

# Nuclear power: friend or foe?



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# Introduction

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The debate for and against nuclear energy has been continuing and vigorous. It is a subject that people tend to have a view about, for nuclear energy is not simply an issue about rational choice of an energy option; it also arouses ethical choices based on opposing values. The debate has ebbed and flowed over the years, influenced by the prevailing discourses. During the early years, the era of the discourse of trust in technology, nuclear energy was regarded favourably and opposing views were largely absent. Later on, as fears about the risks from nuclear energy grew so too did opposition, contributing to a more defensive position by pro-nuclear interests. For a while it appeared that an uneasy consensus was emerging on the issue of radioactive waste management, but positions on the issue of nuclear energy remained entrenched. With the so-called 'nuclear renaissance' gathering momentum in recent years, nuclear advocates, backed by governments, have gained in confidence while opponents have resorted, once again, to mobilising against further expansion of nuclear energy.

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# Learning Outcomes

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After studying this course, you should be able to:

- understand the technical and political constraints on the development of alternative energy strategies
- reflect on the contemporary discourse of nuclear energy
- assess your own position in these debates.

# 1 The task

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Although the context constantly changes, the arguments on both sides tend to remain consistent though the emphasis on particular aspects varies. The rise or decline of nuclear energy depends, it would seem, not so much on which side wins the argument but, rather, on shifting power relationships. While power is partly shaped by discourse, it is also backed by resources. It is the ability of both sides to mobilise resources (in terms of finance, technology, political and public opinion) that determines outcomes. Nonetheless, discourse matters, too, since it both reflects and inspires the changing relationships of power.

For this online exercise you will immerse yourself in the nuclear debate by tackling both sides in the argument. Try to put yourself, first, in the position of an advocate for nuclear energy, and then adopt the position of an opponent. Which of the arguments in favour of nuclear energy seem most persuasive to you? And which are the most convincing of the arguments against? How would you characterise the contemporary discourse on nuclear energy?

## An initial question

I suspect you already have your own views on the nuclear issue; you may even feel quite strongly one way or the other. So, before we begin, you should write down whether you are in favour of or against the further development of nuclear energy and why. If you do not have a view you should identify the issues that you consider important in coming to a judgement on the matter. Keep your notes, since you will need to refer to them later in the course.

## The debate in question

Your task for this course will be to research and develop your arguments for and against nuclear energy. You should spend approximately one hour searching online, and approximately one hour compiling your arguments.

Your argument should take the form of a debate on the pros and cons of nuclear energy. You should tackle this at a generic level, not in terms of specific sites or proposals. I will come back to the issue of specific proposals at the end of the course. For the present, the idea is for you to search out the general arguments, set them down and reach a considered judgement based on your understanding and interpretation of the issues. You are setting out to answer the question: do we need nuclear energy?

You may want to construct your arguments under different headings. The following are suggested:

- safety
- security
- economics
- environment
- radioactive waste management

- public acceptability.

Each of these is actively contested so you should be able to find 'for' and 'against' arguments under each heading. In developing the debate you may wish to focus on one aspect that you consider to be the most important. Alternatively, you may want to construct a debate by referring to a range of relevant aspects.



## 2 Resources

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There is an abundance of online material that is relevant to the topic. There are government documents, reports from various bodies, statements from the nuclear industry and from environmental groups, media reports, and so on. Aspects of the debate are reported almost daily. So your problem is to try not to be overwhelmed by the sheer volume of possible online sources. As a way in, I suggest that you might want to look at two sources, each focusing on one side of the argument. They are:

### In favour of nuclear energy

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[Meeting the Energy Challenge: A White Paper on Nuclear Power, CM 7296, January 2008](#)

Please note this is the Department of Business Enterprise and Regulatory Reform (BERR) website. Responsibility for nuclear energy has been transferred to a new Department of Energy and Climate Change (DECC; <http://www.decc.gov.uk/>). It is probably easiest simply to search the internet for 'a white paper on nuclear energy'.

The white paper is the basis for the UK government's view that 'it is in the public interest that nuclear power stations should have a role to play in this country's energy mix'.

### In opposition to nuclear energy

- ['Is nuclear the answer?', Sustainable Development Commission, 2006](#)

- 

['The role of nuclear power in a low-carbon economy', Sustainable Development Commission, 2006](#)

A series of eight evidence-based papers on aspects of nuclear energy and a commentary paper. The whole set of papers can be found by searching for 'Is nuclear the answer?' and referring to the Sustainable Development Commission.

Both sources are very long and detailed and you are not expected to read through them in great detail. You might find it useful to scan them and to look at the summaries and overviews. While each presents a particular side of the argument, they do so in a context of deliberating over the issues. They are, therefore, useful models of how to present a case based on an interpretation of the evidence.

You need not rely on these sources, or even use them at all. It is quite easy to find relevant material using such keywords as 'For nuclear energy', 'Against nuclear energy', and so on. And you may like to search some online journals and e-books. The discussion below provides another way of getting into the debate.

