



Cynulliad  
Cenedlaethol  
Cymru

National  
Assembly for  
Wales

# Cofnod y Trafodion The Record of Proceedings

[Pwyllgor yr Economi, Seilwaith a Sgiliau](#)

[The Economy, Infrastructure and Skills  
Committee](#)

13/10/2016

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Cofnodir y trafodion yn yr iaith y llefarwyd hwy ynnddi yn y pwyllgor. Yn ogystal, cynhwysir trawsgrifiad o'r cyfieithu ar y pryd. Lle y mae cyfranwyr wedi darparu cywiriadau i'w tystiolaeth, nodir y rheini yn y trawsgrifiad.

The proceedings are reported in the language in which they were spoken in the committee. In addition, a transcription of the simultaneous interpretation is included. Where contributors have supplied corrections to their evidence, these are noted in the transcript.

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

Hefin David <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
Russell George <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Ceidwadwyr Cymreig (Cadeirydd y Pwyllgor) Welsh Conservatives (Committee Chair)
Vikki Howells <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
Mark Isherwood <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Ceidwadwyr Cymreig Welsh Conservatives
Jeremy Miles <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
Adam Price <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Plaid Cymru The Party of Wales
David J. Rowlands <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	UKIP Cymru UKIP Wales

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

Yr Athro / Professor Julie Williams	Prif Swyddog Gwyddonol Cymru Chief Scientific Adviser for Wales
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**Swyddogion Cynulliad Cenedlaethol Cymru yn bresennol**  
**National Assembly for Wales officials in attendance**

Mike Lewis	Dirprwy Clerc Deputy Clerk
Gareth Price	Clerc Clerk
Anne Thomas	Gwasanaeth Ymchwil Research Service

*Dechreuodd y cyfarfod am 11:01.  
The meeting began at 11:01.*

### **Cyflwyniad, Ymddiheuriadau a Dirprwyon Introductions, Apologies and Substitutions**

[1] **Russell George:** Good morning. Welcome to the Economy, Infrastructure and Skills Committee. We do only have one apology this morning, from Hannah Blythyn. Are there any declarations of interest at all? No, there are none.

### **Prif Gyngorydd Gwyddonol Cymru—Sesiwn Graffu Chief Scientific Adviser for Wales—Scrutiny Session**

[2] **Russell George:** I would like to move to item 3. I would like to welcome Professor Julie Williams to our committee this morning and I am aware that you've visited past committees, but this is a new committee with a slightly different remit, and none of the previous members are on this committee. So, we're all new to this committee here this morning.

[3] I would just explain to you that there is translation equipment available: Welsh to English on channel 1, and amplification on channel 2. I should say that this morning's proceedings will all be recorded and a transcript of the proceedings will be made available to you at the end of the session as well. There's no need to touch the microphone; it will all work automatically. You may notice that some Members are using electronic equipment to make notes, et cetera. That doesn't mean they're not observing what you're saying, but it may well be that they're making notes on their electronic equipment.

[4] I'd be grateful, Professor Williams, if you could perhaps give us some opening comments or remarks before we go into some questioning.

[5] **Professor Williams:** Well, perhaps I can start by talking about some of the evidence that underlies what my group have been focusing on. When I came to this position, the First Minister pointed out that one of the big challenges that we face is that Welsh researchers, or researchers in Wales, do not seem to bring in the amount of research council funding, specifically, that you would expect for their numbers. That was the big challenge, really,

to understand what may underlie that.

[6] As a researcher, I looked at the evidence, and the evidence showed, actually, that Welsh researchers punch above their weight on a variety of objective measures. There was an Elsevier report, and I believe there is one about to be published that shows even more improvements, but it showed that on a number of measures, researchers in Wales were doing extremely well. A second report showed that, actually, the problem lies in the fact that we are around about 620 researchers light, if you like, in Wales, and about 600 of those—the majority—would be in science, technology, engineering and mathematics-related subjects.

[7] So, the issue, then, became how we solve this problem. A lot of my focus, and the focus of my group, has been on creating policies and implementing policies to try and address that main issue, and hence *Sêr Cymru 1* and *2*. *Sêr Cymru 1* was already in place, but we now had a refined view, knowing that we did have genuine strength in research in Wales, and we wanted to build on that. So, a lot of the things that we undertook were focused on building around that current strength. The fellowships and, to some extent, the rising stars were there to build around that current strength, but also to augment that by bringing in stars and rising stars who were already showing evidence of success in research, to increase our research base and grow our research in Wales.

