

## **CIWEM Tyne & Humber Branch**

### **New Members Winter Debate on the topic of Renewable Energy**

#### **Rob Berry**

Introduced evening on behalf of the New Members Group by asking the question of what will heat our homes in 2020. Carbon emission targets are failing to be met, and this may have serious implications on the way we live our lives and society around us. RB reviewed the format of the evening's debate and prompted people to become environmental partners with CIWEM if they so desired. RB then introduced David Rathmell who was to chair the meeting.

#### **David Rathmell**

DR made reference to the topical nature of the debate, referring to the energy review / white paper that Mr Blair had just announced the previous day. He described his role as that of keeping the debate in order, which may be needed based on the interest and passionate discussion raised in the previous debate on the topic of locations for renewable energies in Yorkshire. DR then introduced Robin Green as someone who was bound to be provocative and controversial.

#### **Robin Green**

- The presentation is a personal opinion. The views expressed are his own and not those of CIWEM or his employer.
- Most renewables at present are actually reclamation from previous activities. The only true renewable energy is that of wind and hydroelectric. However wave and solar power are not real contenders at the moment. A problem with wind based energy generation is that the wind is uncontrollable. There are only a narrow band sites with suitable wind properties and these are distant from centres of use. Although wind energy generation works well in Denmark, this is primarily due to a stable grid with its neighbours to allow energy transfer when either the wind is producing too much energy or insufficient.
- As opposed to wind, hydro power is controllable as dams and turbines can quickly be used to produce power on demand.
- An ICE paper has been written on why wind will only be able to supply 10GWatts of energy in the UK as opposed to the government's targets of 26GWatts. This is a very good paper and contains some interesting arguments.
- Landfill gas is not a renewable source. It's ok to use it at the moment as it is better to capture it and utilise it than waste it, but it should not be considered a renewable.
- Biomass combustion to replace fossil fuel use in thermal power stations does not address the issue of CO2 emissions and is hence a non-starter.
- Since 1997 the government has had a policy of using natural gas for base load generation. However, we are at the end of the pipeline. The sources of gas are countries such as Libya, Russia and Iran and the political implications of sourcing the majority of your fuel from countries such as these must not be forgotten. In addition to this, there are emerging new markets such as India and China. These will cause additional demand. Natural gas still has an issue of CO2 emissions.

- Nuclear. Currently supplies 15% of our energy, but in France is used for more than 70%. In fact we buy nuclear generated power from France. In the short term nuclear may be our only option as no other government policy, however nuclear does have issues particularly in relation to carbon emissions. Most uranium ores yield between 0.5% and 2%. There are two mines in Canada that have yields of approximately 20%. Even these have associated environmental issues as they are situated in Permafrost and need mining by remote operation due to the heat created by the natural reactions. Issues with waste and the CO<sub>2</sub> emissions from mining and transport. Nuclear is not a sustainable energy generation source.
- Have we not learnt from Chernobyl and 3 Mile Island?
- Will the public be allowed the debate on nuclear energy?
- Nuclear has issues with planning and permitting. These will take over 10 years to achieve before new plants can be brought on-line. In this time 50% of our current base load generation capacity will have reached the end of its life.
- Energy from Waste – Used extensively in other places but not in the UK due to public perceptions. Permitting is therefore also an issue with this.
- Long term solution – Clean coal technology. The UK has large reserves of coal and its mining is becoming viable due to an increase in the cost of oil and gas. If it is burnt and the carbon captured in power stations it can be sequestered. Pumping liquid CO<sub>2</sub> into the North Sea oil fields will actually increase the yield from them.
- The focus on global warming has been lost in the debate over renewables.
- There is an issue of public perceptions. Renewable solutions need to be promoted.
- Solar and wind are the only technologies which will be applicable on a domestic scale. These have been used by individuals to actually generate power from their houses. Imagine seeing your electricity meter going backwards.

