the cost-effectiveness to the individual and then to the economy as a whole. There will be some winners and losers. So there are those two components.

PROF WOODS: I think it's easier to see it in two groups: those that are cost-effective to individual producers and consumers and then where there are externalities to the broader society that might impose costs. So I'd in effect combine 1 and 2 in your categorisation, because we intend to fully explore pricing, information, regulatory barriers or initiatives that can address our particular terms of reference, and as my presiding commissioner reminds us, we'll also be looking at the context of the broader issue.

MR BRAZZALE: Is that to include the cost-effectiveness on an economy-wide basis as opposed to just - - -

PROF WOODS: The first lens for us is cost-effective to individual producers and consumers. If there are externalities that have societal benefit, they are outside and are contextual, but not the core of our terms of reference.

MR BRAZZALE: How do you define the individual consumers? Do you define them as one - - -

PROF WOODS: "In their own self-interest" is a pretty good definition.

DR BYRON: Individual decision-makers.

PROF WOODS: Yes.

MR BRAZZALE: Okay. So still leaves the cost-effective measures across the economy?

PROF WOODS: Yes.

MR BRAZZALE: Which then you leave out.

PROF WOODS: But that's a different way of cutting up than what you've portrayed there.

MR BRAZZALE: Yes.

PROF WOODS: My next introductory question, if I can, is the relationship between your organisation and Environment Business Australia. I get a little confused as to who does what in this patch. Is there any crossover or commonality?

MR BRAZZALE: We share an office in Canberra.

PROF WOODS: Yes, I understand that.

MR BRAZZALE: But not really, no.

PROF WOODS: So how would you best describe your bit and their bit?

MR BRAZZALE: We focus exclusively on stationary energy and pretty well cover most aspects of stationary energy. We won't cover water waste, won't cover transport use. We focus on the stationary energy sector and we have members across that spectrum. Important to the development of the sustainable energy industry is policy and response on greenhouse, including international issues like ratification of Kyoto, introducing emissions trading and the like, and that tends to be the area where we have some overlap with the EBA, Environment Business Australia. EBA, as I

understand it, cover the broad spectrum of sustainable industries and sustainable development, including water waste, land use and aspects of energy.

PROF WOODS: The whole building envelope and the whole - - -

MR BRAZZALE: Yes, and Fiona, when she's dealing with energy, will tend to focus on the higher-level greenhouse Kyoto issues, but will tend to not get into any detail on energy.

PROF WOODS: Thank you.

DR BYRON: So they defer to you on that area?

MR BRAZZALE: Yes.

DR BYRON: That helps a lot. Just coming back to the discussion we were having, I referred to one of your slides about the different types of barriers. It seems to me that the most critical question that we have to try and answer is, if indeed there are these huge potential savings out there that companies and households are not picking up, why on earth aren't they, and how might they be persuaded or encouraged or compelled to do so? So we're looking at these barriers and impediments. You had a breakdown on one of the slides of the various sorts of barriers. There was one category where the barriers are based on the rational, that there's some perfectly sensible reason why companies or households decide that it's actually not in their own best interests to do this, although it might seem to improve technical efficiency.

Do you think governments should have measures to override those rational objections, in the sense of wherever there's a barrier, whether it's a rational and sensible one or whether it's due to some other problem, governments should come in and fix it, or are we saying that there's a certain area where, although there may be potential energy efficiency savings, we're just going to have to live with it because there are very good reasons for not doing it?

MR BRAZZALE: If I could answer that in two parts. I think one of the best examples of that is the use of energy performance contracting. Some of my colleagues are on after me, and can probably speak in a lot more detail about that. Energy performance contracting is a mechanism to address the "access to capital" issue, and it's worth stating that governments, particularly state governments, are some of the worst culprits in this area. You look at hospitals. Hospitals in particular, because they tend to be reasonable energy intensive, tend to be limited by annual operating budgets. Capital budget is elsewhere and other factors determine your capital expenditure.

The industry, with government industry development support, has sought to

establish energy performance contracting. In other words, the businesses can actually pay for the capital investment on a deferred basis and get someone else to take the risk. But there are still all sorts of issues around the risk - the understanding of that - and some governments are sceptical about that. So you can demonstrate, even for government, that some of those are cost-effective, but government has an implicit cost of capital that's much, much higher than anyone else, in reality, because they won't allocate it to things like improving energy performance. They will do it to build a new hospital somewhere else because there are political issues.

PROF WOODS: There's a scarcity of capital.

MR BRAZZALE: Yes.

PROF WOODS: And it applies across both public and private. I mean, even for the private sector, you talked about very short payback periods for investment in this area in the private sector compared to payback that they would expect on a new piece of plant or some new initiative where they may go out four years. You didn't quote figures here, but I got the impression you were talking more the effect of two-year max type - - -

MR BRAZZALE: Yes. That's a good point, but what's the implicit payback that the electricity industry has to invest in? Regulated electricity network businesses have got a weighted average cost of capital just above 7 per cent, so someone in the economy has got to make that investment. So you've got some sectors here investing on long paybacks and you've got other sectors in the economy who aren't investing even on short paybacks, so you've got a misallocation; you've got to have a misallocation of resources. If you've got scarce capital, you should be driving it towards those areas that have got the shortest payback.

PROF WOODS: You didn't actually draw that conclusion out in this analysis, but there is a line of argument there that does merit further thought.

MR BRAZZALE: It did occur to me. There are a couple of areas that we haven't covered that we probably should have. That's one, and the other one is dealing specifically with cogeneration. We tend to consider that as part of energy efficiency, but it has its own particular issues, and it tends to be one of the areas that's suitable for energy-intensive industry as well, and probably suffers from a number of energy market reform problems as well because we've only half done energy market reform. We've tended to focus on the wholesale market, but there are still a lot of areas on the network side to deal with. If we were able to, we'd be happy to provide some additional material on both of those and anything else that crops up.

If I can just maybe finish off on that point. We believe it's worth tackling all barriers, even barriers that may be rational, because even though the businesses may

be acting at the moment on a rational basis because there's a scarcity of capital or there's a perception of risk, we can deal with those, or government policy can deal with or mitigate some of those and unlock some of that energy efficiency potential. So there's absolutely no reason that that shouldn't be part of government policy support.

DR BYRON: Some people have suggested to us that that's a bit of a slippery slope. Once you start to allow that governments know how to run businesses better than their owners and managers do and to override commercial decisions that those businesses would make, the argument is that that's not very far away from central planning and - - -

MR BRAZZALE: Yes. We wouldn't want government to run businesses either, but the government nevertheless does have a role in supporting, particularly where there are information barriers or - some of the risk issues aren't really risk issues so much as lack of information.

DR BYRON: What we've said is that if there are market failures, they should be addressed; if there are information failures, you try and solve them through information programs and so on. But if there are, for example, things which have extremely high transactions costs which make it simply not worthwhile adopting a particular measure, to force somebody to do it at a loss, as you say, is hardly likely to increase overall welfare.

MR BRAZZALE: It depends. If that loss is less than the cost of abatement that someone else in the economy has to bear, then it is worth doing it from an economy-wise basis.

DR BYRON: There's the idea that you have up there of "Let's include a cost of carbon or carbon dioxide emissions and let's pick a number like $15 a tonne or have an emissions trading scheme or something, and then let that permeate all the way through the economy," so - whether we're talking about the choice of brown coal, black coal, gas or whatever, to generate electricity; whether it's petrol, autogas or diesel for motor vehicles, dah dah dah - wind and hydro, which wouldn't have to pay this carbon charge, would be better off by that amount. Once this had permeated and filtered all the way through the economy, wouldn't we see a substantial system-wide change, and how would that compare with trying to prescribe technologies on a sector-by-sector basis and to use regulation - you know, central command and control planning or whatever - to try and correct the same externality, in effect piece by piece?

MR BRAZZALE: We would argue that - and in fact the economic literature argues that - you're better off sticking to a broad based carbon charge, as broad based as possible, so it does permeate through the economy without picking technology

winners or prescribing technologies. You may choose to support particular technologies on industry development grounds, as the government has done in the past, but create a price - - -

PROF WOODS: The perennial infant industry.

MR BRAZZALE: Yes. Well, we could get into the infant industry argument. The coal industry has been an infant industry for a long time and is still the subject of government support.

DR BYRON: About 250 years, I think.

MR BRAZZALE: Yes, and coal-fired power generation has been supported up until now. But I think, putting that issue aside, a broad based carbon tax is sort of like a broad based consumption tax. It will just permeate through the economy and it will drive innovation in probably ways that we can't predict, but it will start to reduce greenhouse emissions. But we believe it will be ineffective for much more diffuse energy users - ie, the residential and commercial energy consumers, where that tends to be a relatively low proportion of their costs - and so we need other measures.

We think the most appropriate measures to drive change and innovation are minimum performance standards or minimum greenhouse performance standards, and we'd advocate a scheme like the New South Wales BASIX approach; again, try not to be prescriptive about inputs but prescribe outcomes. In the BASIX example, you can use whatever mechanism you want as long as you deliver a 40 per cent reduction in greenhouse emissions compared to the New South Wales average, and it's that type of measure that we think we should be driving towards. Don't prescribe the imports; prescribe the outcome we need.

PROF WOODS: Yes, and that's consistent with some of your other comments about letting the market work it out. You create the framework, in this particular case a regulatory framework rather than a price framework.

MR BRAZZALE: That's correct.

PROF WOODS: But nonetheless, how it's achieved is a matter of innovation and trying to capture the dynamic efficiencies.

MR BRAZZALE: Yes. They're the two key elements, if you like, to create a greenhouse price signal, recognising the particular attributes of the different sectors. But there are other things that we think we still need. We still have an energy market that really has been only half-born, and there is still a lot of work that we need to do there. Part of the issues come about by a lot of the distributed energy technologies and better generation, as well as energy efficiency demand-side management. They

suffer in the current market arrangements because we have actually separated the industry into generation transmission, distribution and retail, so a technology that competes at the retail level and provides benefits through the chain finds it extremely difficult to capture those benefits. Again, there is a lot of literature around now that articulate those, but the current market arrangements actually constrain technologies that compete at the retail level, like distributed generation energy efficiency.

DR BYRON: One of the things that has come up in a number of our discussions is the possibility of using that sort of embedded and distributed generation in combination with demand-side management measures, but are there impediments in terms of getting access to the national electricity grid, for example, of distributed generators?

MR BRAZZALE: There are. In fact, we have been trying to address some of those through providing additional information, and we recently published a technical guide to the connection of embedded generators to distribution networks in trying to both inform the proponents of generation projects as well as the distributors, but it is difficult. The connection and access process can be complex, there are delays, and I think we have only still half addressed some of the access issues. We don't have a firm access arrangement in the national electricity market, for example.

DR BYRON: There is the recent decision in Victoria about who pays for the connection to the grid for new distributed generation. Is that likely to be helpful and do you think other states are likely to go that way too?

MR BRAZZALE: It's likely to be helpful. I think we still have some concerns how that's going to be implemented within the national electricity market framework that we have under chapters 5 and 6, but, yes, that will be helpful and will start to address some of those issues. There are a number of issues, but one of them comes down to, if you put generation in the distribution network, at some point in the future it's going to result in deferral of network augmentation. It's really difficult for the proponent to actually get recognition for that. That's one aspect.

The other aspect is, if you're actually putting generation close to where the load is, it should obviate the need to pay for transmission and a significant part of the distribution, if you're supplying local customers or if there are local customers nearby, but that's not the framework that we have.

DR BYRON: The postage stamp pricing.

MR BRAZZALE: Yes. In fact transmission is separate, and you can't avoid, or you can only avoid a small proportion of, transmission charges. So we have a system that's been established. They have separated, and we even have the distribution network service provider who is the one that actually pays for the transmission and

bundles transmission into its charge to the retailers. We have a system that we have established because of the legacy we have had of a government-owned supply industry and we have set it up this way, whereas the gas industry is different.

PROF WOODS: But would you see the need to discount? If the load that you're putting in is intermittent and unreliable, somebody somewhere is going to have to have some spinning reserve sitting there anyway, if the wind is not blowing or your factory shuts down or your boiler needs repairs or whatever.

MR BRAZZALE: Let me just address that issue. Firstly, you will find that wind is much more reliable than any form of fossil fuel generation you can come up with in terms of reliability. In other words, it breaks down less.

PROF WOODS: It breaks down less, yes.

MR BRAZZALE: That's reliability, its propensity to break down. It is extremely reliable. What it is, is it's intermittent.

PROF WOODS: Yes, I did use both words.

MR BRAZZALE: But it's not unreliable, if I can correct you there. The second important issue: the national electricity market copes adequately with that and recognises that one megawatt hour of generation in any five-minute interval is worth exactly the same amount as any other generation from anywhere else. The difference in the national electricity market is that a wind energy proponent cannot and will not sell firm energy, but a coal-fired generator will. So you'll find in the market there is a price differential between firm and non-firm already dealt with, and the ancillary services - everyone creates ancillary services.

The biggest impact on the electricity network was likely to be when a 500 or 600-megawatt generator falls off like that. That's going to have a much more significant impact on the network than maybe a small wind turbine. The market recognises the relative value of intermittent and firmness. That's captured already.

PROF WOODS: The national energy efficiency target: I'm a little unclear. In your submission you have a little description of it and then talk about some modelling and the energy white paper assumptions, et cetera, and we're familiar with all of that, but then you go on to a series of policy directions 1 to 5. I'm not sure if they're actually tackling the target or if they're just broad energy efficiency measures, which raises in my mind the question of how do you see, if there was to be a target, it would actually be applied at the factory level? I think your subsequent discussion really isn't focused on that. I don't understand the flow of logic.

MR BRAZZALE: We see the target not at the factory level. That's a government

policy target. In other words, the government is setting an overall target to limit growth in greenhouse emissions. What we're proposing is the Clean Energy Future scenario target, but we have tried to simplify that by saying it's roughly the same as halving the rate of increase in energy, and so that's the position we're putting. We're not advocating, and we think it's unrealistic, to actually put a target on any individual business, but I think the government should have a policy target and then implement policy measures to actually meet that target.

PROF WOODS: Through a whole range of different interacting measures.

MR BRAZZALE: Yes. And the policy measures should ideally be addressing - let's call them the barriers that are there.

PROF WOODS: Your position is that you wouldn't want to see imposed targets on individual businesses.

MR BRAZZALE: You may end up that way, for an energy-intensive industry, as part of a suite of voluntary measures or semi-voluntary measures on individual businesses. We think that's extremely difficult, but you may end up there and the government is - I won't say it's heading down that pathway at the moment with their opportunity assessment for energy-intensive industry, but it is trying to come up with a more voluntary type of approach, but then what happens with new businesses and businesses expanding? We think it's just too difficult.

DR BYRON: Could I come back to the point you raised about the spikes in energy consumption, particularly in the residential area because of the proliferation of what used to be considered sort of industrial-grade aircons that are now going into houses, and the problem that this creates for both generation and distribution and transmission and all the rest of it. It seems to me the basic problem you're suggesting is that the householders, when they make these decisions to buy one of these or to switch it on, don't actually know or care what the true cost is of the energy that they're using at that time. They're insulated from the consequences because all they see is a fixed flat retail price year in, year out. So they neither know nor care very much about the true cost of the electricity they're using.

MR BRAZZALE: That's correct.

DR BYRON: What do we do about that? I think you had the regulation of price controls on residential electricity as a market failure, but I would be more inclined to categorise that as a regulation failure when we've got wholesale prices that fluctuate quite widely in short periods and we've got retail prices that don't, and so the individual residential consumer has no idea that that electricity is approaching $10,000 a kilowatt hour, because they're paying a fraction of that. How do we get around that problem?

MR BRAZZALE: I would just say that there's another aspect that we need to be also really mindful of: that the energy component is probably the smaller issue. It's the network component that we think is a more problematical area. Just having a look at New South Wales alone, there's $5 billion worth of investment in the next five years on networks, and there's no price signal for that going to consumers. Yet the network businesses themselves will - the investment is driven by essentially the peak power need. A lot of it is that, and it's: how do we get the consumers, particularly those who have airconditioners, to pay for it?

One of the positions that we have advocated is that probably the first best option is to get those customers to pay for the costs that they impose on the system. It could be a demand based charge: larger energy-intensive industry or large consumers pay demand based charges. You could levy a demand based charge on consumers. It's difficult without appropriate metering. Then you come back to the metering. So it's important to get metering right, but demand based charges is one way to do it.

The fall-back option is, if you're not going to charge consumers for the cost they impose on the system, then at least recompense those consumers who actually do take mitigating action, whether that's with installing energy efficiency equipment or embedded generation, like PV or on-site cogeneration facility. At least recognise those. You may not do the first one for political reasons, but then you should do the second one, and we have advocated a sort of standard offer approach.

DR BYRON: So your organisation is basically in favour of time-of-use pricing? Do you see that partly because of the demand management effect and partly because I assume that it would certainly help the economics of installing photovoltaic.

MR BRAZZALE: Exactly. Time-of-use for energy and then you need some sort of pricing for networks as well. So let's not forget the networks, and you can go down a congestion pricing approach, and I think in the Allen report there are some examples in New Zealand of where they have introduced congestion pricing. But you need to have both of them.

DR BYRON: We were talking about demand management. Do you think it's important for us to differentiate between load shifting type of demand management where you're sort of shaving the peak and using the same amount of electricity at other times of the day as from peak clipping type of activities? And then I imagine the energy efficiency activities basically shave off the whole diurnal distribution of electricity consumption, because it seems to me that shifting through time or space doesn't actually do anything at all for greenhouse emissions. Is that right?

MR BRAZZALE: That may be the case. I think the position we've advocated -

certainly in our submission to the National Framework for Energy Efficiency - is, really from our perspective we don't think it's worth distinguishing between them, and what we should be focusing on is reducing load at a customer's connection point. Whether you do that through energy efficiency or in better generation or something like that, that's fine, but that reflects our particular focus.

I know that there are some groups that actually want to differentiate between energy conservation, energy savings and demand-side management. The national electricity market doesn't, and that's really the environment we're in. From a policy perspective you may differentiate, and you may want to encourage actually demand reduction rather than demand shifting, but demand shifting has other benefits. It has benefits in the national electricity market. We think you can get too wrapped up in worrying about the definitions. I think the important thing is to make sure you reduce primary energy consumption, you reduce greenhouse emissions, and you reduce consumption at the connection point. All the sustainable technologies that we deal with can do that.

DR BYRON: That helps clarify that, thank you. Were there other things that you wanted to talk about?

MR BRAZZALE: No. I think they're certainly covered in our submission. What I would like to take on board, however, are the points that we did pick up about the investment requirements and relative paybacks and also I would like to take the opportunity to get back on some cogeneration issues. Probably the other thing we've covered in our submission in parts is that we currently have some - well, we can call them "perverse incentives". Certainly the Commonwealth government has been loath to introduce fiscal measures, yet there are incentives to explore for oil. There are incentives through the Tax Act and depreciation and investment allowance, to explore for oil, but there are none for energy consumption reduction. To deliver energy efficiency you need up-front investment, by and large. That does not get favourable tax treatment, vis-a-vis spending money on operating expenditure.

DR BYRON: Expenses as opposed to depreciation, yes.

MR BRAZZALE: Those work to actually distort behaviour, and you could easily address that. That could be a more cost-effective way to deal with the uptake of energy efficiency; in other words, recognise the benefit of the up-front capital investment. I might point out, other countries have gone down that path. Australia for some reason has been loath to do that, but other countries like the US have got no problems in using their Tax Act to drive certain types of behaviour. We in fact do it. We do use our Tax Act, but it's driving perverse behaviour in terms of energy efficiency. That's the other point I would like to make.

DR BYRON: I guess that's just a question of whether or not governments think that

energy efficiency is so important that it's worth making perhaps radical changes to the Tax Act, and what other implications that might have, and whether you replace one distortion with a different distortion. Yes, I understand the issue that you're getting at there.