[8] **Russell George:** I should say as well: can I thank you for your comprehensive paper that you provided to the committee as well? Can I just ask, could you just explain to Members your role, especially with regard to how independent you are of Welsh Government?

[9] **Professor Williams:** Okay. So, I suppose I have two roles in a way. The role in overseeing that policy, which is a very specific policy, to grow research in Wales is one role, but I also have a role in giving scientific advice. So, that's another component of what I do. That, to me, is—I see myself as a conduit to the best research out there. So, if I'm asked to give advice or if I see areas that I think need advice—I've acted in both ways—I will go out there and pull together the best balance of research in that area and advise accordingly. So, I have two roles, I suppose, under the chief scientific adviser umbrella.

[10] **Russell George:** Are you regarded as a civil servant?

[11] **Professor Williams:** No.

[12] **Russell George:** No. So, if you thought it were appropriate, you could be critical of Welsh Government, if that was your view.

[13] **Professor Williams:** Yes. And I have acted that way.

[14] **Russell George:** Good to know. Mark Isherwood.

[15] **Mark Isherwood:** Thank you. You've outlined focus on research and development and referred to Sêr Cymru. In terms of the overall 'Science for Wales' strategy, what overall progress do you feel has been achieved over the last year? What stumbling blocks have you encountered or had to climb over?

[16] **Professor Williams:** I think we've had a very positive year. To give you a little bit of background, what we set in process was a package of activities to build around our current strengths, so we wanted to bring in fellows. So, we wrote a Horizon 2020 grant, which was awarded, which actually was the biggest grant that Europe had awarded in a Marie Skłodowska-Curie call. That funded about 90 fellows and then we integrated that with a package supported by structural funds, plus co-funding from universities. We worked very closely with all the research-active universities and the Higher Education Funding Council for Wales, as well as putting in funding from Welsh Government. So, these packages funded about 120 research fellows and between 20 and 30 rising stars. The strategy there is to bring people in who have already succeeded and we want them to build their research groups in Wales, and to bring in established stars as well. So, that was the backdrop.

[17] One element within there is recapturing talent, where we have 12 fellowships that are aimed at bringing people who have dropped out of research back in. Those probably are mainly women who've dropped out. It's a big issue in research that we lose a lot of women mid-career. So, we have strategies around that. So, that's the backdrop.

[18] For the last year, we have appointed new fellows. The First Minister is going to announce those in the next couple of hours, actually, in Techniquet. So, we have appointed those fellows. I have a list of what they're doing here, and it's quite impressive, the range of areas that they cover and where they have come from. So, we've had fellows coming to work with some of the best scientists that we have in Wales, who have come from MIT in the States, Caltech, Queensland University—they've come from all over

the world to work with our successful researchers here. So, it's a great vote of confidence in Welsh science that we've been able to attract these people in. So, that is something that I'm very proud of, and we have had quite considerable interest in that first tranche, and we have just closed the second, and we have a good group of people that we are assessing currently. So, I think that's one of the major advances this year that I think we're quite proud of.

[19] Some of the areas are really cutting-edge research. They are contributing both at an applied and a more basic applied research—looking at the zika virus, looking at prostate cancer, looking at aerospace design, looking at quantum computing. It is really cutting-edge work. So, that, I'd say, would be seen as the main advance. We also hopefully will be able to announce a new star coming in, who will join Swansea University, but the Minister was still sort of finalising the last elements of that and, hopefully, that will be announced shortly.

[20] **Mark Isherwood:** Thank you. In terms of Sêr Cymru specifically, what progress has been achieved by the four research chairs over the last 12 months? And as we look forward, which of the four strands are you most excited by in terms of applications for research posts to October 2016?

[21] **Professor Williams:** I think all of them are achieving in their own ways. So, we have the four research chairs. We have a real star with James Durrant. I think he's already brought in £16 million-worth of funding through Swansea University—we've checked that quite diligently—and he is working in solar power, bringing what he has produced—novel ways of capturing the sun's energy, if you like, and applying it. And what Wales has provided through SPECIFIC in Baglan Bay Innovation Centre, for example, is a way of actually manufacturing these—taking it from something that size and seeing if you can actually build something that can clad a building, and then the building becomes its own energy source. But it's looking at efficiencies: how you get those new materials better and more efficient, and hopefully better than silicone in the long run. So, I think that is a major area of success.

[22] Others have succeeded in other areas, some have only just joined us. Diana Huffaker has come in, and I think that's an example where, actually, what we had in Wales was a considerable worldwide strength with a company called IQE semiconductors, and I'm told that that company resulted from one of the early spin-out companies from Cardiff University. So, it's another thing for Wales to be proud of. What we had was strength in the industry.

