Shale Gas in the Netherlands

A critical review on the assessments that led to the discontinuation of shale gas in the Netherlands

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Table of Contents

1. Introduction

The Netherlands is predicted to become a net importer of gas in 2025, due to the significant decrease in the exploitation of the Groningen gas fields (Ministerie van Economische Zaken en Klimaat, 2017). To ease this transition, small shale gas fields are a possible solution to secure the energy supply according to the International Energy Association (NU.nl, 2014). However, shale gas also evokes resistance. The movement 'Schaliegasvrij Nederland' quickly grew to 58.000 concerned citizens in a year (Schaliegasvrij Nederland, n.d.). The controversy of shale gas highlights the importance of high-quality impact assessments to determine the effects on society and the environment. Although the extraction of shale gas could mean a significant growth in the economy, as well as the independence of the Netherlands with regards to energy security, drilling can have negative impacts on the environment and local residents. The Dutch Government decided to ban commercial exploitation of shale gas at least until 2023 (Kamp, 2015), however, the decision after 2023 is still open. A critical review of current assessment can contribute to robust policymaking in the future.

In 2015, the Ministry of Economic Affairs researched the implementation of drilling for shale gas. Next to an exploration for innovative ways of extracting shale gas, two evaluations have been performed that gave insight into the reachability and the desirability of extracting shale gas. An environmental impact assessment EIA (Ministerie van Economische Zaken en Klimaat, 2015a; Ministerie van Economische Zaken en Klimaat, 2015b) has been performed for the Netherlands and shows the effects on the environment caused by extraction, in combination with a disaggregated analysis for different parts of the country. Additionally, an overview was created that considered the costs and benefits of shale gas extraction. This social cost benefit analysis (SCBA)(CE Delft, 2015) is partly based on the EIA, but also takes economic, spatial and energy-related effects into account.

This report reflects on the performed evaluation methods and points out weaknesses and improvements both on a general and specific level. Next to reviewing the assessments, broader issues with regards to shale gas exploitation are also analysed and discussed, leading to additional evaluations for informed decision making. This provides an overview of all relevant factors with regards to granting the necessary permits for shale gas exploitation in the Netherlands.

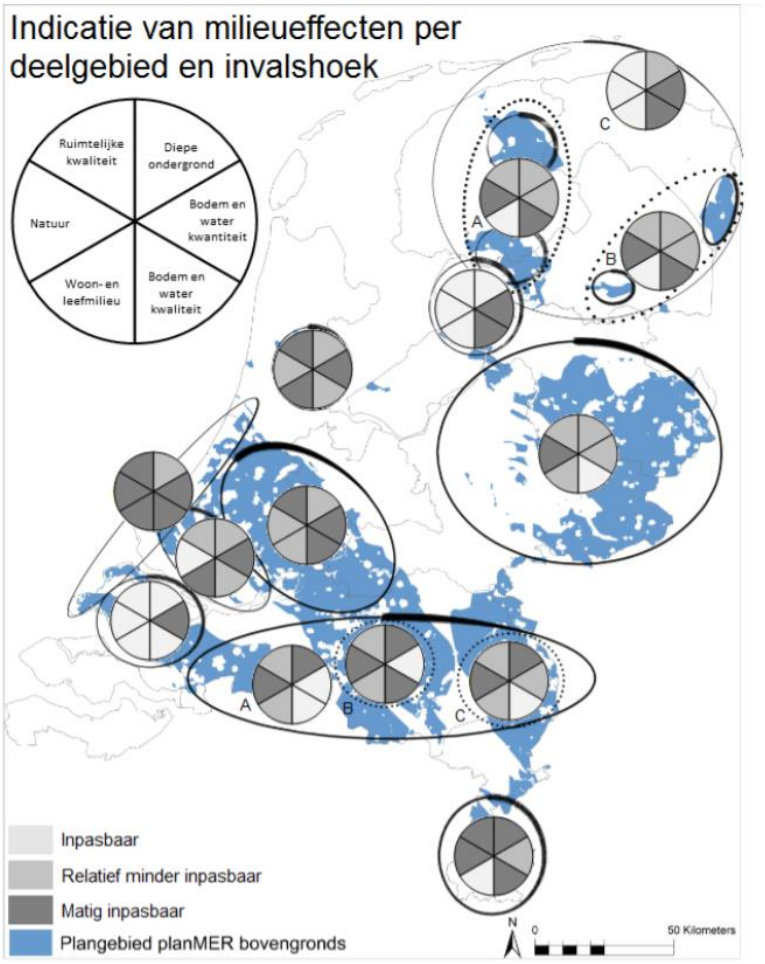
In chapter 2 the environmental impact assessment is discussed. Next, the social cost benefit analysis is presented in chapter 3 following the structure used in the assessment. Chapter 4 considers other factors which were not brought up in the assessments. Finally, chapter 5 concludes the key issues found and whether the created assessments form the basis for granting or denying the required permits for shale gas exploitation.

