

# Climate change in EIA – Inspiration from practice

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## Abstract

Climate change integration has been a topic of much interest in the field of impact assessment for a period, and thus far quite some emphasis has been put on discussions of purpose, relevance and overall approaches in both Environmental Impact Assessment of projects (EIA) and Strategic Environmental Assessments of plans and programmes (SEA). However, EIAs and SEAs are already being made, which integrate climate change, and for some aspects this practice has evolved over a long period. This paper seeks to explore this practice and find inspiration from the work with climate change already taking place. For exploring the praxis of integrating climate change in practice a document study of 100 Danish EIA reports is carried out. From these reports, statistics and examples are drawn. The study shows an emphasis on integration of climate change mitigation, using various quantitative tools, but also examples of different variations of climate change adaptation.

## 1. Introduction

Climate change is an emerging issue in impact assessment and specifically EIA. Several authors have dealt with the integration of climate change in EIA and discussed different methodologies for this (see for example Duinker and Greig 2007; Byer and Yeomans 2007). Further, various authorities have published guidance for incorporating climate change into EIA (see for example Federal-Provincial-Territorial Committee 2003) and notably the EU Commission is currently working on such guidance.

Much of the literature on impact assessment and climate change points to at least three approaches to integrating climate change in impact assessment; Mitigation, adaptation and baseline adaptation. These approaches are not new, but are defined in the context of this paper as follows:

Mitigation: What are the expected emissions of greenhouse gasses resulting from the project and how can they be reduced?

Adaptation: How may the project be impacted by the consequences of climate change and how can the project be adapted to this?

Baseline adaptation: How does climate change alter the baseline for the assessments? And what does this mean for the assessment and possible measures?

(Larsen and Kørnø 2009)

Compared to mitigation, adaptation is a relatively new concept, which has until recently received less attention (see for example Biesbroek, Swart and Knaap 2009; Howard 2009).

On this backdrop, the purpose of this paper is to explore the integration of climate change in EIA with a focus on Denmark as a case. Specifically the study will explore whether and how climate change and specifically climate change mitigation, adaptation and baseline

adaptation are integrated in the assessments. The purpose of this is to provide a status of integration of climate change in EIA in Denmark and extract examples for inspiration.

## 2. Methodology

A sample of 100 cases of EIA reports have been gathered and analysed. An overview of the cases is provided in table 1.

Year	1995-2000	2001-2006	2007-2012
Number of cases	4	37	59

Table 1 Overview of EIA cases and publication year

As can be seen from table 1, most of the reports are published after 2001, even though earlier reports have actively been sought out. The reason for this may be the way the cases were collected, since they were found through searching the internet, and reports from before 2001 are not often digitalised. The bias in publication year may be justified by the fact that climate change is a relatively new issue on the environmental and IA agenda - perhaps it is most interesting to study the reports from recent years for inspiration.

Another important feature of the reports is the types of projects, which they cover. The reports analysed are distributed on project types as follows:

- Energy (27 reports 16 of them on windturbines)
- Transport/infrastructure (20 reports, 14 on roads, 6 on energy infrastructure)
- Agriculture/fishery (17)
- Industry (8)
- Leisure (6)
- Nature/forestry (5 reports 4 on nature)
- Waste/wastewater (5)
- Raw materials (4)
- Retail (2)
- Water supply (2)
- Other (4)

Each EIA report has been searched for the keywords *climate*, *CO2* and *greenhouse gas*. For each occurrence it has been registered whether and how it deals with mitigation, adaptation and baseline adaptation. An assessment of a specific impact is only included once, even though it is repeated in the report. The results of the analysis are reported in the next section, starting with an overview of whether climate change and mitigation, adaptation and baseline adaptation are included in the EIA reports.

## 3. Result

In total 71% of the EIA reports analysed have assessed climate change. As illustrated in figure 1, 68% of the reports have dealt with mitigation, while 5% have dealt with adaptation and 7% with baseline adaptation.