What we may have lacked was strength in the research side, and by bringing Diana Huffaker in as the Sêr Cymru chair, she is now leading the university's ambitions in this area, and I'm told there may be quite an exciting announcement before the end of the year about funding that she's already accrued. But what that did was bring in a catapult in semiconductors to be led by Cardiff University. Having that core there with excellence in industry and excellence in research balancing that up, we now can go from strength to strength.

[23] **Mark Isherwood:** Okay. Thank you.

[24] **Russell George:** David Rowlands.

[25] **David J. Rowlands:** Julie, to a large extent you've answered my first question, which was just talking about the recruitment of the staff that we needed, and you mentioned a figure, that it was 620 light. So, if we can just drill down a little bit more on that, where do you think we are now with regard to how light we are on the staff?

11:15

[26] **Professor Williams:** So, the research, the Halligan and Bright paper, was focusing on those with actual contracts within universities, mainly: most of our research in Wales is done in the university sector. So, that's the 600, that's what we're aiming at. It's going to take time for us to get up to those levels. I think we've made good progress in getting very high-quality groups in, and they will grow, because they are successful. They will pull in more funds.

[27] **David J. Rowlands:** Yes, the illuminati will help you on this, won't they, really, that you've managed to get in at this moment.

[28] **Professor Williams:** Yes. But it's growing at levels. The strategy that we took was to try and make this happen as quickly as possible. So, we focused predominantly on stars, rising stars, and fellows, so that they would emerge into active researchers more quickly. That was the strategy, but, even so, that is still going to take some time for us to get up to the 600 established staff.

[29] **David J. Rowlands:** Okay, fine. I want to move on just a little bit. It's great news that, obviously, we've got two of the world-leading catapult centres now in Wales. One is the precision medicine one and the other is the



compound semiconductor one that we have. What just worries me slightly about this is that—. And I'm very much interested in the interaction between the research and bringing products to the market from that research. Obviously, you have two centres that concentrate on that; it worries me a little bit that someone bringing some other innovations to the market might feel that he doesn't have that contact or that ability to—. Can you comment on that?

[30] **Professor Williams:** We would want more and more of this sort of activity going on in Wales. Having two centres—one is a centre of excellence, one is a full centre in terms of the catapult terms. There's room for many more and there are still applications going in that we support in whichever way we can for others in other areas. One example that's not quite a catapult centre that we are keen to support and have supported quite actively is to get a centre of excellence in nuclear research in north Wales. That is something that my team have been working hard on. We're awaiting decisions on that: there will be a call. Bangor University have already established collaborations with Imperial College London and, working together, they intend to put in a bid for this. We as a UK have lost a lot of our expertise in nuclear power research, and, since that is probably going to be an important component of green energy strategy going forward, we need to retain that. We now have the possibility of putting Wales on the map worldwide and having expertise in a variety of nuclear research. Bangor has tremendous strengths in computational modelling and Imperial have good basic research in the nuclear area, and we have just received applications through Sêr Cymru for, I think, two chairs and rising stars—a whole package of support that will go through the Sêr Cymru panel shortly. So, this combination may well put north Wales on the map in terms of nuclear energy research. In fact, one of my staff was at an event, and somebody from China came up and said, 'I hear you are doing some research, or you intend to, on the boiling water reactor and we'd be very interested to know how that is going on'. So, China have already found out about it. So, having that reputation for excellence is very important to build around that. So, having that reputation, if we can build that excellence in north Wales, then smaller companies will grow around that—people will come and want to work closely with that. So, it is a catalyst for growth in a number of areas, as well as research.

[31] **Russell George:** Adam Price.

[32] **Adam Price:** I think about the same time as the National Science

Academy was created, the National Institute for Health and Social Care Research—NIHSCR—was created around the same time. Sometimes, people deride creating bodies such as this as quangos, but do you think that it's actually helpful to create institutions and, indeed, the role of the chief science adviser, because it helps to focus attention, really, strategically on this area of science and research, and raising that?

[33] **Professor Williams:** I think having structures and individuals that represent things like science is very useful. I don't profess to know everything about science, but I know how to get that information. And having that conduit that you can communicate with Ministers, with other stakeholders, with anybody who really wants to get answers to questions that are evidence-based and provide a balance at that time of evidence out there on any particular question—that is, I've found, a really useful structure.

