Evolving Impact assessment Practice for UK Nuclear Power Stations (out with the old [stations] and in with the new)

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Abstract: *this paper explores the rapidly evolving impact assessment procedures and practice in the UK for the decommissioning of old nuclear power stations and the development of new. There is now several years experience of the operation of the UK EIA Decommissioning Regulations; issues raised and amendments made to the Regulations are discussed. One use of decommissioned sites is for new nuclear build, and in early 2008 the UK Government invited proposals for a new generation of nuclear power stations. An evolving planning process is leading to an array of new strategic and project specific assessment procedures; there are also competing developers, alternative generic designs, and a whole range of sustainability and cumulative impact issues. Overall the evolving procedures have worked well for decommissioning; it remains to be seen whether this will also be the case for new build.*

Context: UK nuclear energy provision and impact assessment procedures

The UK has a long history of nuclear power generation, which provided up to 25% of UK electricity output at peak capacity. Nuclear sites are spread around the country, but with a concentration in S and NW England. But the last new build, Sizewell B, was completed in 1995, and the focus since has been on the decommissioning of many of the nuclear power plants. This process is well under way and nuclear capacity is falling fast (Figs 1/2). Following the 1997 amendments to EU EIA Regulations (CEC 1997), the UK introduced new regulations which uniquely require EIAs for the decommissioning of projects, in this case nuclear power stations and reactors. Under the EIA Decommissioning Regulations (EIADR99) (1999), decommissioning requires the consent of the UK Health and Safety Executive (HSE). A nuclear licensee who applies for consent must provide the HSE with an ES. Further to amendments in 2006, the regulations now also apply to changes to existing decommissioning projects which may have significant effects on the environment (EIADR06) (2006)[1]. The first part of the paper focuses on lessons learned from the application of these new procedures.

One issue for decommissioned sites is that of future end state and use. One possibility is of course more nuclear power plants. Since 2007-2008, this has again become a very live issue in the UK. Under the 2008 Energy Bill and the associated Nuclear White Paper (BERR 2008a&b), the Government has invited energy companies '*to bring forward plans to build and operate new nuclear power stations as part of the UK's strategy for a secure, diverse*, *low carbon energy mix*'. There is also a drive in the legislation for greater and more rapid deployment of renewables, plus the creation of a regulatory framework to accelerate Carbon Capture and Storage (CCS) projects. The invitation on nuclear has been accompanied by new initiatives in the assessment processes and practice, which form the second part of the paper.

A theme which underpins the whole of the paper is the importance of an adaptive impact assessment process, one that is 'fit for purpose'. This is particularly relevant when dealing with an industry, such as that of nuclear power, which is highly sensitive, high technology and changing fast.

1(a): EIA decommissioning--evolving procedures

The HSE has now granted consent under EIADR for several stations. The decommissioning process involves several stages: initial defuelling, followed by dismantling work, care and maintenance, and eventual site clearance. Currently this is seen as a process extending over 100 years, and EIA must build in forecasts for such a long period. The EIADR process includes a commitment for decision making to be open and transparent, with consultation built in at several stages (Fig 3). A significant and commendable aspect of this process is the setting up of Site Stakeholder Groups (including representatives of local government and significant organisations) to manage the process of consultation on preferred End States and Uses for the sites. Alternative uses often include business/technology parks, but now also new nuclear build—which tends to receive considerable local support in the current nuclear locations. The EIA process has also produced some degree of reversal of the normal mix of impacts with for example bio-physical impact benefits, but socio-economic impact costs–with decommissioning accompanied by significant reductions in numbers of previously secure, permanent and well paid jobs.

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[1] Bussell et al (2002) provided some guidance on procedures in the EU, but the EU is not alone in requiring EIA for such projects. For example, in Canada, prior to obtaining a decommissioning licence from its regulator, the Canadian Nuclear Safety Commission (CNSC), the developer/operator must submit an Environmental Assessment (EA), pursuant to the Canadian Environmental Assessment Act (Klukas et al, 2002).

New regulations often have teething problems. Reflecting evolving practice in this high technology field, the original EIADR99 was amended (regulation 13) to also require an EIA 'where *changes or extensions* to the decommissioning of nuclear power stations or reactors may result in *significant adverse* environmental effects'. But there was an issue as to when a change or extension becomes significant. The IAU at Oxford Brookes carried out research (IAU 2002) for the HSE to define appropriate screening criteria. This resulted in a 'traffic lights' system in a screening process for determining the significance or otherwise of changes such as in the size of buildings (eg ILW Safestore), and of procedures (eg reactor building removal strategy), which was built into amended regulations (EIADR 06).

