Public attitudes to nuclear energy

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The last decade has seen a marked increase in public concern about nuclear energy. As a consequence, it is now recognized that the future of nuclear energy will not only depend on technical and economic factors, but that public acceptability of this technology will play a crucial role in its long-term future. This paper summarizes trends in public reactions to nuclear power in various countries and discusses a number of studies on public beliefs and attitudes to nuclear power in general, and to the building of a nuclear power plant near to one's home. It is concluded that the qualitative aspects of the possible risks of nuclear energy play an important role in the public's perception of this technology. It is also clear, however, that differences in perception of the risks do not embrace all the relevant aspects of the public's assessment of nuclear energy. Public reaction is also related to more general beliefs and values, such as emphasis on economic versus social priorities, attitudes to technology and environmental concern.

Keywords: Nuclear power; Public attitudes; Risk perception

Before the mid–1970s, survey data showed consistently high levels of support for nuclear power. The place of nuclear energy as a source of electrical power seemed assured both in the USA and Western Europe. However, since the mid–1970s support has gradually been eroded. Media interest has increased and the polls show a consistently high level of public concern over radioactive waste and potentially catastrophic accidents.

The accident at Three Mile Island has further accelerated public opposition to nuclear power. Immediately following this accident, support in the USA decreased, uncertainty about taking a stand on nuclear power decreased, and opposition towards nuclear power increased. Although there has been some rebound towards pre-Three Mile Island levels of support, the return has not been complete. Recent figures show that the percentage of the USA public who support the continued building of nuclear power plants is, on average, 5–10% more than those who oppose such construction. However, a majority of the US public believes that further accidents are likely to happen,[1] and a large majority (about 80%) of the public now says that it is concerned about nuclear waste management issues.[2]

The above trends are also apparent in Europe and the UK. Recent referenda in Switzerland, Sweden and Austria were all decided by a very narrow margin and public opinion in the Netherlands has shown an 'anti nuclear' majority since the late 1970s. Opinion poll data for the UK show a slow but steady increase in public opposition to nuclear energy since the mid–1970s. Whereas in 1980 there was hardly any difference between the number of opponents and supporters of nuclear energy, a National Opinion Poll survey conducted in October 1981 showed that 33% of the public was in favour of expanding the number of nuclear power stations in the UK, while 53% were opposed.

LOCAL ATTITUDES TO NUCLEAR POWER STATIONS

Results of public opinion surveys in both the USA and Europe show that people are less willing to approve construction of a new reactor close to their community than they are to approve the construction of these energy facilities in general. Support for local nuclear power plants has been in decline since the mid–1970s and in the USA support decreased

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from 47% in 1977 to 28% in 1980.[3] Our own surveys of three small communities in the South West of England which were confronted with the possibility of a nuclear power station in their locality also showed a considerable majority opposing the plans (75%).[4]

A number of surveys have either compared level of acceptance of a nuclear power plant amongst people who live near one with that of people who do not, or they have monitored the local climate of opinion in a locality where the possibility of a nuclear power plant being constructed gradually becomes a reality. Overall, there is mixed support for the idea that familiarity leads to greater acceptance of a nuclear power plant in a community. Melber, Nealey, Hammersla and Rankin[5] mention eight studies which followed local acceptance of a nuclear power plant as it was being constructed. Only two found a significant increase in acceptance over time, and only one locality showed a significant increase in the level of opposition. Results are equally mixed concerning the relationship between living near a nuclear power plant and acceptance of nuclear energy in general (see Thomas and Baillie[6]). Our own surveys show a marginally more favourable attitude towards nuclear energy in general around Hinkley Point (an existing nuclear power station in the South West) than in three local communities which were shortlisted by the CEGB as possible future sites. However, these differences must be interpreted with caution since people who have decided to leave an area where there is a power plant, or not to move to the area for the same reason, will not be included in a survey of local opinion. A survey study of local opinion regarding the proposed Sizewell B reactor also suggests that familiarity does not necessarily lead to more positive attitudes.[7] Results of our research in the South West suggest that attitudes towards nuclear energy in general are not necessarily anti, but that the public has serious doubts about the feasibility of this technology and prefers to postpone further expansion of the industry. Public attitudes are most opposed to building more nuclear power plants when the proposed site is near home. Public attitudes towards building more nuclear power stations elsewhere in the UK, however, also showed an anti majority and were in accordance with recent opinion polls in the UK.

