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Impact assessment for a sustainable energy future—Reflections and practical experiences

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ABSTRACT

As energy issues are at the top of the policy agenda worldwide, policy-makers increasingly need better decision-supporting processes to assist them in fostering a sustainable energy future. This paper reflects on the interpretation of sustainable development, and links these reflections with the theory and practice of impact assessment applied on energy issues. An analysis of existing impact assessment approaches with regard to their contribution to sustainable development leads to a set of principles for 'sustainability assessment'. Through a study of a participatory impact assessment supporting the development of a radioactive waste management plan in Belgium, the interpretational limits of sustainable development in a nuclear energy context are discussed. This paper sheds light on the complex context in which impact assessment exercises must contribute to sustainable energy development, with a focus on the nuclear energy—(un)sustainability nexus.

1. Introduction

Today's world faces a series of complex and wicked societal challenges. The environmental crisis is threatening human societies, and urgent actions are required to take declining resources, demographic pressure and human-induced climate change (Sachs, 2008). Energy plays a central role in many of today's crises, be it directly (such as through the emission of greenhouse gases) or indirectly (such as through the global geopolitical battle for control over resources). Badly managed energy issues can lead to social disruption and to an aggravation of the environmental state of the planet (Scrase and MacKerron, 2009). Structural challenges, combined with recent events with planetary consequences such as the Iraq War, the highest oil prices on record, the ever better documented consequences of rapid anthropogenic climate change (IPCC, 2007; Onishi, 2007), the oil spill in the Gulf of Mexico and the Fukushima incident and the emerging economies' increasing energy needs have promulgated a shift towards 'sustainable' energy production and consumption. The 2009 World Energy Outlook (IEA, 2009), states that the continuation of current energy trends would have profound implications for environmental protection, energy security and economic development, as well as dire consequences for climate change. In the same vein, Lior (2010) warns: '*to prevent disastrous global consequences, it would increasingly be impossible to engage in large scale energy-related activities without ensuring their sustainability*'.

Policy-makers design strategies and actions to address these energy challenges. This paper focuses on the relations between sustainable development and energy policy. Sustainable development is seen here as a decision-guiding strategy and as an action-generating concept. In order to implement sustainable development, the sustainability discourse needs to be translated into actions (Boehmer-Christiansen, 2002), and impact assessments are at the start of this process. The International Association for Impact Assessment (IAIA, 2009) defines impact assessment as 'the process of identifying future consequences of a current or proposed action'. Identifying potential future impacts will ideally lead to better – more sustainable – decisions through the timely integration of that information and its consequences in the design of proposed policy interventions.

From combining impact assessment with the decision-guiding strategy of sustainable development emerged 'sustainability assessment' (Gibson et al., 2005).

Applying impact assessment for sustainable energy policy decisions requires the following:

- A conceptualisation of sustainable development and sustainable energy.

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- A conceptualisation of impact assessment for sustainable development (sustainability assessment).
- Insight into the practical application of impact assessment for sustainable energy policy issues.

This paper follows the above structure, which subsequently leads to a reflection on the interpretational limits of sustainable development and a general conclusion.

2. Sustainable development and sustainable energy explored

2.1. The concept of sustainable development

The concept of 'sustainable development' or 'sustainability' was launched in the early 1980s (IUCN et al., 1980) to reconcile the imperatives of development and environmental protection. Sustainable development's intuitive appeal to the 'common sense' of humankind – as well as its constructive ambiguity (Robinson, 2004) – meant that policy-makers and civil society organizations all over the world soon jumped on the train of sustainable development and made it one of the most often cited concepts in current politics. Throughout this paper, the terms 'sustainable development' and 'sustainability' will be used interchangeably, despite the fact that a minority of scholars makes a distinction in meaning between them (Dresner, 2008)—in that latter case, sustainable development is primarily about development and economic growth, whereas sustainability gives priority to environmental protection (Dresner, 2008).