There is obviously the potential for far more than an hour's work here, and you may want to get into the subject more deeply. At this point you may also wish to pause and use the Comments section below to discuss your ideas with other students. But to do this exercise within the time suggested you will just need to grasp the key points. The important thing is that you think about the questions and about your reaction to them.

## 3 Discussion

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To help you focus on the debate, here is a summary of some of the arguments. Remember that your task is to put the case for and against based on your perspective and interpretation of the evidence.

### 3.1 Arguments for nuclear energy

#### Safety

The safety argument focuses mainly on the risks to human health. It essentially transforms a previous perceived weakness into a present strength. The evidence of enhanced leukaemias and genetic effects near nuclear sites is inconclusive; association does not indicate causation. In any case there has been a progressive reduction in emission levels of radioactivity, and the risks to the health of workers and the general population are well within regulatory limits, which are themselves extremely conservative. Nuclear energy's safety record, with few accidents and stringent procedures, is contrasted with dangerous technologies such as coal (mining accidents), oil (drilling platform disasters) and gas. As Kidd argues, 'Thousands of deaths in coal mining each year, explosions at gas terminals and devastating floods when hydro dams are breached receive a fraction of the publicity accorded to even minor nuclear incidents' (Kidd, 2007a, p. 77).

#### Security

There are three aspects to this. First is security of supply. Unlike renewables, nuclear energy offers continuous baseload supply. Second, nuclear is substantially an indigenous source of supply with an established infrastructure (although dependent on imports of uranium, which can be stored), and not, like oil or gas, potentially exposed to possible disruption of supplies (whether deliberate, accidental or commercial). Third, to ensure security of nuclear materials, nuclear sites are well protected and comply with international regimes of safeguards to prevent proliferation.

#### Economics

The economic arguments have seemingly shifted more in favour of nuclear. Whereas in 2003 nuclear was considered 'likely to remain more expensive than fossil-fuelled generation, especially in a liberalised market' (Cabinet Office, 2002, p. 103), by the time of the 2007 white paper it was argued that nuclear power 'would yield economic benefits to the UK in terms of reduced carbon emissions and security of supply benefits' (DTI, 2007, p. 191). In other words, it could be competitive within a liberalised market with carbon trading where environment and security were taken into account in the price of carbon. Although it would be up to the private sector to provide the investment and meet the liabilities of decommissioning and waste disposal, the regulatory and planning requirements would be reduced. In any case, scale economies using new, more efficient

reactor systems are bringing down the costs of construction, financing, operating and liabilities to the point where nuclear can 'offer electricity at predictable low and stable costs for up to sixty years of operation' (World Nuclear Association, undated, p. 21). Given that nuclear has low operating costs (fuel accounts for only about five per cent of total costs) economies in capital investment could make a big difference to its competitiveness. Uranium reserves are reasonably assured and only in the event of a major expansion of nuclear energy worldwide is there likely to be pressure on supplies.

## Environment

Climate change has become a core argument in favour of nuclear energy. A replacement nuclear programme would provide a low-carbon electricity output capable of operating at high load factors and providing a continuous supply. Comparing emission levels over the whole life cycle of alternative sources, it has been estimated that nuclear emits between 7 and 22g/kWh, similar to wind energy in contrast to 380 for gas and 830 for coal-fired plant (DTI, 2007). It is nuclear energy's potential contribution to lowering carbon output that is decisive in shifting support in favour of nuclear. 'It may be premature to say that the intellectual battle in favour of nuclear power has been won, but it is increasingly looking that way' (Kidd, 2007b, p. 20-3). Nuclear energy also avoids other forms of pollution associated with gas or oil. It may be portrayed as a clean and green form of electricity supply. Environmental impacts are regulated by applying international radiological principles (International Commission on Radiological Protection, ICRP) to discharge limits to air and land and through international agreements to limit marine discharges (Paris Convention) and the banning of dumping at sea (London Dumping Convention).

## Radioactive waste

One of the main problems with nuclear energy is the long-lasting legacy of radioactive waste. Supporters of nuclear energy have become increasingly confident that deep geological disposal of the most dangerous wastes provides a solution that is technically and scientifically robust, and which can achieve public acceptability. Consequently, that most intractable of nuclear energy's problems is solved, thus removing a barrier to further expansion.

## Public acceptability

Nuclear energy has enjoyed increasingly favourable public opinion surveys. Nuclear energy provides investment and jobs and the basis for economic security in communities that host nuclear plants. Among the population as a whole, low-carbon electricity from nuclear energy is seen as far preferable to the high carbon emissions from coal, oil and gas. And nuclear is seen as necessary to plug the 'energy gap' and prevent the lights going out.

