ENTERPRISE AND CULTURE COMMITTEE

Tuesday 6 January 2004
(*Afternoon*)

Session 2

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ENTERPRISE AND CULTURE COMMITTEE
1st Meeting 2004, Session 2

CONVENER

*Alasdair Morgan (South of Scotland) (SNP)

DEPUTY CONVENER

Mike Watson (Glasgow Cathcart) (Lab)

COMMITTEE MEMBERS

*Brian Adam (Aberdeen North) (SNP)
*Mr Richard Baker (North East Scotland) (Lab)
*Chris Ballance (South of Scotland) (Green)
*Susan Deacon (Edinburgh East and Musselburgh) (Lab)
*Murdo Fraser (Mid Scotland and Fife) (Con)
*Christine May (Central Fife) (Lab)
Mr Jamie Stone (Caithness, Sutherland and Easter Ross) (LD)

COMMITTEE SUBSTITUTES

Mark Ballard (Lothians) (Green)
Rhona Brankin (Midlothian) (Lab)
Mr David Davidson (North East Scotland) (Con)
Fiona Hyslop (Lothians) (SNP)
George Lyon (Argyll and Bute) (LD)

*attended

THE FOLLOWING GAVE EVIDENCE:

Blair Armstrong (Scottish Enterprise)
Brian Nixon (Scottish Enterprise)
Dr Robin Wallace (Institute for Energy Systems)

CLERK TO THE COMMITTEE

Judith Evans

ASSISTANT CLERK

Seán Wixted

LOCATION

The Chamber

Scottish Parliament

Enterprise and Culture Committee

Tuesday 6 January 2004

(*Afternoon*)

[THE CONVENER *opened the meeting at 14:02*]

The Convener (Alasdair Morgan): I welcome committee members and members of the press and public to this meeting of the Enterprise and Culture Committee. We have received apologies from Mike Watson, who is at a funeral; from Jamie Stone, who may be late or absent because he has had to go to the dentist in Tain; and from Susan Deacon, who will be late.

I wish everybody a happy new year, and congratulations are due to Richard Baker on his engagement over the festive season.

Richard Baker (North East Scotland) (Lab): Thank you very much.

Renewable Energy Inquiry

14:03

The Convener: Agenda item 1 is our inquiry into renewable energy. Our first witness is Dr Robin Wallace, who is the director of the Institute for Energy Systems and who has kindly provided us with written evidence. If it is okay with you, Dr Wallace, we will launch straight into questions.

Can you explain what the Institute for Energy Systems is, and what your role is?

Dr Robin Wallace (Institute for Energy Systems): The school of engineering and electronics in the University of Edinburgh is a combination of a teaching organisation and five research institutes. The research institutes are collections of scientists, academics and professionals who have common interests. In our case, that interest is all forms of energy. Our institute is the combination of the former wave power and energy systems groups. We have 11 general staff members, seven or eight research staff members, and about 25 postgraduate students.

The Convener: Our inquiry has so many aspects that it is difficult to know where to start. In your submission, you talk about security of energy supply and the necessity for the capacity of no single plant to exceed 10 per cent of the total capacity. That seems to be a fairly sensible rule of thumb; I presume that you state that rule because a whole plant could be lost—for mechanical or maintenance reasons, for example—and therefore no plant should exceed a certain proportion of the generating capacity. Does that sort of thinking also apply to the means of production? For example, if there were a significant amount of wind power in Scotland, it could all be off on a day on which there was no wind. What would be the implications of that?

Dr Wallace: The one-plant criterion is historical. For the reasons that you have summarised, the loss of one plant, or the largest plant, ought not to compromise the ability to meet demand securely and within prescribed limits on the quality of supply. As you suggest, there could be mechanical failure or planned outage. There could also be network events. The same thinking would apply if the lack of a fuel resource caused a plant to shut down.

An evocative question that is asked is: “What happens if the wind doesn’t blow at all?” If that was the case across the whole of Scotland, of course none of the wind turbines would generate. However, that is likely seldom to be the case. The perceived wisdom is that the portfolio of energy sources ought not to be skewed in favour either of

any one renewable resource or in favour of any one carbon-based resource. For a truly flexible and secure supply, it makes sense to have diverse fuel sources in the mix.

In response to the particular question about wind, I would say that there is an averaging effect and a probabilistic effect. The wind will not blow everywhere all the time and it will not be absolutely still everywhere all the time.

The Convener: Has research been done to show that we know, probably, that the wind will be blowing over X per cent of the country? Has any such research influenced where people are suggesting that wind farms should be sited?

Dr Wallace: I cannot confirm that, but I can confirm that studies have shown that the geographical distribution of wind plants across the Irish land mass led to average energy production being perhaps higher than pessimistic views of intermittency had suggested it would be. The geographical dispersal of the plants meant that there was production in different areas at different periods. There is an averaging effect.

The Convener: If nothing else happens, more electricity will clearly be generated by wind farms, at least in the short term. Has anyone in Government or anywhere else been tasked with investigating the situation in Scotland to determine from the installed capacity what the worst case scenario would be in terms of the number of megawatts that would be available on any given day?

Dr Wallace: There are likely to be islands of individual research on meteorological effects. For example, my institute has studied the long-term effects of climate change on the hydrology of conventional hydroelectric plants. I am sure that places similar to my institute are studying trends in the availability of the wind resource. I believe that the first concerted action was the recent Scottish Executive call to look at matching the network to the renewable resource. Clearly, that must take account of the geographic variability of the wind resource and the implications that that has for production of electricity on time and geography bases.

Murdo Fraser (Mid Scotland and Fife) (Con): I want to pursue the issue of intermittent supply. To what extent are the other types of renewable energy that your written submission mentions—for example, wave and tidal generation—subject to intermittent supply, compared with wind power?

Dr Wallace: Let us begin with the methods that are the most predictable, which are those that are related to gravitational effects. My colleagues corrected my inaccurate reference to tidal generation as a lunar effect, because it is a complex gravitational effect. Nonetheless, there are well-established tide tables and the movement of tides is well understood. However, tides vary around the coastline. For example, they are not uniformly high all the way around the Scottish coastline—the ebbs and flows vary, which is reasonably well understood. Therefore, although it is unlikely that the tidal stream—or indeed, tidal basins, which is another issue altogether—will not happen, when and where it happens varies with the time of day.

On waves, the incident wave energy on the western landfalls of Scotland is visible or predictable days in advance through meteorology and satellite imaging. Some of the folk with whom I work will state, for example, that the waves that will arrive on Scottish shores this Thursday are on their way now. Therefore, in that respect there is a measure of predictability.

Murdo Fraser: Is there a way in which you can put that in percentage terms? Is it possible to express the percentage predictability of tidal wave energy as against wind energy?

Dr Wallace: Not without notice.

Murdo Fraser: Perhaps you can come back to us on that. It would be helpful if you could do so.

Dr Wallace: I would be delighted to. I know a man who will have the answer.

Murdo Fraser: With regard to all the different methods of generation—onshore wind, offshore wind, wave, tidal and hydroelectric—is there an ideal mix in terms of the percentage input of each to the total, that would best fit the circumstances that we have in Scotland? Have you done any work on that?

Dr Wallace: Let me walk round the outfield before I answer that question. Each of the technologies has different characteristics, availabilities and levels of security. Alasdair Morgan's earlier point about the wisdom of a diverse portfolio is true. There is a need to reduce carbon flows in the energy chain, which is a major driver, and there is a need to increase the proportion of carbon-free or reduced-carbon energy flows.

