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**HOUSE OF  
REPRESENTATIVES**

STANDING COMMITTEE ON SCIENCE AND INNOVATION

**Reference: Geosequestration technology**

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**HOUSE OF REPRESENTATIVES**  
**STANDING COMMITTEE ON SCIENCE AND INNOVATION**

**Monday, 26 February 2007**

**Members:** Mr Georgiou (*Chair*), Mr Quick (*Deputy Chair*), Mr Hayes, Mr Jenkins, Dr Jensen, Miss Jackie Kelly, Mr Price, Mr Tollner, Mrs Vale and Dr Washer

**Members in attendance:** Mr Georgiou, Mr Hayes, Dr Jensen, Mr Quick, Mr Tollner and Mrs Vale

**Terms of reference for the inquiry:**

To inquire into and report on:

The science and application of geosequestration technology in Australia, with particular reference to:

- The science underpinning geosequestration technology;
- The potential environmental and economic benefits and risks of such technology;
- The skill base in Australia to advance the science of geosequestration technology;
- Regulatory and approval issues governing geosequestration technology and trials; and
- How to best position Australian industry to capture possible market applications.

**WITNESSES**

**ZAPANTIS, Mr Alex, Manager, Energy and Sustainable Development, Rio Tinto ..... 1**



**Committee met at 4.40 pm****ZAPANTIS, Mr Alex, Manager, Energy and Sustainable Development, Rio Tinto**

**CHAIR (Mr Georgiou)**—Welcome. I declare open this meeting of the House of Representatives Standing Committee on Science and Innovation as part of its inquiry into geosequestration technology. The inquiry arises from a request by the Hon. Julie Bishop. Written submissions were called for and, to date, 45 have been received. The committee is now conducting public hearings. Although the committee does not require you to give evidence under oath, I should advise you that these hearings are formal proceedings of the parliament and warrant the same respect as proceedings of the House itself. It is customary to remind witnesses that giving false or misleading information is a serious matter. I welcome the witness from Rio Tinto. Mr Zapantis, do you wish to make a brief statement?

**Mr Zapantis**—I do, actually. I have an opening statement I would like to read to the committee if I may.

**CHAIR**—Please.

**Mr Zapantis**—First of all, thank you for the opportunity to speak to you today. Rio Tinto welcomes this inquiry. Rio Tinto is committed to helping develop low greenhouse gas emission technologies that will allow its products to continue to support economic development and the needs of society. Carbon capture and sequestration is an essential element of that technology mix. Rio Tinto is also committed to engaging positively and constructively in the policy debate around climate change.

We are a major producer of minerals and metals, including coal and uranium. We also purchase large amounts of energy for use in our operations, including for the production of aluminium, thus we are exposed to climate change as a business risk and as a business opportunity as a producer of high- and low-carbon fuels and as a producer of high energy intensity products. Further, our operations and customers are spread around the world, in countries that have Kyoto protocol obligations and in those that do not, so our perspective is truly global. This has driven a very rigorous approach to examining the issues around climate change within Rio Tinto. Rio Tinto have, for example, established a climate change executive that has developed climate change action plans to drive our efforts to reduce our own emissions in our operations.

Rio Tinto unequivocally accepts the overwhelming scientific consensus that emissions of greenhouse gases from human activities are contributing to climate change and that very significant reductions in emissions are required. However, as the committee will be aware, achieving those reductions is a complex and difficult task, requiring long-term commitments and strategies that cross generations and that call for national and international cooperation and collaboration. Rio Tinto believes that technology must play a central role in achieving emissions reductions whilst maintaining economic growth, continuing to alleviate poverty and raise standards of living in the developing world. However, the fundamental problem to be overcome with respect to low-emission technologies, be they renewable energy technologies or carbon capture and storage, is that they are currently too expensive to compete with conventional power generation in almost all markets.

Rio Tinto is contributing to global efforts to develop carbon capture and storage and to bring down its costs, and to understand low-emission technology pathways. Rio Tinto is a foundation member of the FutureGen Alliance in the United States, a member of the CO<sub>2</sub>CRC, the CCSD, the Electric Power Research Institute, the International Energy Agency Greenhouse Gas Research and Development Program, and Battelle's Global Energy Technology Strategy Program. Rio Tinto is a contributor to the Coal21 fund established by the Australian Coal Association. This fund will provide \$A300 million for the demonstration of clean coal technologies in Australia. Rio Tinto is also an active stakeholder in the Carbon Sequestration Leadership Forum, a member of the Australian delegation to AP6 and a leading participant in the IEA-CSLF program to identify early opportunities in carbon capture and storage requested by the G8 meeting at Gleneagles.