These changes in public awareness and involvement have led to the recognition that the future of nuclear energy will not only depend on technical and economic factors. The question of public acceptability of nuclear energy will play an important role in future energy decisions. An important component of public concern over nuclear energy is the public's perception of risks. This has been the focus of much research on risk perception, with the aim of helping to formulate policy decisions on risk regulation and risk-bearing technologies.

Risk perception

Although the experts' assessment of the risks of nuclear energy indicate that they are no greater than, and perhaps substantially less than, other generally accepted technologies, the public distrust of nuclear energy is substantial. Opinion polls consistently report qualms about the release of radioactivity, potential catastrophic accidents, and the disposal of nuclear waste. Both operational hazards and possible adverse environmental impact are seen as major risks of nuclear energy. A variety of concerns underlie these safety fears. Reactor operation risks and waste disposal questions dominate public concern over nuclear energy. Our own research in the South West revealed a similar pattern; the nuclear waste issue and risks to the environment played a major role in public perception and acceptability of the building of a nuclear power station.

It is clear that the public defines risks in much broader terms than the expert. Early research on risk perception aimed to discover the basis of the public's distrust, given expert assessments of the extremely low probability of serious accidents and the negligible consequences of routine emission to health and the environment. The experts' risk assessments were regarded as objective and quantifiable, and public fears were interpreted as biased and irrational. Public disagreement among scientists over the risks of nuclear energy, however, led to the realization that even the experts' assessments are less hard and fast than previously assumed. Recent research has paid more attention to the study of *how* people think about risks. A number of studies have revealed that nuclear power, as compared with other technologies, elicits an extraordinary level of concern, particularly because of the characteristics of the hazards that it poses.[8] Most prominent among these are, first, the potentially catastrophic and involuntary nature of possible accidents, and second, the fact that it is an unknown hazard. Compared to other technologies nuclear energy emerges as the most extreme in terms of the size and seriousness of a potential accident.

The public's concept of risk, therefore, seems to be heavily influenced by the characteristics and seriousness of the possible consequences of a nuclear

energy programme. These factors play a more important role than the assumed probability of the possible negative consequences.

The concept of risk, however, does not embrace all the relevant terms of public acceptance. The public's perceptions of risks are built on values, attitudes and sets of attributes which need not be similar to the representations of the experts and policy makers.

Beliefs and values

Attempts to analyse the structure of people's attitudes towards nuclear energy are usually based on expectancy-value models of attitude formation, which broadly assume that the more a person believes the attitude object has good rather than bad attributes or consequences, the more favourable his or her attitude tends to be. In other words, people's attitudes towards nuclear energy are assumed to be a function of beliefs about the possible consequences of its use. Results of this work pointed at a number of dimensions underlying the way people think about nuclear energy (see for example, Otway, Maurer and Thomas, 1978[9]). These dimensions can be summarized as follows:

- beliefs about the economic benefits of nuclear power;
- beliefs about the environmental and physical hazards due to routine low-level radiation, and possible accidents;
- beliefs about the socio-political implications of nuclear power (eg restrictions on civil liberties); and
- beliefs about psychological risks (fear, stress, etc).

Our surveys in the South West of England pointed to the importance of beliefs about the psychological risks of the building and operation of a nuclear power station in a locality. People's expectations concerning their 'peace of mind' were the most important determinant of attitudes towards the building of a nuclear power station. Overall, the respondents with a pro-nuclear attitude were more optimistic about the economic benefits of the proposed nuclear power station and less pessimistic about the environmental and psychological risks. Even more clear-cut differences were obtained with respect to the importance attached to the various possible consequences. The pro-nuclear respondents stressed the importance of economic benefits, while the antis stressed the risk factors (both environmental and psychological risks). Results of the studies showed that the major differences between the pro- and anti-nuclear attitude groups concern the less tangible, more long-term nature of the potential negative consequences of the building of a nuclear power station.