14:15

That will have an effect on the eventual mix. The components of the mix will have to be determined, taking account of their contribution to security of supply, their location and their ability to make their way to market through the network or in a cost-competitive way. Perhaps it is also wise to consider that entry to the market and the eventual mix will be based on the energy's ability to be dispatched in a competitive market environment, but the pipe dream is to have a proportion of carbon-free generation that is sufficiently large to

meet our CO_2 reduction targets in a way that maintains secure levels of supply that are comparable with those that we enjoy today, and in a way that is economically desirable for Scotland.

Perhaps that did not answer your question about percentages.

Murdo Fraser: That is exactly what I was about to say—

Dr Wallace: In percentage terms, it would be a bit like a balanced diet—

Murdo Fraser: Even a rough estimate of the mix might be helpful—a third accounted for by one method of generation, a third by another and a third by another, for example. I quite understand that you might not be in a position to provide that, but what are your thoughts on the matter?

Dr Wallace: As a starting point—albeit one that is not qualified by the conclusions of work on the matter—we should be guided by the targets that have been set for 2010 and 2020 and we should consider the means by which non-carbon resources can be used to maintain quality and security of supply, and be balanced with additional input to the network from conventional thermal plants, because there will need to be a mix. Whether that mix is, for example, 50:50 or 40:40:20 will be determined only by appraisal of the composite effect on the performance of the energy system and of the network. That appraisal will span economic, electromechanical, geographical and meteorological disciplines.

There is an answer to your question and perhaps people who are braver than I will come up with percentages, but I think that the principle is that we should aim for the targets and ensure that we can do so with a sensible balance that includes conventional plant.

Brian Adam (Aberdeen North) (SNP): You suggested that the perceived wisdom is that wind power provides security. People have arrived at the conclusion that there will be no problem because the situation will never arise in which there is no wind in Scotland. It might seem to be fairly obvious that there will always be some wind somewhere in Scotland, but without an evidence-based approach it will be hard to plan ahead and to quantify what can be delivered. Is there a concerted effort to produce an evidence base to support that assertion?

Dr Wallace: There is not, to my knowledge.

Brian Adam: Should the Executive try to establish such an evidence base?

Dr Wallace: If a decision is ever made to do so, such an evidence base will represent an important component of the discussion about how much non-firm energy can be accepted into what would be classified as a stable plant mix. The expectation—rather than the conventional wisdom—is that there will always be some contribution from wind, but I am not in a position to say whether it would be realistic to expect a minimum of 5 per cent of capacity or to expect a higher percentage than that.

Brian Adam: Should we be worried by that, or should we not necessarily be concerned about whether there is an evidence base? At the moment, the development of wind power is non-strategic because it appears to stack up economically for commercial interests. We receive complaints regularly about strip development. If we are to plan the right balance between renewables and carbon-based or non-renewable energies, we must have an evidence base from which to work. Are you suggesting that we do not need that?

Dr Wallace: I am definitely not suggesting that we do not need that. I agree that that is part of the big picture. Before the meeting started, I stressed to Alasdair Morgan that we require joined-up thinking and lateral thinking on an holistic strategy. What you described is part of that. If we are to consider an intermittent resource to be a substantial component of the energy supply, we must be able to quantify the effects of its intermittency both in time and geographically.

Brian Adam: How should the Executive tackle that?

Dr Wallace: I must be a bit careful about that, because the Executive has called for bids from academia to engage in a study of the network's capacity to match the availability of the renewable resource. If that study is to be comprehensive, it should characterise the renewable resource. However, that in itself would be a significant study.

In recent years, excellent surveys of renewable resources have been undertaken. Nobody has a major disagreement with the final figures. Nonetheless, if we are to achieve the potential proportions of some of the less firm renewable resources, we ought to be able to quantify the consequences of their intermittency on the energy supply's security.

Christine May (Central Fife) (Lab): Good afternoon, Dr Wallace—I enjoyed reading your paper. I will question you on three matters, two of which concern definition. Page 2 of your submission refers to "imaginary power" and page 3 refers to "imported network services". I would be grateful if you explained what they are. I apologise to my colleagues, who I am sure know precisely what those phrases mean.

The Convener: Imaginary power is very cheap.

Dr Wallace: If anyone in the chamber has a completely concise and uniquely understandable definition of imaginary or reactive power, I would like to take it away and teach it.

I will start with real power and make an analogy along the way. Until a means of bulk and commercial volume storage of electricity is found, real power must be absorbed and converted into heat or mechanical power at the instant that it is generated. If an imbalance exists in the production of real power relative to its conversion, the effect is that all the generators that are connected to the network speed up slightly and the frequency rises. Equally, if an imbalance exists and demand exceeds supply, the immediate effect is that the energy that is required comes from kinetic energy—from rotation of the generators that are connected to the network—and the frequency falls. System frequency is maintained by second-to-second balance of the conversion of the fuel source into real power or active power—that is what we call it. I will make a quick analogy. If somebody were driving along a flat road while blindfolded—do not do that at home—

Christine May: Some say that I do that all the time.

Dr Wallace: The driver knows what will happen to the engine speed or rev counter if he or she does not do anything with the accelerator when the car reaches a hill. The driver's response is to touch the accelerator and maintain engine speed. That is analogous to the action of the governing systems on the plant that is connected to the network.

A similar control discipline—not just a system—looks after the delivery of imaginary power or reactive power into the network. The idea is difficult: imagine that the network is a system of magnetic devices and that, as well as capacitor devices, magnetic and electrostatic devices must be charged with electrical charge every half cycle so that the system behaves in the way that we expect it to behave at the correct voltage levels. There must be a delivery of imaginary power into the system's storage to maintain levels of magnetism and voltages around the system. Therefore, imaginary power is at least as important as real power in respect of how the network operates. Its deficiency manifests itself in a reduction in voltage and an overproduction manifests itself in a rise in voltage. It has rather wider percentage limits but it has, nonetheless, implications for the quality of supply.

Christine May also asked about network services. The question relates to where we might source the delivery of stored kinetic or magnetic energy. If there was an insufficient capacity of conventional plant in Scotland due to retirals, with boilers full of superheated steam and large conventional generators storing kinetic energy, we would need to know that we can source from other areas network services that will make the system stable.

Christine May: Thank you.

Dr Wallace: I am sorry if what I have said sounded like a fourth-year lecture, but the questions are quite difficult.

Christine May: I genuinely did not know what the terms meant, so I thank you for your answer. I am not sure whether I could repeat what you said in the concise way that you said it, but I now understand things better.

I have two questions. The first relates to your suggestion about differential renewables obligation certificate—ROC—mechanisms and differential levels of support. Would you expand on your suggestion and give examples of where what you suggest has been done, how it was done and what impact it has had? In particular, would what you suggest accelerate to nearer the market some of the technologies that are currently further back? If so, which technologies would most likely come to market first?

Dr Wallace: I preface my remarks by saying that I hope that I will be impartial in providing facts and scientific and technical input to the process, and that I will not concentrate on any particular energy form or be on a crusade. I will come to that matter later.

Technologies that are currently not near market are classed as such because they have not matured technologically to the stage at which they can enter the market in sufficient volume to be classified as bulk, significant or numerous players, and because there is not a sufficient manufacturing heritage of repeat devices so that production costs have come down as a result of the experience curve. Most technologies follow an exponential reduction in their production costs as the volume of production rises. The technologies that are not yet near market are still producing prototypes of repeat machines potentially in ones and twos. Marine energy is a notable example.

To leap in with another support mechanism, capital grants will favour the development of single sites and will, piecemeal or on a stepwise basis, lead to the additional installation of new technology. The existence of differential support mechanisms across a volume of installed capacity would send a stronger signal to developers and the manufacturing community that there is an economic period of grace. The period of assistance in the early years of the technology recognises the need to engage in volume manufacture and to bring costs down. If the differential support mechanisms are successful, the aspiration is that by the end of that period the

costs will have come down the curve to the point at which the technology is closer to competing with established technologies. I can give you more examples later, but in Portugal, marine energy is supported by a differential mechanism through which there is an increased tariff over, I think, the first 100MW of capacity. I will confirm that figure after the meeting. That is a positive signal, because it is about introducing a technology, not about developing specific sites.

