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The case of the Danish natural gas planning

Lyhne, Ivar

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How strategic dynamics complicate the framing of alternatives in an SEA process: The Danish natural gas security of supply plan

Unpredictable and complex developments challenge the application of strategic environmental assessment (SEA), e.g. in terms of timing, prediction, and relevance of assessments. Especially multi-actor and unstructured strategic level decision-making processes often seem to be characterised by unpredictable and complex changes. Despite apparent implications, explorative investigations about how unpredictability influences SEA application in practice are rare.

This article aims at shedding light on contextual changes and reactions to such changes in practice by a case study of the specific SEA process of the Danish Natural Gas Security of Supply Plan. Special emphasis is given to the framing of alternatives in the SEA process, since alternatives are directly related to the contextual developments. Based on a participative approach, strategic dynamics are mapped and the reactions and concerns in the SEA team are outlined. The contribution of the article is enhanced empirical understanding of strategic dynamics and how it challenges SEA application.

Keywords: Strategic decision-making, strategic environmental assessment, energy, alternatives, unpredictability

Introduction

Decision-making at strategic level has been described as complex and unpredictable, e.g. by de Bruijn and ten Heuvelhof in a multi-actor setup (1999) and by Deelstra *et al.* in the context of large projects (2003). De Bruijn and ten Heuvelhof have found that a multi-actor decision-making process "typically jumps from one partial decision to another, each of them being 'locked into place' for a shorter or longer period". Such partial decisions, they argue, are made in arenas "characterised by a specific mix of political, financial and/or economical, legal and scientific rationalities", where the role of the different rationalities varies between processes. Therefore, they argue, the agenda can change continually and the speed of the progress varies. This description of strategic decision-making seems to share characteristics with Lindblom's (1968) description of public policy-making as apparent disorder, the Garbage Can model (Cohen *et al.*, 1972) and Mintzberg *et al.*'s (1976) structure of unstructured decision-making processes.

To the extent decision-making processes indeed are unpredictable, inflexible impact assessments tools are argued to be of limited use for decision-making (Kørnøv and Thissen, 2000; Lyhne, 2011). Kørnøv and Thissen argue that "... impact assessors can only deal effectively with the dynamics and unpredictability of decision processes if they adopt a flexible, adaptive and learning approach themselves. If they do not, they run the risk of writing a thorough report based on an initial but fixed problem formulation, only to find out after a while that the policy agenda and issues have changed significantly in the mean time, as a consequence of which a well researched report remains unused and ineffective". To reduce

the risk of ending up with a report of little use, contextual awareness and adaptation generally is pointed at as important in SEA application. Hilding-Rydevik and Bjarnadóttir (2007) point at a relationship between context sensitivity and success of SEA implementation, and Hildén and Jalonen (2005) argue that in cases where strategic decision-making is dominated by social struggles, "flexibility and sensitivity to context is a key to successful SEA". Similarly, the Canadian Environmental Assessment Agency emphasises that "environmental assessment must continually adapt to emerging trends, such as changing economic and environmental conditions, new technologies, developments in jurisprudence, and evolving public expectations". (CEAA 2010: 5-6)

One of the aspects that is likely to be influenced by the dynamics of decision-making processes is the relevancy of alternatives proposed in planning and SEA processes. Framing of alternatives is in this article understood as the selection of a specific set of alternatives in a given setting by a group of persons responsible for the content of SEA. In strategic and ambiguous settings, several different framings may be regarded relevant, and consequently, the framing widely depends on the persons involved and their insight into the planning and its context. The framing of alternatives is argued to be a central part of the SEA tool (Noble, 2000) and it is influencing the efficiency of the SEA process (Arts and van Lamoen 2005). Learning from decision-making theory, the framing of alternatives constitutes an information filter in terms of the range of alternatives in play in the decision processes. Cyert *et al.* (1956: 246) assign such a filter "a large influence over the decisions the [managers] can and does reach" and find that in non-programmed decision-making, the search for alternative courses of action is one of the most important processes in decision-making. Kahneman and Tversky (1979) empirically show how specific framings of options influence people's judgement and choice of options. A study of an SEA process in Finland shows that the framing of alternatives influence how the impacts are understood; "environmental impacts often appear most easily as distinctions between the alternatives" (Valve, 1999).