## 3.2 Arguments against nuclear energy

### Safety

With regard to safety, there is some suggestive evidence of leukaemia clusters and genetic defects associated with nuclear facilities. Despite the low levels of emissions, uncertainties about the impacts on health of radiation exposure from routine and accidental discharges make it preferable to avoid nuclear energy in favour of less problematic options. The precautionary principle should apply. There is also an abiding concern about the possibility of low-probability/high-consequence accidents such as Chernobyl, which could have widespread and devastating impacts on human health and environments.

### Security

For cost and technical reasons nuclear plants must run continuously to supply baseload electricity. The more the baseload is provided by nuclear the less room there will be for renewables offering baseload low-cost electricity. In respect of energy security, nuclear relies on foreign sources of uranium, which could become scarcer or of lower grade if worldwide demand increases rapidly in response to a nuclear renaissance. Just as some gas comes from potentially politically unstable countries, so the UK 'may become equally dependent on uranium imports from similar foreign sources' (House of Commons, 2006, p. 36). Then there are the risks of proliferation and terrorist attack. The destructive potential of nuclear power is sometimes presented in dramatic language: for example, Ulrich Beck (1992) pronounces that 'the effect only exists when it occurs, and when it occurs, it no longer exists, because nothing exists any more' (p. 38). It is argued that nuclear plants are particularly attractive targets and therefore vulnerable to terrorist attacks, which, if successful, could precipitate uncontrollable and widespread devastation. For reasons of security nuclear plants are closely guarded and fenced off, with limited access. In some countries they have been the scenes of clashes, sometimes violent, between police and protesters.

### Economics

Nuclear energy has high capital costs relative to other options (around three times those of fossil-fuel plants) and, together with long lead times (about ten years) and long operating periods (now up to sixty years), this represents a considerable investment risk to private capital. Critics point to a tendency for 'appraisal optimism' to underestimate costs and, in the absence of guaranteed prices, to the problem of achieving a sufficiently high rate of return over a very long period in a liberalised market, albeit within a context of carbon pricing. Cost overruns and failure to meet deadlines have been the norm for the industry so far. There is also the possibility that the cost of uranium could increase in the longer term as supplies diminish and lower grades are used. Costs of decommissioning and waste management are difficult to calculate over such long periods and it is almost inevitable that subsidy will be needed in one form or another.

## Environment

While nuclear energy is certainly low-carbon, it is not carbon-free. The nuclear cycle involves mining, milling, fuel enrichment and fabrication, all of which require energy, at present coming mainly from high-carbon sources. Energy is also consumed in the construction of nuclear plants and in the rear-end activities of the nuclear cycle: reprocessing, decommissioning and waste management. Nuclear energy's critics argue that, overall, the contribution of new nuclear plants to carbon reduction is likely to be modest and can be met by other means, notably renewables and energy efficiency. Nuclear energy has an impact on the environment in other ways too. Uranium mining and the associated tailing ponds scar and contaminate landscapes and there are concerns about possible impacts on marine ecosystems arising from discharges into coastal waters.

## Radioactive waste

The problem of radioactive waste has been a major source of opposition to nuclear energy. Long-term storage presents a risk to present and future generations and there is the possibility that containment systems in a deep repository will not prevent the release of radionuclides into the environment in the distant future. While it is recognised that the problem of legacy wastes (those arising from past and current activities) must be managed, additional wastes from a new building programme would exacerbate the problem. Since there is, as yet, no acceptable long-term solution to the management of high-level wastes, there should be no new nuclear programme.

## Public acceptability

While public opinion varies on the question of nuclear energy, polls consistently report overwhelming concern about radioactive waste. Nuclear investment diverts attention and resources from renewables and energy efficiency, which can contribute far more to carbon reduction. New nuclear stations will not be ready in time to plug the energy gap but will lock us in to an inflexible form of power supply for sixty years or more. Nuclear power stations and waste management facilities create fear, anxiety and blight among the communities in which they are sited. Nuclear activities are imposed on vulnerable communities who bear the risks on behalf of society as a whole. Moreover, the legacy of nuclear activities passes a burden on to the future, extending down the generations.

## 4 Reflections on the debate

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Having looked at the range of arguments and weighed the evidence, you should now be able to reach your own conclusion on the question: Do we need nuclear energy?

Is your answer any different from the answer you gave to the initial question, of whether you were in favour of or against nuclear energy? If it is different, what made you change your view? If your position on the question remains unaltered, why is this?

You have been looking at the question in general terms. What about if a new nuclear power station were proposed on a site near where you live? Would it make any difference to your general judgement?

## 5 Conclusion

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Coming back to the general question of 'Do we need nuclear energy?', how far has looking at the evidence helped to reinforce your views, helped to change them or helped you to make up your mind on the issue? Considering these questions will enable you to consider the interplay of evidence and values, and the way that your intuitive feelings about an issue meld with reasoned argument. These considerations lead us on to questions that go beyond 'Do we need nuclear energy?' to the issue of 'Should we develop nuclear energy?' This raises ethical issues and you should find that your participation in the nuclear debate in this exercise will have helped to prepare you for a broader reflection on the ethical issues surrounding nuclear energy.

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