14:30

Christine May: The final page of your paper mentions biomass, in which I have a particular interest. The paper states:

"wider aforestation for increased fuel or accelerated cropping will increase carbon flows."

Perhaps my science is flawed, but that seems to me to conflict with the paper from our research folk, which states that biomass is "Greenhouse gas neutral". Am I confusing two different forms of gas emissions?

Dr Wallace: No, although I am an electrical engineer and not a biologist and I defer to anybody who is the inverse.

My understanding is that if we accelerate the planting, cropping and combustion of biofuel sources, that will mean an increased carbon flow, unless the source is proven to be absolutely neutral. I am concerned about the suggestion that it is carbon neutral to cut down a tree that is at its coppice life—say seven or 10 years—and replant. As an engineer, I am not sure that replacing a premature tree with a sapling results in carbon neutrality. My understanding is that if a tree that was going to grow despite energy policy falls over and decomposes in the forest, either that event or its combustion as a fuel would be carbon neutral. I am happy to be corrected, but my understanding is that any acceleration of the planting process unbalances the neutrality of CO_2 production and may not be carbon neutral.

Christine May: I will perhaps pursue that issue with others who give evidence to us.

Chris Ballance (South of Scotland) (Green): Page 3 of your submission states:

"Scotland's CO_2 targets could be partly met in a more sustainable way by increased encouragement or enforcement of energy conservation."

Will you talk more fully about the potential for energy conservation and whether increased energy conservation will help us to reach the targets for renewable energy?

Dr Wallace: I will surmise the first part of your question, although I think that I managed to hear it.

Chris Ballance: Sorry about that. I am more used to standing up when I use microphones.

Dr Wallace: Don't worry.

My belief is that, because of the effects of the market that reduce the cost and consequently the value of energy, conservation has become more difficult to justify economically than it was 10 or 15 years ago. Nonetheless, it is still a means of reducing carbon flows. If we do not use a kilowatt hour of energy as heat, light or another form of finished energy, there is an absolute reduction in the energy chain by one kilowatt hour, with the attendant reductions in CO_2 production. The pursuit of reduced carbon or renewable energies as an alternative to that may or may not be as CO_2 neutral. That depends on whether their presence in the energy system relies on combustion, or any other carbon flows, to support them.

For example, to choose an energy that is not contentious, if a kilowatt hour of bicycle energy from Dingwall required some of the thermal stations between the Black Isle and the central belt to remain in service to deliver that kilowatt hour south to the load centres, a proportion of those stations' carbon burn ought to be associated with the delivery of that energy, which was initially carbon free. If we choose not to consume a kilowatt hour, that is absolute. We still need plant to be connected to the network, but the carbon flow that is associated with that one kilowatt hour is reduced.

Chris Ballance: I presume that it is reduced by more than one kilowatt hour, because there is also a loss of 20 per cent, or whatever, in transmission. The saving is therefore somewhat greater. Is that the case?

Dr Wallace: Yes, that is true, but the calculation is not a straightforward deduction of the losses that are associated with the kilowatt hour's travel from source to end use, because the system still needs to be maintained, magnetised and fully serviceable, with all the correct voltages. Thermal plant must be connected to the network to ensure that it is available as an energy conduit—that is an interesting evaluation. Did that answer your question?

Chris Ballance: Yes, I think so.

The Convener: As a supplementary to that, I raise the issue of local generation, which has all sorts of attractions. I was going to ask you about that later. Most kinds of power generation are unpopular, but one way to reduce that unpopularity is to say to people that it is their own energy that they are producing—people then have more of a stake in it. It is clear that local generation cannot stand on its own, because everyone wants a back-up for the occasions when their local generator does not work because there is no water, no wind or whatever.

Are you saying that we would need to do a sophisticated study to ask how much thermal capacity the network would need to cover local generator schemes that happen not to be working on a particular day?

Dr Wallace: In answer to the question that was strictly about conservation rather than generation at the point of source, the statement stands that if we can avoid using a kilowatt hour at the point of end use, that is taken out of the energy flow in its entirety. Nevertheless, the network must remain available.

On the convener's question about the need to maintain a network that will allow highly dispersed generation—the autonomy of connecting and disconnecting the network and meeting local demand—as we speak, a few studies are examining the local and regional behaviour of microgrid systems and highly dispersed generation that is connected at the domestic edges of the network. That is an exciting area; it is an opportunity to reduce and, potentially, positively offset demand for energy at the extreme edges of the network. Work is going on in the distribution network fraternity to evaluate the effects of those developments.

The Convener: Before I let Chris Ballance back in, I have another question. When you talk about energy conservation, I assume that you are talking about what I might call true energy conservation. Is it true that energy conservation as practised might not necessarily be energy conservation? If I insulate my house and all that happens is that I use the same amount of electricity but the house becomes warmer, that may be a desirable end, but it is not conservation.

Dr Wallace: It is not conservation. By my standard, conservation would be maintaining the perceptible standards of living, accommodation, prosperity and social activity, such as education—life as we know it—in a way that would use less energy. You would have to turn down your thermostat.

Chris Ballance: I want to follow up your statement that we can predict wave power three days in advance. Is it the case that wave power will be at its greatest when wind power is also at its greatest, or is wave power so much more constant that it might be able to fill in for wind power on any flat days?

Dr Wallace: Nearly, is my knee-jerk reaction. The waves are raised by the action of wind across the surface of the ocean. That is a friction effect, and wind moves ahead much faster than the waves; the wind velocities are much higher than the wave velocities. My understanding is that, if a sustained stormy period were to bring winds ashore, starting from time zero, the wind would arrive first, the waves would build up and the storm would build up, but the length of time for which the waves would be delivered is related to the area of the fetch—the area of the sea over which the wind has travelled. The consequence of that is that the waves continue after the highest winds have passed. There is a correlation and a time displacement, and it is understood—or at least believed—that the effects of wind and marine energy may be quite complementary.

Chris Ballance: From reading your submission, I get the impression that you are saying that we need to develop a range of renewable resources if we are to meet the higher 40 per cent targets and that, although we are quite good at developing wind resources, we ought to be putting more emphasis on the other sources of renewable energy. Is that a fair comment?

14:45

Dr Wallace: I think that we need to develop a sufficient number of renewable energy technologies to provide us with the volume and duration of energy that we require to give us a security of supply that is comparable with that which we have at present. That suggests that we ought to pursue the renewable technologies that have a potential to make a difference within our geographical boundaries.

One of the most recent studies lists offshore wind, wave, onshore wind and tidal stream as the top four renewable technologies—or rather, those that have the most significant potential to contribute to the energy mix. There are many other technologies that are below the top four, which may reach market maturity earlier, but the ones that I mentioned offer the greatest potential. Of those four technologies, one is market ready, another is almost market ready and, in my opinion, the other two need to be nurtured as the next Scottish renewable energy industry, because they could make a big difference to the Scottish energy balance and the Scottish economy.

Chris Ballance: Are the two technologies that you are referring to wave and tidal?

Dr Wallace: Yes.

Richard Baker: My first question follows on from something that Chris Ballance discussed with you. You said that you thought that wave power had the potential to fill in for wind power when it was offline. In your view, would that be sufficient to alleviate fears about the future base-load supply, given that established traditional supplies from nuclear power and plants such as Longannet will go offline during the next few decades?

