



**Cynulliad Cenedlaethol Cymru  
The National Assembly for Wales**

**Y Pwyllgor Cynaliadwyedd  
The Sustainability Committee**

**Dydd Mercher, 25 Mehefin 2008  
Wednesday, 25 June 2008**

**Cynnwys**  
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Inquiry into Carbon Reduction: Evidence Session on Energy Production

Cofnodir y trafodion hyn yn yr iaith y llefarwyd hwy ynddi yn y pwyllgor. Yn ogystal, cynhwysir cyfieithiad Saesneg o gyfraniadau yn y Gymraeg.

These proceedings are reported in the language in which they were spoken in the committee.  
In addition, an English translation of Welsh speeches is included.

**Aelodau'r pwyllgor yn bresennol**  
**Committee members in attendance**

Lorraine Barrett	Llafur Labour
Alun Davies	Llafur Labour
Michael German	Democratiaid Rhyddfrydol Cymru (Cadeirydd y Pwyllgor Dros Dro) Welsh Liberal Democrats (Temporary Committee Chair)
Lesley Griffiths	Llafur Labour
Alun Ffred Jones	Plaid Cymru The Party of Wales
Darren Millar	Ceidwadwyr Cymreig Welsh Conservatives
Brynle Williams	Ceidwadwyr Cymreig Welsh Conservatives
Leanne Wood	Plaid Cymru The Party of Wales

**Eraill yn bresennol**  
**Others in attendance**

Ian Draisey	Pennaeth Marchnata, Dulas Ltd Head of Marketing, Dulas Ltd
Yr Athro/Professor Stuart JC Irvine	Y Ganolfan Ymchwil i Ynni'r Haul, OpTIC Technium Centre for Solar Energy Research, OpTIC Technium
Kevin Mowbray	Pennaeth yr Ysgrifenyddiaeth, Canolfan Ymchwil Ynni Cymru Head of Secretariat, Welsh Energy Research Centre
Miles Willis	Ynni Adnewyddadwy'r Môr, Prifysgol Abertawe Marine Renewable Energy, University of Wales, Swansea

**Swyddogion Gwasanaeth Seneddol y Cynulliad yn bresennol**  
**Assembly Parliamentary Service officials in attendance**

Dr Virginia Hawkins	Clerc Clerk
Annette Stafford	Dirprwy Glerc Deputy Clerk

*Dechreuodd y cyfarfod am 9.03 a.m.*

*The meeting began at 9.03 a.m.*

**Cyflwyniad, Ymddiheuriadau a Dirprwyon**  
**Introduction, Apologies and Substitutions**

[1] **Michael German:** Good morning, and welcome to today's meeting. This will be an evidence session as part of our inquiry into carbon reduction in Wales. This is a scene setting exercise for the energy production element of the committee's carbon reduction studies.

[2] The normal housekeeping arrangements apply; they are familiar to Members. In the event of a fire alarm, please follow the ushers. Please ensure that your mobile phones, BlackBerrys and so on are switched off, so that they do not interfere with the broadcasting

system. You will not need to switch the microphones on, because they are operated automatically. The headsets can be used to listen to the translation and to amplify the sound—channel 0 for amplification and channel 1 for the translation.

[3] Members also need to know that I have received a letter from Cardinal Packaging, which is interested in inviting Members to visit its plant. I know that some Members indicated that they would like to do so. At the end of the meeting, Members could, perhaps, indicate to Virginia whether or not they are interested in such a visit, so that she can make the necessary arrangements.

9.05 a.m.

**Ymchwiliad i Leihau Allyriadau Carbon: Sesiwn Dystiolaeth ar Gynhyrchu  
Ynni  
Inquiry into Carbon Reduction: Evidence Session on Energy Production**

[4] **Michael German:** Today, we will take evidence from the Welsh Energy Research Centre. I am pleased to welcome in no particular order, Kevin Mowbray, who is the head of the secretariat for the Welsh Energy Research Centre; Professor Stuart Irvine, who is the chair of opto-electronic materials in chemistry, from Bangor University—

[5] **Professor Irvine:** Could I correct that? It is the OptIC technium, and I am the director of the Centre for Solar Energy Research. That is a new initiative in Wales—we have just set up the centre as a partnership between the OptIC technium and the North East Wales Institute of Higher Education.

[6] **Michael German:** Thank you, and congratulations on your upward movement. We also have—and I hope that I get this right—Miles Willis, from the marine renewable energy unit at Swansea University.

[7] **Mr Willis:** That is correct.

[8] **Michael German:** Finally, Ian Draisey is the head of marketing for Dulas Ltd in Machynlleth. Thank you for coming. We have agreed to take evidence this morning as a scene-setter for the new study and its four sections. After you have made your presentation, Members will ask questions. So, I ask you to speak about the first section of the report, and I would be grateful if you could discuss our current energy usage, and tell us a little about the work of the energy centre. Who wants to start?

[9] **Mr Mowbray:** I am Kevin Mowbray, from the WERC. As you see from the submission that I sent to the committee last week, the current position regarding our energy needs is that we essentially need the equivalent of 9 million tonnes of oil per year to keep us going as we are. The majority of fuel that we use is hydro-carbons based, and we are producing carbon from that. I would say that, in the next 30 years, we will probably change from a centralised system of large generators to a more distributive form of energy use, utilising more of the energy that we are extracting from fossil fuels at the moment. That will impact on society and on our economy. We need to do more research on what effect that will have on our national grid system, and how the renewable energy sources will impact upon that—how will it be used, who will organise it, and who will produce it? New companies and technologies will be formed, and we should use them to build an industry in Wales, taking advantage of that.

[10] The WERC was formed to try to get the universities to collaborate on producing new technologies and generating spin-out companies, and to present an idea of where we should

be going in this area. So, that is an overview of where we are at the moment.

[11] **Michael German:** Are you all happy if we just go straight into questions, or does anyone want to add anything to that?