MR BRAZZALE: If you don't want to do the first best option, then - you know.

DR BYRON: Mike?

PROF WOODS: No, that's fine, thank you very much.

DR BYRON: Thank you very much for coming.

MR BRAZZALE: Thank you for your time.

PROF WOODS: Thank you for the submission and all the time and effort you put into that.

MR BRAZZALE: Okay. We'll get back to you.

DR BYRON: We'll look forward to your further contributions in a timely manner.

MR BRAZZALE: Thank you. Yes, noted.

DR BYRON: Next we've got the Australasian Energy Performance Contracting Association. Gentlemen, if you would like to come forward and take a seat, and make yourselves comfortable. When you're ready, gentlemen, if you could each introduce yourselves.

MR LEATHER: Certainly.

DR BYRON: Then if you would like to summarise the main points in your submission, which we have both read, we can then talk for half an hour or so.

MR LEATHER: Indeed. Thank you. My name is Greg Leather. I sit on the board of the Australasian Energy Performance Contracting Association, which is otherwise known as AEPCA. I'm also the treasurer of the organisation. I will provide you with a bit of an introduction to our comments and wrap it up and then hand over to Bruce Precious.

MR PRECIOUS: My name is Bruce Precious. Our company, Energy Conservation Systems, is a member company of AEPCA. My role in ECS is as a national sales manager, and prior to joining ECS I was associate director for energy efficiency in the Sustainable Energy Development Authority in New South Wales.

MR LEATHER: AEPCA is the peak industry body for the energy performance contracting industry. It represents not just energy service companies, but stakeholders from industry, including facilitators and government agencies. It represents an industry with a market size currently estimated to be around about $100 million in completed projects, with ongoing projects in the vicinity of $40 million a year. It experiences growth at present of around 20 per cent per annum. To give you an indication of the size of the Australian industry, the energy performance contracting industry has its genesis in the US, or North America generally, where the industry is usually calculated to be in the order of $1.25 billion to $1.5 billion per annum in size. The US agencies that are involved in EPC tend to express the size of the world market in the order of 560 to 620-odd million dollars worldwide, so Australia represents a little less than 10 per cent of the rest of the world at present.

The industry is not very old here. In its current form, it's probably not more than 10 years old, and the industry organisation was established around six years ago. It has achieved a reasonable amount in its short life. It has been responsible for developing standard industry contracts which has addressed one of what have been perceived to be the major barriers to the uptake of EPC. It has developed a best practice guide for use by industry and both government and private sector clients, to better inform them as to what is involved in taking on energy performance contracting. It has developed a guide for monitoring and verification, which is one of the key features of any energy performance contract. It is currently involved in

establishing an accreditation process so that customers, both government and private, can be assured of the standards of the services that are being provided for them.

An energy performance contract is effectively - or has traditionally in any event in this country been - a delivery mechanism for the uptake of energy efficiency measures. Effectively it has involved, I suppose you would call it a building retrofit, to facilitate the implementation of energy conservation measures, thereby reducing the energy spend on commercial and industrial building stock.

Generally speaking, the value of EPC as a delivery mechanism for energy efficiency, particularly for government clients, resides in the fact that it is an outcomes based process and the outcomes are guaranteed. That's probably the fundamental financial feature of an energy performance contract. The consequence of that for governments certainly is that, given the budgetary constraints that affect all government departments and agencies, it is not necessarily the case at all that a department or an agency or a customer needs to concern itself with its budget in order to take up the capital expenditure involved in an EPC. What it effectively manages to do - which is to say, what EPC manages to do - is to provide a mechanism by which a capital upgrade can be effected, which improves efficiency but which does not impact a customer's budget.

There are a number of ways in which an EPC can be funded, both internal and external, and it's of no great consequence to the energy service companies - the ESCOs that provide EPCs - how exactly an EPC is funded. It is often, though, of very great consequence to the customer.

From that framework of what AEPCA has been doing for the last six years, and the manner in which it's currently developing, comes this submission. I would say, before I hand over to Bruce to get into the detail, that the BCSE submission that you've just heard is wholeheartedly supported and endorsed by AEPCA.

DR BYRON: I noticed the similarities.

MR LEATHER: Indeed. AEPCA in fact did have some involvement in its preparation. I'll hand over to Bruce. He's going to talk about the various benefits, the bottom-line effects of EPC within the energy efficiency, and the role for government, and the role for EPC, the various barriers and so forth.

MR PRECIOUS: In our submission I think we've detailed a number of ways that we see government taking a role in furthering energy efficiency in Australia. We're taking as a given, I think, that improving energy efficiency provides economic, environmental and social benefits. Given those net public benefits, and given that energy efficiency doesn't happen of itself, by itself, within the market - and that has been well identified and documented through processes such as the National

Framework for Energy Efficiency and a range of other studies - there is a role for government. We would break that down into both policy and program measures.

Within policy measures, we've included things like minimum energy performance standards, and the expansion of minimum energy performance standards programs, and acceleration of those programs. Associated with MEPS are labelling initiatives that better inform consumers about energy efficiency and energy performance of appliances or buildings. We suggest that, as Rick has just detailed from BCSE's perspective, the tax treatment of the capital investment that's required to improve energy efficiency is not helpful at the moment. There is a role within policy to provide other incentives for energy consumers, which may again be associated with labelling or may be associated with the development of innovation, innovation funding for instance. We would also endorse the BCSE's comments on energy markets, and the role that energy markets play in allowing consumers to take greatest advantage of improving their energy efficiency.

There is a disconnect, as has been discussed already, between what they're paying for the energy generated versus what they're paying for transmission and what they're paying for distribution, and trying to couple up the benefits of energy efficiency is very difficult under the current market regimes.

They're some of the policy measures that are detailed in the submission, but there is also a role for program measures, and a saying that we used to use a lot was, "Good programs inform good policy." Within program measures we would advocate that there are information provision programs. Programs such as energy efficiency best practice we certainly saw as providing some quite outstanding results in different areas, and the raft of programs that state government tends to run in Energy Smart Business, Energy Smart Government programs around the country, have provided information, have provided a testing bed, if you like, for delivery models such as energy performance contracting, and there is still plenty of scope in the market for those sorts of programs to lead the type of innovation that's required.

That also then flows down into developing the skills that are required within our own industry. As the energy service market grows and develops, we find it ever more difficult to find the appropriate skills in the market as our businesses grow and we look to bring on new people. Again from a program perspective, the creation of new skills, development of appropriate training programs and accreditation programs for professionals in the area are key elements where we would suggest the government can be involved in producing good outcomes.

We've identified policy measures, we've identified program measures. More specifically, why energy performance contracting? Why would we focus on this model of delivery? I think that we've created a simple chart that identifies the specific barriers. We don't want to spend a lot of time talking about barriers to

energy efficiency. They've been done to death in the NFEE process and other public venues. What we would like to focus on is how energy performance contracting overcomes some of those particular barriers to improve energy efficiency.

As Greg has mentioned, energy performance contracting has focused on delivering an outcome. It's focused on delivering reduced kilowatt hours, reduced megajoules, without impact on the utility of the energy systems, whether that be a simple lighting system or an airconditioning system or a furnace in an industrial site. We're looking to maintain the utility while we save energy. Under the energy performance contract model, energy savings are guaranteed under a contract process. So how do we overcome the barriers?

One of the barriers that's always highlighted is that relevant information is not always available to the consumer. Under the energy performance contract model, the energy service company, as a specialist in the field working with energy each day of the working week, is equipped to provide the consumer with the relevant information and to provide the level of recommendations as to how best to exploit the technology or the processes or systems that will lead to energy efficiency.

The second barrier that we would highlight is that information programs often don't address other barriers. They provide information on the benefits of energy efficiency, sometimes may provide information on specific technologies, but don't provide enough information for a consumer to actually exploit the opportunity. They may still not be certain how to specify a technology, how to be sure they're paying the right price for the technology. They're not in a position to exploit the technology. So again, having ESCOs - energy service company specialists - as an industry, as a provider, overcomes those sorts of barriers.

Organisations not having easy access to expertise, even those organisations that are large enough to have somebody with the title of energy manager: often that role really is all about negotiating the best contracts across a large portfolio of businesses. Again, they're often not well equipped to take advantage of all of the energy efficiency opportunities that that portfolio may be able to take advantage of. Capital limits is often thrown up as a significant barrier to energy efficiency. Greg has described how the energy performance contract model is in essence becoming a financial instrument because the ESCO - the energy service company - is providing a turnkey delivery price for a range of energy efficiency measures or options and is guaranteeing a return on that capital investment.

We essentially have a financial instrument that people are able to take advantage of. The risk elements have been stripped away. In some state government sectors and the local government sector as well, it allows energy efficiency to be taken off the budget, out of the normal budget cycle, and to be funded quite independently.

Energy efficiency faces high hurdle rates. Often the comment is made that business requires a two-year payback on energy efficiency projects. Whereas they may invest in their business for a much lower return on investment, they expect a two-year payback from energy efficiency opportunities. What we've found is that because we're driving towards outcomes and the outcomes are guaranteed, we're finding that many businesses are accepting a much lower hurdle, or setting a much lower hurdle rate, for an energy performance contract than a two-year payback; so many businesses are accepting 20 per cent internal rates of return. Local government are accepting 15 per cent internal rate of return and lower, state government even lower again, so the energy performance contract model is getting the investment hurdle back to a regular level.

Finally, the lack of evidence of achievements from energy efficiency measures: an example might be that somebody has received information on a technology that can be added to an airconditioning system, for instance, finds out how to purchase it, how to install it, but because of lack of a monitoring and verification process, doesn't really understand what overall benefit he's gained and can't attest to the savings that have been generated. That causes a lot of doubt when that person goes back to their financial controller and is looking to get the next project off the ground. "We're not certain what we achieved from the last one."

Energy performance contracting again overcomes that barrier. Because the ESCO is guaranteeing the savings, then a monitoring and verification regime is an important part of the delivery of the project. Again, we're finding that that is setting new standards within organisations we're working with in how management is expecting projects and initiatives to be reported and the success of those projects to be reported. They're some of the inherent components of an energy performance contract that overcome those barriers. We see it as a very important contributor to improving energy efficiency across industry and commerce in particular. I'd finish the barriers discussion there.

Outcomes and experience to date: energy performance contracting has been supported very strongly by the New South Wales state government. The New South Wales treasury has funded almost $26 million worth of energy performance contracts independently of health and other budgets, so they've had a separate pot of money there. That will result in savings of over $4.5 million dollars per annum from energy bills and over 41,000 tonnes of CO_2 saved per annum. Local government around the country has adopted the model very aggressively over the last two years or so. Councils around the country that have set themselves targets - Cities for Climate Protection, greenhouse reduction targets - have seen the energy performance contract model is a very effective way of working towards those greenhouse reduction targets; the private sector less so, but there are a number of examples of energy performance contracts in the private sector.

MR LEATHER: You'll have seen in the previous submission of ours, and I'm sure you'll see it from more submissions, that there seems to be a general acceptance of the idea that energy efficiency has a wide range of public benefits. Certainly it's very simple to point to environmental, economic and social benefits. As I say, I'm sure you'll get a great deal of detail on that.

From our perspective, as we've noted in the submission, the potential for increases in real GDP of up to $1.8 billion is there. The potential to increase employment, for example through EPC, by up to 9000 people, is there. There is a potential to reduce consumption in stationary energy by up to 9 per cent and to reduce greenhouse gas emissions by up to 9 per cent by using EPC. There is a role for government, though, in ensuring that those benefits are achieved, that that sort of triple bottom line can actually be achieved.

I'm a solicitor. My involvement in the industry originally arose in the context of representing government agencies in negotiating EPCs with ESCOs. I have found that the barriers to EPC, which will reflect the broader barriers to energy efficiency generally, are as stated. One of the principal issues is the lack of information; and the lack of understanding of what can be achieved, the lack of access to funds - all of the things that Bruce has just touched on. It has always seemed to me that the principal role for government is in driving energy efficiency. How exactly that is achieved is potentially through the mix of policy measures and programs that Bruce has just touched on.

There will be an issue as energy efficiency and EPC takes off in Australia for government to address in terms of skills development. There will be a skills shortage that will need to be addressed. That of course is not exclusively government's problem by any means and that's something that the industry will need to address internally. But it does remain the fact that the setting of targets is crucially important, as is the setting of minimum standards for the achievement of energy efficiency.

The provision of information and greater access to information is something that agencies like the Sustainable Energy Development Authority in New South Wales was highly effective in achieving. The provision of information that it set itself up to achieve was something that greatly advanced the uptake of EPC in New South Wales for a number of years. Indeed, we are now seeing exactly the same thing occurring in Queensland with the government energy management strategy there, in South Australia and increasingly in Victoria through SEAV.

It is important, in our view, that the setting of targets and of minimum standards for energy efficiency is something that is driven by government in order to improve the uptake of energy efficiency measures. EPC has much to offer as a

delivery mechanism for the achievement of such measures, or the uptake of greater energy efficiency. As a delivery mechanism it has some great advantages in that it does solve the financial problem that is often perceived to be a very great barrier to improving efficiency. It does provide the technical solution, it does identify existing efficiency status and potential achievements, and it does set about implementing them in a fairly structured fashion.

EPC by its nature, as a contract that tends to take four, five, six, seven years to achieve its aims, tends to result in a partnership between the service provider and the customer. That in itself is a very good thing, certainly in my perception, in that it does increase the understanding amongst the customer base, which is then diffused throughout government and industry and the private sector. This organisation, AEPCA, has been - so far in any event - a reasonably effective industry body in that it has achieved the things I touched on earlier, which is somewhat down the path towards the things that we perceive as being necessary to improve energy efficiency and improve the uptake of EPC as a delivery mechanism for energy efficiency.

AEPCA has been fairly heavily focused since its inception on working with government to achieve these aims and indeed we have a number of government agency members. We're currently in the process of increasing our involvement with various agencies in various states and at the federal level. That's the basis of our submission. We obviously invite any questions you may have.

DR BYRON: Thank you very much. We've been told repeatedly about the huge potential benefits. I said to Rick Brazzale earlier that it seems to me the essence of this is, engineers especially are saying that there are huge potential commercial savings out there that also have terrific environmental and social pay-offs and for some reason, these measures, their technologies, it seems are not being adopted. We're grappling with: why not?

When I first heard of your association about six years ago, my initial reaction was, "This is terrific." You know, there are clients out there who have a problem that needs to be solved. You've got contractors here who have the knowledge. This is a classic example of normal market forces where the people with the problem meet the people who can solve their problem and everybody wins, and doesn't this actually sort of solve the whole problem?

All of the benefits you've listed that energy performance contracting can provide and the way that you've systematically overcome the barriers through the standard contract and solving the access to capital problem and the accreditation of providers and giving them monitoring, it seems to me that you guys have got it made. If there's billions of dollars worth of work out there, I'm surprised that you're not being rushed off your feet.

I guess one of the things that we have to be satisfied about is that the potential energy savings haven't been in some ways, not exaggerated, but maybe a lot of what seems to be a potential energy saving is hypothetical and reality is somewhat less than that.

MR LEATHER: One of the greatly satisfying things about an EPC as an instrument is that it's simply not possible not to know what the result is, what the outcome is. Because the instrument requires the ESCO to guarantee outcomes, there is simply no way to achieve that guarantee without measuring those outcomes, and the consequence of that is that an EPC is extraordinarily dependent on measurement of outcomes achieved and the verification of them.

DR BYRON: It seems like such a lay-down misere. If you can go to a company and say, "We believe that we can save you a million dollars a year and we can guarantee it. You don't have to spend lots of management and board time worrying about it, you don't have to even understand the technology. We have the track record. Here's our credentials, we've done all these things, and we can guarantee that you're going to get this much back and it's only going to cost you that," why on earth do they hesitate?

MR LEATHER: I'll defer to the industry participant. I'm merely an observer on the industry, but it certainly seems to me that there are two problems. Firstly, who drives demand? The issue is often whether or not the perception of such great benefits that is evident - self-evident even - to an organisation at the engineering level is very difficult to translate up to the decision-making level, and it is often the case that were an ESCO to approach an organisation at an engineering level, it can be very easily and very quickly demonstrated that there are great advantages to be achieved.

Getting from that level to the level at which the decision is made and getting the process understood at a decision-making level can be very difficult, and my perception is that certainly the energy service companies constantly struggle with that, simply because there is only a limited amount of time and focus that decision-makers can provide to understanding what is being presented to them. Now, that's a problem for the ESCOs entirely. That's on the one side.

The second problem, certainly in the private sector is - as Bruce and I were discussing this morning - it's often the case that the energy spend in an organisation is as little as 4 per cent of total expenditure. It's usually going to be the case that the cost focus will be at greater percentage items, so there will be a focus on human resources, there will focus on large capex items. Getting down as far as reducing the energy spend is not something that necessarily impacts on the consciousness of financial controllers. That's on the private side.

On the government side, the simple issue is that unless agencies are driven to approach the issue, they don't arrive there by themselves, even though it can be fairly clearly and easily demonstrated that the benefits are achievable, measurable, verifiable and guaranteed. Despite all that, it is very difficult to achieve an interest. The issue, I suppose, comes back to who drives demand, who insists that energy efficiency is something that must be achieved for the public benefit.

DR BYRON: When I said to a couple of CEOs, "This looks as simple as just bending over and picking up a $50 note off the ground. Why on earth don't you do it?" they said, "Well, we're too busy picking up $100 bills somewhere else."

MR LEATHER: Precisely my point.

MR PRECIOUS: I think there's a priority issue. When you approach a business, there's nobody sitting there with the spare time looking for a new initiative to pursue; everybody's time is occupied doing things. So to gain somebody's interest and to get them to actually turn their mind to it and understand and be comfortable with the process so that they can pick up the $50 bills and you can point them out to them - getting that engagement is tough.

When the engagement is being driven from above, so a business has adopted a target, whether it be greenhouse reduction or energy reduction, all of a sudden - I mean, I think there's a general perception that, yes, we all want to be energy efficient, but there aren't that many people that really need to be energy efficient. So it's translating the want to the need that I see is really cutting to the quick.

We've been very successful in engaging with people that have a need, so when a local government, for instance, sets a greenhouse reduction target, the general manager is reporting back to councillors; they very quickly start to get pressure applied. It gets the energy efficiency up the priority list, they've got to do something about it, and here's an effective model that delivers something. In the general community, the want hasn't become a need, so it's not up there in the priorities.

PROF WOODS: I thought your list of 1 to 15, halfway through your submission, was quite a useful one, and to some extent your answer just then has helped me in terms of prioritising some of those items. You don't have page numbers.

MR PRECIOUS: No. Apologies for the page numbering.

PROF WOODS: That's all right. It's about page 10.

MR PRECIOUS: Yes, found that.

PROF WOODS: "Barriers that specifically impact the energy performance

contracting industry include" and you've got 1 to 15 there, which I found a useful list, but is there anything you want to add in terms of prioritising any of those?

MR PRECIOUS: I would only add again the impact that we see targets having, and targets in different ways. Within the commercial property sector - with the uptake of the Australian Building Greenhouse Rating as an effective measure of performance of commercial office space - we're seeing the want being translated into a need. We're seeing large property owners saying, "Well, we want to attract and retain government tenants so we need to improve the performance of this building, we need to improve the performance of this tenancy." So we see a lot more interest from that particular market sector. Again, I think that's a different type of target.

Somewhere a range of different tenants - some of the larger tenants in the country, the KPMGs, the Ernst and Youngs and government tenants - have started to nominate that they want buildings that reach at least four and a half stars on a five-star scale, so that's setting a new target for that particular industry. In terms of an example of target setting, I think it's a really good one.