Dr Wallace: The honest answer is that I do not know. That is precisely the sort of issue that my

institute, along with a number of other places in Scotland, is considering right now. We are examining specifically the contribution that marine energy can make to the evolution of the plant mix in Scotland. As you rightly suggest, there is a retiral programme for thermal plant and we must anticipate that by developing other, relatively firm, sources of energy.

Richard Baker: My second question is about the economic impact of developing marine energy. In your submission, you say:

"There may be modest local employment in service industries, but the likelihood of established manufacture of wind generating plant being re-located from Europe into Scotland is low."

Does that mean that, to create more jobs and economic benefits, we must give greater consideration to the development of marine energy than to the development of other forms of renewable energy? Will that require incentives such as more generous ROCs?

Dr Wallace: It is imperative that we do anything that we can to bring the technologies that are further away from the market, such as tidal stream and wave energy, closer to the market and that we allow them to enter the market and compete there.

In Scotland, our concentration of expertise in marine energy and the extent of our manufacturing base in that area are among the most significant in the United Kingdom and Europe and that could be applied to the manufacture of marine energy devices. My pipe dream—I guess that it is a crusade—would be that we could convert that expertise into a national and international industry in marine energy that would lead the world.

I was not being pessimistic in what I wrote about job creation from the development of a wind energy industry. It is extremely positive for any job to be created as a result of renewable energy policy. However, the industries that produce the high-finished-value components for wind energy are not in Scotland, nor are they ever likely to be. We are starting from the blocks and running flat out with marine energy conversion, which we are in a position to bring to Scotland.

Brian Adam: On the renewable obligation certificate, there is obviously a balance to be struck in introducing a range of new technologies. Would it be appropriate to vary ROC mechanisms to control the market in order to encourage the development of indigenous industries at the expense of industries that are market ready now and in which others have a lead? Are there international constraints on how we use ROCs or, indeed, other regulatory mechanisms to encourage renewable industries that may be a bit further away from the market?

Dr Wallace: Let me clarify that in my own mind first. If you are suggesting—

Brian Adam: I am wondering whether it is okay for Scotland, and indeed the UK, to arrange the market for long-term commercial advantage for our engineering industries by giving fiscal advantages to, for example, tidal energy.

Dr Wallace: I may be corrected on this, but my understanding is that that would not be a devolved decision. My understanding is that a differential ROC system would require wider consultation within the UK and, perhaps, within Europe.

On the issue of fairness—for want of a better word—I do not believe that we should necessarily be advantaging particular commercial interests. The process is about encouraging the growth of a renewable energy technology that could make a significant difference to meeting renewable energy targets not only in Scotland, but in the UK and along the shores of Europe. Therefore, I satisfy myself on the issue by saying that it is about establishing a technology and not necessarily about advantaging any commercial interest.

The Convener: Leaving aside the fact that we cannot necessarily predict that an undeveloped technology will not hit unforeseen snags, is there any reason why renewable technologies, such as tidal or wave, that are not market ready could not be so within the time scales that we are talking about, given suitable incentives? Is it simply a matter of providing enough cash to establish the technology?

Dr Wallace: There are two parts to that. We certainly should not wait for the signals from the development community, and the stakeholders and participants within the industry. We should proceed as soon as we can with the incentives that will establish the industry. However, there is additional development work to be done to come down the volume manufacturing curve to ensure that the reliability, survivability and availability are everything that we hope for when we take a technology from prototype to implementation.

Separate components or streams of activity must run side by side. We need to continue development of the prototypes and to test them in realistic conditions—that is happening as we speak—but we also need to support that with additional work so that when the technology is rolled out in volume, it is rolled out reliably and predictably and behaves and survives as everyone expects.

The Convener: Are you prepared to hazard a guess about the order of magnitude of the sums that will be needed from the Government in Scotland to develop the technologies in the time scale that we want?

Dr Wallace: No. I paused for three seconds to double every figure in my head, which is not the sort of considered answer that you want. One of

the nice things about marine renewable energy is that the manufacturers work together, which was clear at the meeting of the marine energy group of the forum for renewable energy development in Scotland, or FREDS. The community is relatively small and fragile, so it is encouraging that there is a synergy there. From within the collegiate group or fraternity that exists, it would not be impossible to arrive at an estimate of the sum of money that would be required. However, I do not want to have a figure hung round my neck after today. I can get back to the committee, if you like.

The Convener: By all means, do so. We will talk to members of the fraternity in subsequent evidence sessions.

From what we have heard elsewhere, there have been suggestions that in order to deliver onshore wind power or other types of renewable energy from what are usually remote locations, the grid needs to be strengthened or expanded in certain areas. You talked about another problem, which is the vulnerability of the grid to the intermittency of renewable sources. Are those problems related or are they two different issues?

Dr Wallace: The network ought not to be vulnerable to the intermittency of the resource, but the strength of the network will make the effects of intermittency less obvious. If the network were to be fully reinforced with lots of conventional generation close up to the renewable sources, the consequences of there being an intermittent renewable energy source in that area of the network would be less visible, because the network would be stronger and more resilient to the effects of the intermittency and the characteristics of the delivery of the renewable energy. However, as everybody is aware, that is not how the network is arranged in Scotland. The majority of the renewable energy resources are located at the edges of the network.

Without intervention, the effects of the renewable energy source would be most visible at the edges. If a certain quality of supply had to be maintained by statute, that would introduce a limit on the penetration of renewable energy at those points. Intermittency would not be a threat to the network, although it would have an effect on the quality of the supply and on the security of the energy that was supplied.

The Convener: Forgive me if I do not quite understand. Are you saying that, if we want to provide a fair number of renewable sources from the edge of the network, say somewhere up in Caithness or Sutherland, it is not simply a matter of putting in bigger cables, which is what we might think of as strengthening the network, but that we might also have to put in a thermal plant somewhere in Ross-shire to make the system robust? Is that the sort of scenario that you are talking about?

Dr Wallace: It is possible to reduce the effects at the edges of the network by reinforcement from the bulk supply points or from the central areas of the network. However, the characteristics of the renewable plants that are connected might reduce the quality of the local or central supply at the edges of the network where the effects of intermittency would be visible. However, let us suppose that we reinforced the network to avoid that. If the delivery of 100kW of renewable energy at one part of the network displaced the need for 100kW from a plant that provided the network with a greater level of stability, that composite effect would have to be evaluated to ensure that the network was still sufficiently stable.

15:00

Christine May: I do not want to prolong this discussion but, in the light of those comments, I want to press you slightly on what seemed to me to be a dismissal of biomass as something that is almost irrelevant. As I understand it, wood sources can currently be used to co-fire with existing thermal sources—well, with coal, anyway—in order to use less coal and therefore generate smaller amounts of greenhouse gases while still maintaining consistency of supply and contributing to base load. As a result, could it not be argued that that source ought to be encouraged, at least in the short to medium term, while other perhaps more efficient sources that might be set far back from market are brought nearer to it?

Dr Wallace: Absolutely. I do not disagree with that view at all. Indeed, if we took an energy systems perspective on the matter and if co-firing meant that we could use a local resource in another thermal plant and as a consequence of the fuel mix reduce CO_2 production, I would support exactly what you have said. However, it would be prudent to consider the whole energy flow if the biomass resource had to be transported, or indeed had to be grown and then transported.

I certainly did not mean to dismiss biomass. When I made my earlier comments, I was simply airing a question in my own head about the accelerated afforestation that would be required to produce another carbon-based fuel.

Christine May: Of course, any benefits that afforestation would have for the environment through land reclamation, reduction of toxic run-off or whatever would have to be set against any cost with regard to increased carbon emissions.

Dr Wallace: That is where an holistic view is entirely necessary.