[12] **Professor Irvine:** I would just like to add that one of the important issues that we face, both in Wales and more widely, is security of supply. We are painfully aware of our dependence on global prices for energy, but sourcing energy from other parts of the world is also a factor. With the decrease in supply of North sea gas, gas supply will now come from other parts of the world that are probably not as politically stable as the UK. So, security of supply comes into all of these questions, as well as climate change. That requires long-term planning and strategy, and when we are looking at alternatives, in terms of fossil fuels, nuclear power and renewable energy, it is important to consider the long-term view. What we have found frustrating at the Welsh Energy Research Centre is that energy policy often tends to be based on a short-term view, and that does not help to build a secure future.

[13] **Michael German:** We will now move on to questions.

9.10 a.m.

[14] **Brynle Williams:** Good morning, gentlemen, and thank you for coming in.

[15] Your paper highlights the fact that we need power and energy, ‘and lots of it’—I would not argue with you there—for continued economic growth. Can you provide us with a picture of energy provision in Wales as it is at present and the main risks and challenges facing us, particularly in terms of reducing carbon dioxide emissions from energy production?

[16] **Mr Mowbray:** Is that question directed at anybody in particular?

[17] **Michael German:** You can decide who wants to answer that question—you can always have disagreement between you; that is fine.

[18] **Mr Mowbray:** At the moment, we are mainly based on the coal, gas and nuclear side. Of course, we are about to lose the nuclear plant in north Wales, and thought needs to be given to how the gap that that will leave will be filled.

[19] **Mr Willis:** Perhaps I can add to that. From the point of view of offshore wind energy production, Gwynt y Môr is a proposed offshore wind farm that will provide electricity to 500,000 homes. That is currently in the planning process. A lot of offshore wind work is ongoing.

[20] Renewable energy sources, such as tidal and wave-powered energy, are fledgling technologies, so they are not actually supplying electricity to the grid at the moment.

[21] **Mr Draisey:** Also, plans for 800 MW of onshore wind-powered production as part of the TAN 8 process are slowly developing.

[22] I would add to the answer by saying that we are missing an opportunity in microgeneration. You do not have to look very far, just over the water, to see the significant impact made by microgeneration in a short time. It encourages decentralised energy production and it reduces reliance on nodal generation—in other words, large centres of power production. The other things that it has done, which I am keen for us to get across, is that it has promoted indigenous business. The energy debate is very important, but there is also a huge, parallel opportunity for leading markets in research and economic development, and I am afraid that we are falling sadly very far behind.

[23] **Michael German:** To be clear, you said, ‘over the water’; that could mean several places.

[24] **Mr Draisey:** It means France, Spain and, in particular, Germany, and now Italy. Our major competitor in the solar power market, and the second competitor to have done so, has now abandoned the UK. It now focuses its operations in France and Spain, because of the strong domestic markets that have been created. This could also attract industry to Wales.

[25] **Brynle Williams:** You touched on the issue of the nuclear power station in north-west Wales. Are we going to have all this generation in place by the time the station is shut? There seem to be grave concerns, having spoken recently to staff there, as to whether we will have sufficient electricity available when you take Wylfa off the grid. Can we reach the target fast enough?

[26] **Mr Mowbray:** From the point of view of renewables, you will not get to that size of target by that time. A lot of gas will be coming in through Milford Haven, and conventional power stations will be built to use that gas. However, we need to start investing in renewables now to bring them on line, more for the 2020 target as opposed to 2010 when Wylfa closes, and we need to start thinking about the infrastructure and how we can do it more strategically than we are at present.

[27] **Professor Irvine:** The problem with Wylfa is that the nuclear industry in the UK has been run down over the past 20 years. The UK used to lead in nuclear technology. If we have a new generation of nuclear power stations, we will have to import the designs. There are serious issues of supply chain, and whether or not we will be able to resource that from the UK—there would be opportunities, so I do not want to be too depressing about that. If the decision were to be made tomorrow to build a new nuclear power station on the Wylfa site—I know that local people in Anglesey are quite keen on that, because of the economic importance—how long will it be before that energy will come on-stream? We are looking at 10 years at least.

[28] So, we do not have short-term solutions. What we have is gas, and that is a result of a lack of long-term planning 20 years ago. I did my PhD quite a few years ago, working on hydrogen storage for a hydrogen energy economy; there was an oil crisis at the time, and there was a little burst of interest in the subject but, afterwards, there was no money for me to continue that research. So, it all died away and it was business as usual. So, we need to learn those lessons of history. We are not going to find easy solutions right now to the problems of the closure of Wylfa nuclear power station. We must find stopgap solutions to keep the lights on, but, as Kevin points out, we need to address what we will be doing in 2020. It seems a long way off, but it is not. That is the impact that we can make now, and it will make an impact from the point of view of security of supply, as I mentioned earlier, and also hitting reduction targets for carbon dioxide emissions.

[29] **Mr Mowbray:** To add to what Stuart was saying in terms of timeline, some things that we could do are not rocket science, but we need to get the planning in place. For example, we have a generating station at one end of Port Talbot, a biomass generating station at the other end and a new one coming in at the docks. They are putting in a new distributor road past those power stations, and it would not take much to drop a pipe in the trench so that the steam and hot water could be used to pump around one of the most densely populated parts of Wales. However, because it takes 10 to 15 years to go through the European Parliament and get funding, and so on, if you say that pipe could be installed in two years’ time, the response would be, ‘We are not going through that again’. So, it is not so much about the technology—it is about planning and putting the strategic thoughts in place for 2020.

[30] **Alun Ffred Jones:** Mae gennyf gwestiwn i Ian. Yr oedd fy nghwestiwn gwreiddiol yn ymwneud â datblygu economaidd o ystyried y dirywiad yn y cyflenwad nwy, ond i ymhelaethu ar bwynt a wnaethoch yn gynharach ynglŷn â'r datblygiadau a welwyd mewn lleoedd fel yr Almaen, pan yr ydym yn trafod ynni adnewyddadwy yn y Cynulliad, yr hyn a ddywedir o hyd yw fod profiad yr Almaen a Denmarc gydag ynni gwynt wedi bod yn fethiant—bod y trydan yn ddrud a bod problemau cysylltu gyda'r grid. Ai dyna yw'r gwirionedd?