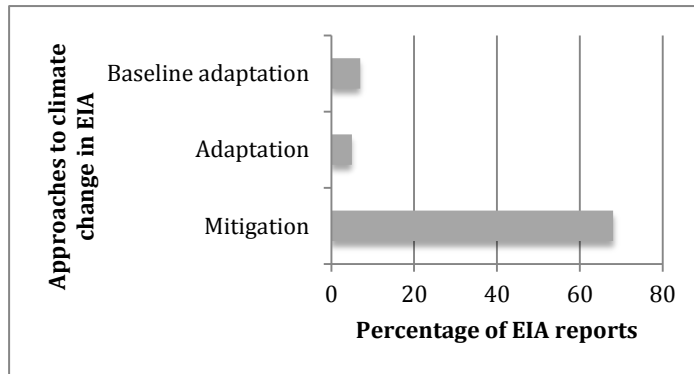


Figure 1 Percentage of EIA reports including the three approaches to climate change.

The analysis shows a clear focus on climate change mitigation in the EIA reports. One reason for this might be that, as mentioned, adaptation is a newer issue on the climate change agenda than mitigation, and thus also in EIA. When viewing the development in integrating adaptation and baseline adaptation in the reports, the analysis shows that adaptation or baseline adaptation was first included in a report in 2008, compared to mitigation, which was first included in 1999.

The following sections report on the results of the analysis of each of the approaches. In each subsection, there is a focus on: 1. Which types of projects typically include the approach. 2. How climate change is assessed 3. Whether the assessment is quantified. 4. Examples from the EIA reports. The analysis of climate change mitigation is most elaborated because there are more reports to analyse, and thus better possibilities of pointing out general trends.

#### *Mitigation*

As stated 68% of the EIA reports include climate change mitigation. The types of projects, for which the EIA typically<sup>1</sup> includes mitigation, are energy, leisure, nature/forestry, resources/mining, and traffic/infrastructure projects. Especially in energy and traffic/infrastructure projects there are many reports, which include mitigation – 96% (26 reports) and 90% (18 reports) respectively. In terms of how climate change has been assessed, the analysis shows that the emission of CO<sub>2</sub> has both been assessed as a positive and a negative impact. Particularly the energy and traffic/infrastructure sectors have slightly opposite tendencies regarding whether climate change is assessed as a positive or negative impact in the EIA. In EIA of energy projects relatively many positive impacts are assessed (22 positive impacts 13 negative), while in traffic and infrastructure projects, relatively many negative impacts are assessed (3 positive impacts, 14 negative impacts). Regarding quantification, 65% of the reports dealing with mitigation quantify the impact. This is mainly the EIA of energy and traffic/infrastructure projects.

<sup>1</sup> Here defined as the project types where more than half of the EIA reports in the study include climate change mitigation.

Example 1: Example 1 is an EIA from 2007 of a group of seven on-shore wind turbines in the municipality of Aalborg in northern Denmark. The EIA is an example of a positive assessment of climate change mitigation as a result of the project, as well as of quantifying the impact. The report states that: *“Wind turbines cause no air pollution, but on the contrary spare the environment emissions of greenhouse gasses, since the burning of coal, oil and natural gas in conventional power plants is replaced by the non-polluting production of electricity...In their service life of 20 years, the wind turbines will decrease emissions of greenhouse gasses with 513.704 tonnes of carbon dioxide... (Aalborg Municipality 2007).* When going through the reports, many of the positive impacts related to energy projects appears to be attributed to the use of renewable energy such as this.

Example 2: Example 2 is an EIA from 2011 of an expansion of a motorway in central Denmark. Here climate change mitigation is assessed as a negative impact resulting from the project. This is due to emissions of CO<sub>2</sub> from both the construction and operational phases of the project. In the report the expected emissions have been quantified for the alternatives and it is concluded that *“There will be a modest rise in CO<sub>2</sub>-emissions of 0,2% compared to the 0-alternative, equalling approximately 3200 tonnes per year, which equals the average emission from the total energy consumption of 320 Danes”.* (The Danish Road Directorate 2011) The last part of the quote is a way of contextualising or assessing significance, which is used in multiple reports.

