COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON INDUSTRY AND RESOURCES

Reference: Development of the non-fossil fuel industry in Australia: case study into selected renewable energy sectors

THURSDAY, 9 AUGUST 2007

CANBERRA

BY AUTHORITY OF THE HOUSE OF REPRESENTATIVES

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STANDING COMMITTEE ON INDUSTRY AND RESOURCES

Thursday, 9 August 2007

Members: Mr Prosser *(Chair)*, Mr Hatton *(Deputy Chair)*, Mr Adams, Mrs Bronwyn Bishop, Mr Cadman, Mr Martin Ferguson, Mr Haase, Mr Katter, Miss Jackie Kelly and Mr Tollner

Members in attendance: Mr Adams, Mr Haase, Mr Hatton, Mr Prosser and Mr Tollner

Terms of reference for the inquiry:

To inquire into and report on:

The development of the non-fossil fuel energy industry in Australia.

The Committee shall undertake a comparative study of the following renewable energy sectors: solar, wave, tidal, geothermal, wind and hydrogen. The case study will examine the relative state of development of these sectors and their prospects for economically viable electricity generation, storage and transmission.

WITNESSES

Committee met at 11.37 am

HIGGS, Mr Bruce, Executive Director, Cynergy Pty Ltd

HOLLIS, Mr Steve, Chief Executive Officer and Executive Director, Lloyd Energy Systems Pty Ltd

CHAIR (Mr Prosser)—I am pleased to declare open this public hearing of the House of Representatives Standing Committee on Industry and Resources for its case study into selected renewable energy sectors in Australia. The case study was referred to the committee by the Minister for Industry, Tourism and Resources, the Hon. Ian Macfarlane, on 8 May 2007. The committee shall undertake a comparative study of the following renewable energy sectors: solar, wave, tidal, geothermal, wind and hydrogen. The case study will examine the relative state of the development of these sectors in Australia and their prospects for economically viable electricity generation, storage and transmission.

The committee is pleased to continue this program of hearings, with Mr Bruce Higgs and Mr Steve Hollis appearing before us today. Although the committee does not require you to give evidence under oath, I advise you that the hearing is a formal proceeding of the parliament and remind you that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers that evidence be given in public. However, at any stage you may request that your evidence be given in private and the committee will consider your request. It is possible that the media will wish to broadcast these proceedings. Do you have any objection to that occurrence?

Mr Higgs—No.

Mr Hollis—No.

CHAIR—I invite you to make a short presentation before we proceed to questions.

Mr Higgs—Mr Chairman, following discussions, as you are aware, it has been agreed that we present tidal documents at a later time.

CHAIR—Yes, that is fine.

Mr Hollis—I have previously spoken to this committee about energy storage and the technological developments that are happening in energy storage. I referred to the system that has been developed in Australia by Lloyd. Today I want to focus particularly on the state of the art with solar energy. I want to talk about the state of the art of solar energy worldwide and about how with the use of storage technologies we now see the future of solar energy in Australia. I will give you some real-life applications. Since I last spoke to the committee the market penetration of the technology has developed significantly. It has also attracted a grant offer under the advanced energy storage technology program, which is currently being administered by the Australian Greenhouse Office. I will talk about some of the economics now associated with solar energy and about where we see solar energy playing a significant part in the Australian energy market.

A PowerPoint presentation was then given—

Mr Hollis—Firstly, and to get things clear, there are two sorts of solar energy technology in use in the world today. There is the PV system, a method of converting sunlight directly into electricity by photoelectric processes, and there are the solar thermal systems, illustrated by the trough system, also shown here. In one case we have solar energy being converted directly to electricity and in the other case, in the other series of technologies or category of technologies, we have solar energy being collected as thermal energy and then that thermal energy being converted to electricity.

The storage technology falls into a lot of categories but there are two main categories of interest. There is electrical storage, where electrical energy is taken into the storage and then taken out again. Obviously, while it sits in the storage there are losses. We all know that if you leave the battery in your car long enough it goes flat. There are losses associated with the storage process. With the thermal production of electricity, you take heat into any storage system and that heat then has to be converted to electricity. That is governed by the laws of physics and there are conversion losses associated with converting thermal energy to electricity. There are other storage technologies, which we will not go into now. The application of storage technologies to the two main solar generation systems that we talk about are really with regard to PV and thermal.