[34] In terms of the NSA, we have worked to make that a more coherent structure and a more focused structure. So, we've reduced the number of projects from around 30 to just over 20. We're focusing them to have at least some of their activity in trying to bring more girls into science, and trying to make sure that people, before they make decisions about what they choose—to choose against going down the STEM routes on some occasions—have the information and they know about what science may be. So, we're trying to pull that together.

[35] We have, now, annual workshops. We had one associated with the science festival in Swansea most recently. This is where we got everybody together so they could share best practice, and we can look at ways of assessing how they're doing. We can also bring in expertise from outside; we had a speaker from the Wellcome Trust. So, this is a new area of activity in terms of public engagement in science, and how do you assess what is good and what is not so good, and that's another focus for this group. Having an umbrella does help pull that together, and I think we're using that quite well now to get that as a more coherent set of activities across Wales.

[36] **Adam Price:** There is a symbiotic relationship between science and innovation; they're distinctive but related. We understand the Welsh Government is currently consulting on the proposal to create a national innovation body for Wales. Have you been consulted on that proposal? What's your view?

[37] **Professor Williams:** I have been consulted on that proposal. I think, for

me, there are very close relationships that would benefit both research and innovation in the current climate. We know at a UK level there is a new body being constructed that has research and innovation together in UK Research and Innovation. Actually, that may help in many respects, but I would agree that we need really good blue-skies science; we have to support that. But to try and integrate and get the best out of translating ideas into innovation, into actual products or services or whatever that might be, is something we can do better. Having possible umbrellas might help that activity, but it's not just a one-directional thing. As I've described with IQE and Diana Huffaker, you need to come at it from a number of directions for a variety of reasons. Some of the things that may be innovative may not be the main focus of the research that you're producing; it could be a computer programme or it could be something else. But trying to understand that that can be commercialised and how can that be commercialised and how easy is it for that to be taken off and produce a different sort of output—we can probably do more in that area, to integrate.

[38] **Adam Price:** Finally, Chair, on this wider theme of innovation, there is a proposal to create an innovation R&D centre in the steel industry in Port Talbot, which Swansea University have been very much involved in. Also, I understand the advanced manufacturing research centre is, possibly, looking at creating a kind of offshoot satellite centre in north-east Wales as well. Could you just tell us a little bit about those proposals in steel and wider materials research?

[39] **Professor Williams:** I think, when we were confronted with what was going on with Tata Steel, my group looked at how we could support/facilitate activity there. So, we fed into that sort of process. So, by pulling together research that was in Cardiff, and we even went into the GW4 arena in Exeter—and, I think, to pull together what we have in our vicinity that could support that commercial activity through research—. One of the areas that I think was most important was added value—better ideas of what you can do with those products—as well as technical issues around energy storage, how you use energy and model it. So, there were researchers who had that expertise that could be brought to bear. We will watch this space, because I'm not sure where we're going with that, but there is still that core of people who could be brought together to support that industry.

[40] **Russell George:** Are we training enough people in the STEM skills most urgently needed for the economy, do you think?

[41] **Professor Williams:** I think most reports show that we're probably well down on STEM skills within the UK. Within specific areas, I suppose, within Wales, medical-related skills would be one of the areas, but I think there's a lot more that is needed. The estimates are that we're going to need another 1 million people in STEM-related activity in the UK by 2020, which is an enormous figure. This is at all levels of working activity. So, without giving actual numbers for each area, yes, I think we need to do more to actually focus on STEM skills, and, specifically, with girls, actually. We have a very small proportion of people who are employed in engineering-related—and this accounts for between 20 per cent and 30 per cent of GDP; these are major contributors to the economy. And we have a very small proportion of that workforce that is female, and a lot of those who work in it are probably not using science-related skills as much as we would hope. So, there are specific things that we would like to increase and, to that end, there's a report, and I have a copy here, that I commissioned, 'Talented Women for a Successful Wales'. It's about STEM and women at all levels, from education through to commercial activity, and puts together recommendations to try and bring more women in and allow them to be promoted and go through the full career structure more successfully. So, there are areas that we are looking at to improve capacity in STEM-skilled activity, but I'm sure there's more that we can do.

11:30

[42] **Russell George:** Jeremy Miles.

[43] **Jeremy Miles:** Which of the recommendations in that report would you like to see being addressed most urgently?

[44] **Professor Williams:** Gosh, there were 33 recommendations and I'm not sure I can remember every one exactly, but I suppose childcare would be one of the things that can influence most women across Wales. Having good provision there would be something that would make the most difference, possibly.

[45] **Jeremy Miles:** Great. Thank you.

[46] **Russell George:** Do you mind, Jeremy? Can I just ask, Professor Williams, the recommendations in your report you just referred to, have they been accepted by the Government?

