

Nuclear power: what is the future?

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Guest: Professor Martin Freer

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Intro VO: Welcome to the Ideas Lab Predictor Podcast from the University of Birmingham. In each edition we hear from an expert in a different field, who gives us insider information on key trends, upcoming events, and what they think the near future holds.

Lucy: Today we're with **Professor Martin Freer** (<http://www.birmingham.ac.uk/staff/profiles/physics/freer-martin.aspx>) who's Head of the Nuclear Physics Group at Birmingham University and he's also Director of the Birmingham Centre for Nuclear Education and Research. Welcome, Martin.

Martin: Thank you.

Lucy: That's a lot of titles!

Martin: Yes.

Lucy: So what exactly do you do?

Martin: My day job is I'm a nuclear physicist so a nuclear physicist's job is to try and understand the structure of the nucleus, so that is really my role as Head of the **Nuclear Physics Group** (<http://www.np.ph.bham.ac.uk/>). My other job is, as you said, Director of the **Birmingham Centre for Nuclear Education and Research** (<http://www.birmingham.ac.uk/research/activity/nuclear/index.aspx>), so this is a virtual centre which brings together many people from across the campus, from chemistry, bio-sciences, materials, engineering, all with common interests in nuclear science, to push forward both educational and research programmes.

Lucy: So we're here today to talk specifically about an event that's happening tomorrow at the **Liberal Democrat Party Conference** (<http://www.libdems.org.uk/siteFiles/resources/docs/conference/Aut11%20Dir%20web.pdf>) which is the kick-off of the Birmingham Policy Commission looking at the future of nuclear. So tell us about the event that's happening tomorrow and the importance of that.

Martin: The debate that we'll be holding at the Lib Dem conference tomorrow is designed to explore the ideas around nuclear power and the future of nuclear power in the UK. So we've had nuclear power in the UK going back all the way to the 1950s, nuclear power provides an essential part of our energy portfolio currently, but the current generation of nuclear power stations are on their way out. So we, as a policy commission, would like to explore what is the future of nuclear power in the UK. Is it building more of the same kinds of nuclear power stations? Is it a new kind of technology? What is the future?

Lucy: So the policy commission meets over a year to discuss these issues.

Martin: Yes.

Lucy: And so it's kind of the inaugural event tomorrow.

Martin: Exactly that. If you like it's the kick-off of the whole process. So as a commission we've already met to lay out the foundations, what are the areas that we are interested in, what are the key areas for the UK and the Lib Dem conference provides an interesting forum to explore those ideas.

Lucy: Because they're not historically particularly well disposed towards nuclear so you might have a bit of a rough ride tomorrow!

Martin: Exactly that. I think it's going to be a challenging event but I think it's good to see both sides of the argument. As a commission, largely we are drawn from people who have an interest in the future of nuclear power. The Dems historically have been against nuclear power although in Government that position has changed slightly, so I think it will be interesting to see those alternate sides to the arguments which should, of course, influence the thinking about which direction the UK takes.

Lucy: The event's being chaired by the Vice Chancellor of the University of Birmingham, **Professor David Eastwood** (<http://www.council.bham.ac.uk/membership/profiles/eastwood.shtml>).

Martin: Correct.

Lucy: You've also got some other distinguished guests. Tell us who else is going to be on the panel.

Martin: So the chair of the commission is **Lord Hunt of Kings Heath** (<http://www.parliament.uk/biographies/lords/26663>), so he previously was an Energy Minister so has a strong interest in the future of energy and indeed nuclear power in the UK. And finally we have a Lib Dem MP, **John Hemming** (<http://www.parliament.uk/biographies/john-hemming/31572>), who has an interest in energy as well.

*[After the podcast had been recorded, Dr Susan Juned was confirmed as a late addition to the panel. Dr Juned is Director of Greenwatt Technology, a 'solution-based' company that provides project and technical expertise, advice, and support to organisations that want to reduce reliance upon fossil fuels. She has a record of service and action as a Liberal Democrat Councillor and Parliamentary Candidate, with experience in rural strategy, energy efficiency and recycling schemes, and was named one of the **Top 50 'Green Leaders'** (<http://www.greenwatt.co.uk/news/DrSusanJunednamesasoneofthetopgreenleaders.htm>) in the West Midlands by Sustainability West Midlands.]*

Lucy: So the big issue is that we've got this energy gap we're approaching which is that we've got old power stations that are closing down, reaching the end of their lives and we haven't got anything to replace them with at the moment, which is why this issue has come to the fore right now.