Murdo Fraser: I have a short point of clarification on support mechanisms to encourage new technologies. I trust that you are aware that the Portuguese Government encourages

investment in tidal power by setting a tariff subsidy that makes investing in such technology very beneficial to power companies. Is that Government paying a subsidy direct to the power companies or is it setting the regulatory regime in a way that makes it more attractive to power companies to invest in those new technologies and which ensures that taxpayers' money is not being handed over to the power generators?

Dr Wallace: I understand that the Government has set an increased tariff for the production of that energy, which would be competitive among the manufacturers who sought to access it.

Murdo Fraser: In other words, it is a subsidy but it does not come from the Government or from the taxpayers but from within the power generation system.

Dr Wallace: I do not know, but it subsidises a technology instead of a particular commercial interest. I think that you were concerned about that point earlier.

Chris Ballance: I want to follow up the point that Christine May made about biomass. I wonder whether the role of biomass is geared not so much towards the direct production of electricity as towards direct heating. Perhaps space and water heating should be taken away from electricity and moved towards biomass. If biomass is used to produce electricity to heat up water, the efficiency rate is something like 30 per cent or 40 per cent at most, whereas using biomass to heat hot water directly gains something like 80 per cent or 90 per cent. Would it be fair to say that?

Dr Wallace: I agree. That would be particularly the case in rural areas where electricity that provides storage heating might be displaced by biomass heating. The only caveat is that the aggregation of demand for the fuel and for the heat that it produced would have to be sufficient to make the economic appraisal of that particular energy stream sensible by comparison. It is not necessarily the case that everybody should just convert to an Aga and move away from off-peak heaters or whatever.

The Convener: Finally, you have been very good at answering all the questions that we have asked, but there may be questions that we did not ask because we did not think of them. Is there anything else that you would like to say to us that we have forgotten to ask you?

Dr Wallace: I wish that someone had asked where all the people will come from who will support the industry beyond 2010 and 2020. That is an important feature of all our plans. In primary, secondary and tertiary education and among the public at large, we need to move energy efficiency and sustainable energy sources further forward in people's minds so that they are higher up people's personal, domestic and social agendas.

Equally, in the educational system, I and other colleagues from across the Scottish universities do all that we can to expand the proportion of undergraduate teaching—rather than research—on energy and sustainability. We need to ensure that, through investment from the primary school upwards, we have a population of skilled and genuinely interested people who will assist us in meeting the targets at 2020. It is likely that the majority of the people in the industry—I must be careful what I say here—who are making the decisions that will affect the 2010 and 2020 targets will have been succeeded or will have retired by the time that those targets have to be implemented. We need to ensure that we grow the next generation of scientists and engineers, who will inherit the system. We need to do that now and from this point forward. That is critical.

The Convener: That is a good note on which to end. I thank you for your evidence. It has been a very interesting first session for us.

Dr Wallace: Thank you for the opportunity.

The Convener: Our second panel of witnesses is from Scottish Enterprise: Brian Nixon is director of energy and Blair Armstrong is manager of power generation and renewables. I thank you for your written evidence. We are not all totally familiar with the structure within Scottish Enterprise, so perhaps you could start by saying precisely what your role is in the organisation.

Brian Nixon (Scottish Enterprise): With pleasure. Good afternoon to one and all. Blair Armstrong and I are directly involved with the work of the energy team, which is a small cluster team within Scottish Enterprise that tries to offer strategic help and advice on energy matters to all parts of the Scottish Enterprise network. Our submission has embraced some of the contributions and views of energy people within the various local enterprise companies, but it has been co-ordinated by the energy team.

The Convener: Would it be fair to say that your job is simply to exploit the generation of energy to the benefit of the Scottish economy? Our inquiry is into renewable energy, but your overriding concern is not with where the energy comes from but with where you see the best economic prospects.

Brian Nixon: That is correct. The energy team is involved in promoting the economic welfare of our companies in the oil and gas industry and in the conventional and nuclear sector. However, we acknowledge that our oil and gas industry will slowly but nevertheless surely decline over the next 20 or 25 years, and we acknowledge the significant balancing effect that renewable energies can offer our businesses and academic institutions.

The Convener: You are probably more at the sharp end, in terms of cash, than Dr Wallace—I hope that he will not take that amiss. I will therefore ask you a question that I do not think that he, for good reasons, would be able to answer. In your paper, you refer to developing alternative technologies other than simply wind power—which is the one that seems to be favoured by the current mechanisms for renewables. What sort of sums does the minister have in his budget that would allow him to make realistic progress within the time scales that we are talking about—the next decade or two?

Brian Nixon: Again, I would hold back from quoting you a figure this afternoon. However, one of the very first initiatives that followed the recent creation of the forum for renewable energy development in Scotland was the formation of the marine energy sub-group. One of the tasks that it has taken on is an assessment of what levels of funding and stimulation would be needed to ensure success.

The Convener: Would it be fair to say that the minister has been asked the question—if not directly then indirectly—and that people are trying to work out the answer?

Brian Nixon: Indirectly, yes.

Murdo Fraser: I would like to ask you the same question that I asked Dr Wallace. In your paper, you refer to the Portuguese Government's mechanism. I want to be clear about this. Is that mechanism a subsidy of taxpayers' money that is paid to the power companies or the developers, or is it just a means whereby a tariff is set at a level so that the subsidy comes from within the system?

Brian Nixon: I would have to hold back from describing the detailed application or implementation of that subsidy. However, it is clearly having an effect. Some Scottish marine energy development companies are clearly aware of, and attracted by, the kind of subsidies that we are talking about. The inclusion of that reference in our submission was to highlight the fact that, although we believe that Scotland has a unique opportunity in the development of marine energy technologies, we have no room for complacency. We have the natural resources and the academic and industrial expertise to carve out a niche in the market, but other parts of the equation are outwith our control.

Murdo Fraser: If we do not introduce some sort of support mechanism—whether based on the Portuguese or some other system—will it be difficult for us to get a share of the market in Scotland? Is some sort of leverage required to help us to exploit the technology to the full?

Brian Nixon: The real focus of the work of Scottish Enterprise—particularly in renewable energies—is to support those sectors that offer Scotland the best opportunity to develop intellectual property. For that reason, we wholly support Dr Wallace's commitment to marine energy which, along with fuel cells and hydrogen production and storage, are the three central themes of our strategy. That results partly from a recognition of the national resources, partly from the academic and industrial expertise that we have, and partly from the fact that our European counterparts have largely already developed wind and biomass technologies, which means that we see little opportunity for Scotland to add significantly to the development of those technologies.

15:15

The main thrust of our strategy is that if we can capture new intellectual property that is appropriate to our academic and industrial expertise, the stimulation and strengthening of an industrial cluster in support of those technologies will be well within our grasp. It is our opinion that the ROCs and tariffs have done a good job in stimulating growth in the wind sector. You might argue that there has been a rush for wind over the past few years, and that perhaps there might be a degree of over-stimulation. We recognise the real opportunity for Scotland, and whatever the ROC stimulus is, it would now be satisfactory to bring on the next leading opportunity.

Murdo Fraser: I have one more question on a slightly different subject. On the first page of your submission, you refer to the number of jobs that have been created in Scotland in the field of renewable energy, and forecast the number of jobs that might be created. However, at the same time as we are increasing renewables, potentially we are running down conventional power generation. Have you analysed what conventional power generation jobs might be lost, and what the economic impact might be?

Brian Nixon: I will ask my colleague Blair Armstrong to answer that, because he has been working on the gap analysis steering group.

Blair Armstrong (Scottish Enterprise): Good afternoon. A gap analysis is just about to be revealed, some of the details of which we have indicated in our submission. At present, renewable energy supports about 2,000 jobs. In the future, that figure could be somewhere in the region of 6,000 to 12,000. At this stage it is difficult to determine how many jobs will be lost with regard to conventional technology, but it will not be as great. We are looking in particular at the jobs that will be created within the new technologies that are coming on stream, and the skills gaps that that situation will highlight. At this stage it is difficult to determine the answer, but the information will be available within the next 10 days or so.