[47] **Professor Williams:** We hope there will be an announcement in the near future. They are going through the system at the moment. We're optimistic that there will be a positive announcement shortly.

[48] **Russell George:** Jeremy Miles.

[49] **Jeremy Miles:** It's fine, thanks.

[50] **Russell George:** Vikki Howells.

[51] **Vikki Howells:** Thank you, Chair. I'd like to focus on the importance of STEM in education, because in order to really plug this skills gap that we've got, we need to go right back, really, to primary school and secondary school to engage and stimulate our pupils, especially girls—I fully agree with you there. So, I was just wondering if you could outline for us the changes that you think might be needed at that lower level in order to try and progress things.

[52] **Professor Williams:** Okay. So, there are many challenges. I'm quite, actually, excited about the activity in this area. This is one area that I've seen quite a lot of change in in the last three years. I suppose the curriculum reform is at the core of that—the Donaldson review, which looked at themes coming through, and STEM was included in two of those themes. What's exciting about that is that it's not just the passive passing of information and knowledge, it's about experience, and that is a very crucial element. With STEM activities, it's the hands-on problem solving that is the most exciting element. I think that's where we want to bring children in, to enthuse and excite them and get them to think in a scientific and systematic way, and then understand that that is at the core of many areas of STEM and that that it actually is quite an exciting thing to have in your day-to-day job as well. So, we can get quite a lot—. That change is something I'm pleased about.

[53] I think, in terms of teacher development, we are aware, and this report shows, that we probably don't have the STEM skills within the teaching profession that ideally we would want. How do we go about addressing that? There are announcements to come that I can't talk about too much, but there's a lot of activity in this area now and a big focus on educating the teachers who are there, as well as the new ones, because that's the major body of people that's working to try and tell children about STEM and enthuse them. There are a number of activities going on there that are focusing on teachers' abilities and supporting their career development and,

I suppose, it's the pioneering idea around a new way of educating children around these themes.

[54] One of the problems I think we have suffered from in science is that we've gone very siloed, and, in some ways, the silos are not terribly exciting. Physics is a good example. I can remember giving a talk to some people involved in marketing, and they said, 'Well, can't you change the name?', because 'physics' actually does put people off? It doesn't sound terribly exciting. So, I think if you have themes—if you have a themed form of education, where you are looking at problems and you're bringing lots of activities to bear and, by the way, that's a bit of physics, it's a much better way of pulling children along and getting them interested in actually doing that. As in any sort of way, educating you about science is good for the population anyway because we are surrounded by new technologies, but it's also good for those who want to go on and use that as the core of their future career.

[55] **Vikki Howells:** Thank you. Just to come back to one of the issues that you talked about there, which is ongoing teacher training for people already in the workforce, the new digital competence framework has the potential to really put radical changes into our schools, but also radical demands on existing teachers. I know that there's going to be a body of lesson plans and resources built up around that, but do you think there's the potential there for extra training to sort of hold a teacher's hand through that process, really, and give them the confidence that they need to deliver these new demands in an exciting and inspirational way?

[56] **Professor Williams:** Well, it is my understanding that that is an important part of strategies going forward, and I think there will be more announcements. Leadership is another issue—you know, having people who have leadership in these areas so that they can bring people along. But it's about the practical issue—you know, how do you get from A to B? We have the workforce that we have now, and we need to support them in trying to address and deliver some of these new areas that they may not be so familiar with. That's why I'm happy that there is a good focus on training and supporting teachers in this area.

[57] **Vikki Howells:** Thank you very much.

[58] **Russell George:** We're visiting one of the Techniquest museums later on this afternoon. I'm just wondering, the funding for museums is changing

from April 2021—is that going to have an impact on engagement and engagement with young people? And if it will have an impact, how will it have an impact?

[59] **Professor Williams:** Well, I've spoken quite closely with both Techniquests, both north and south, and they have some very exciting ideas about how they can improve what they have there, and possibly get it to be more self-sustaining, which I think is the main issue. I think the plans have been amended and changed from their original plans, and the times extended and circumstances taken into account, because what's going on in the north and the south—there are very different barriers that they need to overcome to achieve and succeed. But there are some great ideas. I've been talking to them about things like soft-play centres—science soft play. That's very popular, bringing people in to things that they will enjoy, and then bring more people through these centres in the future. So, I think that that's just one of many ideas that are being considered. I'm very encouraged that there's more activity in gaining funding from other sources like the Wellcome Trust. I know that Techniquest in Cardiff have put in applications. They are an excellent resource, and I'd be surprised if they don't get funding in this area. I'm optimistic that they will succeed in achieving more a level of self-sustainability.