### **Questions**

**Paul Wheeler (EA)** – *You said that bio-fuels were not a solution to the CO<sub>2</sub> situation. Please can you confirm what you meant as these are not fossil fuels?*

**RG** – *No commercially viable plants based on biomass entirely. All use of biomass is as a partial replacement for coal.*

**Alan Taylor** – *It is used in some schools for heat sources, but not for electricity. There are cases of straw and wood chips being used.*

**Rob Davy (YW)** – *2 Questions. No mention of tidal stream energy. This is predictable and regular thus avoiding many of the problems with wind. Do you also have any comment on the proposal to have wind generation by wind auto-gyros on tethered balloons at altitude? These would be at approximately 15,000 feet and have a load factor of 90%.*

**Alan Taylor** – *I will be talking on tidal stream.*

**RG** – *I have not come across the auto-gyro proposal.*

**Oliver Halmer (Halcrow)** – *Why is it not feasible to have wind generating above 10Gwatts?*

**RG** – Wind is ephemeral. It is not controllable. When the wind speed exceeds that of the turbine, it is not able to be used at all and the turbine has to be feathered. There are issues of grid stability. We therefore can not rely on it.

**AT** – True about grid limits. When wind contributes more than approximately 20% of the load it starts to become difficult. It is not feasible to keep power stations constantly ticking over. However, it must be noted that demand / load is also highly variable at present during the day and between seasons.

**David Rathmell** – Why is there so much resistance to energy from waste?

**RG** – Too many people have been allowed to climb on their bandwagons. This results in public hysteria on others perceptions. This is fed by the media.

**Nick Reeves** – This is a very political subject. CIWEM must be prepared to stand up and speak out on it. CIWEM is about the science behind these issues, but we (as institutions) need to be able to step forward from the science and engage in the political arguments.

### **Dr Alan Taylor**

- Will be addressing the issue of marine renewables. This includes a picture of where development is currently at and the issues. It is a personal opinion.
- The 3 main technologies are wave, tidal and offshore wind.
- Wave
  - There is renewed interest in this energy source from public, politicians and technologists after a lapse of 25 years.
  - Maybe this is due to opposition to onshore to wind developments.
  - Many varied types of machines.
  - AT involved with the setting up of the ‘Wave Hub’ in Cornwall which will be a demonstration project / site for pre-commercial installations to allow testing and feasibility development.
  - A difficulty with this project has been considering the environmental statements that may be needed for projects which are yet to be developed. It is required to put in the infrastructure for the devices, whilst their form may not be known.
  - Many are floating devices. For these a mooring is needed. However, very little is known about the baseline marine environment. In the course of investigating what is actually there to determine impacts and mitigation strategies, new species and habitats have been discovered.
  - The devices are very diverse. Supported as a regional development initiative, widespread interest has resulted in 16 totally different concepts have been submitted, although it is still the very early days of these technologies.
  - The key challenge will be maintenance and long term reliability rather than getting them to work initially due to the particular environment and considerations.
- Tidal stream
  - This is different to ocean currents.
  - These vary around the coast so if intelligent development were to take place could provide an almost constant resource. There is vast potential energy.

- The Severn Barrage would be a mega project with significant costs. It would alter internationally designated environments and AT can never see it happening.
- Tidal stream is much different and is based on the idea of a propeller on the seabed. These can be incorporated in bridge supports or causeways. There are about half a dozen key concepts.
- There is an issue with marine mammal impact and the effect of noise and vibration of the ocean environment.
- The issue will still be maintenance feasible rather than simply getting the machines to work.
- The consent process can be hard. There are no formal procedures. It is a very onerous requirement to prove that there is no impact.
- Worried as some developers may not have a very sustainable view of the ecology of the areas of installation.
- It is considered likely that within 5 to 10 years these installations could be providing 1 – 20 MWatts.
- Offshore wind
  - Much less uncertainty than the other technologies. We know what these do and how they work. We understand the processes better.
  - Large scale compared to the other two technologies. There is an installation in the Thames which has 270 turbines.
  - Progress is being made towards an installed capacity of 1GWatt.
  - The cost is now in getting the power to shore. The cables can be very expensive. The wave hub required 28km of cable. Prices increasing due to world copper prices. Suppliers only holding quotes for 7 days which causes price estimation problems.
  - O&M is a bit easier but still needs thought regarding access. Ship navigation can be an issue.
- Future energy vision. This must be a mix. We can not depend on one fuel source. Renewable have a role to play along with energy demand reduction.

