



Renewable Energy in the UK

Zero Carbon Britain

Titles:

How can the UK achieve a high renewable, low carbon future and can we ever reach a Zero Carbon Britain?

Tobi Kellner, Centre for Alternative Technology:

The Zero Carbon Britain project is a research project at the centre for alternative technology that in some way or another has been going on for almost 40 years. Because even in the 1970s when most of the UK was, you know, just fascinated with, you know, a new boom in gas and oil, there were people actually looking at developing a new energy strategy for the United Kingdom. Overall, the aim of this Zero Carbon Britain is simply to create a scenario where the net greenhouse gas emissions are zero. A large focus is on energy, so there we're looking at what we call the 'power down', which is looking at how much can we reduce our energy consumption while still maintaining similar lifestyles to what we have today.

The other component is the 'power up', where we then look at, how can we produce the energy that we still need after savings through renewables. When we looked at the 'power down' in our scenario, you know, how much we can reduce energy consumption by, we first of all looked at where are we actually using energy today? You know, what are the things we do with energy in the UK? We identified that heating, just keeping warm in winter, is a big chunk of the picture, and another big chunk is transport.

So, a lot of focus on the 'power down' research, on reducing our energy consumption is simply on how can we improve our energy efficiency in those fields. So we're talking about, for example, insulation of the existing building stock. And the other part was looking at the transport sector, you know, how can we make sure that people still get from A to B but using a lot less energy where electrification of transport, and a bigger role of public transport. So these are the main components that allow us to overall bring down energy consumption by more than 50%.

And the other side then. We still need to produce the other half in the power up from renewables, from non-carbon emitting and sustainable energy sources, and there we looked at what other resources that UK has a lot of, and it's quite obvious that the UK has a huge potential for wind power. So, approximate numbers, the amount of wind power we would need would be around 140 gigawatt. So, you know, that's very large compared to what we have

today which is, I think two or three gigawatt at the moment. But at the same time, if we look at, you know, the area that we could potentially use for it, it's actually still only a small fraction of the total area that we have available for offshore wind.

So definitely the resource is there for it. If we look at solar PV, you know, solar photovoltaics, we started out by saying well how much roof area is there in the UK, you know, how much of that might be suitable? And we looked at what could we get out of covering 10% of the roof area in solar PV and we arrived at around 60 gigawatts of solar photovoltaic. So you could say one kilowatt per person in the UK very roughly.

One of the big pieces of, you know, criticism that, you know, we got for previous reports that we had done, was that 'yes, you're showing that in overall terms there is, you know, more than enough wind power and solar power to provide the energy for the UK, but what happens on the day when it's cold and dark and the wind isn't blowing, you know, how will we make sure that we stay warm and happy on days when the renewable energy is output is poor'. So what we did, is we took 10 years' worth of data of all sorts of types, hourly data.

So hour-for-hour we got data for the solar radiation coming down on various places in the UK; we got through a NASA computer and satellite model, data for hourly wind speeds for locations far out in the Atlantic and in the North Sea. So we were simulating hour-for-hour, based on solar radiation, wind speeds, temperatures, how the supply and the demand would meet. And one of the findings was that it is a challenging issue. Some people believe that if you spread wind turbines around enough you know, you always have a balance of supply - and we found no, that isn't true. You know, there are in fact times when even across the whole of the UK you have comparably low output for wind power at times of very high energy demands. So one of the technologies for example, that we looked at for backup and storing energy when there is a surplus of energy and then using that energy at times of ... when the demand outstrips the supply, is synthetic gas. So we were looking into how can we use surplus renewable energy to make methane gas, store it in existing gas fields that we have today, and then burn it in gas power stations on days when there isn't enough wind to keep us all warm. And our model shows that we can make that work out pretty all right with the technology that exists today. And the good thing is because this is synthetic gas made from carbon dioxide from the air and hydrogen and electricity, if we burn it, we're only putting as much carbon dioxide into the atmosphere as we took out in the first place, so it's not only renewable energy, but it's also completely carbon neutral.