[60] **Russell George:** Jeremy Miles on EU funding and collaboration.

[61] **Jeremy Miles:** Obviously, on one level, scientific endeavour and innovation doesn't respect geographic boundaries but, equally, there are obviously push-and-pull factors about where scientists want to locate and work. You've talked about attracting people from MIT, Caltech and Australia—aren't we going to struggle to maintain that and build on that when we're outside the European Union?

[62] **Professor Williams:** Well, I suppose, the majority of people who we've attracted are actually outside the European Union now, so that's probably not going to change considerably. There are so many decisions to be made in that area, I can't foresee exactly how that's going to pan out. But science is an international activity. We need to be able to work together and barriers that would be put in to stop that or impede that would be bad for science. I can say that most definitely. But there are opportunities, possibly, to work with countries outside Europe more, and we're looking at that as well.

[63] **Jeremy Miles:** So, does membership of the EU pose barriers to doing

that at the moment?

[64] **Professor Williams:** No, it doesn't, but you would want there not to be barriers to collaboration per se. Most research doesn't respect any sort of boundary and, actually, many research areas benefit from joint activity. There are big problems we face; we need to be facing these together. So, from climate change to understanding diseases, or whatever, usually—usually—you succeed better when you work together. So, whatever happens in the future, we would want to reduce the barriers to collaboration, most definitely. Welsh scientists actually collaborate more than the UK average; we're a very collaborative nation. Many of our best publications are collaborative publications, so we certainly would want to support that.

[65] **Jeremy Miles:** So, access to some of the Horizon 2020, and presumably successor programmes—that isn't a particular pull factor, in your view, to talent from outside the EU?

[66] **Professor Williams:** You mean that people would come here to access the Horizon 2020 programmes? Where there is uncertainty, there may well be issues until it is clear what collaborative frameworks are likely to exist. I would be most surprised if we don't have some sort of collaborative framework of sorts with other scientists in Europe and further afield. If we don't have that, that would be an impediment to success in science and, possibly, if that is a scenario, then that might influence people coming into the UK, but, at the moment, we don't know.

[67] **Jeremy Miles:** Okay. And in terms of the funding that comes from the EU at the moment—obviously we look at developments, for example the Swansea University campus, which obviously is a very significant development that's very substantially dependent on European Union funding—are there any other infrastructure consequences that you can foresee, where the scientific infrastructure of Wales might not be developed as you like to see it develop because of our leaving the EU?

[68] **Professor Williams:** It's very difficult to say because none of us, I suppose, knows what the full ramifications of leaving the EU will be, so I don't really want to speculate on those at any length. All I can say is that, at the moment, the uncertainties, and the only uncertainties that may affect people coming in—we haven't seen any evidence of that with the fellowships as yet, but that may influence people's decisions about where they would take up their next professorial role, for example. However, we are, and I



wrote to Jo Johnson, and we have the statement from Philip Hammond saying that anything that is funded through these, through the Horizon 2020, or other European Union programmes will be funded to the length that they are funded for. So, that helped considerably in those sorts of decisions, but I suppose the one doubt we do have is actually bringing people into the country. And that's still a little uncertain.

11:45

[69] **Jeremy Miles:** Okay, thank you.

[70] **Russell George:** Hefin David.

[71] **Hefin David:** How well supported are taught postgraduate programmes in STEM subjects?

[72] **Professor Williams:** With the taught postgraduate programmes, the funding for them has gone through a chequered history, as far as I'm aware, because some have historical links with the Higher Education Funding Council for Wales and some don't; some were new. But, at the moment, I think they probably need to be predominantly self-funding and self-financing. The STEM-related Master's courses you're talking about here, yes?

[73] **Hefin David:** Yes.

[74] **Professor Williams:** It is my experience that, within the university setting, you would have to put a business plan together and show that you could attract enough individuals to make that course viable. So, those are the factors that tend to dictate the availability of those sorts of courses. I think, in Wales, strategically, it would be of benefit for us to have good postgraduate provision, because we could pull in people who might continue to follow their career, then, in Wales. So, it's an area you would like to see flourish. But I have no direct influence on the postgraduate courses that are offered. That's a university's decision, about what they would pursue.

[75] **Hefin David:** There's an opportunity to influence that through the Diamond review. Did you give evidence to the Diamond review?

[76] **Professor Williams:** Yes.

[77] **Hefin David:** What was the gist of your argument? I'm aware that there

was a consultation document regarding STEM postgraduate taught funding this year, which was an interim policy.