People get a bit confused about ‘efficiencies’. In fact, people are a bit obsessed when you talk about ‘efficiencies’. To give you a general overview, a PV, or photovoltaic, system generally converts energy from the sun—solar energy—into electricity by the process that I have just spoken about. It has a 10 per cent conversion factor, so the solar energy is converted at the rate of 10 per cent. Obviously, there is a lot of work being done worldwide to improve that efficiency. On the other hand, solar thermal systems are naturally 20 to 40 per cent efficient because they are thermal generation processes and they are governed by the laws of physics. You have to be careful not to be carried away by physical efficiencies. The problem is that all renewable energy systems per se are capital intensive. They do not actually cost much to operate but they are extremely expensive, whereas other thermal generation processes—such as coal, for example, and also oil and gas—are also expensive systems. They are not as expensive as renewable energy systems per installed unit but the fuel is horrendously expensive in comparison. So what you have got to look at is the capital cost. That is the main thing. It does not matter how much fuel you use and how much sunlight you use; it is actually the capital cost of the system that is most important. Therefore, quite often a low-cost, low-efficiency system using solar energy is cheaper than a higher cost, high-efficiency system. So don’t get carried away by the physical efficiency aspects of it.

The important thing is that adding storage to any system increases its value. Everyone knows that all the renewables are available only when they are available and therefore have a limited value in the market. They are there when the sun wants to shine or the wind wants to blow and not necessarily when the community wants to use that energy. If we can store it then we vastly increase that value and we close the gap between the cost of production of renewable energies and the alternative source, which is coal. Even when it is coal plus a carbon tax in any form it is still difficult to close the gap between the two, but if we can increase the value then it is much easier to close that gap. At the end, I will explain to you with some numbers how that works.

As I said, solar thermal systems convert at about 20 to 40 per cent efficiency. That is not bad, bearing in mind that coal-fired power stations are only about 30 per cent thermal efficient. If you can store that energy before you convert it to electricity then your storage is, in fact, close to 100 per cent efficiency. If you generate electricity, put it into a storage and then take it out again you have a lot of losses, but with a solar thermal system—and this is the secret as to why solar thermal energy is going to play a very important role in the future of Australia and the world—if you store it before you generate the electricity with it you do not lose much energy at all. So it is very, very efficient.

To go through the various forms of solar thermal energy—and today I am concentrating on the solar thermal energy systems—there are the trough collectors, which you saw a small picture of before. This picture is of solar 1 in the Nevada Desert. As you can see, it is a massive series of troughs.

Mr ADAMS—How big?

Mr Hollis—That one occupies about 400 hectares. It is a very big one. That is 35 megawatts.

Mr ADAMS—That one is 35 megawatts?

Mr Hollis—Yes. The feature of those systems, as you could see from the earlier picture I showed you, is that the parabolic reflectors have a tube running down the focus of the parabola, and the energy is collected in a fluid in that tube. Of course, it only does it while the sun shines. It is limited to around 400 degrees Centigrade, and that is important when you look at the storage issues. The hot fluid can be run off into tanks and stored for use, and that can extend the solar extraction period by an hour or two either way. But it is fairly limited in what it can do. So the limitations on trough collector systems are that they are low temperature and therefore have low generation efficiency. To go back to what I was talking about before, when you generate electricity with steam turbine generators it is 20 to 40 per cent efficient. The high-efficiency turbines are the ones that operate at the high temperatures. The low-efficiency—the 20 per cent efficient—turbines are the ones that operate at the lower temperatures. The laws of physics say that if you are generating electricity from a source which is only around 400 degrees it is not going to be as efficient as the high-temperature ones.

Mr TOLLNER—What would it cost to build a system like that?

Mr Hollis—That was about $200 million.

CHAIR—US dollars.

Mr Hollis—I will get back to the unit costs for the different systems for comparison later. So that is the trough collector system with its limitation of lower temperatures and storage that has to be a fluid because you are collecting the energy in a fluid.