2. Environmental Impact Assessment

In the Netherlands, it is obligatory to perform an environmental impact assessment (EIA) when commencing any project that can have a negative impact on the environment. How much impact an EIA has on the decision-making process depends on multiple aspects. In literature, this is often based on the "effectiveness" of an EIA (Loomis & Dziedzic, 2018). To determine the effectiveness, two dimensions will be used to analyse the EIA. First, the procedural dimension will be discussed, followed by the substantive dimension.

Overall, the EIA process has been performed according to Dutch regulations. However, there are still elements that need improvement. For example, because of the duration of completing the report, the content is not consistent with current laws and regulations (Commissie MER, 2017). These inconsistencies concern nitrogen deposition regulations and outdated mining laws. Additionally, there is a conflict in procedural values, as opponents are not satisfied by the existing institutional frameworks, which includes the procedure of the EIA. One of the complaints is that opponents of shale gas want additional norms and restricting criteria (Dignum, et al., 2016).

It can be stated that the substantive criteria are stakeholder dependent. Overall, stakeholders agree on the same values, namely mitigating environmental impact. However, interpretation of values can differ and therefore form conflicts (Dignum et al., 2016). Where proponents of shale gas agree the EIA effectively mitigates environmental impact, opponents disagree, as shale gas is still a fossil fuel and therefore not sustainable.



The quality of the report is also important in determining the effectiveness looking at the substantive criteria. The EIA considers 31 types of effects. For each of these effects a different method was used to measure the risks. Due to the many knowledge gaps, these effects were presented in a qualitative way, which led to four shortcomings.

Firstly, the actual impact of these effects is rather obscure. For example, how does the classification "reachable" differ from the classification "relatively less reachable"? Secondly, as it is unclear how important each risk is relative to one another, it is difficult to compare the locations with regards to

risk. Figure 1 shows the feasibility of the project for each of the locations, yet it is hard to pinpoint the best location in the manner it is presented. Third, the EIA does not take characteristics of certain locations into account. Although a project in the Randstad seems feasible, the number of people living there could mean that the real effects are worse than a nonfeasible project up north. Lastly, in preparing the qualitative results, the EIA performed a sensitivity analysis in order to deal with uncertainty in realizing the potential projects. However, this has only been done per factor individually. It is not hard to imagine that deviations in more than one factor can lead to bigger deviations than expected due to interaction effects between factors.

3. Societal Cost Benefit Analysis

Next to mapping the environmental effects of shale gas, a societal cost benefit analysis (SCBA) was performed to map the economic and spatial effects. It is important to note that the method is a consequentialist one. Thus, the evaluation merely focuses on the consequences and not on the justness of the actions themselves. This chapter discusses the SCBA in detail. Firstly, the research as a whole will be evaluated after which the specific categories are reviewed more in depth.

3.1 General remarks

Because of the uncertainty with regards to how much gas can be extracted in the Netherlands, the SCBA looks into three different shale gas production alternatives. How the provided production numbers in these alternatives were derived is unclear. A broader analysis on various production quantities would have given a better understanding on what the optimum scale of shale gas extraction would be.

Furthermore, the SCBA misses any comparison of the shale gas project to other alternatives for extracting gas for profitable reasons. As the government has limited spending, it is important to find the most profitable alternatives available. It cannot be concluded from the SCBA to what extent the shale extraction is more or less profitable than, for example, coal gas or other ways of generating energy such as wind or solar energy.

There is the inconsistency of the time dimension in which alternatives are being graded. When calculating the profits for shale gas production, data until 2050 is considered, whereas the demand for gas is only calculated until 2036. Some costs are even present until 2096. For an informed decision, these time scales should be consistent.

Different effects have not been valued in monetary terms, as is common in a SCBA. This hinders the comparison of different consequences (Romijn & Renes, 2013). However, even if these effects could be expressed in monetary terms, opponents of the SCBA argue that not all effects can be measured in this way. This brings us back to the earlier mentioned procedural dimension. The current process of a SCBA might not be satisfactory for certain stakeholders, which could lead to conflicts between proponents and opponents of shale gas.

It is assumed that all effects are of equal importance, which is not in accordance with reality. This makes it impossible to create an aggregated value for each of the alternatives. Additionally, due to the controversy of shale gas extraction, different weights could lead to different outcomes of the SCBA.