[78] **Professor Williams:** I didn't give evidence on that particular issue, to be frank, to the Diamond review. My evidence was based around where we were in terms of research capacity and the issue of STEM-related academics. So, to be honest, I didn't actually address that issue to Diamond, but I would support that provision, because I think it is really valuable—perhaps a little more valuable than undergraduate courses for bringing people in who may stay in Wales.

[79] **Hefin David:** The idea is that postgraduate courses would have the same support as undergraduate courses—

[80] **Professor Williams:** Oh, I see.

[81] **Hefin David:**—which would hopefully stimulate some demand for postgraduate STEM subjects.

[82] **Professor Williams:** Yes, I think that would be a good thing.

[83] **Hefin David:** It's a step forward on the consultation, the interim policy—it seems to be a step forward on that. So, going back to Vikki Howells's point about the school level, that needs to be seen right through to postgraduate level, if you're going to have—

[84] **Professor Williams:** So, you'd need to support it; yes, I agree. And sometimes, you could think strategically about incentivising postgraduate activity even more. I think, in the case of medicine, there are some proposals that are being discussed at the moment, because we want to bring the best clinical academics into Wales, around ways of doing that. So, there are specifics that may come out as well, but I can't talk about those at the moment.

[85] **Hefin David:** Okay, thank you.

[86] **Russell George:** Did the Diamond review consult with you sufficiently?

[87] **Professor Williams:** I gave evidence, but I didn't have any further consultation with the Diamond review following on from that. I think Ian Diamond has done a very good job.

[88] **Russell George:** And did they address your recommendations in the final review? I say your recommendations, but your advice to them.

[89] **Professor Williams:** One of the issues that I did bring out, which is sort of irrelevant now, is that we are 600 STEM researchers down, but that also reflects capacity in STEM. So, how do we actually make sure that we have enough STEM academics, and that also comes into teaching as well as research? And we do know that STEM academics are more expensive and that STEM graduate programmes are more expensive, and, indeed, more expensive than the £9,000 that are charged as fees for many of these. How do you balance that up? That hasn't been the basis of any recommendations from the Diamond review, but that was something that I felt may have influenced the fact that we were, in Wales, 600 STEM researchers/academics down, and something that we should address in future.

[90] **Russell George:** I'm grateful. Jeremy Miles. Sorry, did somebody indicate? On this point, is it, David?

[91] **David J. Rowlands:** Can I just briefly come back to women and girls getting involved in science et cetera? My daughter actually is a forensic scientist, and I have to say that, towards the end, it came as a complete surprise to me that that's where she was going when she went to university. But what worries me a little bit is that the teaching staff never brought that out to me in particular when they talked, and, as girls are, they don't talk particularly to their fathers about things like that. So, is there, across the education system, this assumption that women and girls won't be involved in science, and perhaps can we do something about that generally?

[92] **Professor Williams:** I think there probably is. I think there are biases that go through families and go through all sorts of relationships. I'm sure when a young girl might come home and say, 'Oh, yes, I'm going to be an engineer', they may not get the positive responses that you would hope for. But I feel that that is changing, and that only comes from a variety of influences— actually saying girls can do it, by seeing more girls succeeding in doing it, and better support possibly for teachers who have that relationship, a closer relationship with children, and can influence, to be aware that they need to be broader and more open to other ideas. I think things are changing, and that's becoming—. There's an event here today about girls and advocating for girls' rights, so I think, from a variety of directions, things are changing, but there are issues.

[93] **Russell George:** Mark Isherwood.

[94] **Mark Isherwood:** Some of my daughters did discuss their options with me as a father, but some didn't, so it's down to the individual, I think. Given your expressed concern, what do you believe are the implications for Wales of the current UK higher education and research Bill?

[95] **Professor Williams:** Okay. I think we need to have influence at that level. The body that has been created has a UK-wide perspective, but elements within it, the Higher Education Funding Council for England for example, seem to have a relationship with this body that needs to be clarified, and I have made representation to individuals and to groups and committees that are looking at what these will comprise that devolved nations need to be represented on this body, because this is a UK-wide activity. So, at this moment, I don't know what the outcome will be.

[96] **Mark Isherwood:** And what do you think the funding implications could be if we don't get it right?

[97] **Professor Williams:** Well, I think we don't want to be peripheral to big decisions about where large resources may go. We need to be part of those conversations. I think the research councils, and Innovate UK, will operate in a similar way to the way they are operating now—I haven't seen anything to say that they will be very different. There may be some changes in perhaps how they pull together and work together around some problems and priorities. So, as long as we are excellent in research, we should have a pretty good chance of securing funding, through those normal processes.