**Alun Ffred Jones:** I have a question for Ian. My original question dealt with economic development given the decrease in the gas supply, but to pick up on a point that you made earlier about the developments seen in places such as Germany, when we discuss renewable energy in the Assembly, we are told that the German and Danish experience of wind energy is that it has been a failure—that the electricity is expensive and that there are problems linking it to the grid. Is that true?

[31] **Mr Draisey:** Yn fy marn i, mae wedi bod yn llwyddiant mawr o ran datblygu diwydiant i'r Almaen a Denmarc. Nid wyf yn gwybod a yw wedi llwyddo o ran ynni—byddai'n rhaid gofyn hynny i'r tystion eraill—ond o ran yr ynni adnewyddadwy sy'n cael ei greu, maent yn llawer pellach ymlaen o ystyried y ffordd mae pobl yn ymddwyn yn y gwledydd hynny. Mae eu perthynas gydag ynni yn hollol wahanol i'r ffordd yr ydym ni yn symud ymlaen yn araf. Maent bron wedi llwyddo i newid calonnau a meddyliau y bobl sydd yn byw yno. Mae problemau gyda'r ganran o ynni sy'n gallu dod o wynt, gan nad yw gwynt, yn wahanol i ynni niwclear, yno drwy'r amser. Wedi dweud hynny, mae gennym ffordd bell i fynd cyn bod hynny'n beryglus i Gymru a gweddill Prydain.

**Mr Draisey:** In my opinion, it has been a great success in developing an industry for Germany and Denmark. I do not know if it has succeeded in terms of energy—you would have to ask the other witnesses about that—but in terms of the amount of energy that is created, they are much more advanced when you consider the way in which people behave in those countries. Their relationship with energy is completely different to the way in which we are advancing much more slowly. They have almost succeeded to capture the hearts and minds of the people who live there. There have been problems with the percentage of energy that can come from wind, because, unlike nuclear energy, wind is not always available. Having said that, we have a long way to go before that becomes a danger for Wales and the whole of Britain.

9.20 a.m.

[32] **Alun Ffred Jones:** Do you have any comments about the criticism of the situation in Germany and Denmark that energy from wind has been a dismal failure?

[33] **Yr Athro Irvine:** Yr wyf yn gallu siarad Cymraeg, ond nid wyf yn rhugl, felly siaradaf yn Saesneg.

**Professor Irvine:** I can speak Welsh, but I am not fluent, so I will answer you in English.

[34] There have been many studies on the problems of penetration of what is seen as a potentially intermittent supply from renewable sources onto the grid. The grid is well advanced in managing an uncertain demand for energy, and the grid infrastructure is well capable of accepting the sort of penetration of wind energy and—dare I say it—solar energy, and other forms of renewable electricity generation for the foreseeable future. Studies indicate that more advanced technology will be required when the penetration hits the region of 15 per cent, and different people have different views on that; however, we are a long way from that right now.

[35] On the problems of the potential uncertainty of wind generation, we have somewhat better weather reporting these days than we used to, so there is more predictability in that. Solar is very predictable, because we know that we will get solar energy during the day but not at night—and do not worry about cloud cover because you still get solar energy generation. So, it is much more predictable than some of the press that it gets indicates, and the grid is capable of managing that in the UK.

[36] **Lorraine Barrett:** Could you say something about the role that coal could play in providing the power and energy needed for continued economic growth?

[37] **Mr Mowbray:** I invited Alex Lambie along to today's meeting but, unfortunately, he does not seem to have been able to make it so far. Alex is the chief executive officer of Carron Energy or whatever it is called now—the Welsh Power Group Ltd—and he has more experience on the conventional side. However, producing electrical energy in a low-carbon way does not necessarily have to be renewable. It is not what you are doing; it is how you are doing it. So, coal will be around for a few hundred years and we could use that as long as we use it sensibly: we must use it more efficiently by taking out the carbon dioxide before it reaches the atmosphere.

[38] There is a Welsh Energy Research Centre project on coal gasification, where the coal is gasified underground and then the gases are taken and used in a conventional way. The other way would be to sequester the carbon and pump it underground, but that is quite a long-term plan and would need an awful lot of investment, although I suppose that both forms would. Coal could be a good baseload and a good provider of electrical energy, as long as we do it in the right way, which will take investment. We could then develop that technology and sell it to the Chinese, Indians, and so on, and have more effect in lowering carbon.

[39] **Mr Draisey:** We have focused on electrical energy, and electrical generation. When you mentioned coal, my mind immediately went to Burnley city council, which has already met its 2015 target and beyond, because it has been replacing coal heat generation with biomass. There is a huge opportunity here for us to look at doing the same, because we have a lot of coal infrastructure, not surprisingly. There is a lot of—if you will pardon the expression—low-hanging fruit to be looked at. It is not part of the big energy picture but, on a local level, the Welsh Assembly Government could be looking to support and promote it more actively in the regions.

[40] **Brynle Williams:** You touched on biomass there. Does that conflict with food production? At the moment, half the world is starving. As a farmer, I would go down the biomass production route, but will we see that coming into conflict with food production in the future?

[41] **Mr Draisey:** Your question is interesting, and it is interesting that the worry comes about the spinning reserve and the fact that we will have so much wind power that it will impact on the grid. However, we are so far away from that situation. It is like me worrying whether I will live to be 90. In biomass terms in Wales, we already have untapped waste streams. We already have sustainable forestry that is going for very low-value product, and we have more than 50 million tonnes of trees, a million of which have to be harvested annually to keep the forests sustainable. Worrying about growing crops at the moment is a little premature.