MR LEATHER: I suppose I would add, from the perspective of this inquiry, that a number of these barriers are barriers that can be addressed directly by the industry. A number of them are barriers that probably cannot be addressed without some form of government intervention. So number 4 there, the issue of tenders, is always a live one. It's always going to be dependent on procurement processes, and the standard procurement processes do tend to emphasise lowest common denominator issues, the consequence of which is that unless energy efficiency is something that is mandated as being part of procurement procedures and therefore finds its way into tenders, it is difficult for that to be translated into a greater emphasis on energy efficiency.

DR BYRON: Are you suggesting the government should do that, or is this something the industry has to sort out within itself?

MR PRECIOUS: I think government can show leadership in terms of assessing tenders more on the life-cycle cost approach rather than a first-cost approach. I think that would have a flow-on effect to broader industry and the body of knowledge around life-cycle costing would grow exponentially.

MR LEATHER: One of the advantages of procurement guidelines is that they are guidelines, so it doesn't necessarily put a mandatory position in place but does at least increase focus on the potential for increasing efficiency through these kinds of measures.

MR PRECIOUS: It's sad to say that the only reason we have a successful business is because people don't take into account life-cycle costing when they're running the business.

PROF WOODS: Bruce, you talked about your transition from being in New South Wales government in the area, to being in business. What one or two particular insights would you draw to our attention as being relevant to our thinking - that, as a government bureaucrat, you hadn't realised drives business behaviour in this field, that you're now conscious of?

MR PRECIOUS: I probably underappreciated the role of government and the outcomes that government could generate quite cost-effectively. When I look back now at the types of programs that we were running in terms of Energy Smart Business, Building Greenhouse Rating, I underestimated the effect that they could have on the market significantly.

PROF WOODS: You feel if you could have driven them harder, you would have actually surprised yourself at the returns that you would have got from it?

MR PRECIOUS: Absolutely, yes. I look at it in terms of things like with Building Greenhouse Rating, it applies to office space only. That could easily have been expanded to incorporate universities, TAFEs, schools, shopping malls, all of the other forms of facility grouping. We could have driven that much harder and gained significantly more from doing those sorts of things.

PROF WOODS: With not any appreciable distortion to the actual operation of running those facilities?

MR PRECIOUS: No, to the benefit.

DR BYRON: One of the things that I wanted to take up with you is on the ninth page at the bottom. You say:

> A startling demonstration of the impact of barriers is the NFEE modelling of a 50 per cent uptake over 12 years of energy efficiency measures with an average pay-back period of 2.3 years; ie, a 43 per cent rate of return still requires significant market intervention.

One of the things that I guess troubles me a little is the story of the Australian economy over the last 10 or 20 years of increasing micro-economic reform and efficiency, becoming lean and mean and competitive, and people driving the supply chain harder and squeezing every ounce of fat out of it, and then the CEOs and general managers are looking for every way to make their whole enterprise more efficient, and then you say, "By the way, there's hundreds of millions of dollars of savings that are sitting there on the ground just waiting for you to pick them up," and nobody seems to bother bending over. There just seems to be a disconnect between the two stories.

On one hand, I completely believe that just about every business in Australia could be more energy efficient by 10, 20 or whatever per cent, but that just doesn't seem to gel with the other story that businesses under intense pressures to become globally competitive, et cetera, have been squeezing all the fat out of the system. I guess that's another way of asking the original question, "Are we sure that the savings are as big as we think they are?" or else there must be some really big barriers to people making these apparently self-evidently worthwhile savings.

MR PRECIOUS: My view would be that the savings are as big as projected and as big as have been determined. The savings are genuine, they're real, they're there. The barrier is in picking those savings up, and again, getting people's attention to focus on energy. The easiest answer: if somebody was to scan down the P and L of a business and say, "Have we squeezed everything we can out of labour?" "Yep, can't get any more there." "Have we squeezed everything we can out of our inputs? Have we squeezed everything out of energy?" "Yep. We renegotiated the energy contract. We got the very best price we could," that's far easier an answer than saying, "Yep, we've been right through our process and we've squeezed every part out of our process," because that does take some specialist expertise and a fair bit of knowledge and information-gathering that are some of the barriers that are well known.

DR BYRON: But some of the examples we have been given are just spectacular.

MR LEATHER: I'd suggest that where a company is in the airline industry, they will make a very big point of squeezing the best deal they can for fuel prices. If they have a very big energy spend, they will speak to their network or retailer, or whatever, and get the best price they can - or wholesale price that they can achieve - on their electricity supply. That doesn't necessarily translate into then looking at their building stock and ensuring that it runs as efficiently as possible, because that's not their focus. They're in the airline industry or the travel industry, or whatever industry it might be.

They will certainly focus on achieving the best outcomes they can within their industry sector, but whether that necessarily translates back into looking at their airconditioners and their chillers and their elevators and all of the rest of it, and establishing whether or not they are as efficient as possible, is an entirely different thing. Often that is simply a question of focus, and even though there may be an energy manager who does indeed achieve the best possible price on his energy contract, that is not necessarily the same thing as then stepping back and looking outside the box.

DR BYRON: That's an excellent answer. Thanks. We are going to have to wrap up. In fact, we have to vacate the room for another function.

MR LEATHER: Thank you for your time.

DR BYRON: Are there any final comments or anything else that you wanted to add by way of closing?

MR PRECIOUS: Only that if there are other questions that we could address, we would be more than happy to come back to it if need be.

DR BYRON: Thank you very much. It has been terrific, thank you.

MR PRECIOUS: Thank you.

DR BYRON: I'll now adjourn the public hearing until 2 o'clock when we will resume with the Institute of Public Affairs and the Moreland Energy Foundation. Thank you, ladies and gentlemen.

(Luncheon adjournment)

DR BYRON: Good afternoon, ladies and gentlemen. I'd like to resume the public hearings of the Productivity Commission's inquiry into energy efficiency. Our next presentation is from Dr Alan Moran, from the IPA. Alan, if you'd just like to come forward and make yourself comfortable. We've read your submission, thanks very much. You know the ropes, but if you'd like to just summarise it for 10 minutes or so then we can discuss it for a while. Thanks for coming.

DR MORAN: Sure. Thanks, Neil. Thanks for inviting me. I'll point out a few ambiguities in the submission to start with. It uses some rather strange language, I think, in terms of addressing what it says are inefficiencies but then goes on to say they were "quite efficient". Its English is somewhat lacking, but it seems to be a conglomeration of a whole raft of issues brought together, and although it mentions greenhouse at the beginning, it doesn't mention that very much in the various tirades under which things are discussed.

The tone of the submission is one of government assisting industry and the consumer as a whole to understand how best to use energy efficiency. From my perspective, government isn't normally a very credible source in terms of expertise in this, nor is energy efficiency itself a legitimate goal to be pursued if it's energy efficiency just on its own. Of course, any efficiency is worth pursuing. Energy efficiency or air efficiency or plastics efficiency, it's all worth pursuing, but I think people put a much higher priority on energy efficiency and rightly so in the sense that it is an important part of the economy; but it's not a goal that should be pursued outside general efficiency and indeed there are many ways in which you can increase the efficiency with which we all use energy which would be very costly. We could all bicycle to work, for example.

Although increased efficiency in anything can never be denied as a legitimate and useful goal to pursue, it really has to be pursued in the context of the greater efficiencies elsewhere. I go through in the submission just trying to identify what sorts of goals the government might be addressing in terms of wanting a special priority in energy efficiency. My own view of this is that there is only one legitimate goal overall to do so, and that's the fact that there may be externalities involved in energy use and of course the most important contemporary one is greenhouse. Even though energy efficiency measures started way back in the 70s and perhaps even before in response to now deflated views that the world was running out of energy, they sort of have moved into this greenhouse thing as their main goal and indeed are often ill-targeted as a result of that.

This inquiry might well be quite a useful starting point to try and bring these various subventions from government and regulatory controls together and to be better focused. You will find it, as I found it, extremely difficult to work out how much is being spent by government on energy efficiency in terms of tax concessions and in terms of direct expenditures. My own estimate is that there are about

$670 million - this is by the year 2010 - in emission controls. There are about $160 million in government subsidies. There's the issue of royalties on energy products, which has got to be handled somewhere, but there's $800 million spent on royalties by firms, mainly gas firms, for example.

Then there are issues like MEPS for domestic appliances, solar for housing, et cetera, as well as measures like the ones that have been introduced or are about to be introduced in Victoria to require a charge on consumers for the linking of wind farms. Again, I guess it's based on energy efficiency. It's certainly based on greenhouse-type issues.

The major part of the submission is trying to illustrate that there's a somewhat chaotic system of regulatory requirements on domestic electricity consumers - I do focus on electricity, not on transport and various others - in the three schemes that we have available: that is the MRET scheme, the New South Wales scheme and the Queensland 13 per cent gas scheme. By looking back at what the legislation says and how much the subsidies are in each case and how they're increased by CPI, making various assumptions that way, I come to that level of about $670 million in terms of a cost.

If you want to relate this back to the effectiveness in defraying greenhouse gas emissions, you can see just by looking at that microcosm of the energy efficiency world that there are vast inefficiencies. If we look at the MRET scheme, it's rather an expensive way of reducing greenhouse gas emissions, on my calculations. It's about $38 per tonne of CO_2. The New South Wales scheme is sculpted towards reduction in emissions and is much more efficient, probably about $13. The Queensland scheme is about $33 but the penalty cost of that may well not be picked up. In other words, that might overstate the cost of the Queensland scheme because it's my belief anyway that gas isn't as uncompetitive that it would require the 10 or 12 dollar subsidy to actually make it competitive.

But those sorts of numbers - $38, $30, whatever - for the greenhouse tax are certainly very high compared to those that we've seen published in more recent times by the Australian Greenhouse Office. The McKibbon model throws out 8 to 10 dollars, I think, and I think the ABARE model about the same. I have seen, of course, bigger numbers. In fact it's easier to work out bigger numbers than that but it seems to me that there's a host of different measures we have in place that have come in in a higgledy-piggledy way. Nobody quite knows what they were targeted at and really the only legitimate conceivable thing they could be targeted at, in my view, is the externality of greenhouse. If that's the case, then it would be very useful for this inquiry to try to work out what they all cost, and what their effectiveness and cost-effectiveness was, to give some sort of guidance to get them to put more sensible sets of policies in place. So that's basically my resume of the submission.

DR BYRON: Thank you very much. Could I start with one of the things that you mentioned earlier. To what extent do you think that companies and households need advice from the government about energy efficiency?

DR MORAN: I would take the view not at all, but if government thinks it has some special insights in things, then perhaps it should just put those on the table and allow them to be taken up. My feeling is that that's very rarely the case, that in fact governments will just as often get it wrong, simply because they have a different set of incentives from the householder. Their incentives are amorphous, they're getting elected and maintaining bureaucracies and whatever else, some of which may be good, whereas the householder, the individual is, however imperfectly, geared towards saving money or maximising their wealth or income or whatever.

DR BYRON: Would it be correct to paraphrase what you said a few minutes ago about pursuing different forms of efficiency, that it's your view that it makes sense to pursue energy efficiency but only to the extent that it enhances overall economic efficiency, including any externalities such as environmental or economic externalities?

DR MORAN: Yes, that's right. I agree with that. I think that the externalities one is the tricky part of that and one which would justify some intervention perhaps.

DR BYRON: In the submission you recommend a serious rationalisation of Australia's numerous energy efficiency programs, because some of them are basically greenhouse programs but working through energy efficiency measures. We've also seen a huge range of figures and we've been told about some measures where the cost is actually minus $30 per tonne of CO_2 et cetera, in which case you'd have to wonder why it already hadn't happened last week. Would you like to expand on that point of sort of ranking the cost-effectiveness of abatement and making sure that we start with the least-cost measures. As you say, there certainly do seem to be some measures that are relatively very high cost.

DR MORAN: That's right. Theoretically, as we all know, governments go through processes of justifying their regulatory arrangements one way or another and putting cost-benefits on them. We both know that this isn't the case, but one would think that this is in the system somewhere; that if governments are going to put a new tax or a new subvention of any sort in, they've justified it and in doing so have sought to find out what would the benefits be over and above business-as-usual or free market or whatever. That would give a handle.

What I've tried to do in this is just look at the ones that are similar, and that is the three greenhouse emission schemes, and relating those back to the carbon dioxide reduction level, which is my proxy for - and probably the only rationalisation for - any intervention at all in this. We've gone past the days when we think we're running

out of energy of any sort, and if we were, of course, the way would be to allow things to go because prices would rise and people would find alternative means of meeting their needs. So we've run past those days. We must be looking at externalities.

In terms of the costs of those three schemes, clearly the Commonwealth scheme is the least efficient. I don't know that anybody could say anything different, unless of course they regard the Commonwealth scheme as an infant industry type scheme. I don't think they would get very much sympathy from this agency or indeed any responsible agency of government for those sorts of subsidisations. So it's those schemes. As well as that, I draw some attention to work which has been done on MRET. I've not done any work on the incoming regulation, say in Victoria, to require solar heating on houses. I suspect anybody who did would find that is an extremely expensive way of imposing the government's wishes on the new home builder.

The hierarchy I've done is looking at those major elements and I think it would be very useful to go through the whole lot, if only to shame governments by saying, "Well, this is what it's costing. Here is another way of doing it. Why did you do that?"

DR BYRON: In the submission you make the point that good economic policy is normally best pursued by allowing individuals and corporations to decide how to use their own funds and not to constrict their choice set, et cetera. But the modelling that's been referred to, that was undertaken by the National Framework for Energy Efficiency, basically suggests that there are literally thousands of measures out there that would result in private savings of billions of dollars, even at current low energy costs, using proven technologies. For various reasons - as yet not very well defined - these measures are not being adopted.

One of the things that I think we need to focus on is to confirm that these huge potential savings actually do exist and are of that order of magnitude and then to understand why on earth they aren't already being picked up yesterday. It's like saying there are hundred-dollar bills on the ground and nobody bothers to pick them up. What's your view? Do you think that there are lots of hundred-dollar bills on the ground, and if so, why are businesses too busy doing other things to be able to make these energy efficiency savings that seem to be self-evident and in their own best interest?

DR MORAN: Obviously, there aren't lots of hundred-dollar bills on the ground, otherwise, as you say, they'd be picked up. That's not to say that we don't have innovation and that people discover new ways, and that new way becomes a hundred-dollar bill on the ground and people pick it up. But whenever you hear of these schemes which would save money, whenever I've looked at them in detail, they don't save as much as you think. In other words, you might say, "Well, look, if only

everyone had solar-heated power in their housing - look at that - they could save a quarter of their heating costs," and then you try to work out what does it actually mean, when do they save the costs, what's the maintenance, what's the initial capital cost, and then you go figure it out and it doesn't work.

Even some of the things that are, I think, far more respectable, things like longer-lasting light globes, when you actually figure some of the risks - that it might break for other reasons, that there is a higher capital cost and things - then you start explaining why people would prefer conventional globes. That doesn't mean to say that the conventional globes don't get better, and I'm sure they're miles better now than they were 20 or 30 years ago, but it's paying sort of fivefold or sixfold the price for something which is going to save you energy, maybe even effort in the end. Once people factor all these things in, I think they take a more sober assessment.

In many ways, you can say things like, "If only people actually shopped at the Asda supermarket instead of your little milk bar down the road, they would save a lot of money." They would, but there's a convenience aspect to it, and people trade all these things off.

DR BYRON: Why do people leave money in their no-interest cheque account when they could have it in a savings account?

DR MORAN: Exactly, because it's not really worth getting the 5 per cent for your $1000 in there when you actually might need it right now, and in more ways, it's worth it to you to leave it in that situation where it's not earning interest or whatever, or the effort isn't worth it, or you might want it somewhere where it's not tied up and you're not committed in some way.

DR BYRON: So that people and companies are continuously non-optimising on particular aspects, but trying to optimise over a much wider range of preferences.

DR MORAN: Yes, and indeed, like your chequing account thing, people leave far lesser amounts of money in their chequing accounts now than they did 20 years ago, because you can move it out of interest-bearing accounts much easier. So people did discover hundred-dollar bills, if you like, but it was an innovation that discovered it and people reacted.

PROF WOODS: In that case, obviously bringing down the transaction costs was a key feature, plus the increased information and awareness.

DR MORAN: Yes.

PROF WOODS: I found the submission, I'd have to say, somewhat mixed and in a couple of areas a little disappointing. You have brought to our attention some useful

points about the plethora of programs and some of the analysis on the relative costs, and that sort of material is quite helpful, but in other areas where you speculate on banning motor vehicles or invitation for political corruption or replacing the aluminium industry with basket-weaving, I think it changes the tone of the submission a little and offsets some of the real value that it contains.

You spend a bit of time on the question of royalties, and at one point you could read it as a suggestion that they should cover the cost of the mining warden, and perhaps not much more, but I suspect there is more to your thinking behind that. If you could elaborate on that a little for me, that would be helpful.

DR MORAN: I thank you for your remarks. Royalties are an ancient tax on originally gold and silver, but people who discover certain minerals, unless they are already known about, have gone to an effort in discovering those minerals just as if you discovered a new manufacturing technique, and to put a royalty on innovation or a tax on innovation like that seems to me to be not in accord with the way modern economies should run. None of them are perfect, but they shouldn't run that way. But it does seem to me to be quite reasonable that you would defray the specific costs of that: the mining warden, and there may be other things in there as well. Clearly the royalties on gas, for example, are well in excess of whatever those costs of policing that system are.

It does beg the question about, here we have a situation where we're subsidising gas on the one hand and then we're actually putting a penalty on it on the other hand, and that seems to me to be a crazy way of going about sensible government business.

PROF WOODS: Yes. I think one of the values of your submission is pointing out the various mixed signals, whether it's in the tax side or the mining royalties side or the government program incentive side, and that's something we'll take on board and develop a little further.

DR BYRON: Rearranging what you've both just been saying, if you think that governments typically have regulatory, educative and market based instruments available, it seems in the case of energy efficiency we have been using the regulatory and the educative/persuasive instruments a great deal, but the price signals are going in the opposite direction. It's hard to get people to make decisions and behave as if energy is very scarce and becoming scarcer, when in fact the price signal in the marketplace is that it's not. So there's a policy coordination problem.

DR MORAN: There is a policy coordination problem. I'm not sure to what degree energy is getting scarcer, but it seems to me that there are two taxes: there's a tax on the drilling or the extraction of gas and then there's a subsidy for the use of gas in Queensland. Why are we doing this? Did nobody think that these things are

somewhat in conflict?

PROF WOODS: And different jurisdictions applying.

DR MORAN: Not necessarily.

PROF WOODS: Well, in some cases even the same jurisdiction, but quite often what's happening at the national level is different to - - -

DR MORAN: I don't really want to pick on one state, but Queensland Gas is 13 per cent, and most of the gas actually comes from Queensland.

PROF WOODS: Principal-agency distortions, you say, are equally fallacious following on from your treatment of information asymmetry. You propose;

> It might be said that landlords of property which includes an installed appliance are indifferent to its performance. This, however, is not true.

Then later on you talk about buyers, particularly first home buyers, being borrowing constrained - ie, they are in fact chasing the lowest front-end capital cost - which I thought would be a feedback mechanism to those who are building and owning, in some cases, to being a little indifferent to the ongoing costs relative to the front-end costs at which they're selling the product; ie, the building. I detect a bit of tension in your statements there.

DR MORAN: Let me just explain what I have in mind there. It's oft said that houses built for owner occupation are somewhat different than houses built for rent, because the landlord doesn't care what the renter pays, et cetera. I have never seen evidence for that; indeed I've seen some evidence to the contrary. But it also seems to me - and one can just look at it from one's personal knowledge, from yourself and others - that the first home buyer is a high-risk buyer for a lender, and the lender is very keen to ensure that the first home buyer isn't overextended, and if indeed it was going to lend money, it would start moving in a parabolic fashion the interest rates, but that's rather tricky to do. So what he does, he puts a very clear constraint on how much may be borrowed, which to the first home buyer means that they will go without some things and retrofit them later.

