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Modular evaluation method for subsurface activities (MEMSA). A novel approach for integrating social acceptance in a permit decision-making process for subsurface activities

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ABSTRACT

We investigate how the decision support system 'Modular Evaluation Method Subsurface Activities' (MEMSA) can help facilitate an informed decision-making process for permit applications of subsurface activities. To this end, we analyze the extent the MEMSA approach allows for a dialogue between stakeholders in a transparent manner. We use the exploration permit for the underground gas storage facility at the Pieterburen salt dome (Netherlands) as a case study. The results suggest that the MEMSA approach is flexible enough to adjust to changing conditions. Furthermore, MEMSA provides a novel way for identifying structural problems and possible solutions in permit decision-making processes for subsurface activities, on the basis of the sensitivity analysis of intermediate rankings. We suggest that the planned size of an activity should already be specified in the exploration phase, because this would allow for a more efficient use of the subsurface as a whole. We conclude that the host community should be involved to a greater extent and in an early phase of the permit decision-making process, for example, already during the initial analysis of the project area of a subsurface activity. We suggest that strategic national policy goals are to be re-evaluated on a regular basis, in the form of a strategic vision for the subsurface, to account for timing discrepancies between the realization of activities and policy deadlines, because this discrepancy can have a large impact on the necessity and therefore acceptance of a subsurface activity.

1. Introduction

Recent experiences with subsurface activities highlight the need to include strategic and social concerns in the permit decision-making process (DMP) for subsurface activities (van Os et al., 2014a, 2016). Several scholars have indicated possible approaches. Vanclay (2006) suggests using a social impact assessment to incorporate social concerns. Sánchez and Silva-Sánchez (2008) propose to facilitate the connection between the assessment of strategic drivers and project characteristics. However, they do not seem to address social and strategic as well as environmental and economic interests in a transparent and balanced way. As these attributes interact, the inclusion of all these concerns in the permit DMP seems highly important, turning the decision making into a dynamic process (van Os et al., 2014b).

In this study, we will present a novel approach that addresses the abovementioned concerns related to the permit DMP for a subsurface activity. Our approach consists of a single decision support system, which aims to increase the transparency and credibility of the DMP while improving the efficiency of subsurface utilization. Following van Os et al. (2016), we differentiate the DMP for subsurface activities according to the triangle of social acceptance by Wüstenhagen et al. (2007). This triangle categorizes the DMP on the basis of its stakeholders and their concerns and interest into three classes: sociopolitical, market, and community acceptance (see Wüstenhagen et al., 2007). This differentiation resulted in the Modular Evaluation Method Subsurface Activities (MEMSA) approach. We will apply this approach to the case of underground natural gas storage. To the best of our knowledge, this is the first time that a social acceptance motivated decision support system is used for subsurface activities. We will argue that MEMSA improves the current permit DMP because it structures the DMP in an orderly manner on the basis of the requirements and limitations set by the different classes of social acceptance and their interactions.

Abbreviations: CAES, Compresses air energy storage; CCS, Carbon capture and storage; DMP, Decision-making process; EIA, Environmental impact assessment; FDP, Field development plan; MEMSA, Modular evaluation method subsurface activities; NWR, Nuclear waste repository; PWI, Production water infiltration; ROV, Real option valuation; SIA, Social impact assessment; UGS, Underground gas storage; UHS, Underground hydrogen storage; UNS, Underground nitrogen storage.

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Our case study consists of the prematurely terminated exploration permit process for an underground gas storage (UGS) facility in the Pieterburen salt dome, in the north of the Netherlands. We chose this case because of the pluriformity of its development options and the availability of information.

The basic setting of the case is as follows: On 13 January 2010, the French company Electricité de France applied for an exploration permit for the Pieterburen salt dome to assess the potential of an Underground Gas Storage (see Fig. 1; EDF, 2010).

The exploration permit was awarded to Electricité de France on 23 November 2010 (Minister of Economic Affairs, Agriculture and Innovations, 2012b). However, very shortly after the announcement, the province of Groningen, a number of national and regional non-governmental organizations, and a local interest group, called Pieterburen Tegengas, protested against the project. Subsequently, Electricité de France relinquished its permit on the 23 March 2012 (Minister of Economic Affairs, Agriculture and Innovations, 2012a), citing a re-evaluation of its gas strategy as the official reason, as to why the UGS in Pieterburen was no longer required (EDF, 2012). In our view, as we will try to show in this paper, another important reason for Electricité de France to relinquish the exploration permit was the resistance of regional and local stakeholders, which was intensified by the permit DMP architecture itself. For example, the selection process for the Pieterburen salt dome was perceived as non-transparent and too narrowly defined and the need for an UGS was not made clear in light of the energy transition. Furthermore, there was no early involvement of the host community in the Pieterburen case. If this had been the case, it would have been clear from the onset that the host community had strong negative perceptions towards the proposed activity due to a perceived connection with a nuclear waste repository (NWR).

