

Roy Sumerling
With reference to the Government's Energy Review, 2001
Views of an independent scientist.

As a retired UKAEA employee who has lived near Sellafield for 45 years, I have taken an active interest in energy supplies and the effects on the environment. Nuclear power has generated electricity safely and economically during this time. I believe it is the only technology at present available which will allow Britain to meet its obligations to reduce its emissions of carbon dioxide.

As a minimum requirement it will be necessary to replace some of our older nuclear power plants with modern reactors. In particular, Calder Hall is due to close in 2006; some 50 years after being opened. We should be proud of the achievement. But it could be an opportunity to replace it with one or more of the latest reactor designs, with passive safety features. This would provide much needed jobs locally and also provide the opportunity for export of the technology and hardware to overseas customers. Early action is required to achieve this aim.

Continuity of electrical supply is essential in our modern world. The types of renewable energy which are most useful to us are those which can be programmed to meet demand, such as hydropower and tidal power. Professor Ian Fells, a leading energy expert, has said: "a Severn Barrage would go half-way to meet our requirements for reducing CO₂ emissions, wind and wave can offer a little, but nuclear can do it all".{ref. 1}. Policies which favour energy conservation, including home insulation and more efficient electrical appliances are also important.

In contrast wind-generated power, and wave power which also depends on the wind, are less useful in supplying the national grid with electricity. There are four reasons for this:

1. Wind farms have a low average output, which is about 20% of the rated-turbine outputs. This is according to European experience of land-based machines. It is claimed that off-shore wind turbines would do better, but the extra costs and difficulties in building and maintaining them in a marine environment could outweigh the benefits.
2. Wind power is highly variable, since the power generated depends on the cube of the wind speed: for example, if the maximum power is attained at an optimum wind speed of 30 mph, when the wind speed drops to 10mph, the power falls to less than 5% of the rated turbine output. {ref 2}. At wind speeds above the optimum value, the efficiency of the turbine blades has to be reduced so that the rated value of the turbine is not exceeded.
3. In order to accommodate the variable wind energy, coal or gas-fired plants have to be

power-cycled or operated intermittently, to make up the difference between supply and demand. Operating power plants in this way uses more fuel and incurs higher maintenance costs than steady operation, offsetting some of the value of the wind energy {refs 3,4}. This can be compared with the fuel efficiency of a car, which behaves better with steady driving than on short runs.

4. Electricity supplied to meet demand commands a higher price than that which is produced when there is surplus power available. Since the amount of wind energy available is largely unpredictable from day to day, the proposed building of many more wind farms will not reduce the need for even one existing power station. But the cost of building this extra wind-generating capacity will have to be borne by the electricity consumer or taxpayer. Admittedly wind power will save some CO₂ emissions but there are better ways to achieve this at less cost to our environment.

Nuclear power in Britain has operated safely and cleanly for over 40 years, a creditable record. It now produces about 25% of our electricity, saving the emission of 62 million tonnes of CO₂ emissions each year. France does better with 75% nuclear - and they have no need for vast wind farms in their countryside. Also, we at present import up to 2000MW of nuclear electricity from France via a cross channel cable - this was originally designed to be a two-way link to even out peak demands.

It may be argued that there should be no more nuclear build, until a safe and permanent solution to the radioactive waste has been agreed upon. This is a delaying tactic which is not tenable. In my experience, "green" activists have been negative to the progress already made in solving the technical problems of safely treating such wastes, and so making them suitable for eventual deep underground disposal.

There is a satisfactory solution to the management of radioactive waste already in place, which has operated at Sellafield for some years: the low level waste is compacted, contained and stored in engineered vaults at the nearby Drigg site. The intermediate and high level waste is treated separately and then moved to shielded, retrievable storage in buildings above ground.

This is an option that Greenpeace and FOE have always advocated, so presumably they will have no objection to it during the years required to build a deep repository, allowing more permanent storage. In this context, the small extra waste which would be generated by a modest nuclear build is of little significance. Disposal of toxic waste from industry is a more serious problem.

A few % of renewable energy can be usefully generated by the wind without too much difficulty, but its value needs to be properly assessed, taking into account all subsidies and related costs. Performance figures for windfarms now operating would be helpful. Vague statements which appear in the media about hundreds of homes being supplied by windfarm developments are not sufficient, since the amounts to be supplied are seldom quoted. It is doubtful that plans to provide much more energy from this wind are the best option, when there are more sensible alternatives which can meet our needs.

References

1. Professor Ian Fells, quoted in Power Engineering International, p40, February 2000
2. Mr J R Ratley {formerly a senior engineer at Bristol Aircraft Co} "Notes on Power generated by wind turbines".
3. Mr Fred Starr, "Following the load-an unsuitable job for a power plant?" p13, Materials World, April 2001
4. Mr Niick Jenkins, "Energy-the changing climate", p122/3, Power Engineering Journal, June 2001

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