At a strategic level, unpredictability and dynamics may pose major challenges to the framing of alternatives in SEA practice. The question is: How is adaptation done in practice? How do SEA practitioners react to concrete instances of dynamics and unpredictability in the framing of alternatives? These questions are in line with the acknowledged need for empirical research into the potential of SEA to adapt to different decision-making processes (e.g. Brown and Thérivel, 2000).

Empirical studies on the framing alternatives in strategic dynamics

Whereas much SEA literature prescribes models and methods for how to adapt to strategic decision-making (e.g. Dalkmann *et al.*, 2004), research which empirically shows how complexity and unpredictability influence practice, and how complexity and unpredictability is handled by practitioners in SEA processes is limited.

Desmond's (2007) study of Irish practice is one of the few exemptions. Based on review and interview, she identifies a range of problems in the framing of alternatives: "Procedurally, there was a lack of guidelines for identification of alternatives [...]. Institutionally, there was a lack of experience within authorities in the development of alternatives. [...] Legally, time and resource limitations put severe constraints on identification of alternatives". These identified constraints relate to practice in general and may be amplified in cases of high strategic dynamics.

In a study of a Finnish infrastructure planning, Valve (1999) points at the influence of power structures and political aspects in the framing of alternatives. She further comments: "It may be unclear [to the actors] what choices the assessment should shed light on". This unclearness seems to amplify the political struggles over the framing. In cases of high strategic dynamics

and unpredictability, the actors may be forced to make a stand and act on a highly ambiguous basis.

The influence of contextual developments on the framing of alternatives is indicated in Partidário and Coutinho's (2011) story about the decision-making process of the Lisbon new international airport; several framings on possible locations have been proposed during the long history of the airport development and in a number of instances, contextual developments have influenced the framing of alternatives.

Looking more broadly on the relation between decision support and strategic dynamics, Deelstra *et al.* (2003) investigate the use of research in decision-making on large projects and conclude: "Researchers are forced to cope with the dynamic character of decision-making". They advocate for a stepwise adaptation to the strategic dynamics, which, they argue, make it possible to provide knowledge that "may generate new insights and views for the involved actors, thus changing their perceptions and problem definitions".

Similar to Deelstra *et al.*, de Bruijn and ten Heuvelhof (1999) point at the challenge of timing in unpredictable decision-making. They argue that "[t]he idea that research can be restricted to a single moment in the decision-making process ignores the unpredictable nature of decision-making, which makes it uncertain whether sufficient time will be available for the research required. If the actors see a chance to undertake actions to support their interests during the research phase, they will do so."

Contribution and research questions

This article aims at shedding light on the influences of strategic dynamics and unpredictable developments on SEA processes through a case study of a specific SEA process of a strategic planning process. The specific planning process is the preparation of the Danish Natural Gas Security of Supply Plans (NGSSP) in 2008, 2009, and 2010. These plans are made by the Danish transmission system operator Energinet.dk, which is introduced below.

In this article, special emphasis is given to the framing of alternatives in the SEA process, since the framing of strategic alternatives is directly related to the dynamics of the context. The investigation thus empirically shows how contextual developments influenced the decisions made by the group of practitioners responsible for the SEA content and how this team reacted. The research questions are:

- What kinds of contextual changes influence the framing of alternatives in the SEA process of the NGSSP?
- How are these contextual changes handled by the SEA team and what are the reasons for changing the framing of alternatives?

Method and structure of the analysis

The investigation is based on a triangulation of methods. The point of departure is participatory insight, which is supported and contested by document analysis of public documents and feedback from another involved participant. The feedback was given by email and through a semi-structured interview in August 2011 (Nybroe, 2011)

The participatory insight is gained by participation in the SEA team, hereunder in meetings and reviews of drafts in the SEA process on the NGSSP. The SEA team meetings took place twice in the autumn of 2008 and twice in the summer/autumn of 2009. Besides the meetings, a range of issues were discussed in email correspondence. Insight in the strategic decision-making processes is increased by participation in other meetings and internal communication in Energinet.dk, see Lyhne (2011) and Kørnøv *et al.* (2011).

The team that undertook the SEA consisted of two consultants, three employees of the gas division in Energinet.dk, and the author of this article as a Ph.D. fellow. The three employees of the gas division were key persons in the development of gas infrastructures and therefore they coordinated the planning and SEA processes. Other people were included in an ad hoc basis.