The Pieterburen case suggests that several aspects should be included early on in the permit DMP in order to increase the social acceptance level of the permit DMP and resulting decisions. That is not to say that we develop a model that will 'automatically' yield decisions that are favorable to project protagonists. However, we would argue that the inclusion of these aspects would allow for a more constructive dialogue between stakeholders, instead of the often-observed entrenched positions of the stakeholders. Therefore, in this paper we will investigate the potential for the systematic inclusion of these aspects in a decision support system.

2. The MEMSA process

The general aim of the MEMSA approach is to facilitate a dialogue between the relevant stakeholders in the DMP, by mitigating the shortcomings of the current permit DMP, as observed in the Pieterburen case, as much as possible. We want to reiterate that it is not our intention to arrive at a model that results in project acceptance per se, but to account for key factors that have shown to be highly relevant and have been left unaccounted for. The DMP needs to be restructured in order to allow for the inclusion of a broader range of concerns and interests (van Os et al., 2016). The MEMSA approach structures the decision-making situation

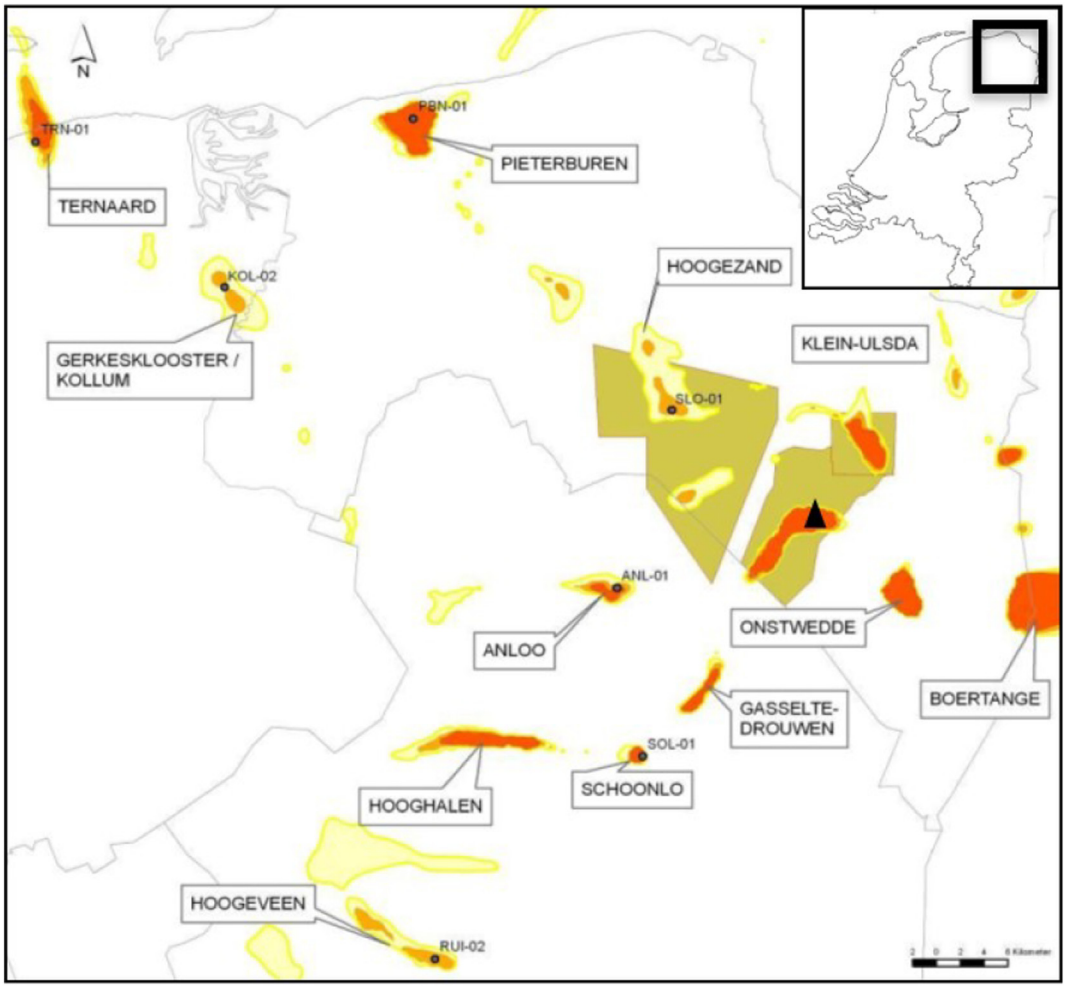

Fig. 1. Salt domes in the northern Netherlands (Remmelts, 2011; TNO, 2012). The orange shapes represent the outlines of the salt domes at a depth of 1500 m. The brown polygons show the existing salt production permits. The black dots indicate some of the existing exploration wells and the black triangle shows the location of the UGS in the Zuidwending salt dome. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)