



## Nuclear energy: What part of the solution to climate change

Jeremy Webb, Editor-in-Chief, *New Scientist*, United Kingdom

Welcome ladies and gentlemen to this discussion:

In the past decade, the debate over nuclear power has been given a new twist by our understanding of the importance of global warming.

In the 1960s, in the UK, the nuclear industry marketed itself by saying "we may be a little bit dirty, but the electricity we generate will be too cheap to meter".

Today that message has changed: "nuclear power may be a little bit more expensive but at least it's clean energy".

What's changed in the intervening decades -- apart from better marketing -- is that we have come to realise the scale of the danger posed by pumping carbon dioxide into the atmosphere, and of course nuclear emits only a tiny amount of the CO<sub>2</sub>, in contrast to fossil-fuel plants.

Attitudes to this fact differ. France, we know, is sold on nuclear. But not everyone is convinced that this is the best solution. Germany is shutting nuclear down in favour of renewable sources of energy. As for my country, the UK, we can't decide, so we flip-flop between renewables and nuclear and we will probably end up justifying both on the grounds that it is good for energy security.

So there is no consensus on whether or not nuclear is a panacea for global warming. But the debate is very lively and I'd like to just highlight a few of the themes raised so far.

First, timing. We know that the quicker we cut CO<sub>2</sub> emissions, the better our chances of lessening the impact of global warming and the less it will cost us economically in the long run.

But, if OECD countries start building nuclear plants today, they will not be completed for a decade. Will this be fast enough? Would it make sense to build more wind farms and subsidise home owners and businesses to install solar panels or solar thermal systems on their roofs? Would this bring down carbon dioxide emissions faster?

Then there's sustainability.

To begin with, nuclear power leaves a dangerous legacy. Nuclear engineers have for years tried to convince the public that disposing of highly radioactive waste is "just an engineering problem". But it is an engineering problem that has remained unsolved for 60 years. So even if nuclear power can lessen the impact of global warming, is it acceptable to saddle future generations with the handling and disposal of high-level waste, and the clean-up if anything were to go wrong?

The other aspect of sustainability is that we will eventually run out of uranium. So, is nuclear power merely a stop-gap until cheap supplies run out? This could, for example, give us time to develop wave and tidal power generators, and make solar cells and fuel cells more cost efficient. It might even give us time to get the hydrogen economy up and running...

Or, are we talking about resurrecting the idea of fast reactors, powered by the plutonium that comes from our Pressurised Water Reactors. This could extend the lifetime of nuclear power by perhaps centuries... but it would require large, long-term funding for research and development. Can we afford to develop both renewable and nuclear technologies at the same time?

Still more intriguing -- should nuclear power be part of the hydrogen economy? Raising the temperature in reactors could allow them to crack water and generate hydrogen.

These issues beg the question of whether nuclear power really is -- as the industry tells us -- a mature technology or whether it is a juvenile still deciding what it wants to be when it grows up.

Finally, there are the issues of cost and security. Is nuclear power an option for the whole world or just those countries that can afford it?

And what about nations that refuse to toe the international political line? Look at what is happening in Iran, today. And the bombing of the alleged nuclear reactor in Syria. Meanwhile, we have Israel, Pakistan and India acting outside of many international nuclear agreements. And then there's the threat of nuclear terrorism? The inherent link between civil and military uses of nuclear material may be of less importance today than it was before we realised the danger posed by global warming, but it is still a big problem.

Right, to discuss these issues, we have a distinguished panel. I will introduce them in turn and would ask them not to go over their allotted time.

I am also going to ask you all here in the audience to save up your questions until you've heard from everyone. This is best, I think, because we are going to hear a diverse range of answers to the questions posed by nuclear power and we will have a more rounded discussion once we have heard from everybody.

So let me introduce our first panellist...