Martin: That's right. So I think there's a couple of ways of thinking about the problem that the UK has and I would say the energy problem is worst in the UK compared to many of our international competitors. In the UK there's a couple of drivers. The first is the Kyoto Agreement which was back in the 1990s and the UK signed up to the Kyoto Agreement and that commits us by 2050 to cutting our greenhouse gas emissions by 80%. So most of the energy that we produce at the moment is through oil and gas powered stations. Those great producers of greenhouse gas emissions, so that's about 80%, so the question is how is it that you cut those greenhouse gas emissions by 80% from the base which is producing 80% of your electricity? So that's a real challenge. And the other challenge is that if we look at the UK as an island and look at our energy production, what you find is that to meet the current demand you need to produce 1 watt per metre squared for every metre squared of land, metre squared of land, in the UK.

Lucy: That's for everything, not just where people are living?

Martin: That's averaging it out, so that's taking the total power consumption over the UK and averaging it over the land mass. Now then you look at how do you do that? So you could take wind turbines and then you say 'well how much energy do they produce?'. They produce about 2 watts per metre square so that means that you'll have to cover almost the whole of the UK with wind turbines. So most people would be unhappy with that as a solution. So what do you do? Well you could use off-shore wind and you could use tidal barrages and all those things but people have their own objections to those, so people have looked at the problem, for example the committee on climate change and they said 'well actually, the only way that you can do this is to have nuclear power and not only nuclear power at the level that we have now but actually an increased amount'. So at the moment we've got about 16% of our energy production is by nuclear power. In the future they speculate that you would need

something like 40% to meet this drive to reduce greenhouse gas emissions and also the energy demand in the UK.

Lucy: So the focus of the commission is what's the UK's place in the future of nuclear power both to meet our own needs but also improving the technology around nuclear?

Martin: We're looking forward to the future so the UK I think, almost certainly, will roll out a new generation of nuclear power stations and these will be what's called 'Generation 3 Plus'. These are reactors which are off the shelf reactors with high levels of passive safety. So these are completely different reactors to the ones for example that went wrong in Japan in Fukushima. So a new generation of reactors will be rolled out over the next ten to fifteen years. The commission is interested at the slightly longer term. What will the nuclear technology be in the future? So one of the problems is that uranium which is burnt in nuclear power stations is a fixed resource and if you make an estimate of how much of that resource is left, you come to a number which is about 100 years. So after 100 years that could be the end of nuclear power unless you find a more efficient way of burning that uranium because the problem is at the moment we only use about less than 1% of the uranium reserve, so natural uranium comes in Uranium 238 and Uranium 235. Uranium 235 which is used in reactors is less than 1% of the total uranium so if you could now burn Uranium 238 you have essentially a hundred times more fuel, so future generation reactors are going to be looking at how you actually burn that additional Uranium 238, or other fuels like Thorium.

Lucy: So we can't get away from nuclear if we're going to meet our targets for reduction of greenhouse gases, so the question is how do we make it more efficient, how do we make it cheaper, safer, producing less waste, all the things that will make it more acceptable to the British public to have more nuclear here in the UK.

Martin: And I think that debate yet hasn't been had within the UK. People really don't realise what the energy crisis on the horizon is and they really need to understand things like safety – how safe is a nuclear reactor? What is the environmental impact? What is the carbon footprint associated with various technologies and how important really is it that we meet these Kyoto targets? I mean I think those really are the drivers.

Lucy: If you're listening and you're interested in learning more about some of these issues I recommend going back and listening to a couple of previous podcasts. Professor Richard Green (http://www.ideaslab.bham.ac.uk/MP3s/Professor_Richard_Green's_Podcast.mp3) deals with the energy crisis and Dr Jo Renshaw (http://www.ideaslab.bham.ac.uk/MP3s/Dr_Jo_Renshaw's_Podcast.mp3) covers a lot about cleaning up some of our existing nuclear sites and both are worth a listen. If you're lucky enough to be going along to the Lib Dem conference tomorrow, Martin, how can we find your event?

Martin: Well, we're on in the **ICC** (<http://www.theicc.co.uk/>) of course. The time is 6.15 to 7.30 and of course we would welcome as many people as possible to join in.

Lucy: And the commission then exists for a year?

Martin: That's right.

Lucy: And what happens at the end of the year?

Martin: At the end we produce a document which will be the recommendations of the commission. There will be a launch event probably down in London.

Lucy: With your findings and recommendations?

Martin: Exactly that, yes.

Lucy: Professor Martin Freer, thanks very much. Good luck tomorrow.

Martin: Pleasure. Thank you.

Outro VO: This podcast and others in the series are available on the Ideas Lab website: www.ideaslabuk.com (<http://www.ideaslab.bham.ac.uk/>). On the website, you can find out how to e-mail us with comments, questions or suggestions for future topics for the podcast. There's also information on the free support Ideas Lab has to offer to TV and radio producers, new media producers and journalists. The interviewer for the Ideas Lab Predictor Podcast was Lucy Vernal, and the producer was Andy Tootell.

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