Lastly, it is important that the benefits and costs are distributed in an equal manner between the national and local level. As any SCBA is egalitarian, it only shows the aggregated costs and benefits. Currently the SCBA does not remark on the distribution enough, although it can be seen that the benefits are mainly on the national level (public treasury) and the costs are at a local level. A solution for this would be to put different weights on different classes of benefits and costs.

3.2 Remarks on specific effects

In the SCBA six different effects are distinguished. Comments and improvements for each of these effects are presented below, except for the effect, "Spatial, environmental and ecological effects", which is coherent with the EIA, reviewed in chapter 2.

Effects on energy prices

The cost of extraction was estimated using literature. Even though this is likely the best approach available, it is unclear how reliable the concluded costs are. Cost of shale gas production is dependent on regulations with regards to mining and the environment, while also being dependent on the condition and location of the shale gas layer. As the EIA itself has stated, much is unclear on the Dutch shale gas layers, except that they are likely not as easily exploited in comparison to American counterparts. The cost of production largely influences the competitiveness of shale gas in the energy market, and thus whether it could reduce prices.

Effects on public treasury

The SCBA mentions the influence of the gas price and the uncertainty of production costs impacting the proceeds of shale gas. The gas price is predicted to rise according to scenarios from International Energy Agency and Nationale Energieverkenning. While the report mentions these uncertainties, they do not adjust their analysis for different scenarios. Prediction of energy prices remain difficult and considering only a single value can lead to different conclusions (Van Santen & Aharouay, 2019).

The benefits to the public treasury are measured in taxes of EBN and the concessionaire. However, it should include costs of mitigating effects for those who would be negatively impacted, similar to the compensation for the decrease in house value in Groningen (Rijksoverheid, 2019).

Effects on energy supply and energy transition

The effects of shale gas use on the energy transition focuses largely on price mechanism effects. Since the SCBA is already qualitative in nature, other aspects should be presented as well. This is mostly with regards to how exploring new non-renewable energy sources seems backwards for a country with ambitious climate goals.

Effects on employment through investments

Shale gas extraction can have positive effects on direct, indirect and induced employment. Since the Netherlands has no experience with the extraction of shale gas, the numbers are based on conventional oil and gas extraction. Differences in labour productivity can result in positive or negative effects on the demand for labour. A sensitivity analysis to examine the effects of these differences is missing. Furthermore, the used input and output tables to estimate the growth in employment do not take scale effects into account, which means that the presented growth in employment is overestimated. Moreover, it is likely that foreign employees will fill the labour demand due to the lack of expertise in the Netherlands. The possible loss of employment in other sectors is ignored. Finally, technological developments that can reduce the demand for labour are not considered.

Effects on property value, tourism and other sectors

The SCBA analyzed the effects of shale gas extraction on property value, tourism, and other sectors. Quantitative estimates of the impact of shale gas drilling on property value can be found in American cases. However, a direct translation of these effects on the Dutch situation is not possible, due to differences in regulations. It is therefore hard to say how big these effects really are. Research suggests that the negative effects of drilling such as noise, visual, and air pollution, could be compensated financially. Additional research should be conducted to determine the height of this compensation. Also, it can be stated that compensation in this shape could be interpreted as bribery (Dignum et al., 2016). Although those compensated are not pushed into performing illegal actions, their behaviour does change due to the compensation, as they will not oppose the drilling plans. The grey area of compensation and bribery, pointed out by Hannis & Rawles (2013) should be kept in mind. The negative effects on the tourism sector and other sectors are more or less known, but it is again difficult to determine the precise impact.

4. Public debate of shale gas

The case of shale gas in the Netherlands cannot be considered without the public debate and the impact this has on policy decisions. Regardless of whether shale gas exploitation is feasible according to SCBA or EIA analysis, it is crucial for large projects to have a positive connotation in the public eye. The public debate will be analyzed using value conflicts, where specifically the role of the formal assessments is highlighted. Value conflicts are often not between different values, but on the interpretation of values (Dignum et al., 2016). As such, it is important that all parties agree on the values considered with regards to technological, institutional and stakeholder values related to shale gas (Correljé et al., 2013).

A case study by Metze (2017) identified several concrete frames which were heavily contested by both sides: expertise in the execution of shale gas, the value of shale gas for the Netherlands, and the role of shale gas in the energy transition. The EIA and SCBA assessments show many uncertainties of shale gas such as production, volume, price, and risks. These uncertainties cannot be seen independently from the contested frames, they are integrated into the different interpretations of proponents and opponents. The public debate highlighted the procedural values, meaning the process, justice, and transparency of current frameworks (Dignum et al. 2016). With these uncertainties these values become incredibly more difficult to manage. For example, how can the accountable institutions give fair distribution of costs and benefits without fully knowing how valuable shale gas is and what the effects on the affected areas are? The uncertainties increase the demand of the public to ensure procedural values are taken into account.