Then there are the power towers. There has been a bit on TV recently about the one I am showing you. That is solar 2 in Spain. As you can see, they are enormous structures. That tower is some 200 metres high. They are big, big engineering structures—not the sort of thing that you could stick in at the back of Charleville or somewhere like that. That sort of system, a power tower, lends itself only to large installations. The feature of that system is that you have all those mirrors—they call them heliostats—around that paddock focusing the energy up into the top of the tower. You can see the bright, white light. All those mirrors are shining up into this tower. They are called tracking heliostats; they track the sun. The sun is always shining on them—as long as it is shining—and they focus the sun up into that tower. That gets up to about 1,000 degrees. So that is fine, because you have a much better generation efficiency for your conversion into electricity. However, once again, the only storage that you can apply to that system is if you have big tanks of hot water and so forth. So you are limited by what fluid you can store ready for generation. You cannot store steam, so it is a very limited application. The hot fluid can only be stored to extend the operating hours.

The Lloyd system is a bit different. I will go backwards. The first of the modules for this system is being built in Cooma now and it will be available for everyone to come and have a look at in about a month’s time. It should be up and operating within a month to six weeks. We are keeping this system on a very agricultural basis. That is actually a Comet tank stand made in Macksville—a stock tank stand. What we are doing is concentrating the energy at 1,000 degrees just like the power tower except we have them much lower down and with a smaller number of mirrors.

The energy is stored at above 800 degrees Centigrade, which means it is available to generate steam very efficiently, but we are not storing the energy in the steam or the water. It is actually stored in the block on the top of the tower. Underneath the block—and this is the prototype that we had running in Cooma—this big, bright shiny thing you see at the bottom is an artificial sun that we are using just to simulate the rays of the sun going up into that recess, and in the recess is where all of the suns rays are collected after they have been focused by the heliostats. That receiver is in direct contact with the storage medium, which you may remember is graphite, and that graphite is in the block and it stays there and it stays very hot. In fact it is red hot, like that, but it is not glowing and it will not burn because the storage box it is in is filled with argon, which is an inert gas. That just sits there.

One of the other advantages of this technology is that it does not lose energy very much, and that is one of the properties of graphite. So it sits in the block ready to be used at any time. That is the solar heliostats. That installation is at the CSIRO in Newcastle at present and we are using the same manufacturer to make the one in Cooma, which will go into subsequent plants—except the ones we are using are the mark 2 versions, which are slightly bigger than that. They are about 5½ square metres in area and the ones that we are installing will be seven square metres in area. The footings for them are being installed today, as we speak, in Cooma and we will start to put the mirrors up next week.

As I said, the block goes on the top of that tower. The idea is to have one of those towers and one block and then approximately 130 of these mirrors around one block. Why it is different to the power tower system I showed you before is because that has thousands of mirrors around it and it is a very high tower. It has high engineering costs and is not appropriate for remote and rural area installations and network support systems, which is where this system really comes into its own. What we have developed is a very agricultural sort of a system that you can pack up on the back of a truck and install anywhere.

Mr HATTON—But there is an Australia company developing much smaller towers. They have taken the German experiment in Spain and are working here in Australia to have much smaller towers. They were down to about 200 metres or so high and they were looking at producing 12½ to 25 megawatts or something—

CHAIR—Something like that.

Mr HATTON—and having a different type of storage.

Mr Hollis—To recap on that point, the difference with this system is that instead of having to take the fluid down and storing it at a low temperature, we are storing it at 800 degrees up in the air and it sits there. That is the big difference with this system. What we finish up with is as many as you like of these modules—each module being one tower and one block—it is a 10-tonne block—and about 13 of these mirrors. I say 'about' because the number of mirrors you need to use depends on where you are. If you are in a high insolation area you can have fewer mirrors; in Cooma you have a lot more because it is not as good an area.

This is the project at Lake Cargelligo for which the AEST grant will be applied. Its role in that location is this. I will step back a bit and explain. All of the rural energy authorities in Australia have got problems with the lines that go out to rural areas because they generally go out and stop. That has a number of problems. Firstly, they are insecure. If a line goes down, there is no supply. That is for an unscheduled outage, a breakage. For a scheduled outage, when they need to maintain their lines or do work, they have to actually cart diesels out to the end of the lines, hook them up and feed power back in whenever they close lines down.

