Science and Technology Committee

Inquiry on "Risk perception and energy infrastructure"

Submission regarding the following matters as specified in the Terms of Reference:

- What are the key factors influencing public risk perception and tolerability of energy infrastructure facilities and projects?
- To what extent can public perceptions be changed by improving risk communication?
- How do risk perceptions and communication issues in the UK compare to those of other countries?

Evidence from Dr Julia West, British Geological Survey (Natural Environment Research Council)

Key factors

1. The UK, together with many countries around the world, continues to face difficulties with all things nuclear – from building new reactors for energy generation to the geological disposal of radioactive waste. Technically speaking, both reactor construction and geological disposal are well understood and have a firm scientific basis enabling informed judgements to be made. However, particularly for the construction of repositories and disposing of waste, national programmes continually stall because of concerns and fears of the various stakeholders; indeed a significant proportion of the public still asks whether a repository or a nuclear power plant is safe.
2. Most people remain unconvinced that living next to a nuclear power station or a deep repository for radioactive waste (especially for high-level waste) is safe. Anything "nuclear" is seen as dangerous, polluting and unpredictable. Much of this anxiety is the result of decades of concerns about nuclear weapons, radioactive fallout from atmospheric bomb testing and long-term effects of exposure to radiation. Such worries are confirmed and reinforced by "incidents" (used as a neutral term in this document) at, for example, Windscale (1957), Three Mile Island (1979), Chernobyl (1986) and, of course, at Fukushima in 2011.
3. Compounding the problem of confidence in the nuclear industry is secrecy – or at least the failure to openly provide relevant and sufficient information – which has too often resulted in a feeling that "they" (the authorities and the experts) are not telling the whole truth. It could be argued that this is the current situation in the UK. Additionally, many scientists lack the necessary communication skills and are poorly equipped to present their work clearly to non-specialists – particularly when attempting to provide clear and unambiguous answers to difficult questions conveying, for example, the idea of risk. There is also the argument from anti-nuclear groups in many countries that "solving" the waste disposal problem only encourages the nuclear industry to continue its "dangerous" activities – indeed many opposition groups now use this link to block any new nuclear power stations until the waste "problem" is solved.

4. Building the confidence of non-experts in the nuclear industry in thus a crucial, but extremely difficult task that must be undertaken if both nuclear new-build and the disposal of radioactive wastes are to be achieved. Only by achieving this confidence, based on sound science and a recognition and acknowledgment of anxieties, can the nuclear industry progress. The communication of risk forms part of this building of confidence. The trick is finding effective communicators, who are also excellent scientists, who can inspire trust and confidence in all groupings.

Risk Perceptions and Experience in other countries

5. Lessons can be learnt from the communication experiences in other countries, particularly with regard to the geological disposal of radioactive waste (West and McKinley, 2007). For example, comparisons between the communication styles in Finland, France, Sweden and the UK reveal two patterns. The "Decide-Announce-Defend" (DAD) approach to site selection has been used extensively in the past in France and the UK. Unfortunately, this has not been particularly successful in its goals and has generated considerable suspicion of the nuclear industry and manifestly not improved the confidence of non-technical groups, in particular with regard to the "riskiness" of a repository. This approach is now often called DADA ("Decide-Announce-Defend-Abandon") because it is ineffectual. By contrast, the "Review-Decide" pattern currently followed in Finland and Sweden (and now used in the UK by the Nuclear Decommissioning Authority NDA and in France) is open, with plans for the disposal of waste in the public arena for scrutiny and comments.
6. Although the "Review-Decide" pattern is not without its own problems (timescales can be very long and it can be an expensive process), it is much more successful in building confidence. However, it must have a sound scientific basis. For example, the use of natural ("nature's laboratories") and archaeological analogies (so called "natural analogues") to illustrate difficult scientific concepts to non-technical parties is now widely used by many organisations and training courses (e.g. www.natural-analogues.com ; http://www.nagra.ch/g3.cms/s_page/83290/s_name/naturalanalogues ; http://www.itc-school.org/index.php/Present-Courses/Utilisation-of-Natural-and-Archaeological-Analogues-in-waste-disposal-2012.html ; Miller et al, 2000) although these must be used with care (see paragraph 9 below).
7. Examples of communication styles in other countries are also useful, particularly in Japan, which has over 50 nuclear power reactors, providing one-third of its total energy requirements. The legacy of the Hiroshima and Nagasaki bombs plus a series of nuclear incidents in Japan in the 1990s and 2000s, which were not always handled in the best and most open way by the nuclear industry, has meant that, even before the Fukushima Dai-ichi incident in March 2011, there was a serious mistrust and lack of confidence in all things nuclear in the Japanese population.
8. The releases of radioactivity from the Fukushima Dai-ichi power plant and ensuing contamination of the surrounding area, resulted in accusations that the risk associated with the site had been underestimated by the nuclear industry and by the Japanese government; and that the robustness of the older reactors at the site had been over-estimated. This criticism is certainly well founded and the fundamental problem of low-probability, high-consequence events and the experience of Fukushima had led to proposals for

improvements in many national programmes. However, the attribution of blame is continuing in Japan but what is happening, following Fukushima, painfully illustrates how societal "nuclear" memories coupled with poor communication have led to the extremely difficult position in which the Japanese nuclear industry finds itself today.

9. Additionally, Chernobyl was linked to the Fukushima incident, even in its earliest stages and generated a lot of fear in Japan. This was not a correct analogy, which technical experts understood but were unable to communicate effectively, and, as a result, the link is still powerful. This linkage illustrates the importance of using the correct analogy when attempting to explain complex issues to non-experts and having a well established, proactive and interactive communication strategy in order to rectify such errors. Indeed much can also be learnt from examining the global history of incidents at nuclear reactors to both allow Fukushima to put into context and to provide better sources of experience to help remediation efforts in Japan (McKinley et al, 2011). Such comparisons will also help the UK and other countries when addressing nuclear infrastructure projects.

Lessons for other Energy infrastructure projects

10. The capture and geological storage of carbon dioxide (CO_2) from power stations (carbon capture and storage (CCS)) is a developing technology which will help mitigate greenhouse gas emissions. The UK government is very supportive of the technology and it is likely that a major demonstration site will be built in the near future. Although it is extremely likely that UK emissions will be stored in off-shore geological formations, it is important to recognise that the 'riskiness' of injection of CO_2 into on-shore storage sites is now stopping the technology in many countries e.g. Netherlands http://www.dutchnews.nl/news/archives/2010/11/barendrecht_co2_storage_plan_h.php and Germany http://www.nytimes.com/gwire/2010/04/07/07greenwire-frightened-furious-neighbors-undermine-german-35436.html?pagewanted=all .
Again, the "DAD" pattern of communication seems to have been adopted which has stalled some projects. It is important to recognise that the communication errors made by the nuclear industry seem to be being repeated in the search for CO_2 injection sites, albeit in European on-shore sites. It is essential that the other errors in communication made by the nuclear industry are not repeated in the drive to store CO_2. There is much that can be learnt by the nuclear and CCS industries having an exchange of experiences (see article by Chapman et al, 2011 also available at http://www.geolsoc.org.uk/page10374.html).

Declaration of interests

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References

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