PROF WOODS: Possibly.

DR MORAN: Possibly, yes, which is more difficult in the case of a house built for rental anyway. If you're actually occupying the place, you can put in the ceiling insulation or whatever else later on. If it's being rented out, it's more difficult.

PROF WOODS: But I'm not sure that that leads us to the conclusion that you put

here that the principal-agency distortion is equally fallacious. I think there are some circumstances, particularly the one you just demonstrated, the borrowing-constrained first home owner.

DR MORAN: I don't know that I regard that as a distortion. I think it's a rational response from the point of view of the lender. Some people are more risky to lend to, and I think that you would be more careful lending to them, or demand a higher interest rate. It would seem to me it's a fact of life: some people are more risky. I don't think it's a market failure.

PROF WOODS: No. In that case the bankers and the builders are responding to the situation confronted by those who are purchasing, but you then drew the conclusion about installing appliances for long-term operating efficiency, and in that case clearly there's a trade-off that is happening in that situation.

DR MORAN: There is certainly a trade-off. I wouldn't be convinced. I have never seen any data to suggest it's not a rational trade-off. There is a capital cost and an ongoing cost. Indeed, I work on refrigeration - fridges - and moving to four or five star was like making a saving of maybe $10 or $12 a year for a capital cost of many multiples of that, which may not make sense to most people.

DR BYRON: That reminds me. I think it was the Housing Industry Association told us some time ago that in the surveys they conduct each year for the last five or six years in each state capital, one question is, "First home buyers, if you had an extra $1000 to spend, would you rather have the insulation in the walls that will save you X hundred dollars a year, or the marble bench top?" Consistently, between 92 and 95 per cent of people will say they will have the marble bench top, thanks.

DR MORAN: Yes.

DR BYRON: Some people in the energy efficiency world would think that that's a terrible decision and governments should constrict the consumer sovereignty of people who are making the wrong decision because they don't know what's best for them. You probably have a different slant on that, do you?

DR MORAN: It's almost like saying, "Would you rather have a pretty wife or a hard-working wife?" or if you change the genders, you could come to the same sort of paradox, and there isn't really a right answer. It's personal taste.

DR BYRON: But the moves towards mandatory minimum standards, both for appliances and for buildings, including residences, I guess do circumscribe the choice that the purchaser or tenant has before them, and it seems to me somewhat unusual that the rationale is not health or safety but, "This is going to save you money in the long term, and trust me, you'll thank me one day." I can't think of too

many other examples where government intervention is based on, "We're going to save consumers money, even if it's not what they want."

DR MORAN: No, I can't either. I think you've hit on an area of great legitimacy where there is a sort of unknown health or safety risk, and government might conceivably be better aware of this, and it might be better to legislate for it than to allow a market - and indeed often that is the case. Yes, it seems that energy is a unique area, and it doesn't matter whether we're talking about MEPS or motor cars or a few other things like that where government actually thinks it knows better what the preference levels should be for its citizens, and it doesn't stand well with our general view of democracy, I don't think.

DR BYRON: Could I switch the subject completely onto peak energy demand. We've had a lot of discussion in the other hearings with regard to the effect of these very large new airconditioners, particularly in places like Adelaide, Perth and Brisbane. They have put a very substantial strain on network infrastructure. It leads to a requirement for not only more generation capacity but transmission distribution substations and so on, and it seems that in many places the cost of the system upgrade, if it's spread across all electricity users, seems to result in a regressive result that those who don't have a big new aircon pay a larger electricity bill than they would otherwise to subsidise those who have bought them. Is that consistent with your work?

DR MORAN: Yes. I didn't focus on that particular feature in this, but I have in other submissions, other pieces of work I've done on energy. There's a bit of a dilemma insofar as there are those saying that we ought to ensure better payment, and we usually say, "We've got to put meters in," and I think there's something for that - - -

DR BYRON: That's what I was leading to, interval meters and time-of-use pricing.

DR MORAN: Yes, and technology changes and things happen. When I first looked at that, that was outrageous. It was like a thousand dollars. People say it's less than that now and it's coming down. I've not seen it actually in place voluntarily anywhere in the world at this stage, as far as I know. Somebody said Italy at one stage, but then I found out it wasn't the case in Italy. So interval meters would be a good thing to occur but to force it along would require everybody to incur a cost which may not pay off in terms of the savings in electricity.

Another way you could do it, though, would be to ask the question, "Have you got domestic airconditioning? If you have, then you have to pay this extra price. If you haven't, then there's this." Now, you might say that's a bit of an honour system and everybody will lie through their teeth, but people are used to paying out insurance and having their insurance voided if in fact you tell a lie in terms of it, so

there may be ways around it like that.

Probably the best way around it, though, is to have a metering system at some stage. That said, though, one difficulty with metering is if I'm going to pay - I don't know what airconditioning costs - several thousand dollars, especially in a place like Melbourne, to install airconditioning really for about 10 hours a year, maybe for 50 hours a year, but 10 hours when I desperately need it, and that is when the price of electricity is 500 times the regular price, then maybe I'll pay it.

DR BYRON: Or maybe you'd go to the movies at that stage.

DR MORAN: Or maybe I will, yes.

DR BYRON: Or the shopping mall or the swimming pool.

DR MORAN: You're quite right. Obviously some people would be choked off at various levels and things, and if it was measured in terms of a meter, and you then are aware of the costs it's imposing upon you, then doubtless some people would do it.

DR BYRON: I guess a technological alternative is to have a remote switch-off function so that when you get those incredible spikes in demand, the aircons would be turned off, but it occurs to me that somebody who's paid a lot of money to have a system that they only need for two or three days a year would probably be a bit displeased if those two or three days a year were when it wasn't available.

DR MORAN: Yes. But I think one of the things - that could be the deal you did. If you did the deal with your electricity company, that you've got a 5 per cent reduction in your electricity bill on the condition that they will cut you off for no more than three hours per year, and especially if they can differentiate between airconditioning and some sort of regular supply, then that might be a deal that you would go into open-eyed and be a bit irked when it happened but, nonetheless, recognise that that's what you signed on for.

DR BYRON: Interruptible service.

DR MORAN: Interruptible service like that.

DR BYRON: I think we've touched a bit on this, but you might just like to expand a bit further, about minimum performance standards and mandatory disclosure and labelling of appliances, and of course there are proposals for mandatory disclosure of energy efficiency of commercial and residential buildings and even renovations. The whole disclosure thing seems to rest on the information asymmetries argument, and you've already said that you are not entirely convinced that the government's

information is always superior to the information that others have, but where is the line between voluntary and mandatory, voluntary measures to provide information and making information disclosure mandatory?

DR MORAN: I don't really know, and I don't know that you can put a hard and fast line in. In the days when essentially the sale process was caveat vendor, buyer beware, then there was no disclosure required. It was not thought to be efficient because the buyer could buy the product and know exactly what was in it, but I think that the market has moved a long way from there and it is now much more of a "seller beware", and the products themselves are more complex.

I'm not offended by requirements. I don't think that they are an intrusion, by and large; requirements for concise and measurable details on what the product is worth and what its features are. Clearly that can actually go too far, but as long as it is disclosed in some way. No buyer is going to buy a car, for example, on the basis of the 10,000 different features of that car. A buyer may look at the brakes, he may look at the engine, he may look at a couple of other things, but really those decisions are taken in addition to aesthetic decisions, et cetera, by others, by agents who may be salesmen, motoring journals or maybe others, all of whom to some degree rely upon the ability to measure those other features.

So the mandatory disclosure aspect seems to me, by and large, to be a way of enhancing efficiency, given the migration of markets from buyer beware to seller beware; from the buyer having more knowledge about the product, or as much knowledge about the product as the seller, to the seller having more knowledge, and it's certainly much preferable to any mandatory requirements on features that should or should not be introduced for other than safety or externality reasons.

DR BYRON: I'm just thinking of the big yellow labels that are on the windscreens of new cars that state their average energy, fuel consumption, et cetera, and on the one hand I suspect it probably costs very little to provide that information, but I suspect that it may not actually achieve a great deal, either, given that anybody who wanted to know what the fuel efficiency of a vehicle was could get it out of a brochure or out of a motoring magazine or off a web site or something else.

DR MORAN: Yes. I think that's probably right. That's a major capital decision. You very rarely just go up the street and buy it because you like it. You look at a lot of things. It would be most unusual if you didn't pay some attention to the fuel economy of the vehicle, even if it wasn't a major factor in the purchase decision. Yes, some of these things are kind of thrown out as a result of normal marketing procedures, but it doesn't really offend me to have them on, and again the same with the fridges, to have the energy efficiency of this fridge.

It seems to me essentially that in that case, in the case of large domestic

appliances, the disclosure is actually misleading. It actually is designed to say, "This is five star or six star", as opposed to two star, almost like a hotel room. In other words, you'd expect it to be twice as large or very much better, whereas in fact if you actually saw what "five star" meant compared to "two star", you could find there is not a great deal of difference. It would be quite interesting if those people who required the disclosure were also to make it very clear what the benefits were.

DR BYRON: I suspect with appliances, like motor vehicles, because of standardisation it's very easy to test the device, then slap a label on millions of identical products. With buildings, including high-rise buildings, houses, et cetera, because basically every one is unique, if only because of its location, mandatory disclosure of energy performance is likely to be far more complex. Would that be right?

DR MORAN: I think it would. That said, I think that people do it and in a kind of rough and ready way probably get it about right in terms of what the energy efficiency is of the house. In other words, there's a standard for energy efficiency which is being sifted through by a lot of people who are expert on this and have come to more or less a consensus about what it should be put at, and it doesn't seem to me to be a bad thing for somebody to say, "This is energy efficiency grade 1. The average household will save $50 per year in heating bills. Buy this one. And this is grade 2 and you'll save" et cetera. But I think often, as I said before, these things are either black and white or they're given standards which the average person would think are far more important in terms of savings than they actually are.

DR BYRON: Yes. One last question: have you come across the national energy efficiency target proposal that was raised by the National Framework for Energy Efficiency?

DR MORAN: Not really.

DR BYRON: You haven't given any thought to that?

DR MORAN: I haven't given any thought to it at all.

DR BYRON: I won't bother you with that one then. I was just wondering if you had any thoughts on it. I think in view of the time we'll keep moving, but thank you very much for your submission and all the effort that's gone into that, and thank you for coming today.

DR MORAN: Thanks very much.

PROF WOODS: Thanks very much.

DR BYRON: Next is Esther. Just make yourself comfortable, Esther, and when you're ready, if you can just introduce yourself and your affiliation.

MS ABRAM: I actually have a PowerPoint presentation.

DR BYRON: Okay.

MS ABRAM: I'm Esther Abram, I'm the CEO for the Moreland Energy Foundation. What I wanted to do today was really to give a little bit more information about my own organisation and some of the projects we're working on as I guess a bit of a contextual thing for the submission that I provided, and also a little bit more information on a green electricians program, about which I understand there were some questions asked at another meeting. I've been asked to follow that up.

We run three programs at the Moreland Energy Foundation. We focus on households, businesses and what we call community entities. In terms of the households we work with, we've discovered that whilst there's a lot of enthusiasm for working with us on energy, there are a number of barriers with households: issues like design, the fact that the major alteration market at the moment is currently unregulated; fashion; intermediaries; lack of accreditation and standards, which particularly impacts upon people who are actually trying to spend money undertaking energy efficiency measures; the private rental market, which has a whole range of its own problems; and the electricity market, which has actually been promoting energy-consuming appliances to householders.

The project that we've put a lot of resources into is our Home Energy Star project. This has 96 households participating in it at the moment and people are recruiting all the time. It's a 12-month program where we basically recruit a household, we get them to provide us with their bills for the past 12 months, we do an analysis, we do an energy audit and then we make comprehensive recommendations and we get them involved in making commitments and we support them to undertake changes. Through this particular project we've become very familiar with the sorts of issues that householders encounter.

In terms of how you get householders to be involved in change, there are issues which market theory says will actually create change, but this particular project is informed by a model called the Seven Doors model of change, which was developed by Social Change Media. What this model does is say, "Well, you need these seven things in place if you are going to get householders to undertake more sustainable activities." So, for instance, what you're trying to do has to link into their aspirations. There are not many people that aspire to prevent peaks in the electricity market, but people actually do have aspirations for safety, comfort, quality of life.

Understanding: people have to know what is required of them, what they need

to do; and I guess our submission makes a lot of references to where there are information barriers. Skills: a lot of these things actually require you to do something hands-on, so that capacity to do something. Convenient systems is a very important one. With energy, we don't have a lot of convenient systems in place, so just as with transport, you can't advocate people use public transport when they're five kilometres away from the nearest bus stop. Obviously that's not going to be convenient enough for them to take that sort of action. Similarly with energy, you need convenient systems in place.

Trusted others: this is really that sense that people actually are stimulated to do action because someone they trust tells them it's a good idea and says, "Yes, you should get involved. You can make a difference." Being told by your parents often can be something that stimulates people to behave in a certain way.

PROF WOODS: Or makes you do the opposite.

MS ABRAM: My mother still manages to get me to undertake action; but also community leaders are very important in that. Change moments: people like to be part of things other people are doing, people enjoy being part of a community. And reinforcement: when people do do the right thing, actually giving them the feedback to say, "That was really good." This particular project has all of these elements within it.

This is one of our households that is part of the project. They have a very old house in Glenroy that they're renovating. We basically taught them how to fit pipe insulation to their hot-water system so that they would not lose so much hot water.

Very quickly, we have started to collect data on the households who have been involved in the project for over a year. We don't have enough households to be able to give trends, but we do have some interesting findings which are worth having a look at. The blue column is the energy, how much carbon emissions they had in the year before we did the audit. Then the maroon is for the year after the audit.

PROF WOODS: By carbon emissions - can I just clarify - you're talking about if there was any change between their sources of electricity, whether coal-fired or wind or something, that would reflect in there as well?

MS ABRAM: That's right. If they purchase Green Power, 100 per cent Green Power, they actually go down to zero emissions. However, we haven't done that on this table, but we have put a little note. So we still calculated how much energy they're using, but we then have put a note that they're a zero-emissions household. We really assumed for this, I guess, that they're all using either brown-coal-fired electricity or gas.

Group A is the group that we think are on track and these households have undertaken a number of actions to reduce their energy consumption. For instance, the very first column, their gas didn't change very much but their electricity use did change, which seemed to suggest that they were just using their appliances more efficiently and using them less. We then had one household that was at home more often, which would often indicate an increase, but they achieved a reduction through installing an instantaneous gas hot-water system and using their gas space heater instead of using their reverse-cycle airconditioner. Sometimes people aren't sure what they should use when they have different appliances in their house, so getting that sort of information is very useful.

The next one along is the change from electric to gas for heating, so you do get substantial emission reduction through doing that. Another one: again portable gas heaters. They went to a gas space heater instead. The final one actually had a small increase in their electricity usage, but they significantly decreased their gas usage over winter, so I think they just started to use their winter heating system a bit more efficiently and did things like draught blocking and those sorts of measures so they didn't need to run it as often. These are the people who are doing well.

We then have some households where there's little change. Really, see, three of those are quite low energy users anyway, so for some you actually find there's not really much opportunity to do a lot with them. They're people who we probably didn't want to get into the scheme, but they managed to get through our net. There's another one who's a reasonable energy user in comparison to the other ones, but what they're doing is they're going to undertake long-term measures. When they actually do some renovations, they're planning on doing some significant energy work at that time. I guess that's another thing with all of this: a lot of these energy measures, if you're doing major renovations, there is a time delay.

Then we have two that have increased. One of them, it's because they had a child and installed a hydronic heating system and are obviously home all the time instead of being at work. Another one increased we're not really sure why, but we've assumed that they're using their electric heating more often. I guess the take-home message from all that is that householders are really varied and there are different capacities for different householders to take on board efficiency. Being able to help them identify them is very helpful and providing them with convenient systems is really positive as well.

With our business program we basically aim to work with existing Moreland businesses to make them more environmentally sustainable and financially sustainable as well. We work a lot with small businesses. We also have a sustainable business program where we look at it and say, "Well, we actually need to get some particular sorts of business in place in order to make this whole thing work," so we try to identify where those gaps are and then focus some attention on

those. I'll talk to you about two of those projects in a minute.

In terms of the small businesses, small businesses are basically a sector that not many people really want to work with in terms of sustainability. It's so diffuse, there are so many of them. They're all quite small in and of themselves but when you add them all up together it's a big impact. They have a lot of barriers. The financial barriers are really quite big for small businesses; the fact that they might only be a sole operator doing everything. In terms of the way they might look at their business issues, if energy is not a huge cost then it's probably not going to be their number one priority. We have actually tried to overcome some of those barriers.

We put in for, and were successful in getting, a grant to run a project called Business Energy Action that had a number of elements to it but the one bit we thought was most successful was being able to offer small businesses a financial incentive to implement energy efficiency.

PROF WOODS: So pay them to make more profit.

MS ABRAM: Well, pay them to actually implement the energy efficiency measures. Whether they become more profitable I think is probably dependent upon a number of other factors. Really, we were looking for measures that were going to have some sort of substantial greenhouse impact.

With this particular business Dairy Queen, which is a cafe in Glenroy, they had a number of fridges that were small. They were inefficient. They accounted for 20 per cent of their energy use. By putting in a new coolroom we're actually bringing in savings on their bill of $1600 per year, which is not an insubstantial amount; but if they were to actually undertake that project without help, there's a 12-year payback period for that project, so it's one of these projects where it's a really good thing to do but for the small business to do it without any incentive, it's probably not going to happen. That's just a quick look at the new coolroom with the Dairy Queens behind the counter.

In terms of sustainable business initiatives the green electricians is one model of program which we think is very good. In 2002, we took a look at the GreenPlumbers program and said, "Well, why can't we have green electricians? We're always getting requests from people within the community wanting to get an electrician who can do particularly energy efficient works for them and we can't refer them to anybody. So why don't we look at setting up a green electricians scheme?" We actually set up a broad partnership with the Electrical Trades Union, with RMIT, the Alternative Technology Association and the Sustainable Energy Authority.

Through those people we came to the conclusion that what was really required was post-trade training for contractors, because the actual trade training has a whole

lot of other priorities and often when people are doing trade training they're not really thinking about the business of sustainability or how they might actually develop niche markets for their work in future. The idea was to set up a post-trade training course but also to have a very visible brand for it, so if you were trained in this way you'd have something that you put on the side of your van, that you'd have on your business card: it would become visible.

Also one of the things we learnt through the GreenPlumbers is that you actually need to market these things to both contractors and the community. You need to market it to the contractors to get them to do the course and get the accreditation. You need to market it to the community so they know that these things that haven't existed before now exist, and give them business. If you don't give these people business, then obviously they're going to see it as a waste of their time. We weren't successful in getting the funding we were seeking at that time - I think that was a bit early - but there was curriculum developed that was trialled and it's basically sitting there ready to be taken on board.

A project that we have had more success with is our Phoenix Fridge scheme. At the moment there are more than half a million excess fridges in Victoria. Fridges are responsible for 17 per cent of household emissions, so they're pretty substantial in terms of a household appliance. The CFCs which are part of the refrigerant gases and often in the foam inside the fridges are 6000 times more potent than carbon dioxide, so they're a very potent greenhouse gas.

What you tend to find with household refrigeration is that there are some people who have an excess of fridges and they will all be running, even if they're empty, often in the garage on the hottest day. The fridge is sitting there empty, running, so using energy for absolutely no purpose. Or ; or you get the old fridge which gets put out onto the nature strip, vandalised and releases its gases or gets thrown in the back of a truck. So disposal issues are very important. Then you get low-income houses that either don't have refrigeration or have a fridge which is costing them a bomb to run and they don't the $1000 to buy a new fridge.

