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Analysis of a prominent carbon storage project failure – The role of the national government as initiator and decision maker in the Barendrecht case

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ABSTRACT

CO_2 capture and storage (CCS) represents an important option to mitigate climate change. However, the implementation of CCS is slow. We analysed one of the unsuccessful projects in the Netherlands that is referred to as the Barendrecht CO_2 storage project, with an emphasis on the role of the national government. We performed an event analysis based on debates in the Dutch Parliament, interviews with the relevant stakeholders and published literature. We show that the opinion of the national government regarding this project changed over time. Consensus on the necessity of CCS was assumed at the start of the project. However, over time, the local opposition intensified, and both CCS as a climate mitigation strategy and its implementation, including its location, were contested. An important contributor was the lack of solid outside support, whereas the views of opponents were strongly represented. Additionally, due to multiple delays, the momentum was lost, which ended the enthusiasm of initial supporters. To ensure implementation of future CCS projects, overall national support should therefore be guaranteed prior to the start of the project.

1. Introduction

CO_2 capture and storage (CCS) is considered an important option to reduce CO_2 emissions in order to mitigate climate change (e.g., EU, 2011; IEA, 2013; IPCC, 2005). However, the actual implementation of CCS is slow, as many planned demonstration projects have not been realised (GCCSI et al., 2012). It is anticipated that the contribution of CCS to climate mitigation will be insufficient at the current rate of implementation (Scott et al., 2013). It is therefore important to analyse the cause of the discontinuation of CCS projects. The Barendrecht CO_2 storage project in the Netherlands is an important example of one of these demonstration projects.

In this project, it was proposed that CO_2 produced by a nearby refinery would be stored in two small empty gas fields that are located under the city of Barendrecht, which is a small community in the Netherlands. The Dutch government was responsible for the storage permits and financially supported the project, which would be executed by Shell. Over time, the local opposition increased, and the concept of CCS, as well as its implementation, was heavily debated in the national Parliament, which ultimately led to cancellation of the project.

Wüstenhagen et al. (2007) showed that the introduction of a renewable energy technology depends on three different types of acceptance: market, local community and (national) social–political acceptance. Although CCS is not a renewable technology according to the classic definition, as an environmental technology it addresses similar issues. First, the current acceptance of CCS by the market is generally poor because viable business models for CCS are lacking (IEA, 2013). This was, however, different in the Barendrecht case because Shell tendered for the demonstration project (Kuijper, 2011).

Second, local community acceptance is a problem for many onshore CCS projects (Huijts et al., 2007; Shackley et al., 2009). Similarly, most residents in Barendrecht opposed the CCS project (Terwel et al., 2012). Several previous articles that analysed the Barendrecht project focussed on the local opposition, as it is a relatively new phenomenon (Ashworth et al., 2012; Brunsting et al., 2011; Kuijper, 2011; Oltra et al., 2012; Terwel et al., 2012). However, in most large (infrastructural) projects, the decision does not rest with the local community because the national government plays a crucial role.

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In the Netherlands, the Minister of Economic Affairs, who is a member of the Cabinet and represents the government, has the authority to grant storage permits for CO_2. Additionally, this Ministry is responsible for Energy policies and, as such, may grant financial support for CCS projects. The Dutch Parliament has a monitoring role and can adjust, approve or reject new laws that are proposed by the Cabinet. In exceptional cases, the Parliament can dismiss Ministers and the Cabinet.

The Barendrecht project was cancelled by the national government after heavy debate in Parliament. The lack of local support was used as the main motivation (Economic Affairs, 2010a). Nonetheless, the national government is not always responsive to local opposition, especially when national benefits are deemed to outweigh local concerns. This is, for instance, the case with constructing airports, nuclear power plants or highways. A good example is the realisation of the planned railroad track of the Betuwe cargo route. In spite of intense local protest from the neighbouring communities, the railroad track was built. Interestingly, one of the local communities was Barendrecht, but in this case, their protests were mostly ignored (Parliament, 2004). Furthermore, in the same period as the Barendrecht CO_2 storage debate, the local community at Bergermeer was unable to prevent a large natural gas storage project, despite substantial local protest. The same ministry was responsible for the storage permits, and both cases were discussed at the same meetings in Parliament several times (e.g., Parliament, 2009a). Hence, local opposition may influence the national decision process, but it is not the only explanatory factor for the cancellation of projects. This is supported by recent literature, which also emphasises the importance of interactions between different geographical levels (e.g., national and local in this case) for successful implementation of new technologies (Binz et al., 2013; Coenen et al., 2012).

In this study, we analysed the national decision processes related to the Barendrecht project, including the influence of the local opposition. A better understanding of why the government changed position during the debate, ultimately resulting in termination of a prominent CCS project, will help to successfully realise future projects.

2. Methods

Discussions and (national) decisions of the project were analysed according to the process method 'Historical Event Analysis' (Van de Ven et al., 1999; Poole et al., 2000). An event is defined as the smallest unit of change that can be identified, for example a meeting, a news article, or a discussion in Parliament. The effects of events are however not equal, as some events have a major impact on the final outcome, while other events only contribute marginally. Events were categorised as either local or national. Local events were related to actors at the level of the Barendrecht municipality, which includes local population and politics. National events were related to the national government, as well as the regional administration, scientists and (inter)national non-governmental organisations (NGOs), as these parties do not have direct local interests. Shell acted on both local and national levels. Shell Storage BV, as the executer of the project, was part of the local level, whereas events related to the Shell Company, including Shell Netherlands, were categorised at the national level. We made this distinction because the interests of both parties were not necessarily identical, even though there was obviously much interaction between the Barendrecht project team of Shell and the main company.

For the event analysis on the local level, several academic papers that already addressed this issue in detail were included (Ashworth et al., 2012; Brunsting et al., 2011; Kuijper, 2011; Oltra et al., 2012; Terwel et al., 2012). The literature search also included the newspaper database Lexis Nexis, which covers Dutch newspapers since 1990 (Lexis Nexis, 2014), and official documents, such as the (interim) permit application.

Furthermore, the deliberations on the Barendrecht project in the Dutch Parliament are well documented. The minutes are almost word-by-word transcripts of oral debates between Members of Parliament and the national Cabinet. The written correspondence between Members of Parliament and the Cabinet is also publicly available. We searched all of these documents for the keyword "Barendrecht", followed by a trace back process, as parliamentary documents have dossier numbers that link to older documents in the same series. That made it possible to find documents about onshore CCS demonstration projects before the location of Barendrecht was mentioned. All documents of Parliament were coded in NVivo10 (QSR) and searched for keywords. We hypothesised that 'demonstration or pilot project' reflects a more neutral description of the project, whereas 'experiment' could be related to risks. We therefore analysed the tone of the Parliament debate by including the words 'demonstration' and 'pilot' (in Dutch: 'demonstratie' and 'pilot') versus experimental project (in Dutch: 'proef' or 'experiment'). Additionally, a search on 'necessary evil' (in Dutch: noodzakelijk kwaad) was performed.

To evaluate the interest of the Dutch society on climate change, the newspaper database Lexis Nexis (2014) was searched for the keywords 'climate change' (in Dutch: 'klimaatverandering') and 'greenhouse gas effect' (in Dutch: 'broeikaseffect'). Outcomes were correlated to a survey of the Dutch population on important concerns potentially threatening their future. The question in the survey was: 'What do you think are the two most important issues facing the Netherlands at the moment?' (Eurobarometer, 2014).

Finally, we conducted personal interviews with different stakeholders closely involved in the Barendrecht project. Shell, as well as the national government and the regional administration, made their own evaluations of the project. These evaluations are confidential. However, we have interviewed the people involved in these evaluations, which have been taken into account. Moreover, we have sent draft versions of our study to key stakeholders, who overall supported the analysis.

3. Background and timeline of the Barendrecht project

The Netherlands developed an interest in CCS during the 1990s. It took until the mid-2000s before the first projects were realised, which included an offshore storage pilot project and the delivery of CO_2 to greenhouses by Shell. The Dutch CO_2 storage capacity for the next decades is roughly equally distributed between onshore and offshore (TNO, 2007). Because an offshore demonstration project was already successfully realised in the Netherlands and as onshore storage is in general less expensive, a strong preference for new onshore demonstration projects was expressed by the government (SenterNovem, 2008). Therefore, the national government tendered for two CO_2 storage demonstration projects in 2007 with a payment of €30 million each (Economic Affairs, 2007). The selection process was to take place through a negotiated tender procedure (SenterNovem, 2008). The actual choice of the (onshore) location was left to the applicant.