[42] **Mr Mowbray:** Some of these fears of taking food crops away and turning them into energy crops are really resulting from the American drive for biofuels—the ethanols. The Americans are concentrating on maize or corn use at the moment, but the next generation of the lignocellulose effect, being developed in Europe especially, will be much more efficient, and you can also grow that on ground that is not being used for food crops. In Wales, we have



the Willow for Wales projects, as willows can be used in co-firing power stations, they can be used on a distributed combined heat and power system throughout mid Wales and so on. Willows can be grown in a location and so not transported too far, they can be used in a more efficient and distributed pattern, and they do not affect food crops. You could also work in partnership with rural society to help it to develop its own industries and heat, and to export that heat as well. That would save you money as you would not have to put such a large grid infrastructure throughout mid Wales to handle that. Biomass is useful and flexible and there is a great deal of resource in Wales. It just needs to be looked at in the light of having a steady supply and engineering that supply route, as opposed to having problems with energy crops.

[43] **Michael German:** We will come back to the grid later, but Alun is next, to conclude this section.

[44] **Alun Davies:** Reading through your paper, you describe the work that you do. I was also interested in the section on what needs to be done. The Government here is committed to achieving or going further than the emissions targets outlined in the Westminster climate change legislation. A considerable element of that will be energy generation and the energy market here. If you were advising us on how to meet that 80 per cent target, what is the energy mix that would help us to achieve our target in the timescales provided?

[45] **Mr Willis:** I would start with the marine side. The initial consultation through the energy route-map suggests that half of that renewable energy should be met from a marine source, whether it is the tidal barrage, or a mix of all the other marine entities. The utility companies always require a balanced portfolio of renewable energies, and they will be critical in this whole decision-making. I think that the decision will be taken out of our hands. On the marine side, and whether or not a tidal barrage goes ahead, we certainly have enough resource around the Welsh coast, in the north, south and west, to do a balanced grid, which is essentially what the utility companies want. The things in our favour are that we have opposing tides in north and south Wales that are very predictable, so that helps. With the wave energy device, we know the weather a number of days in advance and, statistically, we have a lot of information to back that up as well. From the marine side, we see a balanced portfolio, and that would come from the utility companies.

9.30 a.m.

[46] **Professor Irvine:** To meet these ambitious targets, it is important that we use every resource available. The variability of supply from renewable sources would, to some extent, balance out if we had a balance of renewable energy. So, although my own research interests are in photovoltaic solar energy, I do not propose that everything should be solar. However, solar has to be an essential part of that mix. I was disappointed to see that the consultation on the renewable energy route-map did not include solar as one of our resources within Wales. It is a resource in Wales, and the photovoltaic group of the Welsh Opto-Electronics Forum, which I chair, gave a response to that, providing facts and figures. It is a scientific fact that we have a lot of solar energy resource; the question is how do we capture it and use it. We need to be much more ambitious about opportunities like that, and we also need to look at the balance for marine energy, in which there are huge opportunities. Marine energy is in its infancy and needs serious injections of funding to be able to take it to the next level. We have also mentioned biomass. We should be looking at all of those in our mix.

[47] **Michael German:** If you provide the committee with a copy of your response on solar energy to the route-map consultation, it would be very useful.

[48] **Professor Irvine:** I would be very happy to do that.

[49] **Mr Draisley:** I also want to add that we are looking at a very high bar. There are

clearly problems and concerns about how we are going to be supplying enough energy. However, the question is ‘Enough energy for what?’. I know that we have a very active Carbon Trust here, but we need to be looking to reduce, because it is much easier to meet a percentage target of a much smaller quantity. Microgeneration and community energy should not be overlooked because it changes the behavioural patterns of people using energy. Housing is responsible for around a third of energy requirements across the UK, although I am not sure what the percentage is in Wales. However, by putting photovoltaic panels on my own house, I have reduced my electricity consumption by 25 per cent. That is the scale of reduction that we need if we are to achieve any of the targets set, because they look so far in the distance and unachievable that people will not be able to engage with them.

[50] **Michael German:** I am just checking that on the one hand we have reduction and renewables, but we also have conventional technologies. To reach the target, what should be the balance between conventional and renewable technologies?

[51] **Mr Mowbray:** What is your target? If your target is lowering carbon, you will have to continue to use conventional generation. A large gap is developing now that the nuclear fleet is starting to come offline, and you will need to address that. You will have to build some nuclear generation, but do not put all your money into that. Build some, use the interconnectors between Ireland and France, and use the money to develop renewable technologies. We are currently missing the big target of using social impact to get people to go out there and buy PV. The most promising type of energy at the moment is solar thermal, because most of the energy that we use in Wales is to heat houses and industry, and so solar thermal can have an impact on that. Marine is extremely important and needs investment, but if you are looking at meeting low-carbon impact targets and the timings, you really must look at microgeneration, community-sized generation and ploughing these windfarms through local communities. If you are asking to me to look at the balance, I would say that we need to maintain and improve the efficiency of our large generator stock.

[52] We need to look at society and the take-up of microgeneration plans, and we need to invest in longer-term technologies, such as marine technology, and in other technologies that come along. One crucial thing that must be looked at is energy storage, because you produce wind energy, photovoltaic energy and so on fairly intermittently, and you need to gather that energy and store it somehow. There are schemes such as hydrogen storage. If everybody went out and bought a hybrid car, plugged it in at night and stored that energy up, we would have millions of mobile storage devices all over the place. However, in terms of those targets, you need to concentrate on microgeneration.

[53] **Michael German:** We still have four sections left to deal with, so we have to move on, but I will just ask what the opportunities for Wales are in the new scenario that you have just set out. We can then ask a couple of questions on that area.

[54] **Professor Irvine:** The opportunities for Wales are absolutely huge—I cannot emphasise that enough—because we have a renewable energy resource, which is in fact a huge part of the renewable resource for Europe, and that means that we could also develop the technology, and I will come on to talk about research and development in a moment. There are also huge economic benefits, and these are all very much linked.