Rio Tinto are contributing to global efforts to solve the problems of climate change, and we are actively looking for opportunities to contribute more, where it is in the interests of our stakeholders. However, no individual company or government can work in a vacuum: climate change is a global problem requiring a global response across all sectors. Much action is already being undertaken, but that action must now accelerate. Thank you.

**CHAIR**—Thank you very much, Alex. I will lead off on one thing that came through in your submission and also characterises most of the discussions at some point or another. At page 4 of your submission you say that all of the technologies are 'immature'. We keep being told that they are actually ready to go and that they are cutting-edge technologies; they have been proven. But when push comes to shove they are all immature. Can you tell us in tangible terms what that means?

**Mr Zapantis**—They are mature in context. They are mature where they have been deployed in specific niche markets for other things. For example, for 30 years CO<sub>2</sub> has been injected for the purpose of enhanced oil recovery. So you can argue that that particular piece of the pie is mature. However, what is immature is when you pull all of the pieces together and put them together into a system and try to operate that system. That is where the technology is immature.

**CHAIR**—What sorts of risks are associated with that immaturity? Firstly, could you deal with the technical risks.

**Mr Zapantis**—The risks are primarily commercial. There is no doubt that you can pull together an IGCC with CCS today and operate it; however, the cost of the electricity produced by that system will be very large compared to a conventional coal-fired power plant. The technology risk is more around the economics of the technology than the technical reliability of the technology. There is still uncertainty in the area of geosequestration itself—not to the extent that there is doubt that it will work; it is simply that there is a requirement that specific targets for sequestration be better characterised so that the sequestration of CO<sub>2</sub> can be optimised in those particular places.

**CHAIR**—Basically, if the government were to make a decision that was not constrained by cost, you could guarantee us an extraction and injection facility and you would not be worried about technical risks associated with that?

**Mr Zapantis**—To say that you are not worried about technical risks is a bit—

**CHAIR**—Or whatever.

**Mr Zapantis**—We are confident that the engineering exists to allow these clean coal plants to be constructed and to be operated reliably. Obviously, the test will be when the first commercial-scale plant is deployed. Until you are able to walk up to one of these things and kick its tyres and see it operate and gain that experience in operating a full-scale, commercial-scale clean coal technology power generation plant, there will always remain an element of technical risk. However, there is every indication that the engineering required to make it work is there; it is simply a matter of making it happen.

**Mr TOLLNER**—Can you explain what you meant by that? You said that everything is there and we have proven it but when you pull it all together there is an area of technical risk. What specific risks are we talking about?

**Mr Zapantis**—I cannot talk on the specifics of a technical risk; I am not a technologist. The application of technologies in one context provides a level of confidence that the technology can be transferred to another context; however, until you actually operate it in that context, there is still that level of technical risk.

**Dr JENSEN**—It is more about the integration issue, isn't it?

**Mr Zapantis**—That is right. As I said, pulling all of these technologies together and running them as a system is where there is uncertainty. Basically, it has not been done in the past on a commercial scale, so we do not have the engineering experience or the operational experience to know how to run one of these plants in an optimal fashion.

**Mr TOLLNER**—But you were saying that, if it was a commercial reality and money was not a factor, we could do it now.

**Mr Zapantis**—Correct.

**CHAIR**—We just would not be sure whether it worked.

**Mr TOLLNER**—But you did say that it would work.

**Mr Zapantis**—Yes, it will.

**Mr TOLLNER**—If money was not a factor—

**Mr Zapantis**—It will work. We are confident that it will work.

**Mr TOLLNER**—So why haven't we done it?

**Mr Zapantis**—Cost.

**Mr QUICK**—The cost to you or the potential cost to the consumer?

**Mr Zapantis**—The cost to the proponent of the technology. If Rio Tinto, for example, wanted to develop a clean coal technology platform and wanted to build an IGCC, an integrated gasification combined cycle, with CCS, we would be selling electricity into a market where we could not compete with the conventional coal-fired—

**Mr HAYES**—Like with renewables?

**Mr Zapantis**—Exactly. It is exactly the same issue. We simply could not compete.

**Mr HAYES**—Therefore you are looking for a market mechanism to be able to base that upon?

**Mr Zapantis**—A market mechanism is definitely part of the answer, but there will need to be push policies as well.

**CHAIR**—Can you split the costs up? One is the cost of the plant.

**Mr Zapantis**—Yes.

**CHAIR**—Two is the cost that is imposed on the generation of—

**Mr Zapantis**—The operation itself.

**CHAIR**—the operation itself. So you are confident. If it is just the cost of the plant, you are not worried; it is technically not merely feasible but highly achievable. You could build a plant to extract—

**Mr Zapantis**—Oh, yes.

**CHAIR**—So it is not the cost issue or the technical issue that you are worried about. You are worried about the impact of the process on the end cost of electricity or power.