The following analysis of the natural gas security of supply planning is chronologically structured. The chronology is mapped to show the complexity and relations between the planning process, the SEA process, the contextual changes, and the Energinet.dk initiatives. Based on the mapping, each contextual change with importance for the SEA process is described followed by a description of the reaction by the SEA team.

The investigation has similarities with the narrative investigation of Cyert *et al.* (1956) of observing a business decision, although the alternatives in the following investigation only concern what Cyert *et al.* term "substantial alternatives" (page 247) as compared to "procedural alternatives". Besides a technological alternative on biogas, the alternatives in the SEA of the NGSSP only concerns infrastructure connections.

The following mapping of developments shows a clear-sightedness of retrospection that does not reflect the ambiguity and complexity of the process as it appeared to the SEA team when it unfolded. The simplicity of the mapping has been a compromise between reproducing complexity and making the mapping accessible to the reader, and only the major and influential developments are therefore included. Furthermore, the arrows in figure 1 indicate linkages and not direct cause-effect relations, since filters and delays blur these linkages.

Introduction to Energinet.dk, the NGSSP and the purpose of the SEA

Energinet.dk is the Danish transmission system operator on electricity and natural gas. It is an independent public undertaking owned by the Minister of Climate and Energy. Energinet.dk is by law obliged to prepare an annual plan for the security of supply of natural gas, cf. circular no. 884 of 21/08/2006. To uphold the security of supply standard, the plan may include frames for new natural gas transmission infrastructure and therefore, it is to be considered in terms of the Danish legislation on SEA.

The investigation covers the process of preparing the NGSSP for 2008 and onwards to the plan for 2010. Parts of this planning process are also described in (Lyhne, 2011). Preceding the planning in 2008 are a number of activities with the purpose of expanding the natural gas transmission system, which among other things has been expressed in a public debate initiative on the strategic options (Danish Ministry of Environment and Energy, 2001a), environmental impact assessments of offshore and onshore gas pipes (Dong, 2001; Danish Ministry of Environment and Energy, 2001b), and a circular (no 16 of 25/01/2002) on an east-west expansion of the transmission system. Parallel to the development of transmission infrastructure is the development of storage infrastructure, which includes development of two gas storage facilities in Denmark.

In order to gain experiences on SEA, Energinet.dk decided to use the natural gas security of supply planning as a pilot SEA application. The natural gas planning involved different options for infrastructure development, and since no infrastructures were decided upon at this point of time, the perception was that application of SEA had the potential to influence the planning. Furthermore, the legislatively required NGSSP was within the scope of the EU Directive (2001/42) as it in principle constituted frames for development; it was argued that Energinet.dk hardly could develop the infrastructure otherwise than what was described in the document. Furthermore, the international infrastructures described in the plan would without doubt lead to significant environmental impacts. The aim of the SEA application was, besides gaining experiences with SEA, to systematically consider environmental effects of the

infrastructure developments in play in the planning process during the formulation of the NGSSP

Despite many years of experience of natural gas security of supply planning, the dynamics at strategic level made the planning of natural gas infrastructure in the period of 2008-2010 an unstructured decision-making process: It had "not been encountered in quite the same form and for which no predetermined and explicit set of ordered responses exists in the organization" (Mintzberg *et al.*, 1976: 246). Consequently, the planners and SEA practitioners faced novel situations, where no existing solutions or programmed procedures were adequate.

The strategic developments and framing of alternatives

An overview of the contextual developments and influences on the SEA process is provided in figure 1. Figure 2 and 3 show the maps of alternatives presented in the SEA scoping report in 2008 and in the SEA report in 2010, respectively.