[55] **Mr Draisey:** Some of the technologies lie further down the line. Hydrogen storage has been mentioned, and some of the tidal technologies are still a way away from being commercial. However, it could be so simple. If you remove some of the barriers to microgeneration, it will look after itself—you do not have to do anything else. In commercial terms, because of the cost of oil and energy, it will look after itself. Just remove the barriers, and communities will start to take care and, because of the increasing cost of energy, market forces will make communities and individuals proactive where they have not been in the past

10 to 15 years.

[56] **Michael German:** You were talking about some of these feed-in tariffs.

[57] **Mr Draisey:** There are feed-in tariffs, planning laws—the list of barriers is well known.

[58] **Lesley Griffiths:** You say in your paper that there is a large assumption that technology will come to our rescue, but that we cannot rely on that assumption and that we need to rescue technology before it will rescue us. Can you elaborate on the reasons why you think that the development of renewable energy is not happening as quickly as it should? Ian, you mentioned before that we are going to be left behind.

[59] **Mr Draisey:** Our whole company principle is based on using known and robust sources of renewable energy and locking them into systems that meet the customer's requirement. It is very simple. We have not been able to invest in the research and development of technologies for quite some time, because the market, particularly in Wales, has been so slow. We have been acting further afield where there is more of a marketing requirement. Basically, we are a systems house using known technologies. They do what it says on the tin. You can rely on them and trust them, but it is very clear that, in Wales, the UK and even globally, we need to invest very heavily in new sources of renewable energy, and my colleagues and I know that we have been right at the vanguard of those technologies for some time, but if that investment or impetus slips, we will fall back—as we are doing—with regard to the established renewable energy technologies, such as wind, biomass and solar. We will fall back if the policy is not there to support it.

[60] **Darren Millar:** You have touched on some of the barriers to renewable energy generation, particularly on the domestic, microgeneration side, but I would like to move on to medium-sized renewable energy generation, for example by a combined heat and power plant situated on the edge of a town, and the larger developments—and you touched on Gwynt y Môr—and some of the societal views of certain technologies and how those can be a barrier. How do we overcome that? You have talked about investment, but how do we change people's attitudes towards the medium and larger scale renewable energy technologies? I live in a beautiful constituency in north Wales and if you were to propose putting a CHP plant at the edge of a rural village there that did not have access to the gas mains, for example, there would be uproar that you were sticking this thing on the edge of the village.

9.40 a.m.

[61] As a committee, we have seen these things working in places such as Austria. How do we change people's attitude in Wales?

[62] **Professor Irvine:** I will answer that question. Yesterday, I had the opportunity at the Opto-electronics Technology and Incubation Centre to see a project for schools called Magical Homes. Technium OptTIC and the Welsh Opto-electronics Forum have put together the Photonics Academy, which initially was, and still is, very much about providing skills in the growing opto-electronics industry. We also have skills issues with the renewable energy industry as it grows. However, we have realised that awareness is as important as the training. What I saw yesterday was primary school children being tremendously enthusiastic about thinking about how they can incorporate new technology and renewables in the home.

[63] If we progress our technology and leave the population behind, because we are not explaining the technology, the opportunities or how it works, we will not succeed—I absolutely believe that. Within my team, in terms of the new centre for solar energy research, which I mentioned earlier, we are developing training, education and awareness. We see

tremendous opportunities for explaining to people the benefits of solar energy. The question, 'Does wind work?', was asked earlier. Yes, it does work, but we need to explain that. Let us provide lots of information to schoolchildren because they will then tell their parents about how wonderful these things are.

[64] **Mr Willis:** In addition to that, on Monday, I held a task group meeting of the renewable energy research group, and we tackled the problem of people's perceptions. The wake-up call that I gave the group was the fact that the chartered engineers, the social economists and the environmentalists of 2025 are now 11 or 12 years old and in primary school. So, to back up what Stuart was saying, we need to get those young people now and train them properly, and not necessarily in order for them to tell their parents, although that is part of it. They are the people who will be building these things that will ensure that we get our electricity from different sources. We have to change their minds. So, it is about getting in at that very early stage, which is what we propose to do.

[65] **Mr Mowbray:** I wish to say that the majority of people in Wales are already on board on this issue. It is an economic driver that will actually push people over. There is a minority of very vocal people who are making the headlines and the media are following those people. I will give you an exact example. Awel Aman Tawe proposed a community wind farm for the upper Swansea valley, which was based on the Department for International Development's sustainable livelihoods approach. The community would have owned the wind farm and received the profits from it. It undertook a survey, which is lodged with the Department for Business, Enterprise and Regulatory Reform, and 85 per cent of that community was in favour of the project. However, a 5 per cent vocal minority persuaded the council not to have it. There was a 5 per cent swing in the council, and that was the driver when it came to whether this got permission to be built.

[66] The majority of people in Wales are already on board. We need to do some sociological research to find out how we can get the majority of people to stand up and say, 'We are in favour of this; let's do it.', instead of listening only to the very influential vocal minority who stop these projects from happening.

[67] **Michael German:** Therein lies a very big question.

[68] **Mr Draisey:** I will answer your question very directly by asking: whose uproar do you fancy dealing with? To follow on from what Kevin was saying, you can deal with the enraged person who has a nice view over the valley where the combined heat and power station or the wind farm will be situated, you can deal with the industrialist who does not have the power to do his processing and has had to lay off 50 people, which has had a significant impact on the local GDP, or you can deal with the flooded school on the Severn borders. You choose who you would want to deal with; I know who I would prefer to deal with.

[69] **Michael German:** Darren, Alun Ffred and then Leanne will ask the next questions.

[70] **Darren Millar:** Thank you for those answers, which I found very interesting, particularly your focus on younger people. What is sometimes missed by people who promote renewables is the fact that, as politicians, we respond to our electorate in a way that ensures that we get elected. We must represent the views of our electorate, which includes the silent majority and the vocal minority. It will be quite difficult to just look to younger people without trying to change the behaviour of older people. There needs to be further research on this and I know that that is something that the committee is interested in taking forward in future.