The tender was confidential. As such, only the two applicants that won the tender are known. DSM AGRO was one of the contenders. In this project, they planned to inject CO_2 generated from an ammonia plant in the South Netherlands into an aquifer below the plant. This project was far less developed compared to the Barendrecht project. For instance, a preliminary Environmental Impact Assessment was not performed, and the project was cancelled due to financial issues before it raised significant public

interests. The Barendrecht project of Shell was the other granted application.

3.1. Choosing Barendrecht

Barendrecht is a small town with approximately 44,000 inhabitants. It is located in the vicinity of the Port of Rotterdam. The population has a relatively high proportion of families with young children. During the national elections in 2006 and 2010, the population had a tendency to vote slightly more on parties with a Christian tradition and significantly less on parties on the left side of the political spectrum (Electoral Council, 2014). During the project, the town council consisted of parties that were all represented in the national Parliament as well. The (non-elected) major was a member from a small orthodox Calvinistic Christian Party (SGP), whereas the alderman responsible for the CO_2 storage project was a member of the conservative Liberal Party (VVD) (see Section 4 for more information on political parties in the Netherlands). Of note, several major infrastructure projects, like the expansion of the highway and realisation of the Betuwe cargo railroad, were built in the area just prior to the CO_2 storage project, which may have sparked the intense local opposition that unexpectedly arose in later stages (Feenstra et al., 2010).

A Shell refinery is located in the Port of Rotterdam 20 km from Barendrecht and has a hydrogen production facility that produces 1 megatonne (Mt) of nearly pure CO_2 annually (Shell, 2008a). Part of the generated CO_2 is sold to greenhouses and delivered by pipeline. However, in winter, when the CO_2 demand from these greenhouses is low, CO_2 is vented from the facility (Shell, 2008a). The storage project proposed to start with the injection of CO_2 in the Barendrecht field, as a daughter company of Shell had been extracting natural gas below the village of Barendrecht since 1997 (Shell, 2008a). This small natural gas field can be considered almost empty as the current pressure is 30 bar compared to the original pressure of 174 bar and would be filled with CO_2 in 3 years. In the second phase, injection would take place in the larger Barendrecht Ziedewij field to store 10 Mt of CO_2 after 25 years (Shell, 2008a). The initial use of the smaller field was seen as a strong additional learning experience, as the whole life cycle of CO_2 storage, from planning to injection and abandonment of the well, could be carried out in a relatively short timeframe.

In short, the techno-economic conditions were ideal for Barendrecht, as the CO_2 was available at low costs and produced in close vicinity. Furthermore, at first sight, the social conditions also seemed positive. In the ambitious vision of the Port of Rotterdam, a major regional employer to become a 'CO_2 free port', CCS played a vital role (RCI, 2007a,b). Furthermore, Barendrecht inhabitants had already had some experience with subsurface activities, as natural gas had been produced there for a decade.

3.2. Project history in short

The selection of the projects in the tender was scheduled in December 2007, and the CO_2 injection should have started by the end of 2009. The tender procedure only addressed the extra funding of these projects by the government, but permitting requirements were not included in this procedure. Shell anticipated that in order to start the injection on time, the permit procedure should begin in 2007, before the decision on the tender. Accordingly, they held their first meetings with local stakeholders in Barendrecht as part of their normal outreach procedure during permitting procedures. The first signs of public unrest could be recognised at the first public information meeting in February 2008, which was attended by 60 people. The next information meeting in April 2008 was attended by 180 people and sparked much more debate (Feenstra et al., 2010). At the end of 2008, after a delay of almost 1 year, the tender was granted to Shell (EU, 2009). In February 2009, approximately 1000 people attended the third meeting (Feenstra et al., 2010). During this time, the national government was reluctant to mention CCS and, in particular, the Barendrecht project. In March 2009, a website was launched with general information on CCS. In the meantime, the independent Commission for Environmental Assessment judged that the Environmental Impact Statement of Shell contained sufficient information to proceed with the permit procedure, as the project complied with the general standards in the Netherlands for external safety (NCEA, 2009, p. 4).

The national government approved the continuation of the project by announcing their intention to grant the storage permit after the completion of a number of extra studies in November 2009 (Economic Affairs, 2009c). When the responsible Ministers came to visit Barendrecht in December 2009 to explain the national government's decision, a turbulent meeting followed in which emotional residents expressed their distrust and anger (NRC, 2009a). In the fall of 2010, a new national government was installed (see also Section 4), and they decided to discontinue the project on 4 November 2010 (Economic Affairs, 2010a). In Fig. 1, the timeline of the most important events is presented.

3.3. Literature review of the Barendrecht storage project

Five social science papers related to the Barendrecht project have previously been published on the Barendrecht storage project. These studies mainly focussed on the local context, although two also addressed some broader observations, which will be discussed in Sections 4 and 5 (Ashworth et al., 2012; Kuijper, 2011). Note that only the papers of Terwel et al. (2012) and Oltra et al. (2012) were written after the final cancellation of the project.

Terwel et al. (2012) determined the attitudes of the population of Barendrecht regarding the storage project. They concluded that the residents were negative about the CCS project, as a vast majority (86%) found the project unacceptable. Most residents stated that the project was 'unsafe' and 'very likely' expected that the project would diminish real estate value. Moreover, most residents perceived the decision-making process as unfair, and they expressed distrust towards Shell and the national government. All of these elements were significant in explaining the attitude of the population.

Brunsting et al. (2011) argued that the lack of proper local participation and good communication attributed to the local opposition. Shell and the government addressed the project mainly from a techno-economic angle, whereas the local community viewed it from a social and local perspective. This led to a mismatch in communication and resulted in distrust of the local community towards Shell and the national government. The authors also argued that local participation in the decision process was too late, and residents did not have any real influence, which amplified the distrust and the negative attitude towards the project.

Ashworth et al. (2012) and Oltra et al. (2012) compared several onshore CCS projects and proposed several critical success factors that are needed for project implementation. Ashworth et al. (2012) argued that the absence of a communication expert from the launch of the project as an integral member of the team strongly contributed to the local unrest. Another causative factor was the discord between the local, regional and national governments, which decreased the public confidence. The lack of flexibility to adjust the plans in accordance with concerns that were expressed by the public further raised opposition. Finally, they stated that the project did not have a proper 'social fit'. This term is used by Hammond and Shackley (2010) to describe how a CCS project fits within the social and cultural history of a specific location.

Oltra et al. (2012) also pointed at the poor social fit and the unfair distribution of costs and benefits. The community felt they

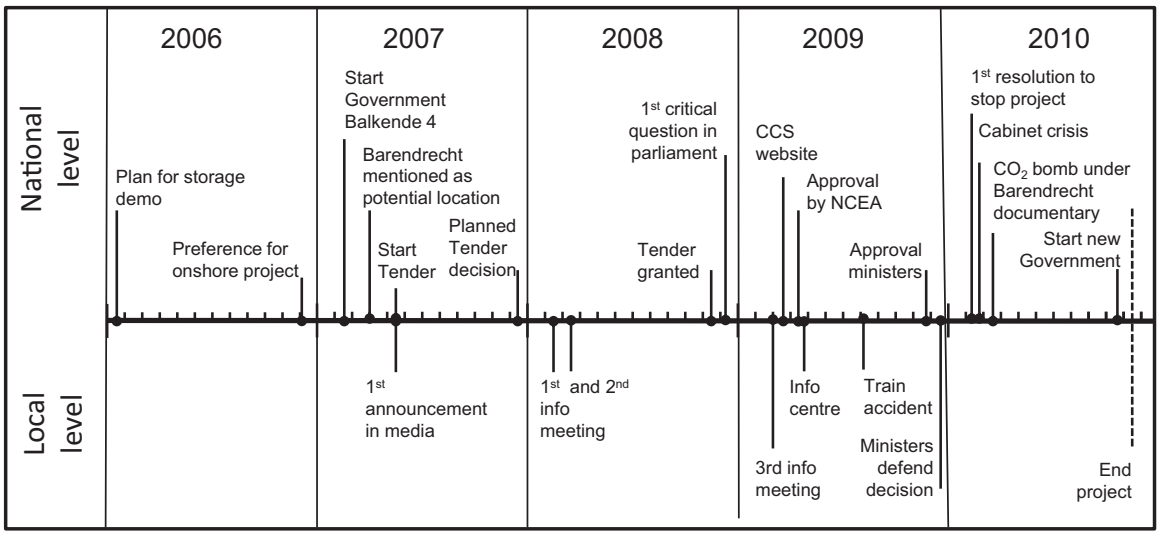

Fig. 1. Timeline of Barendrecht project with a selection of crucial local and national events (see main text for details).

were mostly burdened by the project, whereas Shell would gain the benefits. Moreover, a perceived lack of transparency by Shell and the national government on the costs, risk and benefits, as well as a generic lack of trust in companies, in this case Shell, played an important role in sparking local opposition.