[98] But what we have to be very careful of is that, if they are working together—and they're working together to decide a bit more about infrastructure, for example—the devolved nations, including Wales, have input into those conversations. So, I do spend quite a bit of my time saying, 'And Wales is on that, and Wales is on that'. So, we do need to have that representation. And what we now know is that Wales deserves to be on that because of the quality of the science that we do here. So, there's every right that we should be represented on those bodies.

[99] **Mark Isherwood:** Thank you. What is your position on Professor Hazelkorn's recommendation for a tertiary education authority in Wales, representing both further and higher education?

[100] **Professor Williams:** Well, I mean, teaching is not really an area that I have prime responsibility for. I can see advantages in pulling those elements together. We have the teaching excellence framework to deal with, and that's going to occupy a lot of activity, to maintain and sustain teaching quality. So, having some sort of body that encapsulates that is important. What is done in Wales may be the same or may be different to what is going on in England. So, having an umbrella body may be of advantage. How that is put together, I wouldn't like to give an opinion on at this moment.

[101] **Mark Isherwood:** Do you have a view—and, if so, what—on whether this would be more effective than the role currently played by HEFCW?

[102] **Professor Williams:** I don't—this is teaching. If you're looking at research, I can talk about that, but teaching is not something that I would necessarily have a prime involvement in. So, I'm sure that others would have ideas about that. Coming back to research, and research and innovation, having something that pulls those two things together might be very useful.

[103] **Mark Isherwood:** As a sequel, in terms of funding and incentivising scientists of the future through FE and HE systems, from 16, or even increasingly, potentially, 14, based on the decisions this body might make, this would have implications for the researchers of the future.

[104] **Professor Williams:** Yes, I suppose. But I think that there are—to be frank, this body is going to be very focused on the teaching excellence framework, and how that is going to play out. So, you have to think about how broad you would make these bodies. I don't have a strong opinion either way, but, if I was focusing on research, I think there are arguments to pull research and innovation more closely together.

[105] **Mark Isherwood:** Okay. Thank you.

[106] **Russell George:** Jeremy Miles.

[107] **Jeremy Miles:** Just briefly on this 600 figure of the researchers by which we are under capacity, if you like, in Wales, what's the equivalent picture for the other constituent parts of the UK, if you happen to know?

[108] **Professor Williams:** Well, looking at the figures, Scotland is over capacity in terms of their population size. So, they have more researchers

than you would expect for their population. And the amount of money they bring in sort of associates with that—it's correlated. So, that's the most direct comparison that I've made there. So, I think we do need to get up to parity in Wales, and, if it's working, go even further, because we know that having a strong research base does fire up, you know, economic development, and I think it's important for Wales to be known for a number of things that we are good at, and we need to have our head above that parapet, showing excellence in a number of areas—not everything, but a number of areas—and that's something that I think we are strategically building towards.

12:00

[109] **Jeremy Miles:** What's the picture in England?

[110] **Professor Williams:** England, you know—

[111] **Jeremy Miles:** Not a close comparison, probably, but—.

[112] **Professor Williams:** No. It's a much, much bigger area. I don't know the exact figures in terms of the number of researchers, to be frank. I've sort of compared with more like Scotland, possibly Northern Ireland. So, I haven't got the figures for England that I can give you, I'm sorry.

[113] **Jeremy Miles:** Thank you.

[114] **Russell George:** Professor Williams, can I thank you for your time this morning? It's been really helpful to us as Members to help shape our thinking and our future work, but, if there are any areas that you feel we haven't asked you about this morning that you do want to tell us about, then I'd be grateful if you could send us a note to that effect. And, if you have got a short comment that you want to make before we finish, if you feel that we've missed something specifically, I'm grateful to receive that as well.

[115] **Professor Williams:** I just would like to bring your attention to this, which is coming out in the *Science* journal today, about growing science in Wales. So, it's an article about our ambitions to be known as a research-active nation. So, you may want to have a little look at that as well.

[116] **Russell George:** And if I could also say, if you do feel that you want to provide us with any advice or your views, then please don't feel that you have

to wait for an invite. As a committee, we very gratefully receive any input from you, but appreciate your time today.

[117] **Professor Williams:** Thank you very much. Thank you.

[118] **Russell George:** That does bring our meeting to a close. We're next meeting on 19 October, and we will be looking at the steel industry in Wales.

*Daeth y cyfarfod i ben am 12:02.*

*The meeting ended at 12:02.*