**Mr Zapantis**—Effectively, yes.

**Dr JENSEN**—I am a little bit concerned by your statement that you need a market mechanism on this. The reason I am concerned is that you are asking for trading essentially of a commodity that has no intrinsic value. You can see the dangers of that by what has happened to the carbon price in Europe over the last few months. Surely a better solution would be if you actually regulated the amount of, let's say, CO<sub>2</sub> that you put out per megawatt hour. In that way you are not effectively trying to frame what technology you are going to support. With any sort of pricing mechanism that you put on it, you are going to be, in effect, favouring one technology over another.

**Mr Zapantis**—I did not say we were asking for a market mechanism. I said that we supported some sort of price signal on carbon because, without it, low-emission technology simply cannot—

**Dr JENSEN**—I guess I am saying that if you regulate a maximum amount of CO<sub>2</sub> emissions while having transitional arrangements for companies that are currently generating electricity—so that they can phase those technologies out—wouldn't that be a better mechanism, in that you are not actually betting on a certain technology by trying to set an artificial price on a product that has got no intrinsic value?

**Mr Zapantis**—One can argue that that form of regulation, if done sensibly, is in fact a price signal on carbon. I do not want to get into the specifics of exactly what sort of price signal is required; however, it goes without saying that in order to justify, on commercial terms, the extra work and therefore the extra expenditure to develop clean coal—or clean gas, for that matter—electricity generation compared with conventional, there needs to be some sort of commercial justification for that. I would like to add, though, that a market mechanism, if we are talking about emissions trading, a carbon tax or any other sort of direct price on carbon, will not pull through CCS at the scale required. There will need to be a direct subsidy, and there will need to be push policies as well.

**Mr HAYES**—Having said that, what sort of pricing signal are you looking for to justify that approach? If this is to be almost in addition to setting a market mechanism, the levels of subsidy—are we talking about equating that to a tonne of CO<sub>2</sub> avoided, somewhere in the vicinity of \$40 a tonne?

**Mr Zapantis**—It is going to be specific to the project. We are moving onto dangerous ground if we start speaking in general terms about the economics of CCS, because it is very specific to the project.

**Mr HAYES**—You cannot really do that until you establish a market mechanism.

**Mr Zapantis**—I would think that \$40 a tonne probably would not be enough.

**Mr HAYES**—For one specific project?

**Mr Zapantis**—For any large-scale CCS project. We would think probably \$50 or more, but it is dangerous to speak in generalities.

**Mr TOLLNER**—I was about to say: you seem to be speaking in contradictory terms. On the one hand you are saying that if we were to pull this technology together now it would not be commercially viable; but you could not say what it is going to cost to do that, or what the end dollar rate is. But on the other hand you are fairly certain that a carbon trading system, or whatever you want to introduce, is not going to work; we are still going to have to subsidise it.

**Mr Zapantis**—I do not know that I am being contradictory; what I am saying is that there must be some sort of commercial payback for clean coal or clean gas, No. 1. Whether that is regulation, whether that is a carbon tax, whether that is emissions trading, there must be something, otherwise you are not going to be able to compete with a normal, conventional coal- or gas-fired power plant. In terms of how you make these things happen, a price on carbon is going to be part of the suite of policies that is required to deliver these to the market. But we do not think that a price on carbon alone will deliver; you need other policies as well. There are major issues around regulation, for example. There is a whole lot of policy uncertainty and

regulatory uncertainty and liability uncertainty, particularly around geosequestration. All of this means that the cost of capital when you try to finance these projects gets very high or the financiers say, 'Sorry, we're not going to finance your project because there is too much risk associated with legal and regulatory, as well as normal commercial risk and technical risk, especially for first-of-a-kind plants.'

**Dr JENSEN**—You are still saying that you see carbon trading as a necessary part of the suite. Back in the seventies, for example, in getting rid of SOCs from emissions what you had was regulation about how much you were allowed to emit, and that was it. There was not a trading scheme put on it, and yet that obviously worked because you do not have acid rain to anywhere near the same degree now.

**Mr Zapantis**—I need to be very clear here. I am not specifically advocating carbon trading. I am not advocating a tax, either. What I am saying is there must be some sort of price on carbon. What does that mean, and how will that be delivered in a way that does not undermine Australia's competitive advantage? We have very cheap energy in this country and it underpins a lot of our industry where we are competing with countries which have very low costs of labour, which we do not have.

**Dr JENSEN**—And it has to be global.

**Mr Zapantis**—That is right. Ideally, a price on carbon would be global and would be delivered in a way which does not distort international competitiveness.

**Mr QUICK**—On one hand you are talking about Australia specifically, and you mentioned in your introduction that you have got your fingers in dozens and dozens of countries. Is there uncertainty globally about all the issues about cost and regulation?