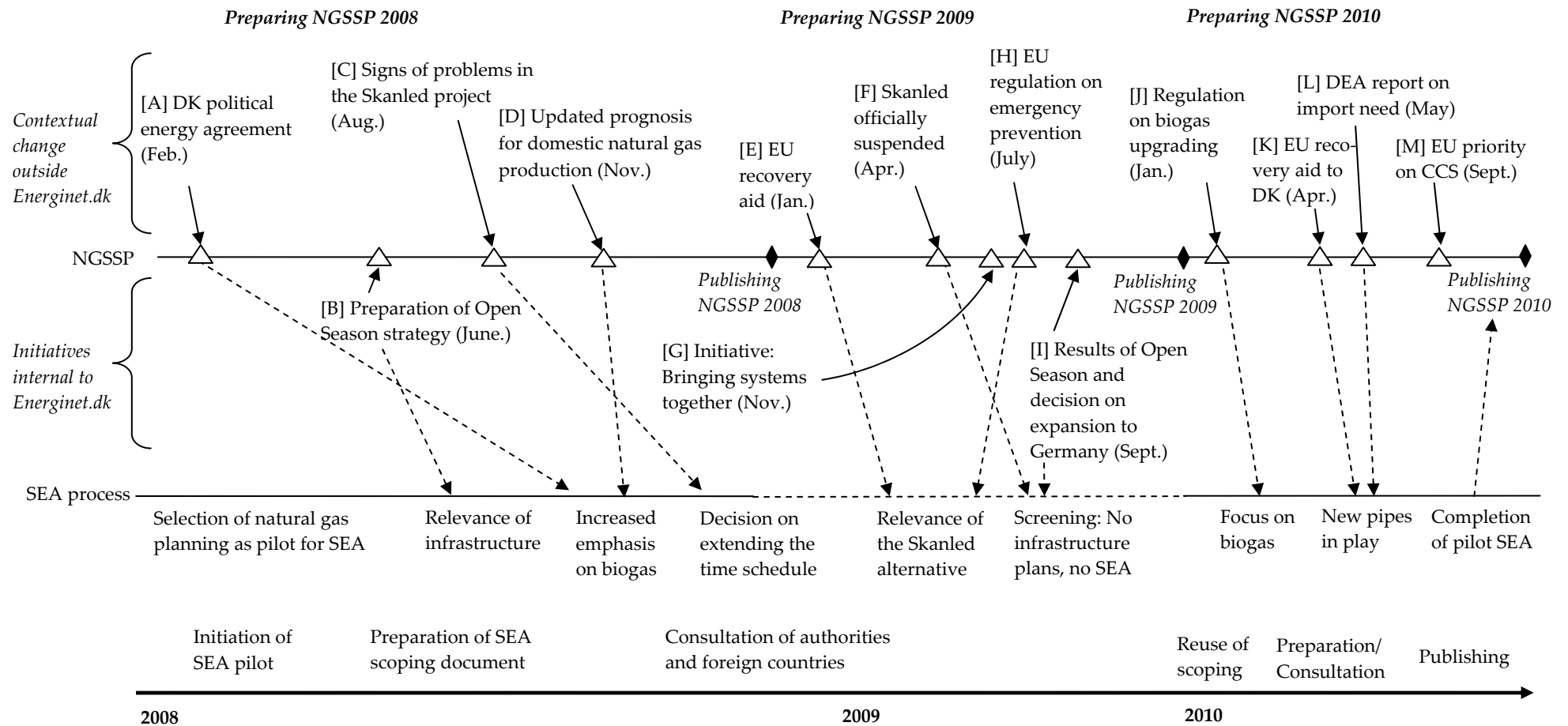


Figure 1. Development of natural gas security of supply plans in Energinet.dk with influences of external and internal activities and the relation to the SEA. Stippled arrows symbolise influence on SEA process and other arrows symbolise influence on planning process. Letters in square brackets are referred to the following text.