Also, as the poor farmers manage to install air-conditioning systems the load is going up. That is largely due to the increase in the number of appliances. As the community generally gets wealthier, it buys more appliances. It is really the air-conditioning load that is creating the big damage in that area. What is happening is the peak loads are going up and the lines are becoming overloaded in peaks. The consequence of that is that we have brownouts and the quality of the power drops. The voltage drops and all the digital clocks start flickering. If any of you have got places in rural areas you would be pretty familiar with that problem.

So what the authorities are looking at—and they include Country Energy, Ergon and those big rural suppliers in Australia—is putting in sustainable systems that are actually out at the other end of the network—out on the extreme ends of the branches of the network—so that they can then come in at peak times and pump the electricity back in. That saves them having to upgrade their networks. Network upgrading is extremely expensive. It is also disruptive. There are also problems with land acquisition—the NIMBY problem and so forth. By putting embedded generation out into those rural networks, you can solve the problem of having to upgrade those networks.

We have been working with Country Energy for some time on this. We are now working with Ergon, on the same problems in Queensland, to install these types of facilities around networks. Country Energy has identified some 200 locations where they could put one in. How did we get to Lake Cargelligo? Well, we said to Country Energy: 'With a $5 million grant and with it being dollar for dollar, we can build a $10 million project. Where in your network are you going to get the biggest bang for 10 million bucks?' They said, 'Lake Cargelligo.' For no other reason that is why the project is going to be there. This project will provide three megawatts of power back into the network for five hours a day in the winter time and for nine hours a day in the summer time.

Mr TOLLNER—That is per tower?

Mr Hollis—No, in total. It is designed as a total. Each of those boxes on top of the towers stores about four megawatt hours. That means it will run at one megawatt for four hours or at 10 megawatts for 40 hours and so forth. It is a modular system. As a matter of interest, the modules cost about $400,000 to $450,000 each. You will get confused as to capital costs if we start talking too much about them. I will tell you what the output costs are at the end. They are probably a bit more meaningful.

As you can see, the application of this solar system is this. Firstly, we plan to roll it out with Country Energy and with Ergon in those places that have got the biggest problems in rural areas on the grid. Also, we are looking at putting it in at a number of locations off grid—we are looking at these with Bruce—where it would be replacing diesel. Just about every mining company in Australia is talking to us at the moment about replacing their diesel system with this system. We will come to the dollars involved at the end.

The first application we see for this stored solar system is in support of rural networks. It is supplying renewable energy to the system per se in toto as well as fixing a network problem at the same time. There are hundreds of locations in Australia where this could go straight in. The ones we are looking at with Ergon in Queensland are to be in Mount Isa and Charleville, for a start, and going up from there. These are the off-grid diesel replacements. We see the future beyond that as being just putting these things in around the rural areas of Australia and generally feeding renewable energy back into the network. That becomes a pricing issue when you are only buying the energy per se.

Mr TOLLNER—In one of these modules, if your graphite cube top block is full of heat—1,000 degrees or whatever it is—and the sun does not shine again for months, how long does that heat stay in the block?

CHAIR—The sun comes up everyday!

Mr TOLLNER—You go through periods where you have thunderstorms and whatnot that go for a few days. Obviously, it varies a bit, but say the sun did not shine at all, and you had a permanent night. How long would the heat stay in the block?

Mr Hollis—Put it this way: if you turned the sun off and did not feed it into the block, the heat loss is about half a per cent per day. You would probably see it getting less and less. It lasts for a very long time.

Mr TOLLNER—That is pretty good.

Mr Hollis—In the analysis of the site we would work out how many cloudy days there are per year and then make allowances in the amount of storage we provide.

Mr TOLLNER—How long does it take to heat up again from zero to full on a good day?

Mr Hollis—It does not go right to zero; it only goes down to 200. We are operating between 200 and 800 so we are extracting 600 out each time.