So what we did was, we looked at doing retrofit measures on old fridges and we basically set up a trial and tested a whole lot of different measures of different fridges and tested them to see what the impact of doing those measures was. You can actually do very small changes and make a saving, and some of the larger changes like particularly putting in a new compressor is quite substantial, so you can get up to 25, 26 per cent and more savings.

DR BYRON: They're also more expensive.

MS ABRAM: It is also more expensive, particularly if you're not actually running this type of a program on a very big scale and you get that capacity to buy in bulk.

We're currently implementing the pilot where we're aiming to get 100 retrofitted fridges out by Christmas, and this has again been implemented in partnership, and the Brotherhood of St Laurence has been a really key partner in this because they've provided the warehouse and the space and they're really interested in progressing this post pilot, so I guess we've been able to come up with the idea, develop the know-how and bring the people together to do that, and we've got this body that actually has the capacity to really take this out across the state.

PROF WOODS: Are there warranty and liability issues that have been concerning the charities in on-selling electrical goods?

MS ABRAM: What they have to do is to basically test and tag them. They have to have a qualified electrician do that. The Brotherhood does already sell electrical appliances, but some charities have ceased doing it when that regulation came into place. But really the current issue at the moment we're trying to work out is how to actually recycle these things sustainably, so you get, I guess, a whole-of-project approach, because with some of these fridges the best thing to do with them is actually just to take them out of the market entirely, so that's the element we're focusing on now.

DR BYRON: I suspect one of the reasons that there are so many fridges sitting in garages still running is simply because the owners don't know how to dispose of them.

MS ABRAM: That's right. What do you do with an old fridge? That's part of our problem. If we actually put out a public call that we were running this project, you would have so many fridges, so it's been one of those projects that you want to get people enthused about, but you don't want too much enthusiasm.

DR BYRON: Gently.

MS ABRAM: That's right. And, very quickly, the community entities area: these are things like schools, kindergartens, libraries. Again they have a whole range of barriers in terms of implementing energy efficiency. Funding is a big one; time priorities. The other interesting thing about these types of organisations is often they are existing in buildings that they don't own and where the management arrangements are very complex, and it can be quite difficult to penetrate that in terms of who actually has the incentive to make the energy efficiency measures.

One particular project we've been working on is with schools, called the Greenhouse Countdown. That was at our launch. These kids won the long-kick competition. Essentially this is another partnership project involving the North Coburg Football Club and Pacific Hydro. We have four northern primary schools participating in an emission reduction competition.

I'll just quickly show you something about the schools. Looking at two of the different schools that are involved in this project, school A and school B, school A has the lowest overall annual emissions but the highest per capita emissions at 467, which is significantly over the state average. School B has the highest overall emissions but the lowest per capita, so school A is actually a school that doesn't have as many students as school B, which is where you get the difference.

PROF WOODS: It's probably fully airconditioned and all the works.

MS ABRAM: Actually, school A isn't. School A as a building is a poor school. Its building are actually in a really bad state and they need a lot of repairs; a lot of portables. They don't have a maintenance budget, they don't have a capital works budget, but they also have I guess capacity to do more because they've got a whole swag of fridges that are on all the time with nothing in them, and part of the problem they have is it's so hot in there in summer that the kids just don't turn up for school on the really hot days, so there are some real reasons to do an intervention with this school.

School B is actually much better resourced, and they have an enormous bank of refrigerated airconditioning units facing north-west, mounted on a brick wall above an asphalt playground, so essentially airconditioners that are very hot and working very hard. And every one has a controlled thermostat for their airconditioners, so it's not a very well-regulated environment.

With this, what we really discovered is that every school is different, so being able to tailor recommendations to each school is very useful. There are things that are just not there in the system at the moment. Professional development materials for staff, implementation packages are not really up to scratch, and there need to be some resources in place to retrofit buildings, as well as building standards, to improve future energy performance.

In conclusion, we're very pleased that the Productivity Commission has launched the inquiry into energy efficiency. We see energy efficiency as part of a deep-cut strategy. We work on energy because of its important role in terms of global warming and climate change, not for the sake of energy itself, but we do believe energy efficiency and energy conservation make very good social and economic sense, as well as environmental sense.

We're very keen to see the package that has come out of the NFEE advanced, but the one area that really does need more work on is the whole national electricity market barriers and the solutions to those barriers, so we're very interested to see what conclusions you come to with regard to those topics.

DR BYRON: Thank you very much, Esther. What I've found quite fascinating about your written submission and also in the presentation just now is the variety, the diversity, of practical, on-the-ground things that your foundation has been able to do, and particularly with small business which, as you say, is often ignored, and some of the small business people that we've spoken to have said they are so up to their eyeballs in things that they have to comply with, whether its OH and S or quality control or food standards and these sorts of things, that it's very difficult for them to find management time when they've got very few management resources to even think about this, let alone get on top of it. Is that the sort of thing that you generally find?

MS ABRAM: Yes, absolutely.

PROF WOODS: Isn't that therefore a concern that's starting to mandate energy efficiency and is just going to push a lot of these small businesses to even more extreme ends of their capacity to operate? Typically, as you say, they're single or owner-manager. When they shut the shop at night they've still got all the paperwork and the ordering, let alone trying to work out any maintenance and read the TaxPack and do all the rest of the things. If you start to mandate too heavily into these areas, the stresses they're going to be under will increase considerably.

MS ABRAM: Yes. I think it depends on how the mandating is done. It can be done in ways that actually makes life easier for them. For instance having mandatory disclosure on point of lease of the energy efficiency of commercial buildings is actually very important because they can then make a comparison at the time that they're choosing to rent a building, and they have some idea of what they're moving into. Things like standards for commercial equipment: there's really very little work that's been done in that area, so again giving them the capacity to make some sort of a choice instead of them having to look at the technical manuals of equipment to make a decision, and there aren't many of them that are going to do that.

PROF WOODS: But that's in fact mandating behaviour onto others that they then can benefit from, and I think that's quite right in many of those cases. That's useful information because it reduces the search costs and transaction costs in acquiring more energy efficient appliances and the like. But I think we've got to distinguish between what we impose on them versus what we impose on others who can reasonably incur the cost, which is of benefit to them.

MS ABRAM: Yes. I haven't seen anything that's on the table that's looking at mandating things for small business to comply with. Where there are things on the table they're either for much, much larger businesses that have the capacity to do that or things like the businesses who have to do reporting to the EPA that are ones that already have - again, they're not going to be small businesses; they're going to be more medium sized.

DR BYRON: I notice on the background about the foundation that you basically are running voluntary and incentive based programs, and yet you're talking about increasing government intervention in the form of information, which you do, and incentives in the form of rebates and grants, which you do, and increased regulation, so I'm wondering why you see the need for "and increased regulation". Is that something that's been completely missing from the tools that you've got available to do your work?

MS ABRAM: I think it's about creating a better environment for energy outcomes to occur. One thing is: we do a lot of delivery of things which are there already or tailoring things that are there already to deliver, and unfortunately we're the only one of our kind in Australia, so a lot of the delivery is just not occurring anywhere else, or it's happening in very limited ways.

In terms of the regulation, I guess the regulation we'd like to see is around areas where we think that it's actually going to maximise our energy efficiency where getting people to sign on voluntarily just is not going to work, so the sorts of examples we've come up with are of those.

DR BYRON: I like the examples in the submission, because one of the things I think this inquiry has to establish or confirm is that there are indeed plenty of valuable savings out there that can be made through energy efficiency which will have considerable greenhouse and other environmental benefits, if only one cares to look and if one knows what to look for and, as you say, if it's made not too difficult and reinforced and so on, and so the foundries and the bakeries and the kindergartens examples in your submission I think are really interesting because across a wide spectrum they actually confirm that, yes, there are things that are relatively easy and inexpensive to do that generate substantial benefits, and yet, as we were discussing with Dr Moran before, his starting point is that if there were things out there that were easy to do and worth doing, people would have already done it.

MS ABRAM: Yes. That just doesn't hold water with our involvement that we have with the community. Often the first part of your job is actually explaining to people what the opportunities are and getting them enthused about that. They just simply don't know, and really it's not about just doing one thing. People use energy in so many different ways and that's one of the difficulties with it. It's quite a complex sort of an issue to get your head around, so if you did a survey of householders today and said, "Do you agree with saving energy?", they'd say, "Yes." "What do you do?" They would say, "Turning off the lights." Now, whilst lighting is important, it's a minor area of household energy use, so that's the thing that is intuitive for people. Their level of knowledge is not very high, and that goes across the board with all sectors, I think.

DR BYRON: One of the questions that we've been asking a lot of people is the extent to which households might respond to a price signal: if electricity prices were higher, would people use the clothes dryer less and hang the clothes on the clothes line outside more often when it's sunny, which would save them money, or conversely, at times when electricity is incredibly cheap, you can sort of understand why people don't bother using the clothes line. I mean, it's a fairly simple example.

MS ABRAM: Yes. I guess the thing with price signals is that it's not as easy as increasing the price and then there's an immediate demand management response. There are obviously issues about how do you have to increase the price to get a demand management response across the board; what is going to be the actual social impact of doing that; what is going to happen to the people who are locked into particular forms of energy consumption. For instance, research that we did with householders recently in the Community Empowerment Project: really, from their perspective - and this was during winter - they saw their peak times as being when they got home from work, they had to cook dinner, they had to get the kids in the bath, there's a couple of hours where they use a lot of energy, and they can't do that at other times.

There are of course things where you actually could focus more energy in around time of use; things like running a pool pump. A pool pump can be run at any time of the day and it can be put onto a timer switch - other sorts of household appliances - but also with airconditioners as well, not necessarily running them when it's not hot, because that doesn't make sense, but having them remote-controlled so they can be switched off. So I think there's actually a swag of policy options which need to be brought together to make a complete picture that doesn't punish people who are already having difficulty paying their bills and living in the worst houses and putting up with the worst appliances, but actually manages to achieve some of the demand management outcomes that are really essential in terms of the electricity network and greenhouse gas emissions.

DR BYRON: If you look at the pricing structure of electricity and gas, for example, there's a fairly steep connection charge. Even if you reduce your consumption of gas or electricity by 10 per cent, the total bottom line of the bill might only go down by 2 or 3 per cent.

MS ABRAM: Yes, absolutely. The tariff structures actually don't send the right signals to people. Having a service-to-property charge that never changes no matter how much energy you consume is problematic, and that does disadvantage people who are low energy users. Also having tariffs which smear costs across whatever time the energy is used - there are people who are benefiting from that, because they can run energy-intensive appliances without paying the full cost, and there are people who are actually paying for those people to get that benefit.

There are those issues that exist at the moment that could be better sorted out, but one of the things we found with the way the market is going is that, through the competitive system, retailers are actually offering additional incentives for people to use more energy, through the sort of block tariffs that they put in place. Those sorts of things just shouldn't be allowed to occur at all.

PROF WOODS: That brings us to interval metering, if we can pick up on that one, because I notice in (xvii) of your attachment you say:

> Participants to this particular set of consultations welcome the idea of instantaneous or rapid feedback on their daily use.

That supports the general notion of wouldn't it be good if people understood that the power they're using at the peak hour of the peak hot day was costing a very large amount. That's all very good, but then when you go back two pages you find that there was a trialling of this centimetre proposal. A couple of things: "Participants found the information interesting." Yes, tick that; that's good. "Surprised how much or how little particular appliances cost to run." That's good; that's lots of information. Then it goes on - and I found this very interesting - "They found that the novelty of the extra information quickly wore off," which also strikes me as entirely true. You'd get tired of running around, peering at it and saying, "Oh, look at that, I just cost a fortune, and the kids wouldn't look at it for me anyway."

Interestingly, none were willing to pay 200 bucks to have it on and none believed it would encourage them to reduce energy use. So all the good things are at the front end and then you get to the shaky bit about putting your signature on the cheque and nobody signs up and nobody thought that it would actually change their behaviour. The novelty would have worn off. If it's hot, you'll put the airconditioner on, and you won't turn the light off when you walk out the door anyway.

MS ABRAM: The centimetre trial was a very small trial, and we basically aimed to recruit households through our network who we knew weren't really focused on energy issues and we went for different sorts of families.

PROF WOODS: Which is probably about 90 per cent of households.

MS ABRAM: That's right, but there were only a few of them that were part of it. They did actually enjoy testing stuff and some of them said things like they couldn't believe how much energy the kettle used, so one would hope that would lead them to conclude that they shouldn't fill the kettle up to the top to make one cup of tea or whatever. I think what it demonstrates is that these tools often have uses, but they don't necessarily solve everything on their own.

Part of the issue with the centimetre trial is that it doesn't give them a sense,

when they actually use it, of what happens when you plug this thing in. What does the reading on the monitor say? That's interesting for them, but they can't necessarily convert that to, "Well, how much does it cost me to run this appliance in the way that I do it all the time?" You'd have to sit down and do some maths to be able to do it. So there are some limitations with that tool, but it would probably be a very good tool for a household that has humungous bills, and they just have no idea why they have these very large bills, for them to do some of that experimentation.

DR BYRON: It's interesting, in that we hypothesise that people are being energy inefficient because they don't have the knowledge. So you give them the knowledge but their behaviour doesn't change anyway. That says, well, maybe we have to do more than just give them the information.

MS ABRAM: Yes. Information is not the thing on its own that's going to solve the problem. I guess, with interval metering, part of the issue with the way that it was dealt with in the research was that it's very difficult to explain to people what an interval meter is and what the sorts of tariffs are that would link to it. It's like trying to explain to someone 50 years ago about the sorts of different deals that you could be on for a mobile phone. No-one ever conceived of it before, so it's just too out there to be able to really describe. So what people sort of grasped onto was the fact that an interval meter would be able to give you some better information and, yes, they can actually give you very good information.

The other side of interval metering is that they should be linked to the retailer, giving you the choice of a suite of different products which have different incentives or costs that are associated with them. We didn't really get to the stage of being able to really explore that with the householders, and that's something that we want to follow up in the research.

PROF WOODS: I just found that it struck a chord all the way through: the surprise for them, the novelty wearing off and then the, "Well, it wouldn't change." It all seemed about right. I'm fairly familiar with the household that runs the big plasma screen and has the ducted electric airconditioning, et cetera. They may not know what each appliance costs but they add them all up and that's why they get such large electricity bills.

MS ABRAM: Yes.

PROF WOODS: So they've got the intuitive information, but it's not going to change their behaviour.

DR BYRON: As I think you said before, it's a relatively small percentage of the total cost for many households and small businesses. I think it was the Housing Industry Association in Sydney last week who suggested that the average cost for

Australian households for gas and electricity is $2.60 a day or something like that. A lot of people spend that on a cup of coffee.

When you think that that's the cost of running all your kitchen apparatuses, the dishwasher, the clothes dryer, TV sets and the central heating or space heating or whatever it is, it's not very much. Then if you say, "Well, there's some great new innovation that's going to make me 10 per cent more energy efficient," if it means that the household is going to save 26 cents a day - well, it probably wouldn't be that because of the price structure; it might be 13 cents a day - you can understand why it doesn't come to the top of their consciousness all the time.

MS ABRAM: That's right. I guess there are other things that are probably more at the top of people's consciousness, and part of the trick with energy is being able to actually link it to those things. For instance, comfort is obviously a key thing for householders. What they tend to do is to go down the track of thinking, "Comfort means plugging in an appliance to make me comfortable." Part of the process that we need to go into as a community is - - -

PROF WOODS: Opening a window.

MS ABRAM: - - - demonstrating to people that there are a whole range of other things that they can do that actually result in comfort all the time, without energy use. This is part of the problem that we have at the moment in dealing with energy outside of the context of climate range. We really need to start getting people's minds focused on what the problems are with excessive energy usage and getting them on board with a regime to sort of cut back, just as with water.

We're dealing quite well, I think, with the symptoms of climate change through water, in that we've had people involved in water restrictions and there have been very few complaints about that. People have taken that on board very well. They can see the sense in it. In fact, you now have people regulating their neighbours' use of water and things like that, so there's been a big mind-shift in terms of water usage. The government has been able to put forward a package of a different tariff - you know, a water structure system - with increased costs. Again, the sky didn't fall in. There was thought about disadvantaged households, in terms of how that was all packaged together.

We seem to be getting momentum with that particular issue, but with energy the momentum just isn't there. Really, I think it is about trying to bed it into climate change and a sense of what we need to be doing in terms of our lifestyles over time to deal with it.

PROF WOODS: But a restriction that says, "If you're an odd number, you shall not water on these days," is a much more powerful thing that you can actually do than to

work out whether somebody has or hasn't turned on their airconditioner on a really hot day. The demonstration effect is much clearer, and so you can understand why it's working better. If you can leverage off that raised awareness back into energy, then there's some potential there.

Can I pick up some more interesting information. I found there were all sorts of useful bits of information in your submission, for which I'm very grateful. Again, unsurprisingly, participants felt that they should be rewarded for doing the right thing and, therefore, liked rebates and subsidies and all of those things. Yet on page 36 of your submission, in terms of incentives for small businesses, if you proposed to them that they have zero or low-interest loans to finance upgrading, retrofitting or whatever to more energy efficient appliances, you're still only getting 40-odd per cent of people who say, "Yes, that might be of interest to me." So we've got 60 per cent of people who, when you say, "How about we give you an interest-free loan or a low-interest loan?" are still not interested. That's a big barrier of disinterest to try and get across, when you're dangling those sorts of incentives and it's still not enough to make people stand up and say, "Oh, this is a good idea."

MS ABRAM: Yes. With all these things, it takes time for people to take things on board. If you did focus on that 40 per cent that said yes and got them doing things and were promoting the fact that they were experiencing the benefits of it, then over time that 60 per cent will start to adopt - - -

PROF WOODS: Yes, but with most surveys where you offer a good thing everyone says, "Yes, I'll have one of those good things that cost me nothing and I'll get some benefit."

MS ABRAM: Yes.

PROF WOODS: Here, where we're offering something that costs them nothing and they will get some benefit, we've still got 60 per cent who say no.

MS ABRAM: They were more favourable about grants, but I think also that survey we did - - -

PROF WOODS: 58 per cent said they'd apply for a grant, so you've still got 40 per cent who said they wouldn't even apply for a grant.

MS ABRAM: When we did that particular survey, we actually did it around tax time and we realised afterwards that that was a mistake, because people were a bit on edge. They weren't in their positive frames of mind.

DR BYRON: That's close to what I was going to come to before, when you were talking about tying this back to greenhouse: the phrase in our terms of reference

about measures that are cost-effective from the individual consumer's point of view. If it's so hard to get people to change behaviours where there is an immediate direct pay-off to themselves, how on earth are we going to go to that second level of getting people to change behaviours for the sake of greenhouse, when it's actually going to cost them?

Maybe we'll learn something in terms of how do you change behaviours to get people to become more energy efficient, when everything is going for it; self-interest, et cetera. If we can learn what the obstacles and impediments are in that category of problem, we're more likely to be successful with, I think, the more challenging one of getting people to make a small hip pocket sacrifice for the sake of greenhouse.

MS ABRAM: Yes. For every obstacle or barrier, there are different reasons and different solutions to those problems. That's the beauty of energy. The thing that keeps us very occupied at work is that there is no silver bullet with it. You need to actually bring on board a whole range of things at the same time. That's one of the reasons we're very enthusiastic about the NFEE package, because it is actually quite comprehensive and makes a really good start in an area where there's very little around at the moment.

PROF WOODS: If you're a business manager who operates across several states, one of the most common complaints is that there are too many fragmented and unrelated things happening. There is a lot happening. They're just not coordinated and consistent, and even consistent over time. What they hate is a program that operates this way for three years and then it changes and you've got to read another 40-page manual to work out how to get back into it through its variation, and they can't understand why, and why can't you just sort of progressively migrate programs rather than chop and change?