Shell described the key elements of a comprehensive public acceptance strategy based on the experience with the Barendrecht project (Kuijper, 2011). Like the other studies, Kuijper mentions good risk communication, proper local value proposition, good social fit and consensus on the need for CCS as vital factors for local acceptance.

In summary, the termination of the Barendrecht project has been mostly studied in the context of the local opposition and the so-called NIMBY (Not In My Back Yard) syndrome.

3.4. Analysis on the local level

There has been much discussion on the concept of NIMBY, as the name indicates that local opposition is strictly driven by self-interest. However, this is an oversimplification, as other factors may explain local opposition as well (Burningham, 2000; Devine-Wright, 2005). Wolsink (2007) therefore proposed four different types of NIMBY that provide more insight in the motivation for rejecting a local project. The following classification applies to Barendrecht:

- NIMBY Type 1: Positive attitude towards CCS combined with a negative attitude to a project in your own neighbourhood.
- NIMBY Type 2: Negative attitude towards CCS and therefore also a negative attitude to a project in your own neighbourhood.
- NIMBY Type 3: Positive attitude towards CCS, which changes into a negative attitude when a project is proposed in your own neighbourhood.
- NIMBY Type 4: Negative attitude towards the specific project, as it is perceived as faulty in itself, without a rejection of the concept of CCS.

All four types of NIMBY were present in Barendrecht. However, it is difficult to estimate the percentage of the distinct groups of the population that belong to the different types. According to this classification, Type 1 is the classical NIMBY motivated by self-interest. Although Type 1 NIMBY presumably applies to the local population, it is unlikely that the national government is receptive to these motivations. The local government therefore argued that the protest was not driven by self-interest, but that this specific project was faulty (Barendrecht, 2009). In other words, they did not recognise themselves in NIMBY Type 1 but in Type 4. The local protest group 'CO_2 = NEE' followed a different line of argumentation to convince that they should not be classified as Type 1 either. Their web-based petition was titled 'no CO_2 storage in Barendrecht and the rest of the Netherlands', which is in line with NIMBY Type 2 or 3 (Petities, 2013). De Best-Waldhober et al. (2012) determined that approximately 10% of the Dutch population rejected the concept of CCS, after having received thorough and balanced information. It is therefore conceivable that the NIMBY Type 2 group is approximately 10% in this case as well.

Almost the entire Barendrecht population (91%) stated that measures to mitigate global warming were desired. A small majority (61%) thought it was 'a little likely' or 'very likely' that the project could help combat global warming (Terwel et al., 2012). In other words, approximately half of the population acknowledged the general importance of the project. Therefore, this group did not have a (very) negative attitude towards the concept of CCS and was not likely to be motivated by NIMBY Types 2 or 3 but by Type 1 or Type 4. However, we are not able to determine the exact size of the different groups.

In conclusion, local opposition was motivated by different types of arguments, which included poor communication, distrust of Shell and the national government, lack of public engagement, relative unfamiliarity with the technology, perceived negative local impact and absence of benefits for the local population. In the next section, we analyse the national processes.

4. National level: the role of Parliament

The Netherlands has a multi-party political system. In general, approximately 10 parties have seats in Parliament. To provide some understanding for non-Dutchmen on the party system, we divided them into families. The Christian parties are subdivided into the Christian Democrats (CDA), which is the largest Christian party and has a longstanding tradition of governing the Netherlands. The other members of this family consist of two smaller Christian parties with an orthodox Calvinist background (CU and SGP), of which the SGP is the most conservative. Within the liberal family, two parties are represented in Parliament, namely the conservative liberals (VVD), which is the largest, and the progressive liberals (D'66). There are also two parties with a socialist background. The more pragmatic Labour Party (PvdA) has ample experience in

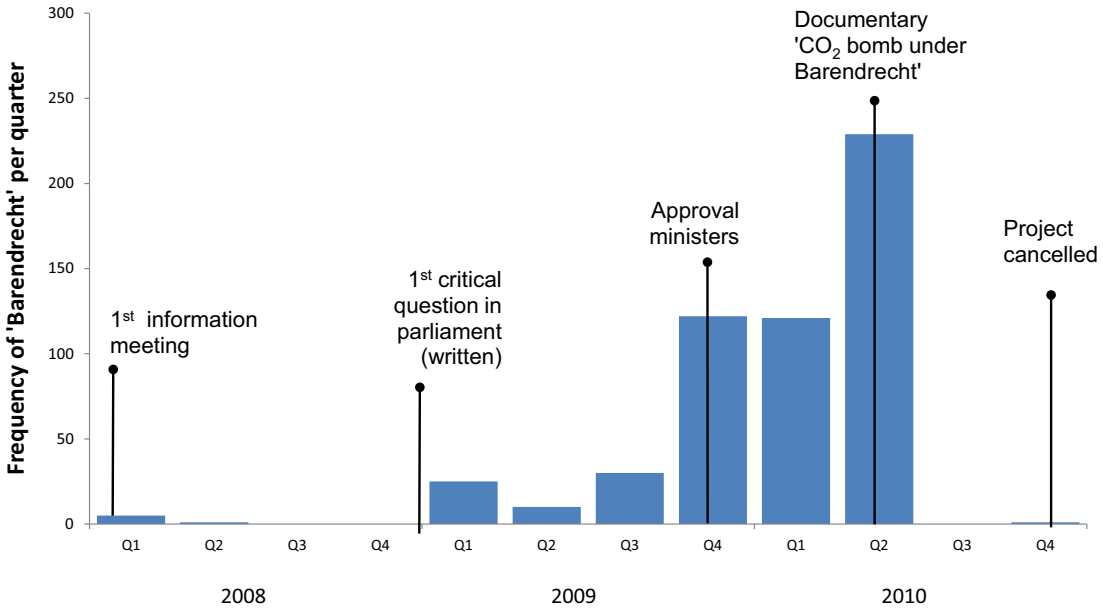

Fig. 2. Frequency of the word 'Barendrecht' in the debates of Parliament over time. Key events are indicated. Q = Quarter. Of note, references to Barendrecht in unrelated topics have been excluded. See main text for details.

governing as well, whereas the smaller SP has more radical and populist views. The Green Party (GL) is located at the left side of the political arena and focusses on social and environmental issues. The freedom party (PVV) has been registered as a political party only since 2006 and has a populist and anti-Islam agenda (Andeweg and Irwin, 2009). In Appendix 1, these descriptions are linked with the official names and abbreviations.

Another very important characteristic of the Dutch political system is the nationwide proportional representation in Parliament. Hence, there is no geographical representation, but Members of Parliament are elected based on membership of a political party and not on regional identification (Andeweg and Irwin, 2009). As Barendrecht is a small town, populated by approximately 0.25% of the Dutch population, its impact on national elections is thus very small.

Furthermore, the Dutch political system is dualistic and separated into the Cabinet and the Parliament with distinctive roles and responsibilities. The Cabinet (core-executive) is formed through a coalition of at least two parties, as no party in history was sufficiently large to have majority in Parliament. The Ministers are part of the Cabinet but are not Members of Parliament. This separation is also visible in the layout of the room where deliberations are held, as the Cabinet (Ministers) sits in a separate part of the room (Bovend'Eert and Kummeling, 2010).

Departments are managed by Ministers. In the Netherlands, each Department is largely autonomous. Consequently, each Department has its own culture, resulting in its own preference for specific policy instruments (Andeweg and Irwin, 2009). The Department of Housing, Spatial Planning and the Environment has a long tradition of interest in CCS, as part of its climate change policy. The Netherlands does not have a Department for Energy. This topic is part of the Department of Economic Affairs, whose focus lies traditionally on affordable and reliable energy. Both Departments were involved in the Barendrecht project, but ultimately the Minister of Economic Affairs was responsible for the storage permit.

The Dutch Parliament consists of two chambers. Despite its name, the First Chamber is secondary in importance to the directly elected Second Chamber, which is the real political forum. The First Chamber lacks the right to initiate and amend bills, and its primary role is the final evaluation of the consistency of new laws (Andeweg and Irwin, 2009). The First Chamber will only be involved once legislation has been passed in the Second Chamber. Because the Barendrecht project was prematurely cancelled, it was not addressed in the First Chamber. Hence, in this manuscript, we use the term Parliament to refer to the Second Chamber only as the source of the debates.