Mr TOLLNER—Once you have a cold block, you go and set the system up. You have some nice sunny days; how long does it take you to get to 800?

Mr Hollis—One day. That goes to the number of mirrors. You put enough mirrors there to heat the thing up in a day, so it is full at the end of the day. That is what it looks like underneath where it goes in.

Turning to costs: it does not matter which of the solar energies you look at. They all run at around 10c to 15c per kilowatt hour. If you look at the capital cost structure of the project illustrated on this slide, almost half the cost of the whole system is tied up in the heliostats, which is not our business; that is other people’s business. Another quarter of the cost is tied up in the steam generation plant—tanks, steam turbine generator, condensers and so forth; industry standard stuff. The actual storage is about 25 per cent of the cost of any of these projects. The cost of the storage—because the storage requires no maintenance—adds about 2c to 3c per kilowatt hour.

You probably all know that wind production is around 8c. It goes into the grid whenever the wind blows and upsets the network owners because it is coming in and out. It has those problems associated with wind, having an unpredictable or unscheduled supply. Thermal energy is obviously a lot more expensive than wind energy to produce. I say a lot—it is a bit more expensive because the 10c is good for large-scale plants. If you had 50 or 100 of these you would get it down to 10c. By storing it you are adding another 2c to 3c per kilowatt hour but by storing it you are—as I was saying before—increasing that value quite dramatically because it is available as peak energy, and everyone knows that peak energy is worth more.

We are negotiating a power purchase agreement with Country Energy at the present moment and we are being paid for three components. We are being paid because it is renewable, we are being paid because it is energy and we are also being paid another premium on top of that because they can have it when they want it—at peaks, when it is worth a lot more. They can buy it and not have to go to the market and pay the higher price. Adding the storage system to this only adds a relatively small amount to the cost.

So how does the economics work? Let us get back to these numbers. It costs about 15c—and that is about the top end of this, because it is a fairly small-scale project. So how does that work economically? Renewable energy is worth about 9c on the market at present. In New South Wales, with the new policies, and in Victoria, that is actually going up a bit. Wind farmers are now looking at a value for wind energy of about 10c, but I have used 9c.

The network support and the other value that the system adds is this. TUOS is the jargon for the transmission costs that you pay. In other words, the power that gets out to Lake Cargelligo could come from the Hunter Valley and that is the cost of transmitting it out there. NEM has a system that levels it out, but the cost for this, at this location, is quite substantial; the transmission costs that they pay to TransGrid to get it out there in New South Wales are quite substantial.

Also, the network support factor has two components. Firstly, there is the fact that Country Energy will not have to duplicate the lines going out there, and that saves tens and tens of millions of dollars, so there is an avoided capital expenditure value on that. Also, until they do that, they have to take diesels out there. Their bill for taking diesels out to Lake Cargelligo and hooking them up at the power station at the other end whenever they want to take the lines out for maintenance is about $100,000 a year. The value of that all translates back to about 6c. So that is how the economics works. The economics does not work on straight energy costs unless you are up into a fairly big scale, but it certainly works where you are avoiding other costs and providing other services as well.

Where do we see it going? There is a very large market in Australia for these sorts of applications, just like at Lake Cargelligo. As I said, the one at Mount Isa will be 10 megawatts and the one at Charleville will be five megawatts and then Mount Isa will go up, in stage 2, to 20 megawatts. As I said, there are dozens.

Mr TOLLNER—What is the capital cost of a 20 megawatt system?

Mr Hollis—With this?

Mr TOLLNER—Yes.

Mr Hollis—It would be about $36 million. That is the budget we set for that project. But it all comes back to: what is the production cost? You have a high capital cost but you have virtually no operating costs—no fuel costs. In fact, at Lake Cargelligo we are leasing the land for a 20-plus-year period from the local farmer and he is going to maintain the system. All he has to do is to wash the mirrors once every 12 months and stick his head in the shed to make sure that the water tanks are okay and everything is operating okay. It is very simple stuff. And it lends itself to remote locations. Those large power towers and so forth will produce energy at around 10c but it cannot be stored, so you cannot have it for 24 hours a day. That is why we believe this is the appropriate application of solar energy technology in the Australian market.