MS ABRAM: Yes, that's true. Of course, you have a situation where, if the Commonwealth doesn't actually want to move with something and the states all start to do their own thing and you're a company that operates across state borders, you're going to be dealing with a very complex picture. From our perspective, that's why that sort of Commonwealth leadership is really important in getting some good programs happening nationally. It's really essential, and you will need to have some regional variation, but a lot of these things can be rolled out in a very similar way, certainly with the same principles behind them.

DR BYRON: I was just thinking of the moves towards national harmonisation through the Building Code of Australia, which recognises different climatic zones and tries to make sort of a nationwide harmonised approach to zone 1, zone 2 and zone 3. But then think of Queensland and New South Wales and Victoria each having some of zone 1 and zone 2 and then you have a Queensland version of

zone 1, a New South Wales version of zone 1, and instead of having three categories, one for each state, you've got three lots of eight or 24 categories, so in the name of harmonisation, going from three sets of rules to 24 sets of rules I imagine doesn't help people who are trying to comply with it. But the idea of having a standardised approach for a particular bioclimatic zone makes sense.

MS ABRAM: Yes.

DR BYRON: As long as you do that instead of, not as well as, by states.

MS ABRAM: Yes.

DR BYRON: But that's not your problem, except that I think you mentioned building design.

MS ABRAM: Yes. You obviously do have to take that into account. If you are going to run the Victorian sort of system in Queensland, what you're going to get good points for in Victoria is not going to be the same as what you get good points for in Queensland, to some degree. So it makes sense to do that, but it also makes good sense to look at where the leaders are too, across the nation, and try to get those programs running across the board, because not every state does everything very well, so it's a good opportunity to get everyone at a high level playing field.

DR BYRON: That's the advantages of federalism, that you have different policy experiments running.

MS ABRAM: That's right.

DR BYRON: We'd better not get into that. I think in view of the time, we're probably going to have to stop. Are there any closing comments that you'd like to make, Esther?

MS ABRAM: No, not from me.

DR BYRON: Thank you very much for the presentation and for all the work that went into the submission, and the case studies especially were really interesting.

PROF WOODS: Yes, there's a mine of information there.

DR BYRON: So practical and on-the-ground.

MS ABRAM: I'm glad you liked it. Thank you for the opportunity.

DR BYRON: Thank you very much, ladies and gentlemen. We'll now resume with Dr Williamson from the School of Architecture at the University of Adelaide. Thank you very much for coming.

DR WILLIAMSON: Thank you.

DR BYRON: Mike and I have both read your submission and enjoyed it very much. If you'd like to summarise and paint the highlights of it for us for 10 or 15 minutes, we can have some discussion on it.

DR WILLIAMSON: Thank you very much. Dr Terry Williamson. I'm an associate professor at the School of Architecture, Landscape Architecture and Urban Design at the University of Adelaide. Just to show you where I'm coming from, it was a bit scary to learn that my first paper in thermal performance of houses was actually published in 1974, so I've been at this for quite a while, and since that time I've authored several books and well over a hundred papers on the subject. I think I would consider myself at the forefront of research in this area, both in Australia and internationally. Internationally I deal with people in the computer simulation area and the thermal comfort area in the general environmental design area.

The issue that I've addressed in my submission to this inquiry is concerned with energy efficiency policies and the associated standards, regulations and codes for residential buildings, and I can summarise my argument in four points really. First is that regulation in support of policies ought to be evidence based; that is, there should be evidence that the regulatory strategies or means are consistent with and appropriately support the policies and goals or ends that the policies have.

Regulation that is instrumentally incoherent is, I believe, inefficient, ineffectual and probably unfair. A particular concern I have is that so much emphasis is put on energy efficiency building regulations that it diverts attention away from mechanisms and responsibilities that may in fact better achieve the policy objectives. That's really the first point I'm coming from.

The second point is that little or no effort has been provided to provide real evidence that energy efficiency regulations for residential buildings in Australia produce results that ensure the aims and the objectives are met. When I'm talking about regulations here, I'm referring to provisions of the Building Code of Australia, the deemed-to-comply provisions within that code, and also the star rating schemes like NatHERS and FirstRate, et cetera.

My research - and I believe I'm 99 per cent accurate in this - is that all justifications for the effectiveness of these regulations to date have been based entirely on the results of computer simulations and that in fact these computer programs have not been subjected to corroboration against real data - that is, real

household energy consumption data - and there is certainly no evidence to support some of the outrageous claims made by politicians in regard to the benefit of these regulations. I've seen claims that regulations will reduce energy demand for heating and cooling by up to 50 per cent. I don't believe there's any evidence to justify that.

I also must say that I think the aims and objectives for the energy efficiency regulations are somewhat confused. Energy efficiency is in fact being used as a proxy for dealing with greenhouse gas emissions. Energy efficiency and greenhouse gas emissions reductions are in fact different things. So there's a confusion there.

The third point is that the fundamental assumption in the regulations is that there is a significant correlation between star ratings and energy consumption or rules of thumb, deemed-to-comply provisions and energy consumption, and that there is little evidence to support that this correlation exists. For the submission I've put together information from some case studies that I could find that I've done and other researchers have done to correlate the star ratings and energy consumption and aspects of rules of thumb in energy consumption, and my submission shows that throughout these survey results there is no significant correlation existing. There is also no evidence that the so-called rebound or take-back effects operate in any simple way, and that is often used as an excuse to explain the difference between simulated results and actual results where those are known.

In the fourth point in my submission I detail some case studies of houses built in very different situations, in Darwin, in Adelaide and in Brisbane, that were built before the introduction of energy efficiency regulations. In each of these houses the measured energy consumption shows actual energy consumption considerably lower than average energy consumption for houses in that area, but the sad thing is that these houses could now not be built under the existing regulations, that each of these houses gets one or zero stars, and that the regulations are introducing mechanisms that reduce trade-off possibilities that I as an architect and other architects would use to in fact make energy efficient buildings. So they're the four points that summarise my submission.

DR BYRON: Thank you. That's an excellent summary and an extremely well-argued and well-supported submission, if I can say so. You have I think complied with your first point there, about things being evidence based, and you've presented us with a lot of the factual evidence and facts and figures rather than some loose assertions, which are fairly common in this area, I think.

Where to begin? Could you elaborate a little bit more on the record with the case studies that demonstrate I think your earlier three points, that these houses, all with very low energy consumption, now could not be built because they don't comply? Why is it that they deliver such good outcomes, in spite of the fact that they don't comply? There seems to be both a type 1 and type 2 error, that houses that do

comply with star ratings don't deliver, and houses that don't comply do deliver.

PROF WOODS: And are there features in those that do deliver that don't comply that are now absolutely prohibited from being included in the Building Code, or is it more an accidental correlation?

DR WILLIAMSON: Well, first I don't think it is accidental. We now have quite a number of case studies that show these sorts of results. The houses that I've shown in the case study, as I said in the submission, are award-winning houses. That is, they have won Institute of Architects awards for generally the environmental design category. One of the reasons that the buildings themselves achieve such low energy consumption is that the building design creates a connection between inside and outside and that the behaviour of the occupants is very different to the assumptions that are made within say the modelling programs; that people accept say thermal comfort conditions well outside any assumptions that might be built into a computer program, and when we have interviewed the occupants in great detail, they see no problem with thermal comfort. It's not an issue to them. They were even sort of wondering why we asked them about thermal comfort. They are much more interested in the relationship between the inside of the house and the outside of the house and moving in and out.

Why don't the houses get high star ratings? They are fairly unusual houses. The one in Darwin, for example, has no glass whatsoever. Its external walls are all flywire, in the main. It has slotted floors. If one tried to aircondition that, it would be impossible, but the star ratings basically assume an airconditioned building. The one in Brisbane has very large openable windows, again with lots of glass, again which sort of works against the star rating. The one in Adelaide is the same sort of thing.

So there's a sort of behavioural difference: that the context in which people find themselves in houses determines their behaviour, whereas the modelling assumptions assume a standard behaviour. I think that's one problem. The other problem - and this is something that I'm just beginning to investigate - the modelling assumptions are built up on lots of singular pieces of data, so there's a singular piece of data about the climate, there's a singular piece of data about the material properties; the user behaviour is another singular piece of data; ventilation, a whole lot of little things.

There is no information about the distributions of that data that are contained within the simulation programs, so that you only have to get one of those a bit wrong from the assumptions which are in the computer program, and you get a very different answer. For example, if you were assuming that an R2 insulation is in the ceiling and that R2 is in fact just R1.8 or 1.5, then you're going to get a very different answer compared to reality. There is no capacity within the rating schemes to

actually take account of the distribution of the data that's contained within the computer programs.

DR BYRON: I think the other very important and again most unusual feature of your submission is that you actually talk about the human factor, as you just mentioned there, but off the top of my head, I don't think any others have actually talked about the fact that what's between the ears of the owners, and occupants can be as important as the engineering and what's actually hard-wired into the system. We've sort of talked about buildings as if they were all occupied by faceless, characterless beings that behave according to a standard computer assumption of behaviour.

DR WILLIAMSON: Well, of course, as an architect, I'm very interested in that, and we try to design buildings for our clients which fit their behaviour. We know that people's behaviour changes with the context. I mean, I've got research figures that show that the behaviour of people who have electric heating systems in their house is quite different to the behaviour of people who have gas heating systems, but none of that is taken into account within the regulations or the rating schemes.

One could also imagine that if you do have a building that has large opening glass doors, the way you use that house will be quite different from if it's an insulated box. It's sort of obvious that that is the case, but the way in which one can most easily comply with the regulations is to have an insulated box.

PROF WOODS: I was interested in your comment about Darwin and assuming that they're airconditioned. In the couple of years I lived there, we had no airconditioning but we had an elevated house, large covered verandahs, louvres, ceiling fans and cross-flow ventilation and you didn't need airconditioning, but I would have assumed that that would actually rate quite well on an energy rating, and in fact airconditioning would have been quite difficult, give its construction, but it was very efficient. So are they now outlawed?

DR WILLIAMSON: Well, they're not outlawed, but one of the limitations of the present software that is used for rating buildings is that it can't adequately account for natural ventilation. That aspect of the performance of a building isn't built into the software, so in effect the way in which they get around that is to assume buildings are airconditioned.

PROF WOODS: So that's common across each of the various state programs?

DR WILLIAMSON: That's in effect common across all jurisdictions, yes. All of the computer programs that are used for rating at this stage - - -

PROF WOODS: All have that core base, anyway.

DR WILLIAMSON: - - - assume that the buildings are airconditioned, and it's the airconditioning load that is calculated that is used then as the basis for the rating.

DR BYRON: We had a conversation on Monday in Canberra with Mr Butt from the RAIA, who was talking about houses being designed for the bioclimatic area. We were talking about Queensland and the classic Queenslander with big verandahs, up on stilts, et cetera. They seem to have disappeared over the last 50 years and instead they're building two-storey concrete McMansions with very little design thought apparently gone into them, but you solve all that by just buying the biggest reverse-cycle airconditioner you can and whacking that in and somehow or other you'll be at the right temperature. What we were considering is the extent to which because of the cheapness of both airconditioners and electricity to run them we've actually gone backwards in the sense of the amount of thought and design that's gone into buildings. Would you disagree with that?

DR WILLIAMSON: I wouldn't say the lack of thought but I would observe that builders are assuming that what the market wants is an airconditioned box, at this stage.

DR BYRON: From your examples, we knew at least 20 or 30 years ago how it was possible to design a house that would be very comfortable to live in that didn't cost a fortune to aircondition and so on, or heat in winter; and yet they haven't become the standard. If anything, they're as scarce now as they were 30 years ago. What you're saying is that the building industry is just responding to what they see as being what most people are happy to accept.

DR WILLIAMSON: Some of the research we've done in the past looks at the social reasons why people choose airconditioning as opposed to a naturally conditioned house. I think there is great social pressure put upon people to conform: that if, for example, they have their guests come around, the guests expect to walk into an airconditioned building. It's that sort of pressure that actually causes the market I think to operate the way it does. One of the examples that I can bring to mind is a test house that we did in Port Augusta that we monitored for several years and showed that within reason this building performed very well without airconditioning. But the occupants, who were Housing Trust tenants at the time said that, "Once you leave and take your equipment out, we're going to aircondition it." I said, "Why?" They said, "Because all our friends come round here and ask where the airconditioner is." It's expected that that's what happens.

DR BYRON: I assume that you're quite comfortable with the proposition that we should be looking at more energy efficient residential buildings. If so, the question is, what if any policy measures or actions by governments are appropriate - or required, if any - in the pursuit of that? It's a multi-part question.

DR WILLIAMSON: I think there is a tendency at the moment for the regulations to become far too complicated, that insisting on, you know, the computer programs and things like that - without the evidence to support them giving proper results, I think the regulation at the moment is far too complicated. I would certainly support simple things like insulation perhaps, although a lot of the evidence that I have for that shows that when houses are insulated, the energy consumption goes up.

DR BYRON: Why would that be?

DR WILLIAMSON: Well, people explained it as this rebound effect, but I have no idea. There is not the data out there to find, to really say what is going on. A colleague in Adelaide, Prof Monica Oliphant, has just completed a large study for SENRAC looking at correlations between house energy consumption and lots of factors. She discovered that building characteristics - insulation, orientation, type of construction - explained well less than 1 per cent of energy consumption and the correlation with insulation being present showed an increase in energy consumption. So the data is not simple and we really don't have enough of it to work what's going on at the moment.

PROF WOODS: When you present this sort of evidence to say the ACT jurisdiction, because you quote them in here and use them as one of your case studies, do they concur with your findings or do they offer alternate reasonings? Presumably you've actually tested it with them and said, "These are the results I'm getting. They don't seem to be consistent with what you're actually trying to achieve." How do they respond?

DR WILLIAMSON: They try to find excuses as to why the results might be the way I found them. You know, this rebound effect is one of the principal reasons that is trotted out for a discrepancy between actual energy consumption and simulated energy consumption. Of course that wasn't one of the things that could have been measured in that data. So they say, "What's happening is that people are accepting the benefit as an increased temperature." Then they say, "Well, the economics are still okay because we can value increased comfort the same as energy." Therefore the economics, the cost benefits, to their mind are still justified.

DR BYRON: I don't think that's a very convincing argument for the consistent divergence or non-correlation between predicted performance and actual performance. We've had a number of other submissions that make similar points to yours about the various defects with star rating systems and, in the case of even major commercial buildings like this one, the commissioning failures and all sorts of other things that lead to horrendous discrepancies between predicted and actual. One would have thought that, over time if somebody did the monitoring and understood the reasons for the discrepancy, somehow these predicted and actual would be

converging. But there doesn't even seem to be much evidence for that, does there?

DR WILLIAMSON: No, because the data is not being collected. There seems to be a disinterest by authorities who are advancing these regulations to actually collect the data to show that the regulations are having any effect. At the same time, we're getting an escalation of regulation - you know, jumping from three stars, to four stars to five stars without any real evidence to justify that at all.

PROF WOODS: I think this might be an area where the inquiry team can confront the various authorities with what evidence we've been collecting and seek a response.

DR BYRON: As you say, it completely violates the first proposition about regulation being based on an analysis of what the problem is and that the means will actually deliver the expected outcomes.

DR WILLIAMSON: As I say, all of the evidence that I've seen is based on computer simulation, so it becomes a circular argument and it's not correlated then to real data.

PROF WOODS: The real data will reflect the actual behaviour of the occupants as distinct from the simulation which will reflect the design of the fabric and an assumed behaviour of the occupants. What you're finding is that there's no correlation between the two.

DR WILLIAMSON: That's right, and it's like an epidemiological study. There are techniques for sorting this out and they simply haven't been applied.

DR BYRON: Would you care to speculate why nobody, perhaps with the exception of you, has been doing the research into this? I mean, a lot of effort is going into regulation but there's very little effort going into the monitoring that would confirm or refute that the regulation is having an impact, or a beneficial impact.

DR WILLIAMSON: I think at best people are persuaded that simulation and reality are the same thing. At worst, I would say they simply don't want to know the answer. It might be too difficult; that putting in place regulations for residential constructions seems like an easy thing to do.

DR BYRON: And it seems like it's very low cost. Well, it's certainly low cost to the regulators. As you say, if you assume that the computer tells you what the benefits are you can do that calculation. When we were talking about the benefits of good designs - as architects, this is your special skill - the RAIA emphasise that it's very hard to patch up and retrofit something that was fundamentally a flawed design from the beginning, so that if you get the design right, it's a good start. I'm not sure if there's a tension there between the major skill and value that architects can add in

terms of good design that is both exceptionally functional and cost-effective and aesthetic and a great place to live in and the simulations that I guess are concerned just with the technical relationships. Your idea of good design is probably different from what is in the computer simulations. Am I just repeating myself again?

PROF WOODS: Far be it for me to suggest that, presiding commissioner.

DR WILLIAMSON: The computer simulations evaluate a design. You can have any design and the computer will - a simulation, given the various assumptions and data that's built into it, supposedly can evaluate the design. In fact, one of my specialties is computer simulations, so I don't want to shoot computer simulation in the foot. But I know that if I calibrate a computer simulation accurately - you know, put in the real data, the real user behaviour, the real material properties - I can get fairly close to predicting what is going on. To do it in a generic way, because that can be done, that persuades people that computer simulation results mean something. I think the problem is, when you start to apply it with generic information, that it runs into difficulty.

DR BYRON: And with very crude averages, rather than the sort of very detailed and site and customer specific data that you could put in.

DR WILLIAMSON: That's right.

DR BYRON: Okay, I understand that.

PROF WOODS: One thing that came to my mind when I was reading through your submission is your colleague Monica Oliphant's work - that the negative correlation with north-facing glass is that if it didn't have associated with it the width of the eaves over that north glass panel, then you're going to get two different sorts of results - something that's got summer shading of eaves versus one that's just a flat, exposed piece of glass. So you really do need to go down into that fine level of detail and I can understand - to some extent the star ratings are analogous to the fridge but the benefit of the fridge is that you measure the actual performance of the fridge, of one fridge, give it a star rating and say, "Well, every fridge that's made that way will have exactly the same star rating in a predictive capacity."

But here you can't do the same with the houses because even if it's the same builder with the same design, its micro-environment, orientation, buildings around, wind, whatever - will all affect the actual performance. So I can understand why the task is harder. What I can't understand is why it's consistently producing no significant correlation.

DR WILLIAMSON: I tried to explain that before.

PROF WOODS: I'm happy with your answer of it.

DR WILLIAMSON: That's just a surmise. I have no information to back that up, and there may be other reasons. Given a decent research project, I'm sure somebody could sort that out.

PROF WOODS: Probably an opportunity for a grant somewhere.

DR BYRON: Coming back to occupant behaviour, would there be much point in the star rating system, or whatever, trying to be stretched or extended to a more nuanced understanding of optimum behaviour? Would that solve the problem or is that just sort of silk purse out of a sow's ear?

DR WILLIAMSON: One of the suggestions I've made and my colleagues in Adelaide have made to various regulatory authorities is that we allow, as best we can know, actual user behaviour to be input into the computer program, so that if you know that there's going to be just one person in the house, as an extreme, then in fact you can do the simulation on that, and you may in fact get a bit closer to the real answer. But the answer that is always returned to us is: what happens if the house is sold and we don't know what sort of user is going to be in the house? Well, my answer is when it's sold you redo it, but that doesn't seem to be in the mind-set of the regulators at the moment.

PROF WOODS: But use is even more subtle than that. The usage when you've got a small baby is different from when they've grown up to become a teenager, so you're not going to be wanting to update every few years. When you go on extended holidays, or one of them moves out for a while and then comes back; all of these things constantly affect the usage within the house. Even though the fabric of the house and even the efficiency of the appliances all stay exactly the same, what's happening in the house varies quite considerably.

DR WILLIAMSON: That's right, and the hope for the simulation is that just having a generic user will somehow - - -

PROF WOODS: Yes, even all of that out.

