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Strategic environmental assessment for energy production

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ABSTRACT

Amongst the approaches that have developed to improve environmental protection within the energy sector, strategic environmental assessment (SEA) has received relatively little attention. This is despite its potential to overcome some of the shortcomings associated with project-level assessment by intervening at higher levels of energy system planning. In this article, a review is presented of the extent to which SEA has been adopted and otherwise promoted in strategic energy planning processes in a wide range of countries throughout the world (with an emphasis on European Union nations). In this regard, the growing importance of regulatory compliance is underlined, especially within the EU, with a particular focus upon the application of SEA to grid systems. The case of the Belgian transmission system is described, illustrating a proactive approach to SEA. But the difficulties inherent in introducing SEA to an increasingly fragmented and liberalised sector are also drawn out, leading to suggestions by which these difficulties may be addressed.

1. Introduction

The consideration of environmental issues is now central to the development of energy policy and to the activities of the energy industry, whether in the search for more sustainable forms of energy or in the expectation of improved environmental performance by industrial operators (Hinrichs and Kleinbach, 2006). Within this context, more widely established approaches for achieving higher levels of environmental protection are taking on increasing importance. In particular, environmental impact assessment (EIA) is now a commonly accepted practice when developing energy infrastructure, and is a regulatory requirement in many jurisdictions around the world (Petts, 1999). However, there are questions about the ability of EIA to deal adequately with the challenges now associated with energy supply; EIA is geared to the environmental improvement of individual projects, whereas the issues we now face need to be addressed at a higher level of planning, at a regional, national or even super-national scale, and environmental protection needs to be built into overall energy frameworks at a much earlier stage of conception.

This is not an argument that is unique to energy supply. Similar points have been made in relation to other sectors that have major consequences for the natural and human environment, such as transport and urban development (Thérivel et al., 1992). This has led to the emergence of a form of environmental assessment which is introduced during earlier stages of governance than the point of project planning, such as during the formation of sectoral policy. Strategic environmental assessment (SEA) is now becoming an established practice, with legal backing in some jurisdictions (Dalal-Clayton and Sadler, 2005). But SEA has not yet been widely adopted in relation to energy production. This is partly because of the relatively fragmented nature of the industry which makes strategic planning itself more difficult (Byron and Sheate, 1997). Arguably, however, the need for SEA is greatest within this sector, given its centrality to the now generally accepted overwhelming need for carbon reduction, and to other longer-standing environmental concerns, such as air quality and landscape issues.

In this article, I present the background to the emergence of SEA, including regulatory initiatives that have fostered its growth, and review the extent to which it has been practiced within the energy sector. I then focus on the uptake of SEA within the electricity industry, which is, for a number of reasons, one area where SEA is making some progress; this is illustrated with reference to the Belgian transmission system. Conclusions are then drawn about both the challenges and opportunities of a wider application of SEA to the development of energy strategies.

2. The emergence of strategic environmental assessment

2.1. Up-streaming environmental assessment

Over the last few decades, proposals for individual development projects have come under increasing scrutiny for their possible environmental consequences, with EIA becoming a well-established

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means of minimising the harmful side effects of developments. EIA legislation was adopted in the USA in 1969, followed by some other developed nations in the 1970s, the (now) European Union in 1985, and many other countries more recently; major development agencies also require EIA for projects which they fund (Glasson et al., 2005; World Bank, online). Energy projects feature prominently amongst the types of development for which EIA must be carried out (see, for example, the annexes of the EU's directive on EIA European Commission (EC), 1997a).

However, doubts about the effectiveness of EIA in ensuring adequate environmental protection have been expressed for almost as long as it has been in force. EIA is seen as coming into play too late in the planning process to make significant differences to the outcome of development proposals which have already gained momentum, effectively invalidating other options. EIA's focus on individual projects also renders it powerless to alleviate the cumulative effects of multiple projects (Lee and Walsh, 1992). An example of this is the assessment of a proposed major power station in the United Kingdom, with no thought apparently being given to the associated need for an environmentally damaging grid upgrade (Sheate, 1995). A higher and earlier level of environmental assessment was therefore envisaged, by which the environmental consequences of broad development strategies are considered before individual projects are conceived; projects should then only be drawn up in line with strategies that have already been 'environment-proofed' (Wood and Djeddour, 1992). SEA should thus overcome the shortcomings of EIA, by 'upstreaming' the principles of EIA to higher levels of decision-making. This argument has been made specifically in relation to energy production (Bérubé and Cusson, 2002).