### **Questions**

**Richard Ramsden (Faber Maunsell)** – *As water is approximately 1000 times denser than air, does this mean that the generating capacity is also higher? Does this fact affect the size of installations?*

**AT** – *Yes. To generate approximately 1MW of power from a wind turbine would require approximately a 70m diameter rotor. To generate 1MW of power from a tidal turbine would require approximately a 10m diameter rotor.*

**Richard Ramsden (Faber Maunsell)** – *You raised a lot of problems with real schemes such as cable costs, and ecological and planning issues. ARE you overemphasising the difficulties?*

**AT** – *The cable costs are approximately £100 to £200 per meter, as they need to be large diameter cables. The costs for grid connections to new power stations are borne by the National Grid. This is not the case for offshore energy. The costs are more significant for the smaller schemes. Unsure why the government has not pushed for more energy from water over wind however there is increasing interest.*

**Richard Ramsden (Faber Maunsell)** – How long until we have commercially viable installations?

**AT** – At present there is very little funding. In the last 2 or 3 years the DTI has identified wind and tidal as being of potential importance and are therefore investing more funds in them. In regards to a timetable, the wave hub will be online in 2007. It will probably need to be 2 or 3 years of testing before going to banks etc. Therefore it will probably be approximately 10 years.

**NR** – A fear is that if the government gives support for 100% nuclear, then there will be no support for renewables.

**AT** – It's likely that the government's support of nuclear will be in terms of taking responsibility for liability.

**David Barber (Ex Yorkshire Water)** –

- Wind mapping. After the WW2, Britain was a world leader in wind mapping.
- Historically electricity has been kept as cheap as possible. This is the cause of our problems now.
- There are some interesting facts on the true costs of electricity generation and inefficiencies of nuclear power plants.
- Nuclear is useful for base load generation on a large scale.
- Localisation is important for local power and district heating.
- Will the decommissioning costs of nuclear be hidden in the current review?

**AT** – The government made historic decisions on the policy against municipal power companies and district power generation. The path followed in countries such as Germany has not been taken here. This makes it now very expensive to change to localised systems which favour renewables.

**Mark Bentley (JBA)** – If the Severn Barrage could supply 10 – 15% of our energy needs, it is surely something that should be pursued. Whilst it is true that there may be large impacts and issues, but are these any more than for a nuclear power station?

**AT** – This is a personal opinion, but he considers the government will find it easier to push through a nuclear power station. However the Severn Barrage could provide as much power as approximately 10 nuclear power stations.

**MB** – Surely it is a debate we should have though and we need to be realistic.

**Paul Winter (EA)** – Is the Marine Planning Bill proposal a good idea?

**AT** – Yes as it will stimulate research into the marine environment and facilitate the planning process.

**Nick Reeves**

- There is an issue of political will versus public perception.
- There is an issue of nuclear versus renewables.
- The opinions given in this presentation are NR's own, and not those of CIWEM. CIWEM are currently in the process of preparing a policy statement on nuclear power.
- Nuclear power is inherently dangerous and requires expensive security. There are fears associated with terrorism, and these feelings are acutely known in London. This scares him to death. He is therefore vehemently against nuclear power.
- Nuclear is also not a clean technology with it not being carbon neutral.