DR WILLIAMSON: - - - even all of that out, but it appears it doesn't.

DR BYRON: Is this because we're sort of carrying over concepts which are relatively simple for a fridge or a dishwasher or something, or even for a motor vehicle where the yellow sticker on the windscreen says that, on average, urban cycle actually is 100 K highway cycle, and probably nobody in the world ever actually gets those average figures, and we know that it varies with tyre inflation or load or whatever, but at least it gives a sort of an understandable proxy, but to try and go

from that to say, "This house or that apartment when occupied by 2.45 people, using dah dah dah, would use so much electricity or would cost $500 or $700 a year to run" - are we trying to stretch a concept far beyond where it's useful and relevant to go?

DR WILLIAMSON: I think that's probably the case, but a house is not like a fridge. There are so many variabilities that trying to put a rating on it as is being done at the moment I think has the limitations that I've shown in the data.

DR BYRON: So even if I produce all my electricity and gas bills for the last three years and how much it's cost me to operate this house, there's no guarantee at all that the new owners, even with the same family size, would get the same sort of figures?

DR WILLIAMSON: No, that's right.

PROF WOODS: You made a very telling point earlier, of keeping it simple, and perhaps the Building Code is trying to become too sophisticated and too nuanced, and perhaps some simple guidelines in terms of design concepts, like keep your wet areas on the west side and have an eave on the north-facing glass and those sorts of things are going to be overall as good a proxy for any energy efficiency as trying to create these more detailed simulations. Is that going too far the other way? Where's the balance? Where do you see the appropriate balance between complexity which isn't producing the desired results, and simplicity, which may miss the point?

DR WILLIAMSON: To be quite truthful, I don't know at this stage. The crux of my argument is that there is no real data on which to make these judgments. There may be no difference between buildings designed just on some general guidelines, some rules of thumb, and buildings designed complying to some very strict regulation. I just don't know, and nobody else knows either.

DR BYRON: But it's somewhat amazing and, dare I say, frightening that we're so vigorously pursuing various policies when there's so little evidence.

DR WILLIAMSON: Yes, very frightening, I think.

PROF WOODS: Is that recommendation 1, presiding commissioner?

DR BYRON: Well, it's a bit too early to say.

DR WILLIAMSON: As I've pointed out in my submission, which seems to have gone over the top of everybody's head, I was trying to draw a parallel between Rene Magritte's painting - - -

PROF WOODS: Yes.

DR BYRON: Yes.

DR WILLIAMSON: - - - that "This is not a pipe", and the relationship between pretending that reality and computer simulations are the same thing, but it went over the top of the heads of most of my colleagues who have read that.

PROF WOODS: We got it.

DR BYRON: Yes, probably because we also do computer simulations and modelling and we know the worst sin you can commit is to actually believe that the results of a model represent reality. I found your exposition in the submission about the history and the origin and the background to the Building Code and to a lot of the other regulatory frameworks incredibly interesting and informative, but I don't actually have any questions to ask you about that, partly because it's so clear and self-explanatory, and thank you very much for that. I don't want you to think that we didn't read it or we weren't interested in it.

PROF WOODS: And I enjoyed the pictures.

DR BYRON: One of the proposals in stage 1 of the National Framework for Energy Efficiency is this mandatory information disclosure, and again that seems to be a nationwide extension of what the ACT has had, that any property that was offered for sale for the last five years or so, any advertising had to state what its star rating was. As far as I know, there hasn't been an independent evaluation of how much impact that mandatory information disclosure has had. I'm not aware of any study of people who were thinking of buying a house but when they saw that it was energy rated 2 rather than 4 or 5 chose not to. In fact, all the anecdotal evidence I've heard is that if people like the house, they like the location, they buy it, whether it's a zero or a 5.

PROF WOODS: I'd be interested, actually, to do a survey in the ACT to work out how many people actually know what that really tiny print in the bottom corner of the ad that says EER 0.5 or 1 or 3 means, and that they think it's some agent code for the number of the ad that they're putting in. I just don't know that people consciously understand it.

DR WILLIAMSON: I have heard, but I can't reference it, that somebody had suggested there was a correlation between the star rating and the price of the house; that the higher the star rating compared to similar houses, the price - - -

DR BYRON: Or was it the other way round, that the more expensive houses were likely to have a good star rating? My point was not to be critical of the ACT but to say is this another example where we're taking a policy prescription and rolling it out on a national basis without having evaluated first how well it worked and how much

it cost and whether it was worth the effort. Coming back to your evidence based regulation, I would have thought that we'd have lots of evidence that this is a very effective and worthwhile thing to do that actually influences investment decisions, and I'm not aware of any such evidence.

DR WILLIAMSON: I think in terms of mandatory disclosure, rather than again rely on the results of a computer program, it may be as simple simply to disclose last year's bill and how many people live in the house, or something like that, so that people can make a judgment themselves on something that approaches real data.

PROF WOODS: I'd never sell the house!

DR BYRON: You're a heavy user, yes.

PROF WOODS: On your point, though, Neil, surely our team will be able to provide that answer in a couple of weeks of having gone and inquired and produced whatever analysis has been undertaken by governments, and we'll know that answer.

DR BYRON: Yes. I don't mean to prejudge that, but again I've been told that you get points in the rating scheme if you've got thick curtains or something, but if the curtains are removed when the house is sold, the rating score may actually not be a very valuable piece of information to the buyer, for example. But I think the most important message that you've given us is the fact that we seem to have a proliferation of state based, particularly, ratings machinations, and the Building Code of Australia getting into sustainability and energy efficiency without a great deal of evidence that it works. So for that point, I think rest assured we've taken that message. Thank you very much for coming. Were there any remarks you wanted to make in closing or, Mike, did you have anything else?

PROF WOODS: No, I found it terrific, very helpful. Anything that you want to conclude with?

DR WILLIAMSON: No, I think most of the points I wanted to cover have been covered.

PROF WOODS: And thank you very much for the time that you've taken to come and deliver it.

DR WILLIAMSON: Thank you.

DR BYRON: We'd better move right on. It's Mr Foster.

MR FOSTER: Commissioners, I have in fact written out my informal remarks because it's difficult speaking coherently enough if you have a few graphs in front of you.

DR BYRON: Thank you.

MR FOSTER: It probably won't make a transcript. First of all, let me say that my message is in two parts. The first is that it's the sun that drives global climate, and if you accept that, it really does simplify your considerations because you no longer have to consider the impact of energy efficiency on climate change. If humans don't control the climate, don't drive the climate, can't stabilise the climate, the sun does it all, or near enough to all that we can't tell the difference, there is part of your work that no longer needs to be done.

The most important bit of information in the whole climate change business is this graph. This shows two things. It shows global climate from 1860 to 2000, and it shows fossil fuel use - that's in millions of tonnes a year, if I can squeeze it over there. Since 1860 temperatures increased 0.6 of a degree. Fossil fuel use has gone up like a rocket, but three things can be seen there. First of all, temperature is cycling; temperature moves in a cyclic fashion. The second is that fossil fuel use didn't really get going until after the Second World War. By that time two-thirds of the temperature increase had already taken place. The conclusion is - and this the basic graph that the Russian Academy of Science used in their May presentation to President Putin, where they recommended that he not ratify the Kyoto Protocol - this is the key graph of that, where they said there is no evidence that humans drive climate change. In fact, let's face it, that graph is empirical disproof of a connection between fossil fuel use and climate change.

Let's just press on. For the Kyoto Protocol IPCC produced a report, a fat report. I didn't bring it in; it's too heavy. In the flyleaf it said a very important thing: that IPCC are presenting comprehensive objective and balanced information on climate change. In fact, that is very, very misleading. They are a pressure group for a cause, and that cause was to get an agreement up, the Kyoto Protocol, and get it ratified and ultimately get it into force, and it comes into force on 19 February next.

Reading that, you might think that they were in some way detached. In their preface to that, they had a statement that there has been a discernible human influence on global climate and that was tremendously influential in Kyoto. I want to show you that. The funny thing is, it wasn't published at the time and you couldn't find it in the text of the report. Those words appeared in the preface, they appeared in the policy-makers' summary, which is I guess what policy-makers read, and then it appeared in the technical summary, but it was not in the report. The reason is

because that information had not been yet published in the peer review literature.

It was later published and when it was published, it showed this: it showed that this is the atmosphere and that's from north to south, and that's from the surface up into the stratosphere. The lower and middle troposphere - the lower atmosphere - is about from there down. Now, it showed - and these are computer calculations - that when you put CO_2 in the atmosphere this is what happens: it warms because of the greenhouse effect, and it warms roughly uniformly over the world, because CO_2 is a long-lived and well-mixed gas. When you put aerosols in the atmosphere, aerosols only last maybe a week or so and almost none cross from the Northern Hemisphere to the Southern, and most of them are put out in the Northern Hemisphere. The Northern Hemisphere cools because of the aerosols. When you add the two together, you find warming in the Southern Hemisphere and nothing much in the Northern, because in the Northern Hemisphere the cooling aerosols and the warming CO_2 more or less cancel out, so you've got a signature in the Southern Hemisphere.

Now, what the article did - and this is the discernible influence - they looked at actuals and they found that over a 25-year period the Southern Hemisphere had warmed. This is the lower atmosphere. The Southern Hemisphere had warmed and the discernible human influence is that these actuals looked like this calculation. Now, what happened though, when they published that, everyone could see what they'd been doing and what happened is that they hadn't taken all the available data. We're talking of 30 degrees to 60 degrees south in the lower atmosphere, and they had weather balloon - the angel data - they had it back to 1958. They didn't take the first five years of the data, they didn't take the last eight years of the data.

If you look at all the data available to IPCC there was no warming trend in the Southern Hemisphere atmosphere. That warming trend was an artefact of the years chosen. They started their warming trend not in this warm time when there was a big El Nino, but during the cool period from the Mount Agung volcano. They started in a cool period. They didn't take the last eight years because that took you into the cool period after the Mount Pinatubo volcano. They stopped in the positive El Ninos, a warm time, before Pinatubo. So they skipped the cool years at the end, they skipped the warm years at the beginning and IPCC contrived a discernible human influence on climate which did not exist. These people are partisans for a cause. It may be a worthy cause, but don't believe that this is arm's-length science.

There was a bigger problem they had at the time and that was the inability of the climate to do what they predicted it would do. If you look at this - this is from that same report - you see the actual temperatures jump quite a lot in the 1920s to 1940s. That dotted line is IPCC's calculation of what greenhouse gases would do. Now, it is overpredicting. Despite the fact that it's overpredicting, it still can't catch that warming then. They get the overprediction down to match here by bringing in these cooling aerosols - and remember, we saw the cooling aerosols in those graphs

there.

PROF WOODS: So is that a Northern or Southern Hemisphere - - -

MR FOSTER: No, this one is world average.

PROF WOODS: World average, okay.

MR FOSTER: This one is world average. That's terribly important, and I'll come back to it. Actually, I should have said that, because it's the key to this conundrum. The next IPCC report said two crucial things: it said that over the last 140 years, surface temperature has increased by 0.6 of a degree, but humans have caused all that and more; there is no natural variability in there. I mean, it's complete nonsense, but that's what they said. The second thing they said is warming in the 20th century was larger than in the previous nine centuries, and the 1990s were the warmest decade and 1998 the warmest year. It may be true, but no-one would know. There just isn't information to say things like that.

But certainly IPCC were quite wrong to avoid, to ignore, hundreds of peer-reviewed papers showing that there was climate variability during the last 900 years, and use a single paper that they found which said there wasn't. That's the paper, that's the hockey stick graph, where you can see 900 years where nothing happens, and then the thing goes up like a rocket in the 20th century - more than all that warming is human caused - and there's 1998, and they draw a line right across and say, "Look what's happening." I don't have time to go into that, but you get the story.

That's figure 1B in the summary of the policy-makers of the 2001 report; their latest report. Here's figure 4: if you look at the left-hand graph, that is their modelling of natural forces. What you see there is 1860 to 1880, and the second half of the 20th century. What they're saying is that if it had not been for human interference, the second half of the 20th century would be warmer than 1860 to 1880. Unbelievable stuff. What they are also saying is that if you then look at humans, their emissions and calculate what that impact would be on temperature, it matches observations. So there's the human output. There is the human; there is the natural. When you add them together, the computer models match reality, therefore they must be right. Again, it's total nonsense, but that's what they say.

There are big problems for them that they have to overcome. The first is that the sun is more active now than it's been for - well, it says there since back to 850, but in fact there is a newer report that's just come out taking it back to about 10,000 BC, about 12,000 years, and it's not until 6000 BC that you get a sun that's more active than it's been since the 1940s. Now, they have to do something about that and what they've done about it is treated solar activity as variations in solar heat output.

That gets it right, because the sun varies very little in solar heat output. This here is sunspot numbers which is a good proxy for solar activity.

But once you use solar heat output you can forget the sun, and we've now got 28 years or so - 24 years or something like that - of satellites, and that shows solar heat output as it varies with the sunspot cycle; in fact, with the double sunspot cycle. Sunspots vary on about an 11-year cycle, but you've got to count two of them together to see what the sun is doing because halfway through, the sun changes its magnetic polarity. Don't ask me why. That line there shows 0.1 per cent change in solar heat output - very small. IPCC is able to ignore the sun and therefore this is just the same graph, which is a prettier version, but once you ignore the sun and actually you get the cooling there because of more volcanic activity in the second half of this year, and the sun is so weak it's doing very little, you can then get that match, and IPCC set great store by that.

The problem is - and, commissioner, you mentioned it - IPCC have used global numbers and it works terrifically well for global numbers. This is cooling aerosols. They are almost all in the Northern Hemisphere, therefore remember - and I've blown up that calculation - CO_2 well mixed, warming everywhere; cooling aerosols in the Northern Hemisphere, the Northern Hemisphere cools, the Southern Hemisphere warms, and that's in the lower atmosphere and the same happens at the ground.

The trouble is it isn't like that at all. It's entirely the opposite. Here, the blue spots are changes in atmospheric temperature and you can see that the warming in the Northern Hemisphere has been most pronounced right where the cooling aerosols are coming out. The Southern Hemisphere, they've said, is warming by calculation because it's got the warming and no cooling aerosols. The Southern Hemisphere isn't warming, and much the same is happening at the surface. So the only reason IPCC have been able to give us those very convincing and - it turns out - totally spurious graphs, is because they've taken the whole world and averaged it. When you divide the world into two halves you see that there is something exceedingly wrong with their science.

This is a pressure group. These are not scientists working in an arm's-length way at the surface. I've been showing you there the atmosphere - at the surface. This is a shocking graph, I'm sorry. But at the surface you can see the same. The big warming is in Siberia and, to a lesser extent, Alaska-Yukon. The big warming is in the Northern Hemisphere which is where the cooling aerosols are. IPCC can get away with it by averaging the whole world. I just show you this, too - very interesting: there is the big warming in Siberia. Alaska-Yukon is the other big warming, but not nearly as big. This deducts summer warming from winter warming. The big warming is not only just in Siberia but in Siberia in winter. That's where the world is warming. You don't get that story from IPCC.

Now, this is a look at the top of the atmosphere. Short-wave heat comes in from the sun and long-wave heat goes out. Put CO_2 in the atmosphere, it traps some of that long-wave heat. The long-wave heat is mostly going where you would expect in the tropics. There it is. When you look - we've had satellites for a while now - at that long-wave heat going out in the tropics, we know from IPCC that the sun doesn't vary its heat output, and they're right. We know from IPCC that the warming in the 20th century is human, caused by the greenhouse effect. If the sun is not varying and the greenhouse effect is warming the world by capturing more of the outgoing infra-red, there is less infra-red radiation leaving the top of the atmosphere.

We've had satellites since 1979. It appears that there is more heat leaving the top of the atmosphere in the tropics, not less, which is entirely opposite to what IPCC are telling us. IPCC have serious credibility problems.

PROF WOODS: Sorry, what is the actual latitude band that we're looking at?

MR FOSTER: As I recall, it's Tropic of Cancer to Tropic of Capricorn.

PROF WOODS: Okay, because your other previous graph - - -

MR FOSTER: Yes, I'll get back to the other one.

PROF WOODS: - - - in fact showed your heating just the equatorial side of the tropics, more than the actual equatorial zone itself.

MR FOSTER: Yes. This graph is a snapshot at one time.

PROF WOODS: Okay.

MR FOSTER: This other graph that I just put over it, is to do with the tropics, but to the trend, the change in heat output escaping from earth, because if more heat is being trapped on earth, less should be escaping. If the greenhouse effect is fair dinkum - I mean, obviously there is a greenhouse effect, but if the anthropogenic greenhouse effect is doing the warming of the world in the 20th century, we have to have less heat, not more, escaping.

PROF WOODS: I'm just finding it hard sometimes to get the relationship, if one is a one-minute-in-time of a whole area versus an angel over a band.

MR FOSTER: I know. That snapshot is probably - - -

PROF WOODS: A year or something like that.

MR FOSTER: But it's certainly not 25 years or whatever. Over 25 years there should be a trend. There is, but it's the wrong direction. Here's our friend the sun. You can calculate the rate of change of torque applied to the sun. The rate of change of torque applied drives the solar eruptive activity. It also drives little changes in solar heat output, but they are minuscule. But the eruption - ejection, let's say - of particles, charged particles, magnetised particles, goes up by many orders of magnitude at times of great solar eruptive activity. When you back-calculate it, it fits in very well with the historical warm periods which IPCC said don't exist anyway, because they say nothing happened, climate didn't change. We know it did, but they say it didn't. But the thing is, for the past they fit together very well.

Now, if the sun plays by the same rules in the future, that leads to interesting possibilities. Here's the past simplified; that's just smoothing it. We're going to get another little ice age minimum, like the Maunder minimum. If the sun does the sorts of things it's been doing for the last 1000 years or more, it's going to be cold in about 2030. Now, that doesn't guarantee it's going to happen, but it's much more likely than anything IPCC have told us. That is within the planning horizon, at least of BHP - I don't know about anyone else - but 26 years away.

PROF WOODS: What is the degree change you were talking about?

MR FOSTER: The Maunder minimum was in fact really a series of very cold winters, an irregular series of very cold winters. Summer temperatures didn't change much, but the winters - not all of them, but lots of them - were very cold indeed.

DR BYRON: And the duration of the Maunder minimum?

MR FOSTER: Everyone argues about that, but you could say, taking it in sensu lato, it was about 1625 to 1720. But let's say if you just look at the most cold part, probably 1650 to 1710 would do.

PROF WOODS: Was that latitudinally distributed differently? Like, the cold winters were in a particular latitude band depending on the circulations - - -

MR FOSTER: It's hard to know because most of the palaeoclimatology has been done in Europe and America.

PROF WOODS: Yes.

MR FOSTER: But recently more has been done on ice cores from tropical mountains and it looks as though it's there. To what extent the Maunder minimum and the other similar minima affected Australia, I don't know. There hasn't been a lot of palaeoclimatology done here. Of course, the research money isn't going into that at the moment, it's going into modelling.

This is an area of magnetic field and that's a direct response to the eruptive activity on the site. With a lag, it is very, very similar to 20th century climate change. Compare that correlation - it's not perfect, but never mind. That's a correlation between an area of magnetic field and temperature in the 20th century. Here's the correlation between temperature in the 20th century and fossil fuel use. As I say, this is empirical disproof. Of course, good correlation is not proof, but it helps.

There are two other things. The sun appears to be controlling earth's climate at least in one way. No-one knows too much about it, but one way it appears to be doing it is through cloudiness. Since we've had satellites we've been measuring cloudiness and, in fact, now the blue lines are - people have gone back to the old way they used to do it, and that's to measure earthshine on the dark side of the moon. That's a proxy for reflectants. Before we had satellites, that's how people used to try and do it.

PROF WOODS: From the dark side of the moon?

MR FOSTER: The dark side of the moon is only lit by earthshine.