Murdo Fraser: Thank you.

Chris Ballance: You said in your introduction that your main driver is economics. Do you agree that within the next five or six years we will become a net importer of gas and oil, and therefore there is a strong economic case for the shift away from conventional technologies to renewables?

Brian Nixon: Yes. We see our role as interpreting the policy, and trying to read into that policy where the best opportunities are for growth of our businesses, sustainability and jobs. However, we have to watch all the other factors that are affecting the market, and our gas supply and potential oil supply are critical, as you rightly point out. We have been active in that area, and have tried to work with the oil companies to examine the situation and see how we can help to safeguard it.

We agree whole-heartedly with Dr Wallace's view of the balance. We support the ambition to secure a balanced supply across the renewables sector but, for the foreseeable future of the next 30 or 40 years, we have to maintain a balance across our conventional sources as well. The security of supply of gas is near and dear to our hearts.

Chris Ballance: On page 3 of your submission, you say:

"if the correct support programmes are in place, these marine technologies will be well placed to deliver larger amounts of power at prices comparable to current onshore wind technology."

Are the correct support programmes in place and, if not, what do you recommend that we do?

Brian Nixon: We are making progress, although there is still a lot of work to be done. In collaboration with our other public partners, we have put in place the European Marine Energy Centre, which we believe will act as a significant stimulus to the development of marine energy technologies. Indeed, the first device—I am thankful that it is Scottish—is hitting the water as we speak. We hope that that will attract not only Scottish and United Kingdom developers but other European developers.

We have made some progress, but further stimulus is needed not only to the development of the generation devices but to the standardisation and, perhaps, modularisation of the back-up systems—the conversion, transportation and storage systems that will inevitably be involved in any marine or wind energy device. There is a lot of work still to be done, but the groundwork of a strategy is being put in place by the FREDS sub-group that I mentioned.

We would also support Dr Wallace's prediction that offshore wind power has the potential to have the largest impact through its overall contribution to our energy balance. It is a little bit disappointing that the offshore wind developments to date have been centred in the south of the UK. We have great ambitions for the fact that the weather conditions around Scotland's coastline are particularly suited to much more significant and more major wind farm developments, which is no surprise to any of us Scots. We have therefore actively supported the work of Talisman Energy (UK) Ltd, which is progressing with the first major deepwater pilot plant, and we are hopeful that that will add further stimulus to the offshore wind sector.

Chris Ballance: On fuel-cell technology, you say in your submission:

"Scotland is at the leading edge of this technology".

Fuel-cell technology is renewable only when the hydrogen is being powered by a renewable resource, so what are we doing to develop fuel-cell technology as storage for renewable energies?

Blair Armstrong: We are working closely with Highlands and Islands Enterprise and some of the universities on the possibility of developing storage on Islay. There is a project there in which we are doing exactly what you described: taking the energy that is generated by the wave machine and using it to manufacture hydrogen. That would be an excellent mechanism to store the renewable energy, and we could then use the hydrogen for the development and running of vehicles or stationary power sources on the island. We are at an early stage of that project, but it is proving to be quite exciting.

Richard Baker: You talked about the potential to alleviate the impact of job loss in the oil and gas sectors through the creation of jobs in the renewables sector, which is clearly part of the thinking behind the establishment of the energy intermediary technology institute in Aberdeen. In your submission, you also referred to the renewables supply chain gap analysis of job creation through renewables; is that based on the current development of wind energy and the way that the development of renewables is going? Could the job creation be greater if we do more to promote marine energy development? What potential is there for further job creation beyond the figure that you mentioned for 2020?

Brian Nixon: We believe sincerely that there is a good opportunity to transfer some of the skills from the oil and gas sectors. The marine energy sector, which includes offshore wind, wave and tidal energy, is an ideal recipient of that talent and expertise. The predicted decline in the North sea oil and gas sector will be greater than the predicted rise of renewables. That can be seen in

the predictions for jobs and annual capital investment. The oil and gas decline will be slow in the next 10 to 20 years, but we suspect—unfortunately—that the number of jobs lost and the reduction in capital expenditure will be greater than the growth that renewable energies provide. Nevertheless, securing as many jobs as possible in the transfer remains a key target for us.

Another concern is the potential level of earnings. It is reasonably well known that the earnings level in the oil and gas industry is quite attractive. We suspect that in the drive to reduce the cost of renewable energy to market-competitive and sustainable levels, the earnings potential might not necessarily equal that to which people have been used in the oil and gas sector. That remains to be seen, but that is a mild concern.

The skills that we have identified are infinitely transferable. Many aspects of marine energy have still to emerge, such as survivability, operability, maintainability, corrosion resistance, installation methodology and maintenance regimes and strategy. All those matters remain to be developed and thought through in the renewable energy sector, but skills and experience on all of them are available in abundance in the oil and gas sector. It is part of our job to stimulate interest and foster early linkages to get that transfer under way.

Richard Baker: So renewable energy will not fill entirely the gap that will be created, but much potential for job creation exists in the long term, too. In a way, a bleak picture has been painted, but you say that much potential remains for job creation beyond the figure of 12,000 extra jobs by 2020.

Brian Nixon: We must consider not only the opportunity for job creation in renewable energy, but the ability to retain jobs in oil and gas companies as they continue their international drive. When companies establish new businesses overseas, they use not only management and engineering staff but many senior technicians, trainers and people dealing with competency, health and safety and environmental matters who have experience from the North sea. The situation is not as bleak as I might have made it out to be.

There is a balance, and other diversification opportunities are available. We are actively involved in promoting the forthcoming nuclear decommissioning market. We have a balance of international oil and gas, nuclear decommissioning and renewable energies, which will all help to sustain the number of jobs that the oil and gas sector provides.

Richard Baker: I have one more quick question on a subject that you have touched on. Your submission says:

"To ensure that other technologies also reach commercial viability, we would suggest that reviews of the market should consider bringing in banded ROCs".

Would that encourage marine technologies? Should ROCs be more generous to them?

Brian Nixon: The phasing of ROCs has an important part to play. The technology and the take-up of wind energy are now well established. The marketplace has quite a lot of competition and several developers, and the industry is moving forward. If an opportunity and a method are available to balance the mechanism, now is the time to swing the balance in favour of marine energies.

The Convener: You used the phrase "swing the balance". Does that imply not simply making additional allowances for marine or tidal projects, but allowing scope for reducing the allowances that are paid for onshore wind development?

Brian Nixon: I do not think that we could do that. In the stimulation of any new market sector, it is clear that the duration of stimulation initiatives is vital. The last thing that we want to do is think about reducing any such mechanisms. Fortunately, there have been some good moves recently to increase the effectiveness and duration of the ROC initiative, which we support, but perhaps there should be additional stimulus of marine projects that would not be at the expense of other sectors.

The Convener: Would I be right in saying that there comes a point in the development of any technology at which continuing to subsidise it, in effect, is simply giving people money for doing what they would have done anyway? I presume that the Executive would come to Scottish Enterprise for advice on whether that point had been reached.

15:30

Brian Nixon: Through discussions with other sectors of the renewables industry, we would try to assess the whole picture. Perhaps that is where there would be such a conversation.

Christine May: Your paper makes many interesting points, particularly on local planning issues. However, I will leave those issues aside in case we run out of time. I would like to discuss support for indigenous manufacturing and engineering industry, identifying opportunities, taking those opportunities and ensuring that there are the available skills that will be necessary perhaps over the medium term to meet challenges. You spoke to Richard Baker about the potential that exists for maintenance, support, health and safety work and so on. What is Scottish Enterprise doing in respect of skills development and support for indigenous manufacturing?