During regular committee meetings, Parliament and the Ministers meet and discuss energy topics amongst others. In the case of disagreements, Parliament can ask for extra clarifications or modifications of the policy. When (part of) Parliament cannot persuade the Minister, they can vote on a resolution. Acceptance of a resolution by Parliament represents a very strong lever to implement the requested changes. If the Minister remains reluctant to conform to Parliament, it has the option to dismiss the Minister as a last resort (Bovend'Eert and Kummeling, 2010).

4.1. Chronological overview of the political debate in Parliament

We found 86 substantive (i.e., non-procedural) documents that were related to the discussion of the Barendrecht project. The first document dates from the beginning of 2006 (Environmental Affairs, 2006), and the last one is the letter from 4 November 2010 with the announcement that the project has been cancelled (Economic Affairs, 2010a). The topic was heavily debated, as the Cabinet sent 41 letters to Parliament, including 16 external reports and reviews. Furthermore, 45 documents were related to the deliberation in Parliament. These included the complete transcript of 23 debates, 17 documents on resolutions and 5 letters with questions from Parliament to the Cabinet. The debate intensified over time, as the word 'Barendrecht' was hardly mentioned before 2009 in Parliament, but mentioning Barendrecht increased during the course of 2009 and the beginning of 2010 (Fig. 2). The debate was put on hold during the summer of 2010, and all decisions were postponed.

Not only did the intensity of the debate increase over time, but the tone of the debate changed as well. We observed that the words 'demonstration or pilot project' reflected a more neutral description of the project, whereas 'experiment' was mostly used in relation to risks. The population of Barendrecht was even described as 'guinea pigs' (Parliament, 2009b). We therefore searched the transcripts of debates in Parliament for these words. In 2008, the word

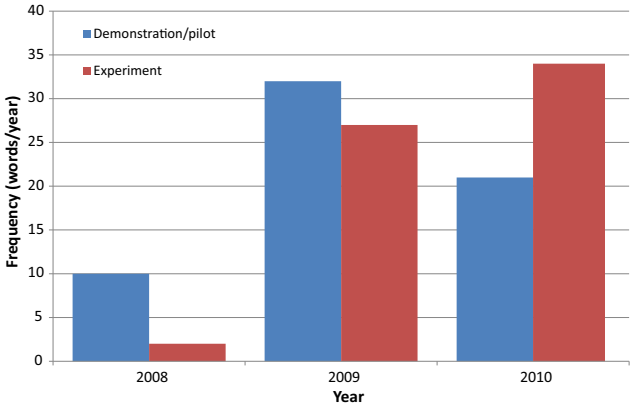

Fig. 3. Frequency of the words 'demonstration' and 'pilot' versus 'experiment' in the transcripts of debates in Parliament over time, as a reflection of the tone of the debate.

'experiment' related to the Barendrecht project was hardly present, but its use increased over time (Fig. 3). On the contrary, the use of the words 'demonstration' or 'pilot' initially increased as the debate intensified, but they were replaced by 'experiment' when the process proceeded, which indicates the debate became more negative.

In the beginning of 2006, the Cabinet prepared a complicated deal on extending the life-span of the Borssele nuclear power plant. This resulted in an extra budget of € 250 million for CO_2 reduction. The Cabinet proposed to split this budget into three similar parts for renewable energy, energy saving and CCS (Environmental Affairs, 2006). At the end of 2006, the Cabinet informed Parliament on details of the Borssele deal. Concerning CCS, they proposed two routes. One route focussed on actual CO_2 reduction by storage of CO_2, whereas the other involved research and development. The first route should be realised through a European tender with criteria cost effectiveness (Euro/tonne of CO_2) and learning effects. Furthermore, there was a strong preference for onshore projects. Learning effects were not restricted to technical aspects only, as improving cooperation between different stakeholders was also included as desired effects. The projects should additionally contribute to the public acceptance of the relatively new and unknown CCS technology (Economic Affairs, 2006).

Members of Parliament asked several written questions about the procedure, planning and cost effectiveness of the tender. One question included the possible locations. In April 2007, the Cabinet mentioned Barendrecht and Drachten, the latter being a small town in the Northern Netherlands, as potential storage locations (Economic Affairs, 2007). In February 2008, several political parties observed social unrest in Barendrecht during a meeting with the Minister of Environmental Affairs and warned the Minister to proceed with care. The Minister answered that the permit procedure was pending and that the Environmental Impact Assessment would be evaluated as usual, after which the Cabinet would take its final decision (Parliament, 2008a). At the end of November 2008, the tender of €30 million was granted to Shell (EU, 2009).

On 15 December 2008, the first critical remarks from Parliament were made when a member of the Green Party asked written questions about the risks, public acceptance and location choice (Parliament, 2008b).

In March 2009, a Socialist (SP) went further, marking the beginning of the oral debate in Parliament. He asked the Minister of Environmental Affairs to take the concerns of the local population seriously and to act accordingly by cancelling the Barendrecht project (Parliament, 2009b). He argued that the local protests were not only NIMBY Type 1, but that the residents disagreed with the concept of CCS (Type 2 or 3). He furthermore stated that his party rejected the concept of CCS, as this technology requires a lot of energy, whereas energy saving should be a top priority of the government. The Minister answered that she took the concerns of the population seriously. However, she provisionally accepted Shell's choice of Barendrecht as the technically optimal location, although she repeated that the final permission depended on the judgement of the Commission on Environmental Assessment. The Minister also announced that the Cabinet would take its final decision in June in collaboration with the local and regional authorities. In the same meeting, an Orthodox Calvinistic Christian (CU) also argued that the protests by the local residents were not simple NIMBY Type 1. She pointed at the absence of a general selection procedure for the location. The Minister replied that studies showed that Barendrecht was the best choice (Parliament, 2009b). The Commission on Environmental Assessment decided in April 2009 that the Environmental Impact Assessment (EIA) contained all of the relevant information and that the external risk of the project was in accordance with Dutch law on industrial activities. According to the Commission, the choice of location by Shell had been guided by sufficient consideration of the environmental aspects, given the framework of the tender (NCEA, 2009).

In September 2009, the Minister of Economic Affairs informed Parliament about pending additional research on the risks, stress-related health effects and alternative storage locations. She also announced a letter in which the Cabinet would explain how the Barendrecht project would fit into the plans for large-scale implementation of CCS in the Netherlands and why CCS was necessary. Finally, she stated that the go/no go decision about the storage permit would be taken in close consultation with the regional administration. However, she omitted the role of the local authorities, in contrast to the commitment of her colleague of Environmental Affairs 6 months earlier (Economic Affairs, 2009b).

During the next meeting, Members of Parliament asked many critical questions about the local acceptance, risks and alternative storage locations. They emphasised that the Cabinet was facing a difficult decision in which the national benefits had to be weighed against local concerns. However, the majority of Parliament refrained from making a final judgement of the project, as they awaited the results of the new studies and the final decision of the Minister. Only the largest opposition party, the Socialists, remained negative (Parliament, 2009e).

In the fall of 2009, the debate intensified as the Ministers were about to make the final decision (see Fig. 2). On 18 November 2009, the Ministers informed Parliament of their final positive decision and intention to approve the storage permit. According to the Ministers, all extra studies showed that the risks were acceptable and that no alternative location with the same benefits was available onshore. According to the study by the research institute TNO, offshore fields might have been suitable as well. Nonetheless, the Ministers rejected this option as the 'realisation of storage onshore was and remains the starting point of the tender'. A shift to an offshore project would not generate new knowledge, would be more expensive and would delay implementation of CCS by years. Finally, they also stated that the actual offshore realisation was questionable, as it was not clear whether the owners of the particular fields were willing to participate in the project (Economic Affairs, 2009a). They did, however, decide to divide the project into two phases. Granting the future permit of the large field was made conditional on a positive evaluation of the first 3-year phase. They also noted that the project was a necessary first step in the preparation of a new law stating that CCS is mandatory for coal-fired power plants (Economic Affairs, 2009a).