**Mr Zapantis**—Yes, absolutely. I will give you a good example. I do not know whether you have spoken to BP but they have started a new business that they have actually called Alternative Energy and one of the projects they would like to start is in the UK. It is the Peterhead project and it is a full-scale CCS project. That project, I understand from press releases that I have seen, is basically ready to go. However, they are waiting on a response from the UK government on the extent to which they will support the project, because commercially it simply will not fly without public support. They are facing exactly the same issues that we face in Australia.

**Mr QUICK**—With an ageing generation capacity, can you give me a time frame; say, 10 or 20 years time? When do the coal-fired power stations we currently have get to the stage where this is going to be cheaper than refurbishing and upgrading those existing power stations?

**Mr Zapantis**—That depends very much on the particular plant you are talking about. When you talk about a retrofit, you are really talking about post-combustion capture, and one of the major issues with post-combustion capture is the energy penalty that you pay. When you bolt this chemical plant—it is a chemical plant, effectively—onto your coal-fired or gas-fired power station you are losing effectively 25 per cent or thereabouts of the electricity that you produce because it takes that amount of electricity to run that capture plant, the compression et cetera. If you are starting with a plant that already has relatively low efficiency, as some of the Australian fleet do, it really makes it not a viable option. So you need to look at the newer plant which is

operating at a higher efficiency—30-plus up to 40 per cent efficiency. Those plants are much more amenable to post-combustion capture. So you come to a decision—and the electricity industry is far better placed than I am to comment on this—where the economics of an old plant if there is a price on carbon simply do not stack up and it is time to retire it. Then there are issues around how much sunk capital there is and what that means in terms of the overall economics of the company versus establishing a new plant to replace that generation capacity.

**Mr QUICK**—So when do you see a new coal-fired power station being built in Australia—in 10 or 15 years time?

**Mr Zapantis**—The electricity industry will say that there has already been underinvestment in the generating fleet in Australia and that really we need to start building new plants now. So they are holding off to some extent, as I understand it, to wait and see how the policy develops, to inform their investment decisions. We are talking about investments here in the order of \$1 billion or \$2 billion, so companies, especially relatively small companies that operate in Australia, will not embark on those sorts of investments lightly. They need to have enough certainty in the future environment to know that their investment is not going to become a stranded asset down the track. I do not have a satisfactory answer to the question; suffice to say that investment in our electricity-generating fleet, basically, is required now.

**CHAIR**—You have a lot of optimal solutions here in your submission. ‘We will have to do it together’, ‘there has got to be international cooperation’—nobody is an island et cetera. Given the imperfect state of the real world, how would you proceed, given your knowledge?

**Mr Zapantis**—How would I proceed? You can announce a price on carbon before it is introduced. That is one option. So the Australian government, or any government for that matter, could say: ‘There will be a price on carbon. It will commence in 2015 and it will be this amount.’ That would start the industry adjusting immediately, without the burden of that price on carbon on the economy. Maybe it could go through a staged approach whereby initially that price on carbon, however it is introduced, is under some sort of control by the government such that it is capped. And then, once broader arrangements are made with other countries such that international competitiveness is not unduly distorted, maybe we could go to a full-blown emissions trading scheme. There are a number of options, but they must also be offset by a policy push for this technology. As I said, a simple price on carbon—

**CHAIR**—Policy push is fine, but what does it actually mean?

**Mr Zapantis**—What does ‘policy push’ mean?

**CHAIR**—Yes, tangibly.

**Mr Zapantis**—It means incentives. It means public money going towards the establishment of these first-of-a-kind plants. It means a range of other things as well: it could mean tax incentives, it could mean accelerated depreciation, it could mean reductions of other taxes et cetera—fees, levies. It could mean a whole range of things. The bottom line is that the first of a kind, the first n of these projects, simply cannot get off the ground without public support.

**CHAIR**—What differentiates the first of a kind from subsequent plants? Why doesn't the government just say, 'Go and do it; we'll pay for it,' and that will show what the costs are et cetera? If that is so distinctive—

**Mr Zapantis**—That's a question for the government, isn't it? Why wouldn't the government do that?

**Mr TOLLNER**—Do you really see that as a good policy decision?

**Mr Zapantis**—Yes. In short, yes. If the government would like these technologies to be deployed, the government is going to have to support their deployment. It really is as simple as that. The economics simply do not stack up without that support. Now, what will happen, as with other technologies, is that the price will come down with learning, with experience. That is the case with all technologies and this technology is no different. So, whether it is the first or the second or the third that needs to be supported, I cannot say; but definitely the first will need to be supported.