Just to summarise: we have solar energy on demand. It is simple. It is scalable. It is very agricultural. It is environmentally friendly: there are no nasties whatsoever; there are no emissions or anything like that, and graphite, the storage medium, is environmentally benign. It suits remote areas. It suits developing countries. And it is very cost competitive in those sorts of applications.

The other selling point is: when you go to try and sell it to rural communities, they are not going to be stuck with wind turbines like the one on that slide. That little one there, with the round thing on it, is what a 20-foot Comet windmill looks like, and the thermal storage tower is exactly the same height. So you are looking at a much lower impact on the countryside. The other benefit is that there is a damn sight more sun in Australia than there is wind.

Mr TOLLNER—And no threat to the orange-bellied parrot.

Mr Higgs—Have you ever seen one?

CHAIR—Thank you for that. What I propose to do is to have those who have questions regarding the Lloyd energy system go first before we go to Mr Higgs for his presentation.

Mr Higgs—No, I will not be talking today because of time constraints.

CHAIR—All right; that is easy then. Questions?

Mr HATTON—In terms of the comparisons, we had another company some time ago talking about what was happening with solar-thermal and what they were trying to do and the fact that they have a different method of storage. It was about the same time that you first spoke to us about what you were doing with the graphite. There are about six solar-thermal operations in Europe. The Spanish one is a descendant of the original German stuff from 1982 to 1992. Is the key with all of these just finding simple systems to allow for the storage, as you found the graphite—being able to use that heat concentration and then finding a way to do the storage properly and effectively so you can deliver? You then have a modular for small communities all around the place.

Mr Hollis—I am not here to knock other technologies and systems. Every one probably has a place in the world. The secret is that you are storing it between when you collect the thermal energy and when you actually make the electricity; that makes the storage very efficient. It does not matter what you store it in. It just happens that graphite is a very cost effective way of doing it. Fluids are not cost effective because you cannot take them to high temperatures, and it is a fact with energy that the higher the temperature the more energy you can pack into any given space. There is a molten salts system which has been supported by Boeing and Bechtel—some very heavy hitters. We have a group of investors who are now looking at taking the licence for this technology to the States and the guy who is doing their due diligence for them, Bruce Kelly from Bechtel, is the guy who was running their molten salts system. He is very excited about this system because he said that one of the problems with the molten salt system is that it is very complex and involves pumping very dangerous and corrosive fluids around and around, which is a continual maintenance problem. They are looking for simple solutions and that is what this system offers. The systems being developed by the ANU with their phase change materials with ammonia is also an effective system. I have not seen any of their latest costings on it yet. It is aimed at doing the storage at the point of collection and it has similar objectives to this, but it is probably a bit more complex than the graphite block stuff.

Mr HATTON—Is the molten salts system based on Australian research or is that overseas stuff?

Mr Hollis—No, that is based on research by Boeing.

Mr ADAMS—The production cost margin of getting the energy up is 10c and the renewable energy value is 9c on your support network and then there is the cost of storage. What is the cost of the energy itself?

Mr Hollis—Do you mean the selling price?

Mr ADAMS—Yes.

Mr Hollis—Those numbers I gave you only apply to the Lake Cargelligo project. That is a fairly small project so it is at the higher cost end. I am just illustrating that even at the higher cost end it will work. As these things get bigger, the costs drop dramatically. We have another project that is costed for a client in South Australia. It is a smaller facility, only 500 kilowatts, and will run a mine site. It has a production cost of closer to 20c, but it is not grid connected—it is off grid and is competing with diesel. Diesel is costing them about 60c a kilowatt hour. So it is a walk up start in those sorts of remote areas.

Mr Higgs—It is about a third of the cost of fuel.

Mr ADAMS—I would have thought that at some of the mining sites it would have been lay down misere.

Mr Hollis—Yes, they are getting very friendly with us at the moment.

Mr HATTON—When you spoke to us previously I think you talked about the different sizes of the graphite blocks and so on. Can you tell us a bit more about that and whether there are efficiencies with larger amounts and whether, as you develop the industry, you can cut the cost of the graphite—given that it is a quarter of the cost of the whole program. What is the situation there?