The next day, the Freedom Party (PVV) declared its opposition to the project in a meeting with the Minister of Economic Affairs because they acknowledged CO_2 as only 'a fertilizer for trees but not

the cause of climate change'. One of the Orthodox Calvinistic Christian parties (SGP) also opposed the project. The latter questioned the necessity of the project for the implementation of CCS in the Netherlands, as other European countries were now also planning demonstration projects. For the SGP, the local opposition played a crucial role, as they agreed with the notion of the local community that the region had already coped with enough risks from highways and railroads. Finally, the Green Party (GL) rejected the project, as they stated that no CO_2 storage project should be performed in residential areas without a 100% safety guarantee. The Conservative Liberals (VVD) were willing to support the project, on the condition that the Cabinet would support nuclear energy, which was their preferred technology for CO_2 reduction. The two largest parties of the coalition at that time, the Christian Democrats (CDA) and the Labour Party (PvdA), reluctantly still supported the project together with the opposing Social Liberals (D'66) but requested more (financial) compensation for Barendrecht. They also strongly expressed the hope that the second phase would become obsolete after a positive first phase, allowing immediate large-scale implementation in the northern part of the Netherlands. The other Orthodox Calvinistic Christian party (CU), which was part of the Cabinet, refrained from voicing its final judgement (Parliament, 2009a).

Meanwhile, an economic crisis had arisen and the Cabinet proposed a new law to reduce the length of permit procedures for infrastructural projects in order to boost the economy. Because local authorities in the Netherlands can go to court when they believe their interests are harmed by the national government, the new law proposed to eliminate these juridical steps by local authorities (Parliament, 2009c). Many Members of Parliament, including several who supported the Barendrecht project, reacted with indignation when they discovered that the Barendrecht project was included in this new regime. They considered this unfair towards Barendrecht, as it was promised at the start of the process that the project would be discussed in a proper manner with the municipality (e.g., Parliament, 2009d, 2010b). According to the new law, the local government would be stealthily outmanoeuvred, rendering the national government an unreliable partner.

In January 2010, the Conservative Liberals (VVD) stated that they now unconditionally opposed the project, while the few remaining supporters asked for more guarantees and mitigation measures for the Barendrecht community. The Orthodox Calvinistic Christians (CU), the smallest party of the coalition, still refrained from giving a final judgement and requested again more proof that the Barendrecht project was necessary for large-scale implementation of CCS. To even further aggravate the situation, Parliament also debated whether it was legally correct to separate the project into two parts, as the tender specified a storage of 2 Mt CO_2, whereas the storage capacity of the first field was only 0.8 Mt CO_2 (Parliament, 2010c).

Some weeks later, a small majority (55%) of Parliament rejected a resolution to cancel the project. However, the third coalition party (CU) still had severe doubts and filed a resolution to postpone the final decision, which was passed (Parliament, 2010a).

In February 2010, a critical event occurred, as the government had to resign due to a political deadlock on the military intervention in Afghanistan; parliamentary elections were announced (Parliament, 2010d). It is common practice in the Netherlands that no controversial decisions are taken by the outgoing government before a new Parliament has been elected and new Ministers have been appointed (Andeweg and Irwin, 2009). The Minister of Economic Affairs therefore confirmed that the final decision regarding the storage permit was put on hold, as it was considered controversial (Economic Affairs, 2010b). Another important event took place shortly afterwards, as a television broadcast called 'The CO_2 bomb under Barendrecht' aired, escalating the debate again. Shortly after, the Minister was summoned by Parliament to answer critical questions on the risks, local acceptance and necessity of the project (see Fig. 2). Moreover, several Members, including those in favour of the project, accused the Cabinet of withholding crucial information (Parliament, 2010b). The Minister was asked to give Parliament access to an additional new report on CO_2 storage by the Utrecht University, which had been commissioned by her Department. She replied that the study was neither finished nor commissioned by her, which was immediately contradicted by a Member of Parliament who read aloud the order for the report that had been issued by her Ministry. This rendered the report instantaneously controversial, and the incident was significantly covered in the media (Parliament, 2009a). Another resolution to abolish the project was proposed by Parliament but rejected by the same small majority (55%) as the previous resolution (Parliament, 2010e). After all parties were convinced that the Minister indeed would postpone all next steps related to the project, the debate in Parliament stopped.

After the elections, there was no longer a majority in Parliament that supported the Barendrecht project, as all coalition parties had suffered electoral defeat. The new government, with a prominent role for the climate sceptical Freedom Party (PVV), determined that CO_2 storage would only be allowed after granting permission for building a new nuclear power plant and under the conditions of sufficient local support (VVD and CDA, 2010). Considering the very visible opposition in Barendrecht, this led to the cancellation of the project on 4 November 2010 (Economic Affairs, 2010a).

4.2. Analysis of the political debate

During the discussions in Parliament, the debate repeatedly focussed on the conflict between the necessities of the project on the one hand versus local opposition on the other hand. The necessity discussion played on three levels: (1) the need for CCS, (2) the requirement for a small demonstration project before large-scale implementation of CCS in the Netherlands and (3) the necessity of Barendrecht as the location.

(1) Several policy documents presented CCS as an option to reduce CO_2 emissions before the Barendrecht project was mentioned. CCS as a possibility was almost not debated. However, when CCS became a real choice in actual projects, political discussions started. Kuijper (2011) therefore stated that the lack of discussion must not be confused with consensus. It was not surprising that the climate sceptical Freedom Party (PVV) rejected CCS. When the discussion proceeded, it became apparent that the largest opposing party (SP) rejected the concept of CCS on principle as well (Parliament, 2009b). Furthermore, once the discussion broadened, the Conservative Liberals (VVD) saw the opportunity to use CCS as a bargaining chip for their nuclear energy preference (Parliament, 2009a). After 4 years of deliberation, even the supporters of Barendrecht in Parliament referred to CCS as 'a necessary evil' (e.g., Parliament, 2010c, 2010f).

An additional complicating element in the debate on Barendrecht was that the project was framed as a necessary step for large-scale CCS implementation at controversial and new coal-fired power plants. Consequently, the tight link between CCS and contentious coal-fired power plants negatively influenced the acceptance of CCS in Parliament. For example, the Conservative Liberals (VVD) ultimately rejected Barendrecht on the premises that they did not accept the obligation for CCS at coal-fired power plants (Parliament, 2010c.). Remarkably, in spite of the cancellation of Barendrecht, new coal-fired power plants have been built without CCS, which was not contented by the new government. Thus, we conclude that there was no broad consensus on the need for CCS in the Netherlands in Parliament.

(2) There was disagreement whether the Barendrecht project was necessary for large-scale implementation. This discussion was initiated by the Orthodox Calvinistic Christian party (CU) that was

part of the coalition. The government postponed and delayed the project several times, whereas the number of planned CCS projects outside the Netherlands increased. This triggered the discussion whether the Barendrecht project was really indispensable from a knowledge perspective. Moreover, by dividing the project in two parts, the amount of actual CO_2 reduction was decreased by over 90%, which raised questions about the legitimacy of the project due to the specifications mentioned in the tender. In addition to reducing CO_2, the tender also aimed at learning about both technical and non-technical concepts. After the discussion on risks became more intense, the government attempted to alleviate concerns by framing CCS as a safe and well-known technology. The aim of the project therefore gradually shifted towards lessons on cost estimation and procedures on permits. Although these aims are equally important compared to technical lessons to ensure large-scale implementation, Parliament perceived these issues as less important and easier to reach in a different manner without burdening the population of Barendrecht. In addition, several lessons on cost calculation and juridical procedures in the Barendrecht project had already been established, which was the second reason for the new Cabinet to stop the project (Economic Affairs, 2010a). In conclusion, the new government judged the added value of the continuation of the project as too small.

(3) Perhaps the discussion revolved most about the question why the location of Barendrecht was chosen. Gradually, the political arena, including the government and the Committee on Environmental Assessment as an independent advisor, were convinced that Shell selected Barendrecht based on the location of their own natural gas fields. As such, a national assessment for a storage location was lacking. It seemed that at the start of the tender nobody realised that this procedure could lead to an issue of justifying the choice of location. To defend the Barendrecht location afterwards, a report was written about alternative locations. The inventory of locations showed that Barendrecht was indeed the best onshore location. However, this conclusion was not very convincing in the heat of the debate, and the question 'why not offshore' remained. Parliament considered the view of the local community that Barendrecht already had its fair share of large infrastructural projects with corresponding risks as reasonable. The argument of Barendrecht became even more valid when two trains collided at Barendrecht in 2009 on the contested Betuwe railroad (AD, 2009).

We therefore conclude that Parliament doubted all three levels of necessity of the project: the need for the concept of CCS in the Netherlands, the requirement of a demonstration project for large-scale implementation and the necessity of Barendrecht as location.

In addition, the lack of local support played an important role in the deliberation. Parliament took local concerns seriously. Due to the lack of local support, a stronger burden of proof to justify the project was required, as an Orthodox Calvinistic Christian (SGP) remarked (Parliament, 2009a). Nevertheless, Parliament was very careful about accepting NIMBY Type 1 as a legitimate argument. A typical example occurred during a debate on a resolution that proposed to cancel the Barendrecht project. The resolution considered the lack of local support as a justified reason to reject the project. This was contested by a Member of Parliament (who opposed the project as well) because by accepting NIMBY Type 1 as motivation for cancelling, nothing could ever be built anymore in the Netherlands. The submitter of the resolution subsequently called it 'a slip of the pen' and amended the resolution (Parliament, 2010c).