**Mr QUICK**—So the cost of that will be—what?

**CHAIR**—A couple of billion dollars.

**Mr QUICK**—Two billion dollars. We are talking about \$10 billion for the Murray-Darling Basin.

**Mr Zapantis**—Well, to build a standard coal-fired power plant costs \$1 billion to \$2 billion, depending on the size and a number of other variables. To build a plant with CCS is going to be probably up towards \$2 billion if you are talking about a large scale—between \$1 billion and \$2 billion, probably closer to \$2 billion than \$1 billion. So there would need to be some sort of capital subsidy up-front and possibly ongoing support as well, because—

**Dr JENSEN**—Is that in addition to?

**Mr Zapantis**—In addition to what?

**Dr JENSEN**—You said a coal-fired plant is \$1 billion to \$2 billion.

**Mr Zapantis**—No, it is not in addition to that.

**Dr JENSEN**—Okay. So how much in addition?

**Mr Zapantis**—If a normal coal-fired plant is between \$1 billion and \$2 billion and closer to \$1 billion, then a plant with CCS is going to be closer to \$2 billion.

**Dr JENSEN**—In other words, close to \$1 billion for the backing?

**Mr Zapantis**—Possibly. It is very dangerous to get general, because you need to look at the specific bits, such as how far away your central source is and all of those sorts of issues. But you are talking about a significant—

**Dr JENSEN**—You are talking hundreds of millions of dollars, anyway.

**Mr Zapantis**—Absolutely.

**Mr QUICK**—But, if the first one was built, what would be the flow-on effect?

**Mr Zapantis**—The flow-on effect would be learning in terms of the engineering. The first one would probably be overengineered. The proponent would want to be sure that it was going to work; it would be overengineered. That is typically how technology progresses. So through the operation of the plant you would learn what the opportunities are for reducing the engineering, for example. You would also learn how to operate the plant optimally in terms of the technology, in terms of human resource practices, in terms of the interconnection to the grid—and also the operation of the sequestration part of the plant as well.

**Mr QUICK**—So two years after it is commissioned we would have a rough idea of cost, its effectiveness and its capacity to put into the national grid—all those sorts of things would be answered?

**Mr Zapantis**—In the first two years you would basically go through a process of cost discovery. You would know within a year or two how much it is actually costing you to run this plant. That is the first step. One of the major challenges we have at the moment is that we really do not know. There are a range of estimates as to the cost of clean coal or clean gas with CCS, but until we actually run a plant they are just estimates. So we would know how much it actually cost to run one of these, and we would know that to the nth degree.

**Mr QUICK**—So what generating capacity would it have? Would it be larger, smaller or the same size as the average power station?

**Mr Zapantis**—When I talk about full-scale, what I am talking about really are projects that have an output of, say, 500 megawatts, which means that they are producing about 700 to 750 megawatts of electricity, but that difference between 700 to 750 and 500 is required to run the capture and the sequestration.

**Mr TOLLNER**—So let's say the government allocates \$2 billion to build a coal power station with carbon geosequestration and it turns into a winner; what are the marketing opportunities that the government would have from that?

**Mr Zapantis**—If it did work?

**Mr TOLLNER**—If it did work—if everything worked.

**Mr Zapantis**—I do not think we are advocating public funds paying for all of the plant. I do not think anyone is putting that argument forward. I think what private industry is saying is that industry will bring these to market, industry will build these. However, there is a gap between commercial viability and where these plants stand, and that really needs to be made up by the public purse, at least for the first year. Sorry, your question was—

**Mr TOLLNER**—My question was: could this technology be sold around the world and what sorts of benefits would there be for Australia, possibly? They are all hypotheticals at the moment, of course.

**Mr Zapantis**—Let me put it this way: there will need to be many thousands of these around the world. In order to deal with climate change there are going to be thousands of clean coal or clean gas plant built around the world. So the first movers who develop the IP and own that IP if they are able to maintain control of it will have a considerable business opportunity. Australia is already in a pretty good position, given the excellent work that has been done by organisations such as CO2CRC. That work is ongoing, of course. Peter Cook is a world expert in this area, and the work of his group is second to none. So there are considerable opportunities for commercialisation and monetising of the IP that comes from these plants. As to exactly how that will pan out, I would be speculating, but there are definitely opportunities there.

**Dr JENSEN**—Can you give us some idea of scale? You have said something about hundreds of millions of dollars, but obviously there are three technologies that you have identified. There is basically pumping in pure oxygen, there is gasification of the coal or there is slapping an add-on onto the end of a conventional power station. Can you give us some idea of how much you would expect the government to have to contribute to each of these technologies in order for the thing to be commercialised?