1(b): EIA decommissioning –practice

The new screening criteria have proved very effective in assessing significance of changes in the decommissioning process, and the regulations as a whole have been applied at several stations (eg Bradwell, Hinkley Point A, Sizewell A, Dungeness A, Calder Hall and Chapel Cross). Interestingly, consent was not required for several stations that ceased generation before the advent of the regulations in 1999 (eg Berkeley, Hunsterton A and Trawsfyndd), although there have been several cases of the use of the screening criteria for subsequent changes at those stations. The decommissioning at Hinkley Point A (BNFL 2002) provides some insight into the assessment process. In particular the socio-economic effects assessment had a high profile, including devising assessment criteria where there are no well established recognised guidelines. There are of course always exceptions to the rule and the case of the decommissioning of the experimental nuclear station at Dounreay, with its serious pollution problems, is certainly that—with very substantial current employment and likely to remain high for several decades.

The start of the process for decommissioning the JET (Joint European Torus) nuclear fusion experimental facility in Oxfordshire provides a recent (2007) example of the stakeholder consultation process. This was also undertaken by Oxford Brookes and involved a very intense process (stakeholder workshops, web consultation, public exhibitions etc) leading to a clear preference by all parties for a continuation of some aspect of fusion research on site, rather than the return to the 'green belt' agricultural state and use that was at first anticipated.

2: Towards a programme of nuclear new build—evolving procedures and practice

Like several other countries the UK Government now sees new nuclear power as a key building block for a low carbon future; nuclear power is seen as '*low-carbon, affordable, dependable, safe and capable of increasing the diversity of our energy supplies and reducing our dependence on any one technology or country for our fuel supplies'* (BERR 2008a). To progress the initiative and, partly linked to new Planning legislation (DCLG 2007), the Government is developing its procedures for a new programme of stations. This involves a set of strategic planning initiatives, including:

- ***Strategic Siting Assessment (SSA), with its associated Strategic Environmental Assessment (SEA);***
- ***a Generic Design Assessment:***
- ***a National Planning Statement (NPS) on Nuclear Power; and***
- ***a new Infrastructure Planning Commission***

The nature and relationship of these new initiatives, designed to provide a streamlined and efficient planning and assessment process, is still evolving (BERR 2008b). The SSA will consult on and identify the criteria for determining the suitability of sites for new nuclear power stations (eg. local political acceptability, skilled labour supply), and it will incorporate an SEA. This is seen as limiting the need to consider high level environmental issues in the subsequent planning process. The Jackson Report (DTI 2007) has already undertaken a preliminary assessment of the opportunities of existing sites (see Fig 4, which highlights the particular potential of a set of sites in the south of England). A Generic Design Assessment will assess 4 nuclear reactor designs which have been submitted by vendors to determine the one to be used in the UK. An NPS will then be produced for nuclear power. This will be subject to public consultation. A key component will be the siting criteria devised in the SSA with an indication of certain locations that meet those criteria. The Nuclear Power NPS will set the policy framework for decisions on particular development proposals by the new IPC.

These procedures are still evolving –but they have raised some questions/concerns as to how it will all work in practice (eg on the nature of the integration of the SEA within the SSA process; on the relation between the SSA and the NPS; and the potential delay in agreeing a generic design which could slow the whole process). There was also concern around the potential for duplication of issues covered by the SEA and the EIAs for particular sites; perhaps the SEA should be applied at the locality rather than the site level to keep the assessment strategic?

Yet within this evolving context, potential developers are working, in an open and consultative way, on draft EIAs—and raising another set of interesting issues related for example to: site ownership, cumulative assessment

(for example on sites with decommissioning stations, current stations and potential new build—possibly with a large new windfarm off the coast!). There are also issues of the supply of labour to build the new developments, and key bio-physical issues such as sea-level rise. In addition there are technological advances in modular construction, in the power/size ratio of new nuclear reactors, in the operational life of stations (now up to 60 years) plus more efficient decommissioning procedures (10-20 years rather than 100 plus).