At the 1992 United Nations Conference on Environment and Development, sustainable development was formally politically endorsed through the adoption of the Rio Declaration and Agenda 21. The 2002 World Summit on Sustainable Development reaffirmed the world's commitment ten years later. More recently, influential scientific reports such as the Millennium Ecosystem Assessment (2005), the Stern Review (Stern, 2007) and the work of the Intergovernmental Panel on Climate Change (IPCC, 2007) exerted a major impact on decision-makers and all made reference to the sustainability agenda. Sustainability gained high acceptance in the political discourse, but the gap between words and deeds is still large (Lafferty and Meadowcroft, 2000). Sustainable development is often labeled as a vague and fuzzy concept. On the one hand, this might explain its popularity in use for covering day-to-day political decision-making; yet on the other hand, it precludes a satisfactory implementation of its core principles.

The most famous definition stems from the influential report 'Our Common Future' (WCED, 1987): '*sustainable development is development that meets the needs of the present without compromising the abilities of future generations to meet their own needs*'. This often quoted sentence is actually the 'mission statement' of sustainable development, which points out two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given, and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs (WCED, 1987). Sustainable development is not a fixed state of harmony nor a defined end-state, instead it is '*a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations*' (WCED, 1987).

Robinson's (2004) definition of sustainable development, stresses that developmental and environmental objectives should be reconciled, as well as the views and interests of different stakeholders, and as well as various temporal and spatial scales. Meadows (1998) defines sustainability as 'good lives for all people in harmony with nature'.

Despite its apparent vagueness and normative nature and the plethora of definitions, sustainable development does not leave the door open to all interpretations and refers to a more or less stable set of characteristics. Sustainable development has unambiguous interpretational limits. Lele (1991) makes a distinction between 'trivial' or 'contradictory' (mis)interpretations and meaningful ones. Meaningful interpretations consider sustainable development as a process of change, harmoniously integrating traditional development objectives, such as socio-economic and institutional objectives, with environmental objectives, while trivial interpretations only use 'sustainable' in the sense of 'ongoing, lasting'. Besides this fairly obvious caveat, a meaningful definition of sustainable development has limits, which are not all to be left 'open for interpretation'. Rockstrom et al. (2009) for instance define a 'safe operating space for humanity', establishing scientifically underpinned limits to growth or 'planetary boundaries'. This endeavor points to the need for quantification of sustainability as a first step towards sustainable development (Lior, 2008).

Furthermore, sustainability is a process of directed – sustainability oriented – change, and not a fixed state of harmony, nor a defined end-state (Robinson, 2004), as society, the environment and their interaction are subjected to a continuous flow of change.

Despite the disagreements on 'exact' definitions, sustainable development does refer to a more or less stable set of characteristics (Lele, 1991). These characteristics can be termed principles that 'embody' sustainable development, yet this does not exclude fruitful discussion between potentially contrasting yet mutually enriching interpretations.

Such principles of sustainable development are to be the reference for anyone making the statement of acting in a sustainable way. Sets of principles have been clarified in international declarations, guidelines and charters (e.g. IUCN et al., 1980; UNCED, 1992; WCED, 1987). Within the frame of this paper, defining a common ground referring to sustainability is the priority. Sustainability principles have been proposed by scholars such as Cashmore (2007), Gibson et al. (2005), Haughton (1999) and Lafferty and Meadowcroft (2000) amongst others, as well as by governmental bodies such as the Belgian Federal Planning Bureau (BFPB, 2007), which compiled principles from the academic literature. All these sets of principles draw on the same understanding of sustainable development, and do not contradict each other. Following this perspective, and based on the abovementioned academic and policy documents, we propose the following list of principles, defined as 'rules of action towards sustainable development'.

This means that sustainable development entails at least respecting the principles of the following:

- *Global responsibility* (in tackling global socio-ecological issues, which refers to international cooperation in a spirit of 'shared but differentiated responsibility').
- *Integration* (of ecological, social and economic impacts and their interactions, which refers to the reconciliation and integration of environmental and developmental objectives).
- *Inter- and intra-generational equity* (which refers to the needs and preferences of current and future generations (inter-generational equity), and also includes geographical (global North-global South) and social intra-generational equity).
- *Precaution* (in the face of uncertainty): the precautionary principle states that the lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation.
- *Participation* (which refers to the involvement of all concerned stakeholders in decision-making for sustainable development).

While sustainability principles are keys in understanding the concept, they need to be operationalized in order to feed the