**Mr Zapantis**—I think the jury is still out on which of those technologies is going to be the best commercial prospect. IGCC and post-combustion capture are probably about line ball, although Peter Cook from CO2CRC will say that, based on his research, he thinks maybe PCC is slightly in favour. But it really is early days. I keep coming back to the fact that, until we have the experience of operating a full-scale plant of each type, it is going to be very difficult to—

**Dr JENSEN**—That is a massive amount of money you are talking about.

**Mr Zapantis**—It is, and that is the challenge. That is why it has not happened yet, because it is a massive amount of money.

**CHAIR**—I am starting to get a bit puzzled. A drug company puts in a lot more than \$1 billion to develop a new drug—high risk.

**Mr Zapantis**—But there is a return.

**CHAIR**—There may or may not be a return.

**Mr Zapantis**—Overall there is a return. We know right now that we can build one of these things and it will not be able to compete and it will be losing money from day one; it is a certainty—whereas drug companies are a bit like mineral companies: they do a lot of exploration. Rio Tinto spends a lot of money on exploration, but overall there is a return.

**Mr TOLLNER**—But I thought you said the IP would be worth something internationally.

**Mr Zapantis**—It would be.

**Mr TOLLNER**—So there has got to be an incentive there for the company to go and spend a billion dollars.

**Mr Zapantis**—It is a large risk to take.

**Mr TOLLNER**—But, as Petro says, drug companies do it all the time, and the risks are just as high.

**CHAIR**—Sometimes they pull the drug off the market and—

**Mr Zapantis**—I come back to the analogy with the mineral industry. The mineral industry spends hundreds of millions of dollars a year on exploration and often does not find a thing, but overall the market is such that you can make those investment decisions in the knowledge that, as long as you manage the activity properly, there will be a return. With clean coal technology, we know right now there will not be a return. We know absolutely that it will be making a loss from day one.

**Mr QUICK**—We spoke initially in hypotheticals about \$2 billion. If the government said, ‘We want four operating, and we will put \$500 million into each,’ would we get four up and running? Would that risk be lowered enough?

**Mr Zapantis**—Possibly. You would have to look at the economics of each project.

**Mr QUICK**—If you sited a couple in the Bowen Basin and a couple down in Gippsland, where most of the coal resources are, and you had the capacity to geosequester—

**Mr Zapantis**—Possibly.

**Mr QUICK**—that would be a huge carrot. We are talking about demonstration after demonstration and we have all these little places around the world map, but sooner or later someone is going to have to bite the bullet. Look at China. China is basically putting in a new coal-fired power station every 10 days. They are just belching the stuff into the atmosphere. We could sell them the technology, as Mr Tollner said, and it would be worth a fortune.

**Mr Zapantis**—I do not think that, from one plant, you will be able to develop IP which is saleable. I do not think that, from one plant, you will crack the code such that you have IP which can be deployed globally. There is a necessary process of learning that will come from more than one plant.

**Mr QUICK**—At what stage does the learning stop and all these pilots suddenly land and we have something concrete? CO2CRC have been ‘allocated’ tens of millions of dollars, and they are all over the place. At what stage do we say, ‘Enough’s enough; we’ve got the capacity to do it; let’s go and do it’?

**Mr Zapantis**—We do have the capacity to do it, but I come back to the economics. The economics are such that these plants will not fly without support. I do not believe that, from one demonstration plant, the IP and the experience and the technology will be developed such that

the cost will be brought down and that IP can be sold around the world at great profit. We will learn a lot, but it will take more than one.

**Mr QUICK**—When it came to the installation of nuclear power stations—they are all over the place now—how long was it from the establishment of the first one through to the current reactors?

**Mr Zapantis**—Nuclear power is older than television in Australia. Nuclear power was around before television was introduced in Australia.

**Mr TOLLNER**—At least 60 years.

**Mr Zapantis**—It has had 50-plus years to come down the cost curve. We are talking about a new technology here, a new technology that underpins Australia's competitive advantage going forward.

**Dr JENSEN**—There appears to be a relative lack of confidence in the industry about this, in that the industry has not invested in it. You have identified that thousands of plants are going to need to be built around the world.

**Mr Zapantis**—Correct.

**Dr JENSEN**—There is agreement that a reduction in CO<sub>2</sub> is essential. With the first plant, maybe you will not have the IP on absolutely every stage of the process, but you will have IP on certain very relevant parts of it which surely would be worth a lot of money. The industry not investing in this—and this gets back to the point the chair made—indicates that the industry is not very confident about it. It is requiring government to put in money to prove it up, or maybe not.

**Mr Zapantis**—Firstly, the industry is investing in clean coal technology. Hundreds of millions of dollars globally are being spent by the private sector to develop this technology. But you are talking about a very large risk with very large sums of shareholders' money. It is akin to buying a lottery ticket. If you think you can hit the big one by building one plant, it is simply not going to happen. It is simply too large a risk for one company to take.