Mr Hollis—Lloyd owns technology and it all started from a process to produce graphite cheaply. The purified graphite from China for this project is costing us $3,200 per tonne. With the process that we have got the licence for, we could do it for about $600 per tonne. But that means setting up a plant to do the processing. You need a fair sort of an order book in front of you to do that. But given that the cost of the graphite, particularly in these solar projects, is a very small proportion of the total project, those variations in the cost of graphite become a bit marginal. So we are saying that it is hardly worth the effort to race into clean graphite production now; we will hold back until the whole thing grows a lot more.

In terms of the block sizes, certainly there are some physical things associated with bigger blocks and bigger storages—the losses are a bit lower. That is a bit of a trade-off against having something that you can stick on the back of a truck and take out to Charleville or places like that. We have come down to two modular sizes: the solar system with an all-up gross weight with the casing of about 15 tonnes; and the electrically heated system at about 25 tonnes, which is container sized. That is because it is better. We are going to be producing the 10-tonne blocks in Cooma and shipping them out to the site. It is better and cheaper to do it that way than to try to do big storages in situ in remote locations.

Mr HATTON—One of the things that is most interesting about this is the scale on which you are doing it. I had a look at some stuff and talked to Norsk Hydro in Norway about a new wind project they are looking at that involves doing stuff well out to sea so that people will not see them. It is the same kind of thing but on a much larger scale. They are doing very dense projects but with no visual impact. They are doing it in waters in which they were previously not able to do it. Across Norway most of the activity that is visible is really small hydro projects—each little village running their own small hydro project to provide for themselves in remote areas in

Norway—just as we have remote areas in Australia, but we have not got the water in Australia. You are providing that same kind of solution where it is absolutely not a case of one size fits all. The chief thing here is that those costs you are saving as you are providing an in situ solution are so great they do not have to worry about transmission losses and all those things.

Mr Hollis—The transmission losses, the cost of providing lines, the difficulties of providing compliance and people not wanting transmission lines running around the place mean it is quite an issue.

Mr HATTON—Given the simplicity of it—in terms of the maintenance in particular and that, it occurs to me, is something that is pretty important—how saleable is it outside Australia into the States and the other majors?

Mr Hollis—Very much so. That is why we have got interest from Americans who are coming out. In fact, they are coming out the week after next to go to Cooma. They cannot even wait for the thing to be finished because they are trying to tie us up to an MOU before we even get the thing up and running—before anyone else gets in the door. So we are getting a bit of pressure now.

Mr ADAMS—Will you be able to bring down the cost even more in the future?

Mr Hollis—It is just a matter of scale. The smaller ones in the remote locations will withstand the higher cost because there are a lot of other savings.

Mr ADAMS—Competition?

Mr Hollis—If we want to build big ones and bring them on stream, they have probably got to be of the order of 20 megawatts plus. That brings them down to the 8c to 10c level, which is equivalent to wind. That is about the order we should be paying for energy. Bulk energy is about 4c—whenever we get a carbon tax it will grow to about 4c. I do not want to get into politics and cost equations here but, if you took the real cost of generating electricity, it is not 4c a kilowatt hour. When you take all those other externals, it is about 8c. That should be the level we are paying for energy. This has got the ability on a large scale to get down to about 8c.

Mr ADAMS—You get to a level where, as Michael said, you have the one community—whether it is a mining community or a small town or whatever—using the facility.

Mr Hollis—That is where we see the initial roll out. That is where it is going to add high value very quickly.

Mr ADAMS—It will—if you can get a package together and sell it.

Mr TOLLNER—Regarding future cost projections, you are saying that if you start going gangbusters all over the world you could almost halve the cost—bring the 15c down to 8c.

Mr Hollis—Yes, that is correct.

Mr ADAMS—Energy is going to increase in cost.

Mr TOLLNER—Yes, but obviously with greater production and that sort of stuff—

Mr ADAMS—It will start to come down—that is right.

Mr TOLLNER—It certainly beats tidal.

CHAIR—As there are no further questions, thank you for your presentation today. If we require any further information the committee secretariat will contact you.

Committee adjourned at 12.20 pm