Conclusions

The nuclear industry provides a vivid example of a sensitive and highly technical energy industry which is changing fast. In the UK planning and assessment procedures have evolved for the decommissioning stage , and are now changing fast in relation to new build. They have generally worked well for decommissioning; it remains to be seen whether this will also be the case for new build.

There is one final point for consideration and debate. The nuclear industry has been subject to unique EIA procedures with regard to the decommissioning stage. Should there be other suitable cases for such treatment? Bussell et al (2002) note that –'there is also scope for application to other large or controversial projects'. Using indicative criteria such as some of : key health and safety issues, hazardous process, cost, very long time scale , and major public concern—what other major projects might enter the frame? A shortlist might include: other major energy projects (eg coal-fired station; offshore windfarms), petrochemical plants, major infrastructure projects (eg dams) and possibly mines and quarries. But-of course, and wherever possible, the impacts of decommissioning should be built into the original EIA process.

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Figure 1: Civil Nuclear Power Stations in the UK

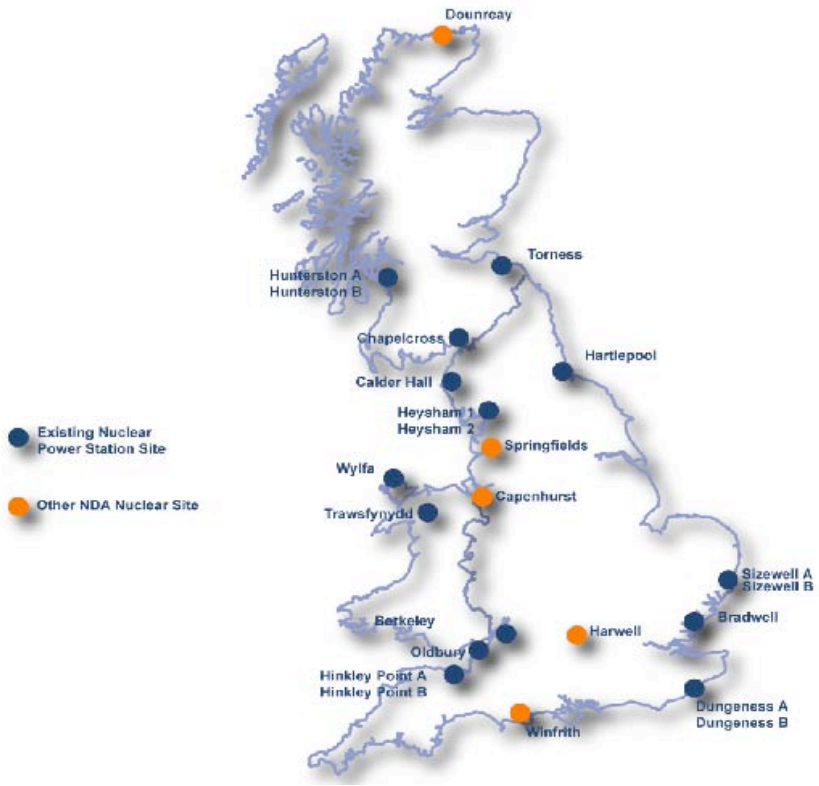
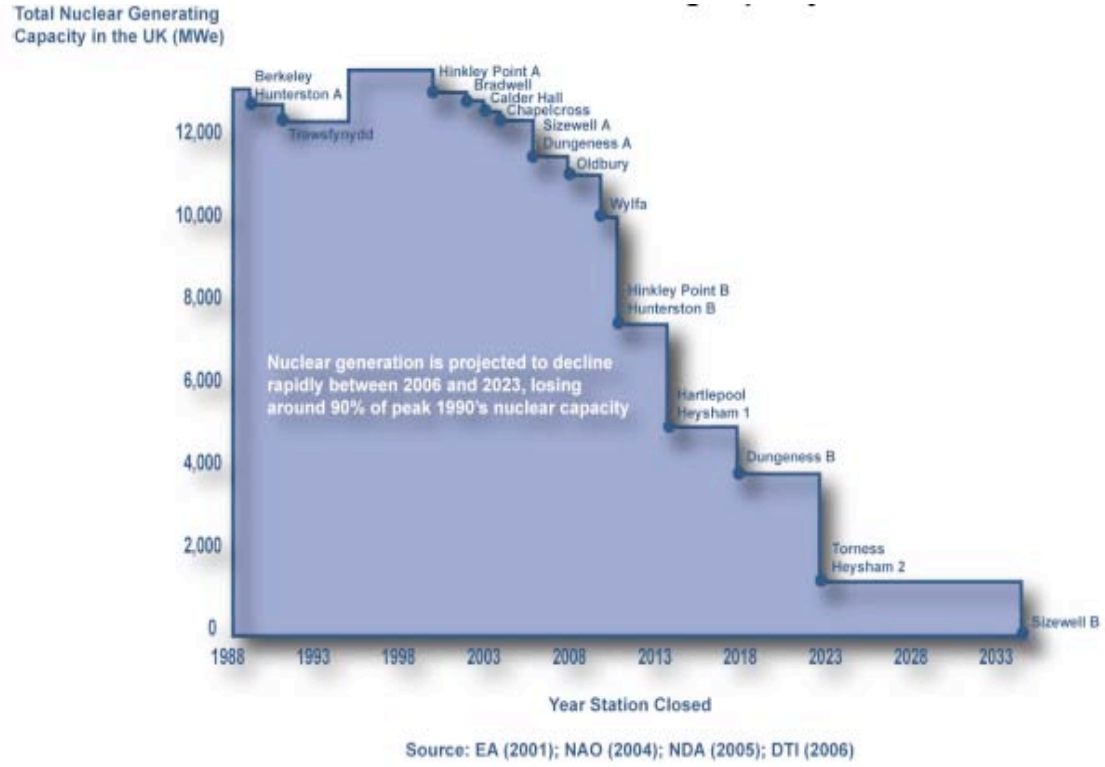