**CHAIR**—We are talking about the cost of the plant and, all other things being equal, the inability to sell the product at a cost that people will pay. So there are two distinct issues. Is it the case that the industry may not be worried about the initial capital cost but its capacity to sell the energy will take even more assistance?

**Mr Zapantis**—It is both, because the capital cost feeds into the price of electricity.

**CHAIR**—Yes. I am trying to be simplistic!

**Mr Zapantis**—You cannot separate them. If industry were confident that it could build one of these things and compete, it would build it. We are dealing with a market failure here; that is what we are dealing with. When there is market failure, governments need to intervene to get the outcomes that governments are seeking. I think it is a misrepresentation to say that the industry

is not confident about the technology. The industry is very confident about the technology, but in reality it is not prepared to risk the sums of money that are required to be put at risk—and, in any case, it probably could not get the finance for it.

**Dr JENSEN**—In a way, it is not really a big ask. The chair has indicated the issue with pharmaceuticals. Airbus have spent—

**Mr Zapantis**—Heavily supported.

**Dr JENSEN**—close to \$20 billion for the development of the A380. That is a very risky market, yet they have taken that risk. Admittedly, they have—

**Mr Zapantis**—There is a large amount of public support for Airbus, so that is probably a good example.

**Dr JENSEN**—But Boeing, for instance, has done a similar thing with the 787.

**Mr Zapantis**—There is large support for Boeing as well from the US government.

**Dr JENSEN**—Only if you call military sales ‘government support’.

**Mr Zapantis**—The way we look at it is that climate change is a societal issue: it affects every man, woman and child on the planet. Industry, being a sector of society, has a role to play in helping to solve the problem. Industry needs to stump up some money, some effort and some intellectual capacity to solve the problem, but the rest of society also has to contribute to solving the problem. I think there is a bit of a misbalance in expectations. Some people are arguing that industry should meet the cost of all the effort to fight global warming.

**Mr QUICK**—No.

**CHAIR**—We are certainly not arguing that. We are trying to discover the conditions and the mix.

**Dr JENSEN**—I think you are really helping us in terms of defining what we are looking at. This is a very complicated issue and I think your evidence has been very constructive in assisting us to look at what issues we need to examine, going forward. So the fact that you are getting rigorous questioning is not because we are critical but because we are very interested.

**Mr QUICK**—We have heard of 30 and 40 per cent increases in electricity charges to the average family household. That seems to be seen as bloody terrible and people are not going to cop it. Yet private health insurance goes up every year incrementally and people just take it as a matter of course. The price of petrol went up to \$1.40 and we just took it.

**Mr TOLLNER**—Petrol sales went down. We all felt a bit of pain on that one, Harry!

**Mr QUICK**—As you said, this is a societal issue, and the ordinary average punter is prepared, if you ask them, to cop something in order to have clean air.

**Mr Zapantis**—There has been quite a lot of research done on how much people are prepared to pay. The work that I have seen shows, typically, that only a very small proportion of people actually ticked the box to say that they were prepared to pay a significant amount. Having said that, the reality is that we are all going to have to pay to solve this problem—every single one of us.

**Mr QUICK**—But, if the government said, ‘Here is \$2 billion to set up four of new these new things,’ how many years would it take to get them up and running? It is not going to happen tomorrow, next year or the year after.

**Mr Zapantis**—No, it would take several years. They are not going to all come on stream at once, either. You are going to have one, then you might have two. If the cost of that plant were levied across the whole network then the incremental cost of electricity to mums and dads would be relatively small, but it would be an increase. Having said that, if all coal-fired plants went to clean coal technology then there would be a significant increase. It could be 50 per cent to retailers.

**Mr QUICK**—But at what stage would it start to increase—from the day the company decided to retrofit Loyang No. 1? Or would it be a year down the track?

**Mr Zapantis**—I do not know. In simplistic terms, the day the plant started selling electricity to the grid at the increased price, that increased cost would have to find its way into—

**Mr QUICK**—It is a bit like the oil companies saying: ‘The price has gone up. We haven’t got it yet but we’re going to belt you anyway.’ Do you see that that would be the case for the power generators? If it is not going to be up and running for three or four years, there should be an incremental cost to the consumer rather than saying, ‘It is going to cost 30 per cent more at the end so we will whack up your fuel price 30 per cent to start with.’

**Mr Zapantis**—You would be better off talking to the electricity industry on how the cost flow-through would work. As I said, in a simplistic assessment, from the day it started selling power to the grid at the increased cost, that increased cost would need to be met in some way.