[71] I wish to touch on some of the other potential benefits, particularly on marine technology from a renewable energy production perspective. Obviously, energy security is an

issue, but so is the mitigation of the effects of climate change. Things such as tidal barrages can have a positive impact on reducing the increasing flood risk across Wales, for example. I am not necessarily advocating the Severn barrage, but there are smaller schemes that could perhaps move forward. Why are they not moving forward and, given that the Welsh Assembly Government makes investment available for flood protection, do you think that it should be making some investment available for those sorts of renewable energy schemes in order to kick-start them and prime the pump?

[72] **Mr Willis:** There is a great example of what you are referring to up in Tywyn.

[73] **Darren Millar:** That is where I live.

[74] **Mr Willis:** It is even more relevant then. The offshore tidal empowerments or the coastally attached empowerments are great plans—they are only at the planning stage. I think that your question is: how do we get from the plan to some action? In order for that to happen, you need a funder who is reassured that there is some long-term investment potential and that there will be some feedback from that investment. As well as having an academic input, I am involved with a developer, and we know that investors are burning cash for a long period of time with no return whatsoever. So, you really need to reassure them. In addition to having governmental policy incentives, I think that a way around that is to have everyone in the industry, including those involved in socio-economics, the environment and technology, all working together as a large group, which would give reassurance to investors. I think that the crux of it is that you need to reassure investors.

[75] **Darren Millar:** If investors can be persuaded to put their hands in their pockets to shell out money for the development of these technologies and to move projects forward, that is all well and good, but where there is a positive impact in another area that the Government is responsible for, surely it would be right to call on the Government or any other agency to put their hands in their pockets and put some money on the table, would it not?

[76] **Mr Willis:** The critical path tends to be that you have the technology and perhaps you have some funding in place; the plans are submitted and you have backing from the Welsh Assembly Government; the plans then go to the council—Conwy County Borough Council in the case of Tywyn—and they get thrown out. We have seen this in terms of offshore and onshore wind. It is about bringing the county councils on board and making them realise that it is not just a voting issue but a long-term strategic issue.

[77] **Darren Millar:** Of course, local authorities do not have planning responsibility for offshore matters. However, the point here is that everyone seems to want to move that particular project forward, but it is not doing so at any pace. How do we move it forward at some pace? Does it require some Government investment? You can give us a ‘yes’ or ‘no’ answer.

[78] **Mr Willis:** Of course it does.

[79] **Alun Ffred Jones:** This follows on straight from that. We hear a lot about the potential of tidal stream technology in Wales, which is a very favoured option. How much is currently being invested in developing this technology in Wales? How does that fit into UK development? How far away are we from having something that works and is able to deliver some electricity? In debates here, we hear that marine technology is the future, and then that is it. So, what is the real picture?

9.50 a.m.

[80] **Mr Willis:** A number of Welsh companies are working on tidal stream turbines, but,

from a Swanturbines point of view, we have a number of initiatives in the Bristol channel, where I have been involved in a large piece of research work, sponsored through the work initiative. There is a company looking to go in to the Bitches, between Ramsey island and the mainland in Pembrokeshire. It is in the early stages of consultation; I went to a public meeting there last Friday. It is in a situation of putting something in probably in 2011. That would be devices of up to 4 MW, so a fairly small farm. There is a company looking at the north-west of Anglesey for a small farm—Marine Current Turbines Ltd. It is currently doing its testing in Strangford Lough. To give you a round up of technology in the UK and Wales, they have come out of their garden sheds, built some large bits of kit, and tested them as prototypes of about 1 metre in diameter. Many have now secured funding for demonstration devices of about 10 metres in diameter, producing up to about 500 kW, which is 0.5 MW, and they are starting to be tested at the European Marine Energy Centre in Orkney. Someone from Bristol is going up there as we speak to put in a device. Swanturbines also intends to go up there to test its devices.

[81] It will take two or three years to get a fully tested demonstration device. The next phase would be a demonstration farm. We feel that Wales is very well suited for that next phase—almost a Welsh version of EMEC—to test the devices on a larger scale. I am talking of farms of between 10 MW and 30 MW.

[82] **Alun Ffred Jones:** So, we are looking at 2015 before we—

[83] **Mr Willis:** Yes, you are. The electricity generation from these, up to the 2025 target, will not be a step generation. There will be nothing for a long time, and then, at the end, there will be a large jump. That is the nature of the beast.

[84] **Michael German:** I am conscious of the time. We have stretched ourselves to cover behavioural change, renewable targets and the energy mix, but one area on which we have not yet focused is the distributed energy network. Someone has already mentioned the interconnectors between Ireland and France, and asked whether we need to strengthen the way in which we distribute energy around the UK and Wales. Does the system of supplying electrical power need a radical rethink? What should we investigate as a committee for the future?

[85] **Professor Irvine:** I will go first, and then Kevin might like to add to what I say. The frustration that I find when explaining the benefits of renewable energy and the enormous opportunities that we have with renewable energy is that we tend to have a mindset that is based on large power stations distributing energy across the UK. For the future, we must have a different mindset in looking at the distribution of power, to the point at which we as consumers are also producers of power. That is a huge shift in mindset, which we must not underestimate. Again, looking at PV, and we have mentioned micro CHP and so on, there are a lot of opportunities for householders or communities to take control. Unfortunately—dare I say it?—politicians and Governments look at big solutions, and the Severn barrage is an example of that. That may be a fantastic opportunity, and it is not to be denigrated, but we tend to focus on the big solutions. Nuclear energy, in a way, is seen as a big solution, if we can achieve a huge percentage of our electricity generation from a few plants.

[86] I mentioned the security of supply earlier. We are all too painfully aware of the security issues that we face in the UK and globally. If we have distributed power, it is very difficult to knock it out; if we have one or two very big power installations, they could be a terrorist target and so that needs to be considered.