Brian Nixon: We have two principal initiatives that are under way, both of which are focused on diversification. One initiative involves the development of a planning and analytical strategy planning document, which we have called a diversification toolkit. The document allows companies to assess their human intellectual and financial assets, their experience and so on and then to assess where talents and experiences might otherwise be applied. There are also introductory descriptions and market overviews of new sectors.

A current example relates to nuclear decommissioning. A substantial programme over the next 20 to 25 years is emerging. We are putting together a series of programmes that will alert companies to opportunities, advise them on how business is conducted in that sector—assuming that the company is new to the sector—and introduce them to the key players and major project initiatives. The programmes will also stimulate and facilitate the formation of partnerships between oil and gas companies, for example, and companies that have nuclear experience. The benefit is that customers, practices and methods of working can be transferred to the oil and gas company and the oil and gas company can benefit by transferring its technical expertise and aspects of its technology. We do practical things of that nature. We did similar things in the earlier days of wind energy.

Specific sub-groups are the other major instrument that we use. We have a grouping of companies called the Scottish energy industries group, which now numbers more than 140 organisations. Academic organisations as well as companies are involved. A programme of events, a marketing and information system and a networking organisation allow the transfer and advertising of ideas and indeed the stimulation of participation in other sectors. The three principal strands of our strategy are the commercialisation of new technology, the internationalisation of our businesses and the diversification of our traditional businesses into new, emerging industries.

Christine May: I may come back on the development of skills, to which Dr Wallace also referred.

Page 3 of your paper mentions the necessity for Scotland's major engineering contractors to participate. Given the constraints on all companies in Europe as a result of competition rules and state aids, can you suggest any methods other than those that you have mentioned whereby Scottish companies might gain legitimate competitive advantage?

Brian Nixon: When we mentioned the necessity to participate, we were thinking about the fact that our industry is made up of a relatively small number of major engineering contracting and manufacturing organisations and a rather significant number of small and medium-sized enterprises. The supply chain works by a number of smaller companies feeding into the major manufacturers and engineering companies. Our observation was that, although the development of new techniques, products and devices is vital for wealth generation, it is also important that we do not take our eye off support for the major contracting organisations that provide a significant supply-chain opportunity for the small companies.

Christine May: On page 5 of your submission, under the heading "Infrastructure", you make an interesting point about

"any decision to upgrade and invest in the grid to be taken strategically, as one decision."

Will you say a bit more about that? Will you also talk a little about biomass and energy crops?

Brian Nixon: Our observation parallels that given by Dr Wallace. We recognise that a network is a complex infrastructure. If decisions are made at a local or regional level, we are concerned that we might not get the correct results. Our recommendation is that, in the same way as the Strategic Rail Authority has had to consider the whole network and not just the branch lines, the overview of the grid should be done holistically and not just on a regional basis.

Christine May: That is significant and I suggest that the committee might want to consider whether it wants to take a collective view on the issue.

I would be interested to hear your comments, in amplification of what you say in your submission, on the earlier debate on the use of biomass for heating and the growth of energy crops for co-firing.

Blair Armstrong: We have been involved in various types of biomass project. In particular, we have been involved in the Greengairs site in the east of Glasgow, where, with the developer, we have captured the methane that flows from the infill site and that has to be burnt off in any case and converted it into a feedstock for energy. We are now generating more than 8MW of power from the Greengairs site and putting it on to the grid. That is one small example of a biomass opportunity.

There are not many opportunities in Scotland, I must confess. We have been considering schemes in the Scottish Borders but, for the reasons that Dr Wallace mentioned, we have had problems with that. We are by no means excluding the idea of biomass; we want to pursue as many of those types of scheme as possible, because they give special help to rural areas.

Brian Nixon: I go back to my earlier comment on one of the main strategies of our work, which is to focus on those areas where we believe there is a significant opportunity for Scotland to develop intellectual property. In the biomass arena, we acknowledge the fact that the technology is generally available. Work with biomass tends to be happening at a local enterprise company level. If there is a facility or resource and a will to put together a biomass plant, the scheme will go ahead and it will work, but it might not need the strategic overview or the investment in technology development that we are focusing on with marine energy and fuel cells, for example.

Christine May: That is interesting. Thank you.

Brian Adam: Your paper gives some background information on the energy ITI. What proportion of its £15 million a year budget will go towards developing renewable energy as opposed to traditional energy? Will that money be spent primarily in the higher education sector or will some of the SMEs be able to gain access to those funds in order to make the developments?

Brian Nixon: I cannot give you an answer about the percentage split of that investment. What I can tell you, however, is that the energy team has been working closely with the energy ITI and we are in absolute agreement about our strategy. The energy ITI will actively embrace renewable energy, which I suspect will attract a significant proportion of funding, although I would hesitate to quote a figure. The energy ITI will consider some of the outstanding issues facing the oil and gas sector and other opportunities within conventional power, such as clean coal technologies, but there is no doubt that renewables will feature.

The involvement of SMEs has always been a key objective of the ITIs. It is recognised that we will work with as many academic institutes in Scotland—and outwith Scotland if need be—as possible. We will encourage major organisations, major operating companies and major generating companies to become involved. However, there has been clear recognition from the outset of the initiative that SMEs are very much required and that they will be encouraged to join. The latest indication is that SMEs will be able to become members of the ITIs for as little as £400. That demonstrates the real desire to get the SME community on board with the ITIs.

Brian Adam: When are the ITIs likely to be in a position to give us an idea of the kind of projects that they will be supporting in the renewables sector?

Brian Nixon: Work has been on-going for some months. I am sure that you are aware that the chief executive has been appointed and takes up his post within the month. The marketing foresight director has been on board for some time and has been conducting an extensive series of interviews with our academic and industrial companies to do some of the groundwork for what is being termed the market foresighting. A market foresight panel has still to be put together. An early initiative by the chief executive will be to assemble a panel of experts from the industry to help to put together those foresights. The other active recruitment, of four or five other members of the energy ITI, is well under way. Once the staff are on board, we will see some fairly early indications of the kind of projects that will receive support.

Brian Adam: Is any work in renewable energy likely to be commissioned by the ITI in this calendar year?

Brian Nixon: I cannot give you time scales, but I am convinced that the ITI will want to commission work as early as possible. Renewable energies will be one of the fields in which it will wish to commission work, so I would be amazed if it did not do so.

Susan Deacon (Edinburgh East and Musselburgh) (Lab): I apologise to the convener for missing the earlier part of the meeting and to Dr Wallace for missing the earlier part of his evidence. I did, however, catch Dr Wallace's answer to the question about skills availability and the extent of the threat that the lack of skills availability poses.

I am aware that Scottish Enterprise has commented on that to some extent in its written evidence but, although other sections of the evidence end with comments about Scottish Enterprise working with people on the issue or recommendations that something should happen, I could not find the appropriate comment in relation to skills. As we have heard from other sources and in other contexts, there is a widespread view that there are issues about the low number of engineering students. There are also issues for the renewable energy sector and other sectors. I appreciate that the question is wide, but what in your opinion should be done about that and who should be doing it?

15:45

Brian Nixon: I will certainly try to answer that. We view the issue at two levels. One is the engineering and management graduate level. You are right when you say that the engineering sector is experiencing difficulty as well as the power generation and renewables sector. We are aware that all aspects of the engineering industry are struggling in that respect. We are also aware that all the engineering institutions have active attraction programmes.

We work with several of the institutes. For example, we work with the Energy Institute, which

was formed through the merger of the Institute of Petroleum and the Institute of Energy, both of which we used to work with. Individually, we are involved as members of the Institution of Mechanical Engineers and the Institution of Electrical Engineers. A lot of stimulation is going on.