It was originally thought that SEA would be carried out at three distinct and hierarchical levels of planning, described, from the highest to the lowest, as policies, plans and programmes (Wood and Djeddour, 1992). In practice, strategic initiatives do not fall into such neat categories; for example, the EU's system of SEA (see below) refers collectively to 'plans and programmes' without making a distinction between them. But the principle remains that an SEA process should run alongside the preparation of a strategic planning action, and ensure that environmental issues associated with the action are carefully assessed before project-level planning begins; EIA can then concentrate on the fine-tuning of project proposals which already respect the parameters drawn up through SEA.

According to this model, SEA is carried out in a similar way to EIA, following a well-defined sequence of stages (von Seht, 1999). These include:

- Screening: determining whether SEA is necessary for the strategic action in question.
- Scoping: determining the environmental issues to be addressed in the SEA.
- Impact assessment: determining the likely environmental consequences of the proposed action.
- Alternatives: considering whether the objectives of the action could be achieved by other means.
- Impact mitigation: proposing measures that will minimise any undesirable environmental consequences of the action.
- Report: publishing the findings of the assessment in a publicly available form.
- Consultation: involving interested parties in the process and inviting comments on the report.
- Monitoring: measuring the actual effects of the action, once implemented.

In practice, however, SEA has taken on different forms according to the varying contexts in which it has been applied; indeed, it is part of wider SEA thinking that a very flexible approach should be taken in order to adapt SEA to the many different settings and types of strategic action to which it may relate (Verheem and Tonk, 2000). In line with this adaptability, one important shift away from EIA-based SEA has been the introduction of objectives. Whereas an EIA-based approach seeks to make a quantitative forecast of the likely effects of a strategic action upon a measured environmental baseline, an objectives-based approach seeks simply to determine the extent to which a strategic action will achieve certain pre-defined environmental objectives. For example, the proposals contained in a plan may be assessed for the extent to which they will lead to a substantial reduction in greenhouse gas emissions. It is argued that when assessing strategic actions, this is a more useful and attainable approach than attempting to apply the more quantitative methods typically used when assessing individual projects (Partidário, 1996). This approach has also led to the use of indicators, which are more specific parameters than objectives, intended to measure the possible achievement of objectives. For example, the growth or decline of a particular indicator species may be evidence of wider environmental trends. The use of objectives and indicators has now become a common feature of SEA in some contexts and is being more widely recommended (Thérivel, 2004). Finally, attempts are also being made to combine the EIA-based and objectives-based approaches into an integrated process, especially where regulatory compliance still demands that certain EIA-type elements are carried out, such as in the EU (Office of the Deputy Prime Minister, 2005; Sheate, 2001).

2.2. Experience in SEA for energy production

The earliest experience of SEA was in relation to land use plans; for example, UK planning authorities carried out a rudimentary form of SEA on their statutory development plans during the 1990s (Curran et al., 1998). Some attention was also given to SEA within other public sectors, especially transport (Fischer, 2002). But from the beginning, the energy sector was also reckoned to be an ideal candidate for SEA. The central importance of energy to national economies, and the significant environmental issues associated with energy supply and use, gave weight to this argument (Thérivel et al., 1992). It was suggested that SEA should be applied both at a broad policy level and in the planning of new capacity, especially for renewable energy (Sheate, 1996).

Indeed, there are examples of energy SEAs during this period, both for overall energy policy and for individual components of the industry. One of the earliest of these was an SEA in 1992 of the Netherlands' national electricity supply plan, carried out by government departments. The plan provided policy direction for the country's fuel mix, and indicated locations for plant and transport facilities. The SEA involved the consideration of different energy scenarios and produced restrictive criteria for the siting of power stations (Sheate, 1996). With regard to lower level energy plans and programmes, examples from the 1990s include the following.

- An analysis of clean coal technologies in the USA, to assess their potential environmental consequences (Byron and Sheate, 1997).
- An assessment of a Swedish municipality's energy plan, commenting on the environmental issues associated with energy use (EC, 1997b).
- A study for local wind farm development in Germany, consisting of mapping environmental criteria restricting the location of wind farms and assessing the likely impacts of wind farms in the favoured areas (Kleinschmidt and Wagner, 1996).