[87] How do we change the mindset so that, as communities and individuals, we actually take control of the solution of providing our own power? We could be providing our own power, but it could be considered to be more expensive, which is an issue that is thrown at me

all the time with PV, owing to how the calculation is done. The energy source is actually free, but you have to make an up-front investment to have PV installed, and people do not like doing that. If it were a question of taking control of your own power generation, you would then take more control over your energy usage, namely the demand, and that is very important. If we are wasteful with our energy, it does not matter how much we try to generate with renewable energy, we will be chasing our tails all the time. So, the message is very much, 'Let us take a different view of how we approach energy, how we use energy, and how we generate energy, and let us think about the individual and the community'.

[88] **Michael German:** I suspect that you will probably have the same message, Ian.

[89] **Mr Draisey:** Partly, but I would like to see the Welsh Assembly Government on the case with the distribution of renewable energy. I want to see an advocate, an ally and a supporter. I want to see the Welsh Assembly Government keenly promoting schemes and helping us to fight the apathy of the distribution network operators when it comes to connecting renewable energy schemes or even just to getting studies or a response. We have delayed connecting hydropower schemes, even though it is bullet-proof, 100-year-old technology, and we have plenty of water in Wales. It is one technology that has not been mentioned today, but it can provide a reasonably predictable load factor of up to 40 per cent, given the right conditions. We can wait 12 months for a connection or we can wait six months for a study on a connection. The farmers and the landowners whom we are trying to support with these schemes, which just chug away in the hills, unknown and unnoticed by anybody, are not getting the support that they need to get these schemes going, which are easy to develop. That is the first thing that I would say. There are big issues with providing large-scale connections to some of the larger onshore windfarm sites. I know that those are big issues, but I also know that they are being looked at. However, we should not just look at the very big issues when there are lots of connection opportunities possible. All we need is an advocate, somebody to make the DNOs sit up and pay attention.

[90] **Michael German:** Kevin, do you want to add anything?

[91] **Mr Mowbray:** I do not want to repeat what the other guys have said, but I sense that we are in a catch-22 situation at the moment. The grid will not supply connections because the renewable sources are not there, but people will not put the renewables in because the grid system is not there. We are too used to the fact that people supply us with electricity, but all that is going to change, as has been said, and we are going to take more control over that. However, we need a much more distributed, lighter grid and we also need to take account of where we are putting these windfarms and wave farms, where they will be, and where we need that grid. If we were to put what is essentially an umbilical cord around the coast of Wales, so that we could plug in supplies and use our existing north-south infrastructure, it could be useful. We need to think about a lot more intelligent grid systems and a more distributed system.

[92] **Michael German:** Before I ask Alun to come in, I want to pick up on something. I think that it was Ian who mentioned the interconnector. Sorry, it was Kevin. Could you explain how you see that playing a part here? You talked about the Ireland-France interconnector, did you not?

[93] **Mr Mowbray:** I was referring to the fact that when we decommission all our nuclear generators, we will have quite a large hole. If you want to fill that hole by investing in seven to eight nuclear generators, that would mop up quite a few billion pounds-worth of investment and, essentially, all your eggs would be in one basket again. Let us not do that; let us put in a smaller number but use the French nuclear generators and whatever the Irish are going to use for generation and import that until we develop our renewable capabilities.

10.00 a.m.

[94] **Michael German:** To be clear, you want to see a Wales-Ireland interconnector.

[95] **Mr Mowbray:** I think that that would be very useful.

[96] **Michael German:** I know that Ireland wants to see it.

[97] **Mr Mowbray:** That is an issue. If we do this right, we will be supplying England and possibly Ireland with green energy. Under the current set-up, it is very inefficient to transport electricity from Wales to England. That needs to be addressed. If Alex Lambie were here, he could tell you more about that.

[98] **Alun Davies:** You made the case earlier that the Welsh Assembly Government needs to invest in the development of different technologies, and I understand and appreciate that. Could we have your view on the Welsh Assembly Government's microgeneration strategy, with the 200,000 units target? Is that sufficiently ambitious, given the timescale, or does it fall short of the ambitious change that you are outlining? How would you see Welsh Assembly Government stimulating demand and further investment in the sector outside of the writing-of-the-cheque investment? I am sure that there must be means by which the Assembly Government could stimulate much more demand for your products, which would generate the sort of investment that you are looking for.

[99] **Professor Irvine:** I will take the first go at answering that one, if I may. On the targets set in the microgeneration plan, I was actively involved in the Welsh Opto-Electronics Forum PV group, which lobbied for an increase in the targets, and they were increased from what they were originally set at, but my feeling and that of the group was that it was a fairly cautious target for what we could achieve in Wales. We have fantastic opportunities for microgeneration. The problem of its being too cautious a target is shown when you look at the renewable energy route-map. Microgeneration is one element of that and the total amount of energy produced from microgeneration looks marginal compared with the overall ambition, which goes back to my point about having a few big projects to provide a large amount of electricity and then having this microgeneration. We have really missed the opportunity in those documents to be ambitious about microgeneration. There is no physical or technological reason why we could not be a lot more ambitious in that respect.

[100] **Alun Davies:** When you say 'a lot more ambitious', do you mean the timescale, the total target, or both?

[101] **Professor Irvine:** For the target, you can keep those timescales, but I think that we could achieve far higher targets in that timescale. As you will see from the document that I will circulate to you, if we include in the renewable energy roadmap megawatt-plus installations for PV—and that is certainly achievable as it has been done in Germany—in a retail park or something like that, we could increase that enormously.

[102] **Alun Davies:** Do you want to give us a figure?

[103] **Professor Irvine:** I have figures. For the 2025 target, with the growth of the industry, it would be technologically possible to achieve 10 per cent of that target through PV technology.

[104] **Michael German:** There are some raised eyebrows about that. Did you want to say something before I bring Brynle in, Ian?