Some parties (SP, VVD, and PVV) opposed the project based on their rejection of the concept of CCS (NIMBY Types 2 and 3). Other parties (GL and SGP) rejected the project as they considered the project itself as faulty, analogous with NIMBY Type 4. The supporters of the project argued that the national necessity to meet CO_2 reduction targets outweighed the local objections.

The final decision was postponed repeatedly to meet demands to demonstrate the necessity and safety of the project. In the 4 years of deliberation, the political landscape changed. In the fall of 2006, Al Gore's 'An Inconvenient Truth' had a huge impact, and climate change was an important issue for the government and society, evidenced by an increase in the number of newspaper articles on climate change and concerns of the public for the environment (Fig. 4). In 2010, the climate sceptical Freedom Party (PVV) gained popularity, resulting in a significant increase in the number of seats in Parliament, and the overall importance of climate change on the political agenda dramatically decreased. For example, the VVD suddenly demanded an independent assessment on the reliability of the Intergovernmental Panel on Climate Change (IPCC) before spending any more money on climate change mitigation (Parliament, 2010g).

The Cabinet also made some serious mistakes. For instance, it was accused of misinforming Parliament about the Barendrecht project by keeping a critical report secret. Furthermore, the credibility of the Cabinet also considerably decreased due to the inclusion of the Barendrecht project in the new permitting procedure, which eliminated the possibilities of the local authorities to appeal the project in court.

Thus, at the end of 4 years of deliberations, almost everything relating to CCS and Barendrecht was questioned by the public and Parliament. Extra information was demanded over and over again, resulting in repeated postponement of the decision, which is a typical example of an arena strategy used by opponents (Devos et al., 2012). We conclude that any enthusiasm for the project had vanished after 4 years of debates and controversies, and even initial supporters of the Barendrecht project considered it a lost cause. The local opposition played an important role triggering the national debate. However, ultimately it was the lack of necessity, as seen by Parliament, that led to the cancellation of the project.

5. National level: the role of other stakeholders

The Netherlands has a long tradition of involvement of interest groups in the policymaking process (Andeweg and Irwin, 2009). In Section 3, we discussed the attitude of the local community in Barendrecht. In the previous section, we showed that their message played an important role in the national discussions. In this section, the role of NGOs, energy companies, regional stakeholders and scientists is discussed, as well as the contribution of Shell.

Stakeholders play an important in lobbying. Moreover, they can influence public opinion and trust by conveying their message (Ter Mors et al., 2010). In May 2007, Dutch environmental organisations and labour unions presented a study on a green energy plan for the Netherlands (Green4sure, 2007). This plan aimed to reduce CO_2 emissions by 50% in 2030 compared to 1990 to be realised through energy saving, renewable energy and CCS. The report mentioned mixed feelings on the concept of CCS by the environmental organisations. Nonetheless, it was agreed that halting climate change was so important that CCS should not be excluded. During the public debate on Barendrecht, the environmental organisations, however, did not publicly support the project. Moreover, after 2008, Greenpeace became increasingly critical concerning CCS because, in their view, it was used as a justification to build new coal-fired power plants (Greenpeace, 2008). At a later stage, they used the media interest on Barendrecht to emphasise this statement. Thus, we conclude that the NGOs did not play a major role in the Barendrecht project or the debate, despite the fact that the project was framed as an environmentally friendly project.

Almost all major Dutch energy companies considered CCS as an important option to reduce CO_2 emissions, but they did not make any public statements on the Barendrecht project either.

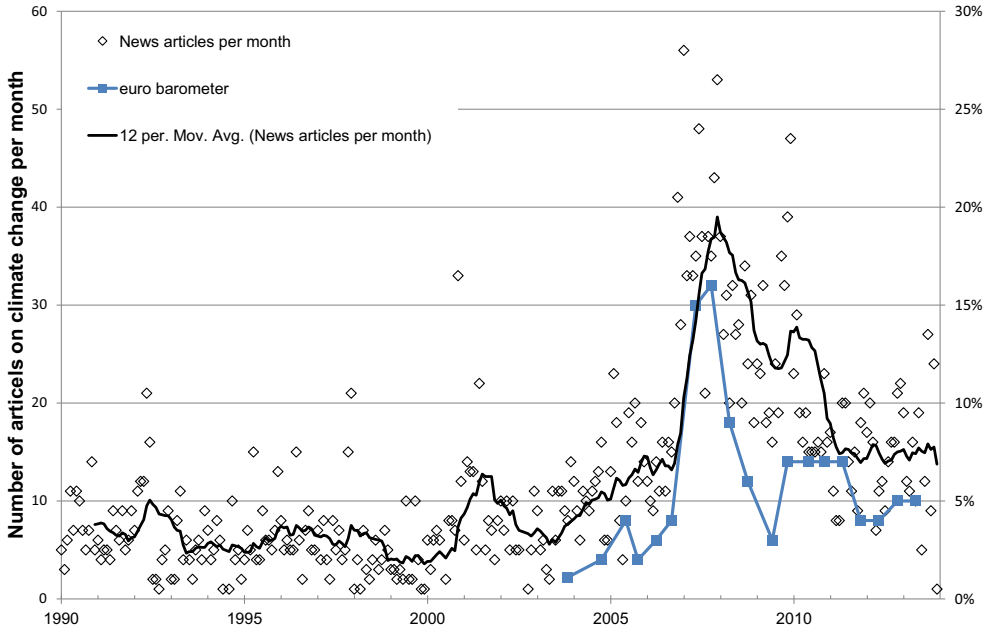

Fig. 4. Number of newspaper articles on climate change and the public opinion on the importance of environmental issues over time. Articles of the Dutch NRC newspaper were analysed with Lexis Nexis (Lexis Nexis, 2014). Public opinion was measured via a survey (Eurobarometer, 2014).

In September 2009, an open letter was sent to Parliament calling for a strong policy supporting large-scale implementation of CCS. Over 30 people, including almost all CEOs of energy companies and research institutes as well as several leading scientists, signed this letter (NRC, 2009b). The letter did not mention the Barendrecht project.

As mentioned in Section 3, CCS was an important part of the climate strategy of the Port of Rotterdam. The focus of the Rotterdam Climate Initiative (RCI) was offshore storage, which seems logical for a harbour. They therefore promoted the concept of CCS but did not explicitly support the Barendrecht project. Mr. Lubbers, former Prime Minister of the Netherlands and ambassador of the RCI, was an exception (e.g., NRC, 2008).

Scientists that supported CCS were largely invisible in the public debate on the Barendrecht project. Most of them participated in the Dutch CCS research programme CATO. It was thoroughly discussed whether the programme should join the public debate. However, the participants were reluctant to voice their opinion in the media because it was deemed important to maintain an impartial position (Van Egmond et al., 2012). In juxtaposition to the relative silence of CCS proponents, a handful of scientists that strongly opposed the project were very visible in the public debate and received ample media coverage. For instance, a professor in inorganic chemistry referred to CO_2 storage in Barendrecht as 'an irresponsible experiment' (NRC, 2009c). Additionally, a retired professor in geochemistry criticised the concept of CCS and proposed an alternative solution to sequestrate CO_2 in rocks. The public and media accepted the alternative views as credible. Consequently, more than 80% of the local Barendrecht population had the impression that scientists disagreed on the safety and necessity of the project (Terwel et al., 2012).

Furthermore, one of the contributing factors of the Barendrecht failure was the lack of alignment between Shell and the national government (Ashworth et al., 2012). This may have been due to the (perceived) unclear responsibility of both parties. Shell felt they were doing the government a favour and expected governmental support, which was disappointing (Kuijper, 2011). The government initially framed the tender as an invitation to industry to realise storage projects. However, in later debates, Shell is referred to as the initiator, implying more responsibility for Shell. Consequently, the local community viewed the project as a Shell initiative, which hampered the credibility of the project (Feenstra et al., 2010). Oltra et al. (2012) noted that CCS projects led by research organisations are likely to be perceived as more credible by the local population.

After February 2010, the government started to perceive Shell as a potential opponent instead of a partner in order to circumvent financial claims by Shell. In short, Shell and the government did not operate as a team, resulting in a faltering approach of the project.