We are also running an initiative in association with the United Kingdom Offshore Operators Association—the scheme is not directly related to renewable energy, but it is an interesting example of the continuing initiatives. An articulated lorry, in which we have placed high-tech, high-spec engineering and computer graphic software, is touring universities and schools throughout the country. We are trying to capture the imagination of people before they choose their final university subjects and, we hope, the imagination of pupils before they decide what to do at university.

We want more such programmes. With the Energy Institute, we are considering running a series of conferences and seminars around the country that, again, would be designed to capture the imagination of people and demonstrate the high level of technology in the industries and how exciting that is for new entrants. Therefore, work is under way on attraction programmes, but it is not enough. The area needs continued attention.

The second level is the technician level. Blair Armstrong mentioned the imminent publication of the renewables gap analysis, which will give us for the first time not only the level of requirements, but a forecast split of the skills. It would be useful at that stage for us to instigate a discussion with Careers Scotland, with which we are now integrated, and to devise a programme to produce a shopping list of necessary skills. We could then decide how we could cascade that list into the work of Careers Scotland. Effort is required at both levels and we believe that we should contribute to that.

Blair Armstrong: Members will be aware of the proof-of-concept idea that we administer. One of the exciting things about it is that, through the universities, we are getting many innovative renewables technologies. As my colleague said, we are concerned about the number of graduates, but it is exciting that people are thinking hard about the new technologies. We hope that, as the concepts develop, they will be the embryo of a new industry in Scotland. On the positive side, we regard proof of concept as exciting.

Susan Deacon: I am grateful for those informative answers. On the general issue of the future supply of engineering graduates, I have a couple of specific questions about the energy industry. As your answers indicate, a multifaceted approach that involves all sorts of players is needed. The process cannot all be driven by the Government or by Government agencies. You referred to Careers Scotland. Can you say a bit more about that? Specifically, what do you believe Scottish Enterprise's role is in the future supply of engineering graduates? What further things could or should be done at the agency's own hand? Finally, you did not mention the funding councils. What is the nature of the dialogue at that level?

Brian Nixon: I do not profess to be an expert in the field. Skills and learning are not my chosen subject. However, lifelong learning and skills and learning are a major part of Scottish Enterprise's work. Each of the 12 local enterprise companies has a directorate exclusively for skills and learning, for which there is a range of programmes.

Our team, like similar cluster teams for food and drink or tourism and biotechnology, for example, works with the Enterprise, Transport and Lifelong Learning Department to feed in the needs and requirements of the sector. As I explained, once we have an industry perspective of the skills requirements for the emerging sector—not only for renewable energy, but for nuclear decommissioning—we will feed in that information through our lifelong learning colleagues and Careers Scotland. It is fair to say that the information will be actively picked up on and translated into regional programmes.

Susan Deacon: I am conscious that you said that this was not your chosen subject, so please feel free to refer me to someone else, as I am more than happy to get the information at a later date. I would be interested to know a little more about what lies behind the paragraph about skills in your submission. For example, you said:

> "There are concerns at the low number of engineering graduates entering the energy industry owing to perceived lack of future career opportunities."

That is quite a definitive statement to make. What research exists in that area? How much of what you said is based on instinct, judgment and insight—all of which have a part to play—and how much is based on systematic research, if any has been undertaken, about the barriers to recruitment in the area?

Brian Nixon: In truth, I am not sure what else I can add to the earlier comments. In the submission, we cited one area of energy engineering that we felt was particularly appropriate to the renewable energy sector. As you said, we are talking about an industry-wide problem. We would be happy to take the point away and come back to the committee on it. As I said, I do not profess to be an expert in the field.

Susan Deacon: I appreciate that. I am happy so long as the committee has the opportunity to get further information on the subject at a later date.

The Convener: Okay. I do not think that there are any other questions. I thank Mr Nixon and Mr Armstrong for their evidence. This has been another interesting session. Perhaps you could provide us with more information about the point that Susan Deacon raised. It would also be interesting to see the results of your gap analysis, once that is available.

Work Programme

15:52

The Convener: We move quickly to item 2, which concerns our work programme. The purpose of the item is to formalise the discussions that we held informally after our last meeting when we discussed our proposed inquiry into business growth and entrepreneurialism and the fact that the Auditor General for Scotland is undertaking an inquiry into Scottish Enterprise and Highlands and Islands Enterprise. I suggest that we postpone the development of our inquiry into business growth until the Auditor General's report is available to inform our discussion.

If we agree to that, we need to address the gap in our programme. This might be an opportune moment to begin the inquiry that we decided to hold on the roll-out of broadband. The purpose of the paper is to seek the committee's agreement to those two points. If they are agreed to, we will bring forward a remit for the broadband inquiry in the very near future.

Susan Deacon: I am happy with the proposal not least because I am increasingly seized of the urgency of the broadband issue. It would be useful to undertake that inquiry. My one reservation concerns some of the thinking that underpins the decision. I say that as someone who is also a member of the Audit Committee, so I am familiar with the work that the Auditor General is undertaking on Scottish Enterprise.

I worry a little that the nature of our inquiry into business growth and entrepreneurialism was intended to be significantly different from and significantly broader than the inquiry in which the Auditor General is engaged. I want to note that. I do not think that this was your intention, convener, but the inference could be made that we see the spend of the enterprise agencies as forming a larger part of our inquiry than perhaps it will.

Chris Ballance: I am in general agreement with the proposals, convener, but I seek information on how many sessions you expect the broadband inquiry to take. What stage are we at with the ITI inquiry? Is that likely to impact on the situation?

The Convener: Susan Deacon is right that the inquiry into entrepreneurialism and business growth covers more than simply the spend of the enterprise agencies. Another problem that we had was that, although the inquiry is potentially much bigger than that, I did not feel that it was well enough defined at this stage. If we are to have an inquiry, we must ask questions that will produce sensible recommendations. I did not feel that, in the next couple of weeks, we would be able to agree on a precise remit for the inquiry. My

proposal would kill two birds with one stone; it would postpone the inquiry until something that will be germane to it is available and it will enable us—with input from members, I hope—to tie down a specific remit for the inquiry.

On Chris Ballance's point, I am not sure how many sessions we will need for the broadband inquiry, because we will need to agree the remit first. On ITIs, we decided to wait for more developments. We have had an initial evidence session, but we are at an early stage. We cannot say terribly much, and certainly we cannot produce a report, but we felt that it would be useful to return to the issue in the future and see what the ITIs are doing once they are established. At that stage, we could pontificate on the results.

Christine May: My recollection of the agreement to hold a quick inquiry into ITIs was that the decision was made because I and others raised concerns that ITI Scotland should not be yet another talking shop or bureaucratic hoop for organisations to jump through to get money for developments. I am concerned about waiting until ITI Scotland is fully established because, if there is a problem, waiting until it is established will be too late. I am reflecting anecdotal concerns that have been raised with me that the organisation does not have the credibility that it should have because it is overstaffed and just another filter or another hoop through which institutions must jump. That was my understanding of what we were going to consider.

The Convener: That point did not come out at the evidence session that we had and I do not feel that we can come to that conclusion. I would welcome a discussion of what further steps to take at a future meeting. We need to decide on a remit and on which people we should talk to. I am happy to consider the issue that you raise, but I would rather have written suggestions from members, so that we can proceed on the basis of a paper.

Christine May: I am happy to speak with you outwith the meeting, convener.

Susan Deacon: It strikes me that something can probably be done now to take on board Christine May's concerns about timing and seeking to influence the outcome, although that may fall short of an inquiry. I am interested in exploring those concerns, but that can be done initially through an exchange of letters to provide us with more information.

The Convener: Okay.

Do members agree to the two recommendations in the paper?

Members *indicated agreement*.

Meeting closed at 15:59.

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