#### *Adaptation*

As stated previously 5 of the 100 EIA reports include climate change adaptation. Typically the reports deal with problems with events of heavy precipitation and sea level rise and the flooding these two issues may cause. Further some reports deal with the rise in temperature. The reports that deal with adaptation are within the sectors of leisure, traffic/infrastructure, waste/wastewater and other (a project on constructing a dike). In the EIA reports, adaptation is both assessed as both positive and negative in relation to the project. Regarding quantification, only one EIA report quantifies climate change adaptation.

Example 3: Example 3 is an example of climate change adaptation as negative impact and an example of adaptation being quantified. The example is an EIA report from 2012 for a new incinerator at ‘Nordforbrænding’ in Hørsholm Municipality. Here, climate change adaptation was raised as an issue in the hearing for the EIA, where the neighbouring Fredensborg Municipality wanted climate change adaptation in relation to the nearby Usserød stream to be included in the EIA. The EIA states that *“the climate change burden of the enterprise stems from the emissions of CO<sub>2</sub>. Beyond this, the enterprise’s fortified area and roofs will cause drainage of surface water.”* This focus on the adaptation side of the project leads to a calculation of the fortified and roof areas and the volume of water drainage from here. Based on this, adaptation measures in the form of green roofs are planned and a total water balance for the surface water in the area is calculated including the effect of the measures. Interestingly the arguments for implementing these measures are and not water need for the enterprise at all, and not only the risk of flooding of the enterprise itself, but also the

role it can play in the general adaptation in the area. (Environmental Protection Agency 2012)

#### *Baseline adaptation*

As stated previously 7 of the 100 EIA reports include baseline adaptation. As it is the case with adaptation, the reports typically deal with problems with events of heavy precipitation and sea level rise and the flooding these two issues may cause as well as the rise in temperature. The reports dealing with adaptation are within the sectors of energy, nature/forestry, traffic/infrastructure, water supply and other (a project on local drainage of rain water). For baseline adaptation, none of the reports have quantified the impacts.

Example 4: Is an example of using baseline adaptation in an EIA from 2009 for a nature restoration project of a river valley. The report states that “based on the climate change scenarios used, the expected changes in the future climate will have an impact on the water balance in the river valley.” The report proceeds to list the issues of importance, namely: the change in precipitation which will effect the frequency of flooding; the longer period of drought which will mean that the wet areas will dry out for longer periods; evaporation will rise and ground water will be lower. This is used as a backdrop for the assessments made in the EIA. (Environmental Centre Århus 2009)

## **6. Conclusion and discussion**

The study finds that climate change is included in 71% of the EIA reports studied. It can be discussed whether the focus on climate change is high enough? Climate change of course should only be in focus if the scoping shows that it is one of the major concerns in the specific EIA and thus it may be impossible to say something about the need for focus on it in general. However, when viewing the cases in this study, there are examples where the expediency of not including climate change can be questioned. For example a case of expansion of a chemical plant placed on a narrow tongue of land stretching out into a fjord (XX). Here one might argue that climate change adaptation is a relevant issue, but it is not mentioned in the EIA report.

Also the study shows that climate change mitigation is receiving more attention compared to adaptation and baseline adaptation. Part of why this is the case might be that adaptation and baseline adaptation are relatively newcomers on the climate change and thus the EIA agenda. However, there are emerging examples of all three approaches in current practice. The study shows that in climate change mitigation, there is a focus on both positive and negative impacts as well as a relatively high level of quantification. It might still be discussed whether the focus is right in a larger picture? For example in an EIA for expansion in an oil and gas field in the North SEA it is stated that “*the energy consumption for operation of generators and compressors on the rig constitutes the largest source of emissions of CO<sub>2</sub> and NO<sub>x</sub>...*” (DONG , 2011). This issue of the energy consumption on the rig is assessed and quantified, however in the big picture, it seems less significant compared to the impact of the oil and gas, which is produced with the new expansion? This may illustrate the limitations of EIA in terms of aiming at the larger issues, and the need for SEA to step up and supplement EIA.

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