[105] **Mr Draisey:** I think that the targets are cautious, and I will just reiterate what I said



earlier, namely that if you remove the barriers, the targets meet themselves. I was at the eco-schools exhibition at Aintree Racecourse in Liverpool on Monday, and I left completely inspired by the opportunities for learning that there are in our schools. There is no reason why every school in Wales should not have microgeneration, to demonstrate the technology but also to offset the use of energy, because not only does it increase educational value, it also increases awareness and puts a value on electricity before kids reach the commercial world. It is given a value that is more than money.

[106] **Mr Mowbray:** To comment quickly, the Welsh Assembly Government should show the way forward by plastering its infrastructure and buildings with PV.

[107] **Brynle Williams:** To return to the mix, have we missed a trick here, in that the major generators are putting in windfarms, and attracting a lot of financial support from the Government? Should we not have diverted some of that support into smaller schemes? I think that you mentioned, Ian, that we have an effective hydro scheme in Dolgarrog in north Wales that has run for 100 years or more, that I would say is truly carbon neutral and consumer friendly. It dots all the i's and crosses all the t's. Have we focused too much on big business—it has come in on wind turbines, and it has a role to play—and not put enough emphasis on smaller schemes, such as hydro and biogas? We have been through them all this morning.

[108] **Michael German:** In answering that question, could you also talk about timescales, because they are important?

[109] **Brynle Williams:** Exactly, it is about getting the timescale right. We do not have time—

[110] **Mr Draisey:** The figure that wind can provide is a minimum of 800 MW. The availability of hydropower in Wales is probably, for small hydro, somewhere between 5 MW and a maximum of 20 MW. So, in terms of scale, you have to get on with wind technology if you want to get anywhere near your terawatt hour targets. Facilitate it, support it and get it in as quickly as possible, otherwise your targets will be blown.

[111] **Michael German:** Do the rest of you agree with that last statement that, unless we turn to wind technology, we will not reach the target, because it is an important assertion?

[112] **Mr Mowbray:** Wind is the current technology; you have to put that in to give you sufficient capacity.

[113] **Professor Irvine:** I agree. PV will not meet any short-term targets, but we need to start to seriously adopt PV now in order to hit the longer-term targets. However, I absolutely agree on wind.

[114] **Michael German:** So, it is wind that will fill the gap.

[115] **Mr Willis:** If you look at the pie chart that divides up renewable energy resources, wind is already online and producing. We now need to start investing in the follow-on technologies. We have said that we need to talk about the large technologies, and we need to do that because they make up a large piece of this pie. I would advise putting the money into how much each of these will give, retrospectively, to your portfolio.

[116] **Mr Draisey:** We came close to losing the opportunity to develop wind power in Wales. The process took so long and was so slow that the developers nearly walked away. There are much better, easier places than the UK to develop wind schemes at the moment, and we nearly lost their engagement, and they are the people who will deliver these projects.

Everyone may not be aware of how close we came to losing that 800 MW, but I was a part of the process, and saw how close it was. These are risky investments and developments, and we need to clear the path. We need to take away the risks and the barriers, or we will have no chance of achieving the target.

[117] **Mr Mowbray:** There is a shortage of wind generators in the world at the moment. The developers do not have to come to Wales, so we should make the path easy for them.

[118] **Professor Irvine:** That was an ‘either/or’ question. One thing on which we agree in the Welsh Energy Research Centre is that this not an ‘either/or’ question, but an ‘all of the above’ question. Each technology has its own unique contribution to make, and we must now invest seriously in all of them. To add a quick point to that, if we invest heavily now in what we might call the emerging technologies, such as marine and PV, we will have huge economic benefits from the point of view of the industry. We should be innovating in Wales; some innovative work is going on here, but it is not enough, and we need more. We need to follow that through to an industrial scale. There are enormous opportunities there for our economy.

[119] **Alun Ffred Jones:** To go back to distribution and networks, somebody said that the transmission lines or the distribution network between England and Wales is inefficient. What do you mean by that, and what is the reason for it?

10.10 a.m.

[120] **Mr Mowbray:** It is more efficient to come into Wales than it is to go out of Wales. I do not have the technical knowledge to give you an answer on why that is, but if you spoke to Alex Lambie, he would probably be able to give you a much more informed opinion on that.

[121] **Michael German:** Before I thank you all, two issues have come up in evidence on which I think that the committee would like further information. The first of those is the whole area of interconnection, including the Wales-Ireland connection; I am aware of this issue because the British-Irish Inter-Parliamentary Body has done some work on it, in which the Assembly—not the Assembly Government—is very much engaged. I think that we need to examine that area as well as the interconnection with England that you have described.

[122] The other issue that arose and that we need to investigate is the need for a greater knowledge and understanding of the behaviour of investors. It is clear that they are part of the mix that has not yet had a reasonable hearing throughout the whole process. Some of what you said has already reached our ears and some of it is new, but, essentially, those are two very new areas that the committee might want to examine.

[123] I thank you all for being here. Alex Lambie was not present today, but if you could, on behalf of WERC, invite him to submit some written evidence on the back of the questions that we asked today, that would be helpful to the committee. Thank you for provoking our thoughts and for giving us an overarching view that will start us off on this section of our investigation.

[124] The committee will now move into an informal session to discuss a previous report. I thank Members for their attendance today. The next meeting will be on Wednesday, 9 July, when we take evidence on fossil fuels as part of the energy production section of the inquiry.

[125] I should have stated at the beginning that there are apologies from Karen Sinclair and that I am substituting for Mick Bates.

[126] **Professor Irvine:** On behalf of the Welsh Energy Research Centre, thank you for

inviting us today. We found it very stimulating and welcome the opportunity to be able to present these views. We are happy to furnish the committee with any further details and information that might come out of your discussions and deliberations. I am sure that if you contact Kevin, he will field the questions accordingly. We are very happy to help you in this process.

[127] **Michael German:** Thank you. That is the end of the meeting.

*Daeth y cyfarfod i ben am 10.13 a.m.*  
*The meeting ended at 10.13 a.m.*