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Fuelling fears

Nov 30th 2009
From Economist.com

A uranium shortage could derail plans to go nuclear to cut carbon emissions

THERE is an awesome amount of energy tied up in an atom of uranium. Because of that, projections of the price of nuclear power tend to focus on the cost of building the plant rather than that of fuelling it. But proponents of nuclear energy—who argue, correctly, that such plants emit little carbon dioxide—would do well to remember that, like coal and oil, uranium is a finite resource.

Some 60% of the 66,500 tonnes of uranium needed to fuel the world's existing nuclear power plants is dug fresh from the ground each year. The remaining 40% comes from so-called secondary sources, in the form of recycled fuel or redundant nuclear warheads. The International Atomic Energy Agency, which is a United Nations body, and the Nuclear Energy Agency, which was formed by the rich countries that are members of the Organisation for Economic Co-operation and Development, both reckon that, at present rates, these secondary sources will be exhausted within the next decade or so.

Once every two years the two agencies publish what is considered the best estimate of global uranium stocks, "Uranium: Resources, Production and Demand", colloquially known as the Red Book. It estimates that there is enough unmined uranium to supply today's nuclear power stations for at least 85 years for less than $130 per kilogram. But Michael Dittmar, a researcher at the Swiss Federal Institute of Technology in Zurich, thinks they are mistaken. He has studied the uranium supply and argues, in a recent series of papers, that shortages will drive the nuclear renaissance to an untimely end.

Dr Dittmar has unpicked the most recent Red Book numbers on primary production and asserts that they are founded on an alarmingly weak basis. The Red Book is compiled from questionnaires, each of which is handled differently in the countries to which it is sent. The forms might be completed by any number of different government agencies, with added input from mining companies. All, of course, will have their own agenda about the matter. He concludes, "The accuracy of the presented data is certainly not assured." Dr Dittmar goes on to speculate about the accuracy of a great many figures, both of the amount of uranium that is known to exist, and estimates of how much more might be available. He predicts that shortages of uranium could begin as early as 2013.

For its part, the World Nuclear Association, a nuclear-industry body, argues that if uranium becomes more expensive, mining companies will devise cleverer ways of extracting it—from rock, other elements or even from seawater. Its estimates put the demand in 2030 at anywhere between 42,000 and 140,000 tonnes.

Although your correspondent suspects that Dr Dittmar is probably being overly pessimistic, he is inclined to agree with him that the Red Book's precise assessments of what will be economically sensible over 85 years are far from accurate. But there are two other factors that could come into play. One is that there may eventually be enough economic incentive for the countries with weapons stockpiles of uranium to release much of it for warmth and peace.

The other is that the International Energy Agency thinks that nuclear power could more easily weather a storm in fuel markets. A 50% increase in the price of uranium would, the agency predicts, cause only a 3% rise in the cost of the electricity it generates, compared with 20% for coal and 38% for gas.

Either way, none of the figures take into account nuclear "new-build". Where there is an economic incentive to extract more of a resource, industry has a long history of developing technology to do it. Just do not bet on electricity from nuclear power ever becoming too cheap to meter.