A number of other studies also showed that opponents and proponents of nuclear energy have very different views on the possible consequences of nuclear energy. In a study conducted in 1978,[10] it was found that opponents to the expansion of the nuclear industry did not think that this development would strengthen the UK economy or the UK's ability to meet future energy demands, while those in favour of nuclear energy thought both consequences to be quite probable. Furthermore, opponents thought that expansion of the nuclear industry would increase the risk of nuclear terrorism, the risk of a serious nuclear accident, the risk of further proliferation of military nuclear capability and restriction on individual civil liberties in the UK. Supporters of the expansion of the nuclear industry did not share these beliefs.

In this study, we also considered which possible consequences were seen as important by the supporters and opponents of nuclear energy. Results showed striking differences between the two groups, supporters most frequently choosing the strength of the UK economy and the UK's ability to meet future energy demands, and the opponents choosing restrictions on civil liberties and the risk of nuclear terrorism. Finally, the two groups showed remarkable differences in their perception of which factors they felt contributed most to the overall 'quality of life'. The factor most frequently chosen by the supporters was 'advances in technology', whereas 'decreased emphasis on materialistic values' and 'conservation of the natural environment' were chosen by all the respondents opposed to the expansion of the nuclear energy programme. The above findings were obtained in a study on mainly professional people with a relatively active interest in the issue, attending a one-day workshop on the issue of nuclear energy. A more recent study on a general sample of the public resulted in similar findings.[11]

It seems, therefore, that individuals with opposing attitudes tend to see different aspects of the issue as salient, and hence will disagree not only over the likelihood of the various consequences but also over their importance. In other words, *opponents and proponents have different reasons for holding their particular attitudes*; the supporters see the potential economic benefits as most important, while the opponents attach greater value to environmental and public health aspects. Results concerning the

perception of the importance of more general social issues were in line with the above findings. These results clearly indicate that attitudinal differences towards nuclear energy are embedded in a wider context of attitudes towards more general social issues. Public thinking on nuclear power is not simply a matter of perceptions of risks but is also related to more generic issues such as the value of economic growth, high technology and centralization. It therefore seems impossible to detach the issue of nuclear energy from questions about the kind of society in which we want to live.

CONCLUSIONS

Public attitudes are relatively stable and are embedded in a wider context of values and attitudes towards more general issues. As a consequence, large-scale attitude conversion is more difficult than often assumed. However, people may change their attitudes as a function of serious accidents that attract widespread attention, especially if they have not committed themselves strongly to one of the two sides. With regard to safety-related aspects of public acceptance of nuclear power, it seems much easier for nuclear attitudes to become suddenly more anti-nuclear because of a major accident or a series of smaller accidents (eg the recent events at the Sellafield reprocessing plant) than it would be for nuclear attitudes to become more pro-nuclear as a longer-term result of an extensive period of safe operations. Changes in pro-nuclear direction are more likely to result from events related to energy supply, eg a substantial increase in coal prices, making electricity much more expensive.

Both public disagreement among scientists concerning the likelihood and magnitude of potential risks of reactor operation and waste storage, and the frequent mention of possible health hazards (eg recent reports on the incidence of cancers around the nuclear establishments at Sellafield and Sizewell) will reinforce public distrust of nuclear technology. Since safety-related issues play a crucial role in public acceptance of this technology, it seems necessary to improve the relations between the expert and the lay public. For the lay public this poses an important challenge: to be better informed and to be aware of the qualitative aspects that strongly affect their perception of risks. For experts it seems necessary to recognize the limitations and fallibility of risk assessments. Furthermore, awareness of the fact that important qualitative aspects of risks influence the responses of lay people might improve relations with the public. However, it is also clear that the risk concept in itself is not sufficient to explain public reactions. Public reaction is also related to more general beliefs and values, and the issue of nuclear energy is firmly embedded in a much wider moral and political domain.

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