The public debate and controversies help the institutions to get a broader understanding beyond risk assessments. Downer (2015) mentions three critical limitations of risk assessments for nuclear accidents: framing limitations, systematic limitations, and epistemic limitations. They respectively describe the inability to quantify all risk, foresee normal accidents, and have an accurate knowledge of the system. However, these limitations can be applied to the shale gas case as well. The knowledge used in the report comes from foreign sources, often American cases, where it is unclear how relatable they are to the Netherlands. There are still scientific disagreements on the geological conditions, let alone the ability to quantify the risks that come with it (Metze, 2017). With these limitations inherent to the EIA and SCBA, it is important to take the social aspect into account in the decision-making process as risk assessments cannot present the full complexity of the issue.

In general, the controversy around shale gas is missing from the SCBA and EIA. Despite the effects on residents in the form of quality of life or air quality, no interests of citizens are taken into account. A proper way of dealing with the social effects of the extraction, is to perform a social impact assessment (SIA). An SIA is not legally required, however, it can help reduce opposition by involving all relevant parties. A study on shale gas in Lancaster by Szolucha (2016) showed that fear and stress on the impact of shale gas are considerable among nearby communities. The distrust of the local community can lead to significant delays, or even cancellation of the project. While distrust can be caused by many factors, research has shown that public engagement, communication, and strong shale gas regulations can help (Cooper, Stamford, & Azapagic, 2016). A SIA helps to increase public engagement and communication with the local community.

For the SIA, at least the following three social effects need to be considered. Firstly, it is important that the 'crowding out' effect of shale gas is considered (Witt et al., 2017). Investments in shale gas means that resources of other projects, such as renewable energy, will be crowded out. It will extend the life of gas use in houses while other projects such as heat pumps and hydrogen gas have more difficulty getting off the ground (Paylor, 2016). Secondly, an influx of employees can influence the housing price (Witt et al., 2017). Thirdly, the SIA needs to include health symptoms such as stress and anxiety created by the process (Jacquet, 2014). The consultation and high impact of a project such as shale gas can lead to frustration within the community.

However, these social effects are not enough, there is also an ethical consideration when dealing with the community as mentioned by Taebi (2017), social acceptance is not the same as ethical acceptability. Firstly, it is important to make sure that shale gas is accepted by all different social groups in society. The public debate has become an (inter)national question, so it should be very clear where the boundaries are. Secondly, the aforementioned procedural values need to be at the forefront when engaging with the community. It should be made clear what the limitations are of the risk assessments, and engagement with the public should happen from an early stage, so that the citizens can easily voice their opinions. The SIA should not be seen as the end-all solution for social acceptance, but it does help provide insight into the mentioned problems that are not considered at the moment.

5. Conclusion and recommendations

This report examined the performed evaluations for the potential exploitation of shale gas and pointed out critical difficulties that should be kept in mind when deciding on giving a green light for the exploitation.

Due to the low accuracy of the estimations made for environmental effects, the performed environmental impact assessment (EIA) does not contribute sufficiently to the mitigation of relevant environmental impacts. There are too many knowledge gaps, resulting in unclear conclusions. Moreover, the large amount of information, 31 types of effects spread over 800 pages, make it difficult to get a grip on the crucial parts of the EIA. The summary, which should have been a means for creating this grip, fails to do so. In the end, the EIA did affect the decision making, as the EIA made clear that there are too many knowledge gaps to properly execute a shale gas exploitation project.

It can be stated that most of the potential monetary characteristics are taken into account in the executed social cost benefit analysis, although it does not comprehensively cover the quantitative costs and benefits that the exploitation of shale gas will cause. Some specific parameters for the implementation of shale gas were taken into account, such as the volume of gas that could be drilled, or the time period in which profit can be made out of the gas. More research should fill these gaps, which would add up to a well-founded decision.

A more fundamental issue with the performed evaluations is that the social consequences are not considered. The value conflict in the debate highlighted the need to take the social aspect into account. The uncertainties in the risk assessments mean that the procedural values need to be prioritized more. Limitations of EIA and SCBA also stresses that social complexity needs to be added, as decision-making cannot purely rely on these methods. Although the environmental impacts are covered broadly through the EIA and the costs of multiple sorts are presented in the SCBA, the concept of shale gas drilling in society is nowhere to be seen. The public debate on shale gas and the public opinion on the projects that have been framed multiple times, are not present in the evaluations that have been carried out so far. Performing a social impact assessment in addition to the existing assessments would add to the overview of positive and negative impacts of drilling for shale gas. Performing this SIA should be the next step as it helps create understanding and incorporates the community into the process, however, it remains a methodology that can only support the decision, not make it.

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