**Dr JENSEN**—Taking your best guess, when will we have the first fully functional clean coal power plant in Australia?

**Mr Zapantis**—Five years after the government provides the support required to get it up. It is as simple as that.

**CHAIR**—Do you want to go into politics? I think you have the perfect patter for it!

**Mr Zapantis**—The clock starts when the support is available and it will take three to five years—probably five years.

**CHAIR**—Is it too pessimistic to say that, on the basis of what you have said here, the prospect at the present time seems really unlikely because you have so many preconditions and conditions that all have to be met simultaneously that the only thing you are left with is pessimism? It is a good idea but—

**Mr Zapantis**—What is a good idea?

**CHAIR**—Carbon capture and storage. It is a really good idea and we have the technology. But, as things stand, there are so many different pieces to be brought together, like an international solution, that nothing is going to happen until everything happens, and in the nature of the real world everything does not happen at once.

**Mr Zapantis**—We are not saying that we need to have a perfect solution. Obviously, we need to take into account where we are today and the realities of international relations, markets, et cetera. The questions of developing CCS plants and a price on carbon, which I think are the issues you are alluding to, can be separated. The government could choose a regulatory approach or to introduce a low price on carbon. The government could choose not to introduce a price on carbon at all and simply go the push-policy route. There are a range of options. The bottom line is that this must happen. We must have CCS.

**Mr QUICK**—So who is going to lead the charge—America, if they decide to join Kyoto; China, India or Europe? We are really only a bit player in the world, aren't we?

**Mr Zapantis**—We are, and that is a good point to make. Firstly, I think the developed world will lead the charge because the developing world is on another track altogether. They are focused on providing electricity to their people, let alone providing clean electricity to their people. Whether it is the United States of America or Europe will come down to the economics in each of those jurisdictions. Organisations like BP that are looking to do this will look around the world and find the markets where their projects will fly and that is where they will settle and develop projects. So, if we want them in this country—

**Mr QUICK**—My big fear is that it is going to happen somewhere else and that we will still be going along with our normal coal-fired power stations and only have an end product. If it is made in America or in Canada, who sell it to China or India, we will have lost the opportunity once again. We have the expertise, the demonstration projects, the capacity to do it—the intellectual capacity and the scientific capacity—and we have set the world on fire with our CO<sub>2</sub>CRC and companies like yours that are putting their money where their mouth is, so it seems a shame to me that we are not leading the charge.

**Mr Zapantis**—In some ways we are leading the charge, but I think what you are saying is that we will be beaten to the punch in developing a full-scale CCS plant, and maybe we will be. Just to temper that for you a little bit: Australia is a small economy and I believe we should have at least one of these plants in Australia for a couple of reasons—firstly, to prove it under local conditions and, secondly, to demonstrate it to the Australian population, who need to be convinced of the technical feasibility of the technology and also its safety and about liability issues. The only way that that is going to be developed in this country is to actually have one. But, at the same time, we as a nation should not be seeking to develop all of the demonstration plants required to prove each of the different kinds of the technology, because we are simply too small an economy. We need to coordinate our activities with other, much larger economies.

**Mr QUICK**—I am a Tasmanian and we have wind power in the north-west. For a variety of reasons, wind power is being pushed aside at the moment, yet Roaring Forties, the Tasmanian-Chinese joint venture, are busy putting wind farms into China as fast as they can make the

turbines. That worries me. We have all this capacity, so let us do it. Let us quantify it and—I agree with you—let us at least build one. I do not care where it is as long as we have one. We can then say to our potential scientists, ‘Rather than wandering around the world, stay here and use your skills and expertise.’

**CHAIR**—You have heard where we are coming from in our own incoherent way. Do you want to summarise or clarify anything for us, if you think we may have headed in the wrong direction?

**Mr Zapantis**—I would. This is going to be a bit of a rambling monologue, but I would like to start from the starting point, which is who should pay. The reality is that everyone should pay. Climate change is a societal issue. Industry must play a role in solving the problem. In fact, industry will bring on the projects, industry will make most of the investment and industry will deploy this technology going forward. But, until governments are able to support these projects so that they stand up economically, they simply will not happen.

There was a line of questioning earlier around whether or not the industry is confident that the technology will work—absolutely, yes; the technology will work. The issue is the economics of the technology. Industry is investing heavily in this technology but within the constraints under which public listed companies can operate. There is a large degree of risk because of the policy uncertainty going forward. One only needs to look at the price of carbon in the European emissions trading scheme lately: it dropped to less than €1 a tonne. So it is not only the policies in place that will provide that certainty going forward; it is the market’s confidence in that certainty going forward. That is probably all I want to say.

**CHAIR**—Thank you very much. Your evidence was very instructive. We got a lot out of that. I think we will see you once more before this process is over.

**Mr Zapantis**—I am pleased to be of assistance.

Resolved (on motion by **Mr Quick**, seconded by **Dr Jensen**):

That this committee authorises publication, including publication on the parliamentary database, of the transcript of the evidence given before it at public hearing this day.

**Committee adjourned at 5.30 pm**