PROF WOODS: As in the dark-facing side - - -

MR FOSTER: Yes. It looks from this fairly new work that there is some correlation between them, but it turns out that the earth has got a lot less reflective, a lot less cloudy, since satellites began to about the mid-1990s, and now it seems to be getting more cloudy again, so things ought to be starting to cool down perhaps. But the interesting thing is that between 1985 or so, and a bit after 1995, we got an effect on a stable sun - and the sun seat is stable - but the reflectants went down, so more heat reached the earth. In that 10-year period we got more warming from reduced cloudiness than greenhouse gases in IPCC's own calculation have given us since the Industrial Revolution - twice as much in fact - and that's in 10 years. It shows there are big influences there that IPCC have, for various reasons, chosen to ignore.

The last one I want to tell you about is this: remember I showed in that first graph how cyclic climate is? Climate is on a 300-year warming trend since the Maunder minimum, and that is tied to the increase in solar activity since the Maunder minimum. But on that 300-year warming trend, there is a marked cyclicity with about a 60-year period. I was amazed when I first saw this graph. Here is length of day. Now, humans can't influence length of day. Length of day changes in line with solar eruptive activity. I'm not saying solar eruptive activity has anything whatever to do with it - I don't think it has anything - but it changes. Length of day changes about that. The same inertial influences that drive the solar torque cycle are in fact driving earth's length of day. It means that there is a big interchange in earth

between the stony earth and its mobile blanket of oceans and atmosphere, and that is driving the 60-year and shorter change in temperature in earth, right down to individual El Nino and La Nina effects.

PROF WOODS: This is essentially rate of spin that we're talking about?

MR FOSTER: Yes, sure. But these are inertial events, and once you slow the earth down something big happens in the oceans - and in the atmosphere - but the oceans are the ones with the heat.

DR BYRON: Thank you very much. That's been quite fascinating. As I've been telling a few other people, this isn't actually an inquiry into climate change or whether or not Australia should ratify Kyoto, et cetera - - -

MR FOSTER: I just took advantage of the opportunity.

DR BYRON: - - - but, as you say, it does make quite a difference in terms of the environmental benefits that might come from energy efficiency measures. I think there's some evidence that the main reason why governments are concerned about energy efficient measures comes back to their belief that there is anthropogenic-enhanced greenhouse effect through the consumption of fossil fuel and therefore energy efficiency seems to be a relatively easy and painless way to reduce emissions of CO_2. I don't know that I can ask you anything about that.

PROF WOODS: No. I have asked my various questions because, having sort of gone through this, and then as you went through, we seemed to have cleared up my areas of questioning that I had from the submission.

DR BYRON: Yes. In addition to the submission I did read the paper by Theodor Landscheidt, New Little Ice Age Instead of Global Warming?

MR FOSTER: Right, yes.

DR BYRON: We've got quite a little library emerging of critiques of greenhouse, but that is, as I say, not actually our job in this one.

MR FOSTER: Yes.

PROF WOODS: But it adds to the broader knowledge.

MR FOSTER: Yes.

PROF WOODS: Do you have any concluding comments you wish to make? I think you've covered the area fairly thoroughly.

MR FOSTER: Yes. I mean, it's a big area and there's a lot more that could be said, but I do think that's enough.

PROF WOODS: We appreciate your time.

MR FOSTER: Thank you.

DR BYRON: Thank you very much.

DR BYRON: As I said this morning in my opening comments, it customary to ask each day at the conclusion of public hearings if there's anybody else in the audience who wanted to come forward and put some comments on the public transcript. There's always an opportunity. Please come and sit down, and introduce yourself for the record.

DR WOODARD: Thank you very much. Do you mind if two of us come up, just in case you've a question that - - -

DR BYRON: Yes, go for it.

DR WOODARD: My name is Dr Alastair Woodard. I'm the acting executive director of the Timber Promotion Council, and this is Boris Iskra, who is the technical manager from the Timber Promotion Council.

DR BYRON: Could you introduce yourself personally, please.

MR ISKRA: My name is Boris Iskra. I'm the technical manager at the Timber Promotion Council.

DR BYRON: Thank you.

DR WOODARD: We'd just like to make some comments following on Dr Williamson's presentation and his concerns about the software modelling and its correlation with reality, and certainly a comment, commissioner, that you made, that it's frightening pursuing policy sometimes with so little information. The timber industry here in Victoria would certainly categorically concur with that comment, and in fact before the discussion was held on what impact this meant in terms of simulation and I guess what real impact that meant on the community, we might not have actually, I suppose, appreciated that effect, but certainly in terms of the impact of regulations introduced recently to Victoria there are real, tangible and measurable effects both on economies and on jobs that we'd just like to point out.

We believe in terms of Victoria that that's because of the introduction of the new five-star regulations which are based on NatHERS and FirstRate models which use a thermal mass philosophy in their simulation, and the effect that actually has to potentially decimate the $70 million timber sub-floor market here in Victoria, which is also a flow-on in job effects with people in the particle board industry or in the construction industry. The timber industry has certainly asserted that the current software doesn't truly model sub-floors and it doesn't use the currently available state-of-the-art information, much of which Dr Williamson has actually produced.

You asked the question earlier on of Dr Williamson, "Why do you think we've stopped trying to improve the relationship between simulation and reality?" which

was a good question, and I certainly believe here in Victoria that one of the things that are causing us some problems there are that the Building Commission has to implement a political decision. That's been put in place by the government and they will go through hell or high water to get five star into the system in terms of the Sustainable Energy Authority in Victoria.

I believe it's because of their need to protect their computer software, FirstRate, which is in the marketplace, and certainly in terms of CSIRO, and recognising that all of these regulations nationwide are based around either NatHERS or FirstRate in Victoria, which is simply a black box version of that. There is one piece of software that's used right throughout Australia to measure the simulation. It's a monopolistic bit of software in the marketplace. There's no alternative to go to to get a solution, and there's only one person in the CSIRO at the moment who actually works on that software who can make any modification and, just by example, he's been actually quite ill for the last two or three months and hasn't been able to even look at any comparisons that have been asked for. So CSIRO is definitely undermanned in terms of the manning of that software, even though there are other skilled people, such as Dr Williamson, nationally who potentially could do that type of work.

You might sit back and say, "Well, why isn't industry out doing some simulations?" Well, in fact the timber industry is certainly trying to do that. We have a current research proposal through the Forests and Wood Products Research and Development Corporation, which will build three full-scale houses in Tasmania which they will fully monitor over a three-year period to really get some hard numbers that we can use, and in fact when we've let CSIRO know that, they've been extremely enthusiastic to be part of that project because, as Dr Delsante down there said, "At last we'll have some figures to see if the simulations match reality."

So we have some real concerns at this point that these new regulations that are in place are already having an impact on a proven construction system simply based on the software that's being used, and we certainly would assert that that software doesn't match reality. Just to finish on that, by example there has also been some recent research that's come out of New South Wales that's looked at the energy efficiency used in different types of materials in construction, and it's shown that in fact the net effect of a concrete slab compared to a timber sub-floor is that a concrete slab emits 15 tonnes more carbon dioxide into the atmosphere than does the timber sub-floor.

In Victoria alone each year we do 36,000 slabs, so 36,000 times 15 is about 550,000 tonnes of carbon dioxide that go into the atmosphere just because they're using concrete slabs over a timber sub-floor. So you can see the effect is quite huge in terms of that carbon dioxide emission, and the whole premise that the Victorian government put in place for five-star regulations was reduction of carbon dioxide. 100,000 tonnes a year they said they would reduce it by, but this figure is five times

that amount.

We would just put to the commission that these energy regulations are having an impact and - concurring with Dr Williamson - they are based on computer modelling. We certainly believe, as you said before, it is frightening, the policy that goes on with so little information.

DR BYRON: That was more of a question than a statement. I don't actually know yet how little information is behind it, but it would be frightening if regulation is controlling our way, ahead of proven evidence to support it, or subsequent monitoring to confirm that it has been done. So, yes, the lack of hard data is a real worry.

PROF WOODS: A question: you mentioned that you'd have three houses in Tasmania and they'd be monitored closely and that this would somehow establish some link between modelling simulations and actual performance. The core of the simulations is all about what an average household will do in a generic fabric that has certain characteristics that enter into the fields, into the model. I don't think three houses in Tasmania is going to actually progress that knowledge a lot further. It will tell you a lot about the behaviour of the occupants in those particular homes but as I reflect on my own little meter box, it's divided up; there's already a separate switch for the oven and one for each of the airconditioners and one for the powerpoints which you could then separate out, and take the plasma screen one out and the meterage separately, et cetera.

You could get an awful lot of information from thousands of households. The lighting of course is all on a couple, so if you just did some very simple monitoring of what those various circuits in the house are doing and multiply that over thousands of houses, I would have thought you'd generate a lot more useful data than worrying about the intricate lifestyles of three households in one climate area.

DR WOODARD: Boris might want to elaborate on that but just as a simple sort of uneducated response to that, I totally agree - - -

PROF WOODS: And you're welcome to my meter box any time.

DR WOODARD: - - - and was busting to say before that we've always had a concern with the occupancy behaviours, particularly those that have been used with NatHERS. The new software will actually use more realistic occupancy behaviours. I've got a couple of kids and they come home and they flick on the heater when they're cold and they flick on the airconditioner when they're getting hot, and they've got no relationship at all compared to the occupancy rates that any of these software models use.

But just to answer your question on that, why would these houses be important? Well, what we will certainly try to do is to ensure an environment within the house which is similar to those of the software program we'll be using, so we can actually proceed realistically. If you use those occupancy behaviours, is it anything like the output that comes from the computer model? Now, I totally agree that it will be an artificial environment that these houses will effectively be used in, but it will at least give us some hard data with a real home, compared to something that's coming out of a computer.

PROF WOODS: Sure, but there are hundreds of thousands of real homes that I'm sure for a $10 incentive or something would be happy for somebody to plug a bit of more sophisticated metering into each of their circuits and generate some data as well, but maybe that's all a bit simplistic.

MR ISKRA: Well, I think one of the key aspects of the three homes: two of them will be targeting the five-star type level and, from a construction perspective, the walls and ceilings in both houses will be the same. One house will have a slab and the other one will have a timber floor. And then we'll run the occupancy behaviour in those houses to mimic the AccuRate model or whatever, to get some validation happening. I suppose you're right. I mean, if we could have a thousand houses we'd love to go out to individual houses and get more data.

PROF WOODS: And it needn't be quite so fine-grained, I wouldn't have thought, but, hey, I'm not the expert in this area. You people are.

MR ISKRA: Well, that work came out of a bit of frustration from the industry, saying, "We don't have validation of the models. What can we do as an industry to try and progress that?"

PROF WOODS: So you're worried about the heat bank/concrete floor syndrome affecting your sales.

MR ISKRA: Yes. A lot of the models are based on the mass-type philosophy, and being a lightweight structure, we don't have that, and so therefore we believe that the philosophies are probably slightly out of kilter.

DR WOODARD: But to be clear in the answer to your question there, seriously it was because the current software NatHERS - and the producers of that software at CSIRO openly will testify to this - that the model they used for the sub-floor is quite primitive, and in fact the more sophisticated model they have at the moment, AccuRate, which does look at that more accurately, in fact shows that the gap between a concrete slab and a timber sub-floor is quite reduced.

When the government four or five years ago told us they were going to

introduce minimum energy performance standards, we were fully supportive of the concept, but then it was four star. A lot of research was done to demonstrate uninsulated timber sub-floors could meet four star. 12 months out from its introduction the goalposts were shifted to five star, which gave us a bit of a problem, but the biggest problem was that we didn't have a computer model that was able to allow us to test and simulate new types of products. That will only be available probably over the next four or five months.

Our issue is that the regulations are in place at the moment, so the impact is already in the marketplace. Builders are already trying to get five star and can't do it, and the easiest solution for them is to go from a timber sub-floor to a concrete slab. Our concern which we've particularly expressed to the Building Commission is that if they're making decisions on software that's wrong, they're changing a construction practice which in fact will give them more problems in the future, because building on a sloping site a timber sub-floor is a much better solution. If you have to go and excavate in and dig out a whole lot of dirt, it costs a lot more, it's a bigger impact on the environment. There are going to be downstream effects with flooding, all sorts of problems.

In low-lying areas, a similar thing. You raise it up above the flood level with a timber sub-floor. There are a whole lot of reasons why it's a good construction system, and our concern is that software in the marketplace that we know isn't modelling correctly is changing the marketplace at the moment, but based on an energy rating is the reason that it's there.

PROF WOODS: That's quite a practical demonstration of how regulation can affect resource allocation and behaviour, and if the modelling is wrong, then the behaviour is not optimal.

DR BYRON: Yes, got that point. Anything else you wanted to say or is that it?

DR WOODARD: No, not really, but thank you for giving us an opportunity just to put that position and support Terry's submission.

DR BYRON: Thank you.

MR GALLIENNE: Rick Gallienne, director of Energy Advice. We're a consulting firm that acts for advisers and represents some large industry in Australia that uses large amounts of electricity and gas, the likes of CSR, ACI-Pilkington, that sort of area. I'm going to dig a hole for myself. A perhaps below-the-belt comment here: we're in a large room. Could we have used a smaller one, less airconditioning, less lighting? We've got lights over there by the windows where we don't need them. They don't do anything. And we've got a three and a half star rating fridge in the kitchen instead of four and a half.

I'm going to dig myself out of the hole now, if I may. At the back here we've got Royal Melbourne Hospital which has two 5.3-megawatt cogeneration units operating. Round the corner here we've got St Vincent's Hospital. Round the corner there we've got Alfred. Another three hospitals in Victoria are running cogeneration units, operating from 7 am until 11 pm Monday to Friday. As far as energy efficiency goes, it would be far better to run those 24 hours a day, seven days a week, and take out some coal-fired generation down Latrobe Valley. That's not done because of economics.

On an emotional scale, my father put a $200 skylight in his kitchen, rather than run his 40-watt fluorescent tube. I said, "I'll pay for the power, dad. Don't worry about it." I would have been better off over 30 years, than spending this $200, but some people will do the right thing, regardless of the cost. We've got four-wheel drives out in Toorak that consume a hell of a lot of fuel for no reason; some people will do the wrong thing, regardless of the cost.

Williamstown Dockyard was upgraded a number of years ago by the Department of Housing and Construction. They chose the lowest tender which involved putting in air-heating units for the factory. A year after it was taken over by Department of Defence those air heaters were taken out because they were too costly to run, and radiant heaters were put in. Even though they're more expensive to install they took about a tenth of the amount of gas to keep the place warm.

We talk about a reduction in electricity to save greenhouse gases. Perhaps I'm jumping a few points here, but if I can get my point across - we talk about reduction of electricity to save greenhouse gases, in fact in Victoria that probably wouldn't work so well, because with the big stack through the NEM, the gas-fired peaking stations would be taken off first and the coal fire would be kept going, so therefore the average greenhouse gases would rise per megawatt hour of electricity produced. That's not to say that reduction of electricity is a bad thing.

Commissioner Byron was asking a question there before in which he said, "Why aren't existing cost-effective measures implemented?" Perhaps if I can offer some comment here. I've got five reasons that I believe may be of use to you, and the first is that those improvements may not have been identified. I think a lot of

factories out there are surprised at the number of issues and the number of improvements that can be made that they're not aware of. Just recently the Victorian Environment Protection Authority required energy audits of large industry. A number of our clients went through that process and we identified quite simple savings that had not been identified before. So it's not always a case of businesses not wanting to do the right thing, but they can do it if they know about it, so there's a whole combination of reasons behind that.

PROF WOODS: They can do it, but still don't necessarily do it.

MR GALLIENNE: They can, but still don't necessarily do it, yes. Point number 2 on that is lack of finance access, which was brought up many times before.

PROF WOODS: Yes.

MR GALLIENNE: Pilkington Glass Manufacturing in Dandenong is going to upgrade their glass tank in five to seven years' time. They are reluctant to invest in energy saving measures on that tank now, when far better performing improvements are going to be made with that upgrade. So those improvements that are required by EPA will be negotiated out to a much better solution for a five-year program. Another issue why - - -

PROF WOODS: Sorry, just on that point, does that suggest that there is some rationality entering the process; that you can actually trade off small mandatory improvements now for larger more effective improvements at a later date?

MR GALLIENNE: We would like to think that the authorities would see reason in that, yes.

PROF WOODS: Is that well founded, or you don't know yet?

MR GALLIENNE: It's becoming well founded.

PROF WOODS: Good.

MR GALLIENNE: Yes.

PROF WOODS: Some good news.

MR GALLIENNE: Yes, it is, excellent news. A lot of the benefits that can be gained by energy efficiency improvements are not well marketed, and they're not marketed - sorry, they're not well marketed to the people who are making those decisions - the beneficiaries, government, society generally - and I believe that there is an issue there that needs to be had for improving that marketing of those

initiatives.

My fifth point on benefits on improvements is that there's no transfer of benefit between sectors. I guess I'm reinforcing a point that was made earlier this morning, that to install embedded generation will assist the networks, will assist transmission companies in not having to augment systems. But that assistance is not transferred to the person putting in that embedded generation, and if that could be in some way recognised, then industry would be far more appreciative of assistance to put those improvements in. So I think that's the sort of five that I can come up with this morning, when I was taking notes and listening to the presentations.

DR BYRON: Thanks very much.

MR GALLIENNE: Thank you.

DR BYRON: It occurs to me that most of those five things, the energy performance contractors - their whole package basically tries to address those five obstacles you were talking about. They provide the information, they can get access to finance, they can work with the timing of upgrades of machinery, they hopefully - well, they have to target the decision-makers if they want to get the contract, but presumably they've got every incentive imaginable to try and get this off, and so at least those ones are in there.

Every time I think about the energy performance contractors I imagine that if I was AMP or whoever owns this building, or if I was running Fosters or Amcor or something and an energy performance contractor came through my door, you know, it should be like you've just won the lottery, because this guy is going to find money for old jam - I believe it's money for old boots. You know, it's just the knowledge, the equipment, the access to capital, the guarantees, the subsequent monitoring and everything else and no loss of functionality or quality control of my output or anything else. I'm just staggered that all these energy performance contractors aren't just sort of rushed off their feet and working 24 hours a day, because it seems to me that the package that they're offering solves the identified barriers of why companies aren't already picking up measures that seem to be self-evidently in their own self-interest.

PROF WOODS: Is that a question?

DR BYRON: No, it's a vigorous agreement with what you're saying, I think. Just on the first point you raised, this used to be my office right here, and we had architects come in and turn a couple of offices into this hearing room, and I've no idea why they put those sort of lights and where they are, but - - -

PROF WOODS: But if you went down the corridor you'd find a man on a

stepladder taking out all the fluoros and putting in triphosphorous little fluoros to be much more energy efficient, so we're getting better.

MR GALLIENNE: We're currently running a study for 7-Eleven stores which had about 350 stores throughout the eastern states, on efficiency of lighting. Their lighting is on 24 hours a day, seven days a week, and it is amazing the amount of energy that can be saved by putting in correct lighting.

DR BYRON: Yes, not to mention the other benefits in terms of comfort, productivity and safety and so on.

MR GALLIENNE: Yes.

DR BYRON: No, I don't have a question. I thought your observation about gas generation being taken out of the national electricity grid, because of the way it operates and coal-fired baseload continuing to spin. That is another helpful observation. At this stage I can't think of anything to disagree with you on, or ask questions about.

MR GALLIENNE: Okay.

PROF WOODS: Thank you very much. It's been very helpful.

DR BYRON: Thanks very much for pointing that out to us. If there is nobody else, I'll declare the hearings adjourned and we'll resume tomorrow morning at 9 o'clock. Thank you very much, ladies and gentlemen.

AT 5.26 PM THE INQUIRY WAS ADJOURNED UNTIL
THURSDAY, 25 NOVEMBER 2004

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