The lack of full internal support in both parties may have played a role as well. The senior management of Shell Company was committed to CCS (e.g., Shell, 2008b), and the project team of Shell Storage BV was clearly devoted, but based on our interviews, we question whether the whole company favoured the project. This is exemplified by the remark of Kuijper (2011) that 'acceptance within the company can also be a challenge and should not be forgotten'. Similarly, full support inside the government was lacking, and the two Departments that were involved in the project had their own agendas on energy policy. For instance, the Department of Economic Affairs, which housed the governmental CCS project team, in fact favoured nuclear energy. The small size of the team that had to address all CCS issues, including Barendrecht, furthermore suggests a lack of priority.

In conclusion, large groups of professionals, including environmental organisations and scientists, shared the opinion that CCS was an important option to mitigate climate change. However, this message was hardly voiced in public. When they advocated CCS in public, mostly the concept of CCS was addressed, but the specific Barendrecht project was barely mentioned. They therefore played a minor role in convincing the local community and Parliament of both the necessity and safety of the project. Furthermore, both the discord between Shell and the government and the lack of internal full support resulted in indecisiveness and diminished the credibility of the project.

6. Conclusions and recommendations

Although NIMBY played an important role in the Barendrecht project, it does not explain the whole story. Quite often, NIMBY arguments are overruled in favour of national interests. Why did this not happen in Barendrecht? We showed that the necessity

of the project was contested at the national level because CCS was a novel and relatively unknown technology. In Parliament, there was no thorough debate on either CCS as a climate mitigation technology or the implementation strategy of CCS before the local unrest started. When the debate started, supporters for CCS outside the project remained silent, whereas opponents were very visual, resulting in a negative attitude towards the project. Furthermore, momentum was lost due to the multiple postponements of the project, as the sense of urgency for climate change measures declined. Finally, the credibility of the arguments of the local opposition increased, after the government made some mistakes with the implementation of the project. Hence, Parliament demanded more proof of the national benefits project in order to overrule the local opposition.

The Barendrecht project is not unique. Quite often, the national government is the initiator but has also the right to make the final decision regarding large infrastructural projects with a conflict of interests between the national benefits and local opposition. We therefore recommend in those projects not only to prepare for possible local opposition but also to prepare a strong coalition at the national level by ensuring explicit consensus and support by national stakeholders before local opposition arises. A proper local implementation, with public engagement, well-designed communication strategies and effective compensation measures among other things, will not only reduce the chance of local opposition but will also decrease the credibility of local opposition in the national Parliament. A strong national coalition can then cope with local opposition when this arises. In Barendrecht, both a strong national coalition and proper local implementation were lacking, ultimately leading to cancellation of the project.

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Appendix 1. Description and names of some Dutch political parties

Description and names adopted from Andeweg and Irwin (2009) and Woerdman (2013); seats (%) in Parliament calculated from Leiden University (2013). The percentages printed in bold indicate that the party was part of the Cabinet.

Table A.1.

The debates in the Parliament are indicated with 'Parliament' and a date that refers to the date of the meeting and not the date of the official approval of the minutes. Letters from the Ministry of Economic Affairs or Ministry of Environmental Affairs are referred to as 'Economic affairs' or 'Environmental affairs', respectively. These documents can be found at www.overheid.nl.

Table A.1
Description and names of most prominent Dutch political parties.

Dutch abbreviation	Short description	Seats in Parliament	
		2006	2010
CDA	Largest Christian party with a long tradition of governing the Netherlands	**27%**	**14%**
PvdA	Largest socialist party, often referred to as the Labour Party, with a long tradition of governing the Netherlands	**22%**	20%
SP	Socialist party, more radical than PvdA, has never governed	17%	10%
VVD	Conservative liberal party, with an ample tradition of governing the Netherlands	15%	**21%**
PVV	Freedom party with a populist and anti-Islam agenda	6%	**16%**[a]
GL	Green and left party with a focus on social and environmental issues	5%	7%
CU	Small orthodox Calvinist party, more progressive compared with SGP	**4%**	3%
D'66	Progressive liberals, founded in 1966	2%	7%
SGP	Small orthodox Calvinist party, more conservative than CU	1%	1%
PvdD	Party for the Animals with a strong focus on environment	1%	1%

[a] The Freedom Party was formally not part of the Cabinet, but it had a special status.

References

AD, 2009. National Daily Newspaper, Barendrecht: het is nu echt, 3 October 2009.
Andeweg, R.B., Irwin, G.A., 2009. Governance and Politics of the Netherlands. Palgrave Macmillan, Basingstoke, UK.
Ashworth, P., Bradbury, J., Wade, S., Feenstra, C.F.J., Greenberg, S., Hund, G., Mikunda, T., 2012. What's in store: lessons from implementing CCS. Int. J. Greenh. Gas Control 10, 169–180.
Barendrecht, 2009. Zienswijze MER ondergrondse opslag van CO_2 in Barendrecht, letter from Barendrecht City Council to Province Council Zuid-holland, 23 March 2009.
Binz, C., Truffer, B., Coenen, L., 2014. Why space matters in technological innovation systems – mapping global knowledge dynamics of membrane bioreactor technology. Res. Policy 43, 138–155.
Bovend'Eert, P.P.T., Kummeling, H.R.B.M., 2010. Het Nederlandse parlement. Kluwer, Nijmegen, the Netherlands.
Brunsting, S., de Best-Waldhober, M., Feenstra, C.F.J., Mikunda, T., 2011. Stakeholder participation practices and onshore CCS: lessons from the Dutch CCS case Barendrecht. Energy Procedia 4, 6376–6383.
Burningham, K., 2000. Using the language of NIMBY: a topic for research, not an activity for researchers. Int. J. Local Environ. 5 (1), 55–67.
Coenen, L., Benneworth, P., Truffer, B., 2012. Toward a spatial perspective on sustainability transitions. Res. Policy 41, 968–979.
De Best-Waldhober, M., Daamen, D., Ramirez, A.R., Faaij, A., Hendriks, C., de Visser, E., 2012. Informed public opinion in the Netherlands: evaluation of CO_2 capture and storage technologies in comparison with other CO_2 mitigation options. Int. J. Greenh. Gas Control 10, 169–180.
Devine-Wright, P., 2005. Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. Wind Energy 8, 125–139.
Devos, C., Lannoo, S., Ossenblok, K., Rommel, J., van Liefferinge, H., 2012. Besluiten tot beleid, Inleiding in de politieke besluitvormingstheorie. Academia Press, Gent, Belgium.
Economic Affairs, 2006. Brief van de Minister van Economische Zaken, 30 000 nr. 44, 4 December 2006.
Economic Affairs, 2007. Brief van de minister van Economische Zaken, 30 000 nr. 45, 16 April 2007.
Economic Affairs, 2009a. Brief van de ministers van Economische Zaken en van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 31 209 nr. 103, 18 November 2009.
Economic Affairs, 2009b. Brief van de minister van Economische Zaken, 31 510 nr. 37, 2 September 2009.