Figure 2: Decline in UK Nuclear Generating Capacity



Source: EA (2001); NAO (2004); NDA (2005); DTI (2006)

Fig.3: EIADR (99) Decommissioning Process

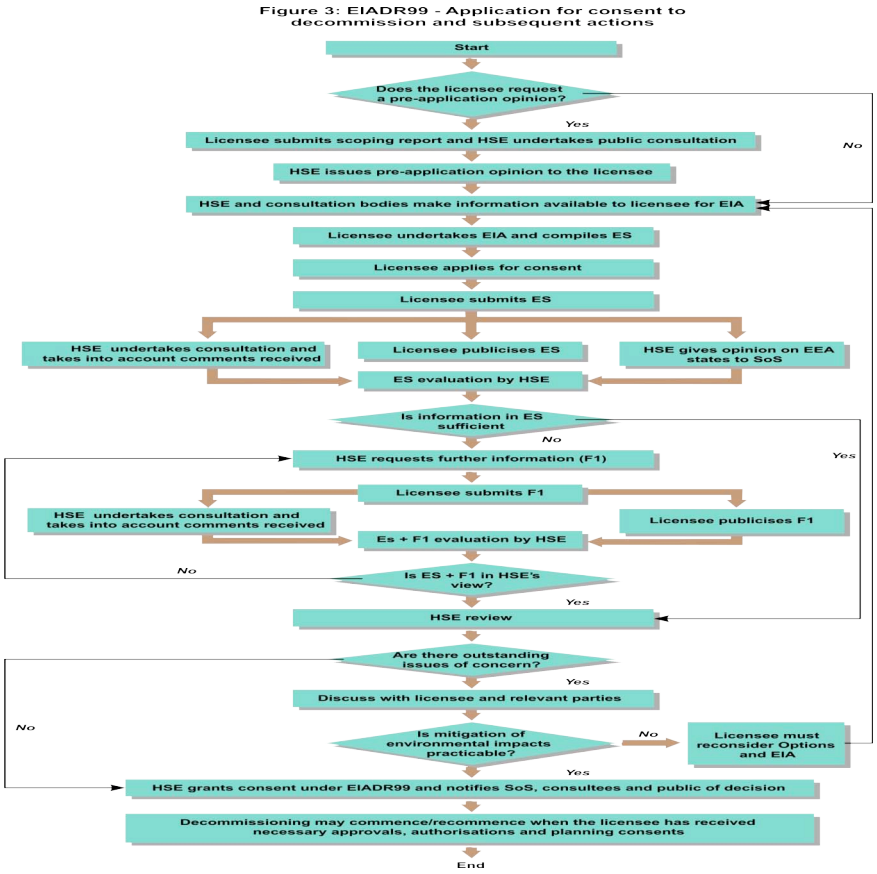


Fig 4: Key Opportunities for Future New Build (DTI 2007)