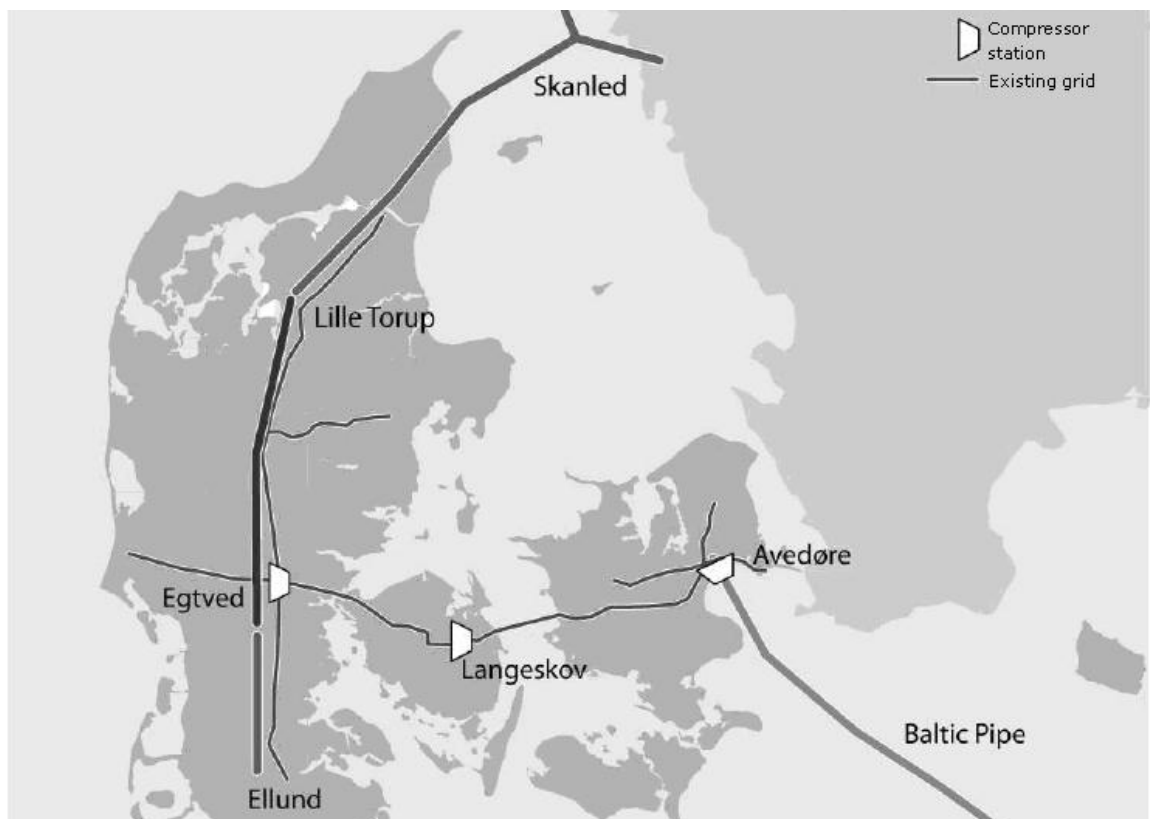


Figure 2. Map of alternatives presented in the SEA scoping report on Energinet.dk's NGSSP'08. The map shows the Skanled Connection from Lille Torup to Norway and Sweden, the connection to Norway and Germany from Egtved to Ellund, and the Baltic Pipe connection from Avedøre to Poland (Energinet.dk, 2008b).