Economic Affairs, 2009c. Brief van de ministers van Economische Zaken, en van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 31 510 nr. 33, 6 February 2009.
Economic Affairs, 2010a. Brief van de minister van Economische Zaken, Landbouw en Innovatie, 28 982 nr. 113, 4 November 2010.
Economic Affairs, 2010b. Brief van de ministers van Economische Zaken en van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 28 982 nr. 104, 12 April 2010.
Electoral Council, 2014. Database with Results of Elections in the Netherlands, Available from: www.verkiezingsuitslagen.nl (accessed 28.07.14).
Environmental Affairs, 2006. Brief van de staatssecretaris van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer over Kerncentrale Borssele, 30 000, nr. 18, 10 January 2006.
EU, 2009. EU Official Journal Publication: 9/2009, 10694-2009, Brussels.
EU, 8 March 2011 COM(2011) 112 final. Brussels 2011. Communication from the Commission to the European Parliament, a Roadmap for Moving to a Competitive Low Carbon Economy in 2050.
Eurobarometer, 2014. Standard Eurobarometer 2003–2013, Commissioned by the European Commission, data taken from www.ec.europa.eu/public_opinion (accessed 14.08.14).
Feenstra, C.F.J., Mikunda, T., Brunsting, S., 2010. What Happened in Barendrecht?–Case Study on the Planned Onshore Carbon Dioxide Storage in Barendrecht, the Netherlands, ECN, Report, ECN-E-10-057, June 2010. Petten, the Netherlands.
GCCSI, Global Carbon Capture and Storage Institute, The global CCS institute, 2012. The Global Status of CCS 2012, Canberra, Australia.
Green4sure, 2007. In: Rooijers, F.J., Boon, B.H., Faber, J., et al. (Eds.), Het groene energieplan. CE Delft, Delft, the Netherlands.
Greenpeace, 2008. The false promise of CO_2 dumping. In: presentation by H. Altevogt, on the 3rd Dutch CCS Symposium, 3 April 2008. Rotterdam area, The Netherlands.
Hammond, J., Shackley, S., (Working paper: SCCS 2010-08) 2010. Towards a Public Communication and Engagement Strategy for Carbon Dioxide Capture and Storage Projects in Scotland: A Review of Research Findings, CCS Project Experiences, Tools, Resources and Best Practices.
Huijts, N.M.A., Midden, C.J.H., Meijnders, A.L., 2007. Social acceptance of carbon dioxide storage. Energy Policy 35, 2780–2789.
IEA, 2013. Technology Roadmap Carbon Capture and Storage Edition 2013.
IPCC, Intergovernmental Panel on Climate Change, 2005. In: Metz, B., Davidson, O., de Coninck, H., Loos, M., Meyer, L. (Eds.), IPCC Special Report – Carbon Dioxide Capture and Storage. Cambridge University Press, Cambridge.
Kuijper, M., 2011. Public acceptance challenges for onshore CO_2 storage in Barendrecht. Energy Procedia 4, 6226–6233.
Leiden University, 2013. Available from: http://www.parlement.com/id/vh8lnhronvx6/zetelverdeling_tweede_kamer_1946_heden (accessed 04.12.13).
Lexis Nexis, http://academic.lexisnexis.nl/
NCEA, 2009. Toetsingsadvies over het milieueffectrapport, Ondergrondse opslag van CO_2 in Barendrecht, 2047-172, Utrecht, The Netherlands.
NRC, 2008. National Daily Newspaper, Zonder CO_2-opslag kunnen we het schudden, 4 July 2008.
NRC, 2009a. National Daily Newspaper, Ministers trotseren boze en bange burgers, 2 December 2009.
NRC, 2009b. National Daily Newspaper, Ook CCS noodzakelijk om klimaatverandering tegen te gaan, R.F.M. Lubbers et al., 2 September 2009.
NRC, 2009c. National Daily Newspaper, Opslag CO_2 in leeg gasveld is niet veilig, Geen experimenten in woonwijk, K.P. de Jong, 5 March 2009.
Oltra, C., Upham, P., Riesch, H., Boso, À., Brunsting, S., Dütschke, E., Lis, A., 2012. Public responses to CO_2 storage sites: lessons from five European cases. Energy Environ. 23.
Parliament, 2004. Onderzoek naar infrastructuurprojecten, Reconstructie Betuweroute: de besluitvorming uitvergroot 29 283 Nr. 7, 15 December 2004.
Parliament, 2008a. Verslag van een notaoverleg mbt het Europese Energie- en Klimaatpakket, 31 209 nr. 25, 27 February 2008.
Parliament, 2008b. Schriftelijke vragen van het lid Vendrik (GroenLinks) aan de ministers van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer en van Economische Zaken over CO_2-opslag in Barendrecht, 2080907720, 15 December 2008.
Parliament, 2009a. Verslag van een algemeen overleg van de vaste commissie voor Economische Zaken en de vaste commissie overleg met minister van der Hoeven van Economische Zaken, 31 209 nr. 111, 19 November 2009.
Parliament, 2009b. Mondelinge vragenuur, vragen van het lid Jansen (SP) aan de minister van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer over dat de minister het CO_2-proef- project in Barendrecht wil doorzetten ondanks de bezwaren van de gemeente en de bewoners, 10 March 2009 61-4886 t/m 61-4888.
Parliament, 2009c. Indiening Crisis- en herstelwet, 32 127 nr. 2, 29 September 2009.
Parliament, 2009d. Verslag van de behandeling van het wetsvoorstel Regels met betrekking tot versnelde ontwikkeling en verwezenlijking van ruimtelijke en infrastructurele projecten (Crisis- en herstelwet 32 127), 24-2140 t/m 24-2204, 12 November 2009.
Parliament, 2009e. Verslag van een algemeen overleg van de vaste commissie voor Economische Zaken met minister Van der Hoeven van Economische Zaken, 31 239 nr. 72, 3 September 2009.
Parliament, 2010a. Stemmingen over moties, ingediend bij de behandeling van het verslag van een algemeen overleg met de minister van Economische Zaken over energie en gasopslag (31 209, nr. 111), 46-4380 t/m 46-4381, 26 January 2010.
Parliament, 2010b. Verslag van het debat over het bericht "CO_2-bom onder Barendrecht", 78-6626 t/m 78-6652, 20 April 2010.
Parliament, 2010c. Verslag van een algemeen overleg met de minister van Economische Zaken over energie en gasopslag, 41-3960 t/m 41-3975, 13 January 2010.
Parliament, 2010d. Brief van Minister president Balkende aan H.M. de Koningin, 32 324 nr. 1, 20 February 2010.
Parliament, 2010e. Stemming over aangehouden motie (28 982, nr. 105), 86-7287, 20 May 2010.
Parliament, 2010f. Verslag voorzetting van het debat over het bericht 'CO_2-bom onder Barendrecht', 79-6691 t/m 79-6701, 21 April 2010.
Parliament, 2010g. Verslag van het debat over 'Verkeerde informatie IPCC-rapport', 48-45538 t/m 48-4559, 8 January 2010.
Petities.nl, 2013. Available from: http://geenco2.petities.nl (accessed 04.12.13).
Poole, M.S., van de Ven, A.H., Dooley, K., Holmes, M.E., 2000. Organizational Change and Innovation Processes, Theories and Methods for Research. Oxford University, New York, USA.
RCI, 2007a. The World Capital of CO_2-Free Energy, Rotterdam, June 2007.
RCI, 2007b. The Route to Large Scale CO_2 Capture and Transport in the Rotterdam Harbour Industrial Complex, Rotterdam, Juli 2007.
Scott, V., Gilfillan, S., Markusson, N., Chalmers, H., Haszeldine, R.S., 2013. Last chance for carbon capture and storage. Nat. Clim. Change 3, 105–111.
SenterNovem, 2008. Europese Aanbesteding–CO_2 opslag in de Bodem–Aanbestedingsleidraad Definitieve inschrijving, 22 May 2008.
Shackley, S., Reiner, D., Upham, P., de Coninck, H., Sigurthorsson, G., Anderson, J., 2009. The acceptability of CO_2 capture and storage (CCS) in Europe: an assessment of the key determining factors. Int. J. Greenh. Gas Control 3, 344–356.
Shell, 2008a. MER Ondergrondse opslag van CO_2 in Barendrecht, Deelrapport 1: Samenvattend hoofdrapport. Shell CO_2 Storage B.V., Den Hague, The Netherlands.
Shell, 2008b. Press Release Shell Urges Government Action on CO_2 Emissions, 7 April 2008, The Hague, The Netherlands.
Ter Mors, E., Weenig, M.W.H., Ellemers, N., Daamen, D.D.L., 2010. Effective communication about complex environmental issues: Perceived quality of information about carbon dioxide capture and storage (CCS) depends on stakeholder collaboration. J. Environ. Psychol. 30, 347–357.
Terwel, B.W., ter Mors, E., Daamen, D.D.L., 2012. It's not only about safety: beliefs and attitudes of 811 local residents regarding a CCS project in Barendrecht. Int. J. Greenh. Gas Control, 41–51.
TNO, 2007. Options for CO_2 Storage in the Netherlands – Time Dependent Storage Capacity, Hazard Aspects, and Regulations, 20 07-U-R0564/B. TNO Built Environment and Geosciences, Utrecht.
Van de Ven, A.H., Polley, D.E., Garud, R., Venkataraman, S., 1999. The Innovation Journey. Oxford University Press.
Van Egmond, S., Brouwer, J.H., Heimeriks, G.J., Hekkert, M.P., 2012. Overview and analysis of the Dutch CCS program as a knowledge network. Int. J. Greenh. Gas Control 11, S1–S9.
VVD, CDA, 2010. Vrijheid en verantwoordelijkheid, Regeerakkoord VVD–CDA, 30 September.
Woerdman, E., 2013. Politiek en politicologie. Noordhoff uitgevers, Groningen, The Netherlands, pp. 350.
Wolsink, M., 2007. Wind power implementation: the nature of public attitudes: equity and fairness instead of backyard motives. Renew. Sustain. Energy Rev. 11, 1188–1207.
Wüstenhagen, R., Wolsink, M., Bürer, M.J., 2007. Social acceptance of renewable energy innovation: an introduction to the concept. Energy Policy 35, 2683–2691.