- Nuclear power stations do generate CO2 emissions in their fueling and decommissioning.
- There is only enough rich ore to support 1000 power stations. If low grade ore is used then there are large CO2 emissions.
- Nuclear is not commercially viable. This is widely known. Nuclear is
  - Uninsurable.
  - Has issues associated with the waste produced.
  - Confusing the public due to the different messages from the scientific community.
  - Expensive
  - Requires public subsidy and will continue to do so.
  - Risky as even in the most safety conscious system humans still make mistakes.
  - Inherently wrong irrespective of the science.
- Nick Reeves' 12 ways to save the world.
  - Legally binding CO2 reduction targets for government each year. All countries should be required to play a part.
  - Decentralise supply. Each town and village should have a combined heat and power plant.
  - All new buildings to be CO2 free. This could include boilers, solar, wind.
  - Energy efficient light bulbs should be compulsory. These use 25% of the electricity with no loss of performance.
  - Boost neglected renewables.
  - Funding to solar / wind / tidal resources etc.
  - Focus on offshore wind farms.
  - Radical energy efficiency including insulation and labelling. Things such as bottled water to be banned.
  - Tackle cars. There should be the imposition of a £1000 tax on SUVs and vehicles with a high consumption.
  - Stop cheap flights. Raise passenger duty.
  - President Bush – needs to be spoken to as the world's greatest polluter. The USA should be taking a lead.
  - Population – needs to be tackled. This is the cause of all environmental problems. The WWF has estimated that the world can not support a population greater than 3 billion sustainably.
- Why do we need another energy review? We only had one 3 years ago. Will it be a waste of time to justify a decision which has already been made?
- A London family spent £20,000 on renewable energy sources for their home by installing a turbine and solar panels. They are now net contributors to the grid.
- Our choices now will dictate the future. We are facing social and environmental chaos, and are at a crossroads.
- Nuclear and or renewables will need the effort of a war type economy, but this need not be painful.

### *Questions / discussion*

**Rob Davy (Yorkshire Water)** – Also read the ICE journal on renewables. However there is no hint of a lead. As an institution we need to take this lead. He has seen a

*change in CO2 concentrations from 350 to 380ppm in his lifetime. He did not believe this was true at first, but now does.*

*AT – I am a member of the Energy Institute, which is also failing to take a lead. It makes him worry.*

**Peter Wilson** – *We never have an effective national plan. The country is a business and should make decisions on a rational basis. There is no understanding of the real underlying issues or what the problem is.*

- *We are running out of generating capacity.*
- *With regard to CO2 emissions, what difference can the UK really make as we are so small in comparison to other countries. The only way we can make a difference is to take a political lead.*
- *50 million of CO2 are emitted from transport in England. This is a big issue as it is a similar number from those emitted from all power stations. Tackling transport may be the cheapest and quickest way to reduce CO2 emissions but there is no proper plan or understanding.*
- **WE HAVE TO HAVE A PLAN**

**RG** – *I agree. But it is not a vote winner. It comes down to an issue of personal choice. We need to put our head over our hearts.*

**Statement from the floor** – *Energy analysis allows rational decision making. Everything can be equated as energy consumption. This should be developed.*

**Niall Bourke (Arup)** – *India and China will be the big emitters of the future and are rapidly developing. Also cynical over the scale of CO2 emissions that the UK can achieve, but we can lead in terms of technologies. It's not our size but our technologies and abilities that can make a difference.*

**RG** – *We also need to show leadership as many other countries will follow. We need to shame the US into following us.*

**DR** – *What is the role of our Institution in the Energy Review?*

**RG** – *There will be a call for consultation to which CIWEM will respond.*

**NR** – *CIWEM will also be proactively approaching government and advising. However, it may be that David King has already written the energy paper and the consultation exercise is merely a token gesture.*

**Stuart** – *How successful are energy from waste products? Looking to the future, do the panel have any idea about the rate of growth in this field?*

**RG** – *We should use waste. We have good technologies. We have clean technologies. These are extensively used across Europe. The problem is that there is not the political support for it.*

**AT** – *There is an argument that these technologies would deter recycling. However it has been found that the regions with the highest recycling rate are those which make use of energy from waste schemes.*

**DR** – *Provided information from local waste incineration schemes in Sheffield and Grimsby.*

**RG** – *There is an opinion that local scale waste management and disposal may help to overcome political opposition as it is your own waste rather than others that is being disposed of. It's a case of instilling a responsibility for the waste produced by yourselves.*

RB – Vote of thanks to all three speakers. It seems as though there are two main themes. These are what the government does in terms of leadership and support for the future energy markets and the second is what we do as individuals and professions.

To thank the speakers, each was presented with a certificate for a tree which has been planted in a local wood on their behalf.