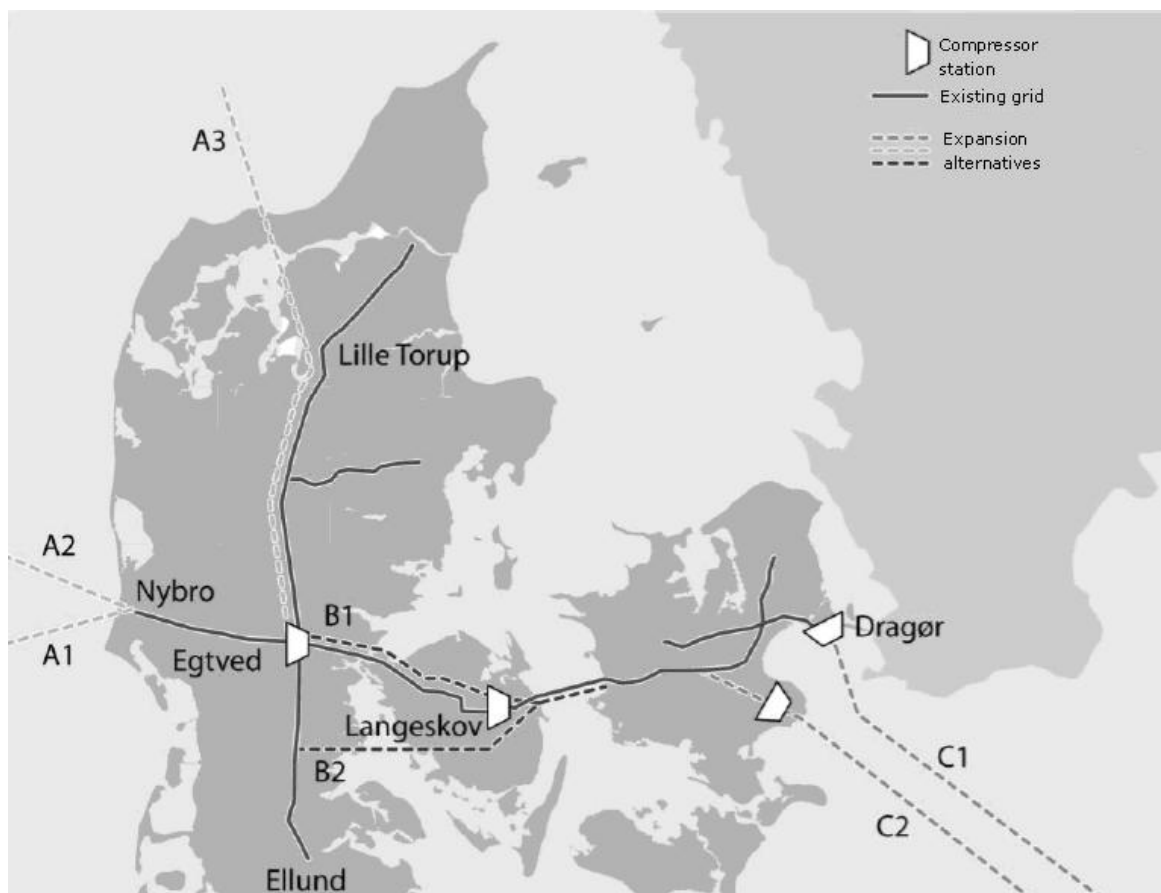


Figure 3. Map of alternatives presented in the SEA report on the NGSSP10. The map shows three alternatives for connecting to Norwegian gas (A1, A2, A3), two alternatives for strengthening the domestic grid (B1, B2) and two alternatives for connecting to Poland (C1, C2) (Energinet.dk, 2010d).

The seeking start in 2008

In 2008, it was evident that the Danish natural gas resources in the North Sea within a couple of years no longer were sufficient for covering the domestic consumption of natural gas. Therefore, the NGSSP involved several thoughts of linking the national natural gas network to the neighbouring gas networks, i.e. the European mainland gas network and the Scandinavian gas network (Energinet.dk, 2008a). The first draft of the SEA scoping report was prepared during the summer. Based on the infrastructures mentioned in the natural gas planning drafts at this point of time, it framed the alternative developments as a zero-alternative and five different international infrastructure developments. These were similar to the infrastructures in the later scoping report visualised in figure 2, but also including a Baltic interconnection between Germany, Sweden and Denmark, and a new connection to the existing infrastructure in the North Sea termed Europipe II.

[A]: In the beginning of 2008, a political energy agreement increased subsidy to biogas (DEA, 2008a). This gave biogas a more prominent role in the long term planning of gas security of supply, and made it more relevant to deal with biogas as an alternative in the SEA.

Reaction: Biogas transport in the transmission network was faced with uncertainty on the relevance and the techniques for achieving the necessary quality for transport and therefore, the SEA team chose not to mention biogas explicitly in the SEA scoping.

[B] During the summer, the Gas Division in Energinet.dk prepared an Open Season approach (see de Joerde and van Oostvoorn, 2006) for providing a better basis for the planning of new infrastructure. This approach facilitated bids and contracts with market actors on natural gas transport capacity prior to development.

Reaction: The market orientation in the Open Season process made it clear that major infrastructure developments were not separable; a connection to Poland was not relevant without connection to the Norwegian gas resources, since the Danish gas resources were not sufficient to cover the cost of the infrastructure. Therefore, the SEA team chose to combine Skanled and Baltic Pipe into one alternative and Europipe II and Baltic Pipe into another in the second draft of the scoping report.

The idea behind Europipe II was to make use of the existing pipes to the gas resources in the North Sea as the free capacity of these pipes was increasing with the decline in production. However, these pipes were private owned and concerns were raised about fees for gas transport through these pipes. Therefore, the Europipe II was excluded from the scoping report of the 2008 plan. The interconnection between Germany, Sweden and Denmark was determined unrealistic due to the complexity of regulations and interests. With only one possibility left for connecting Norwegian gas resources with East Europe, the final SEA scoping report therefore included a) a zero investment alternative with other fuels, b) a minimum alternative with expansion of the connection to Germany that would meet the consumption of gas, c) a 'main alternative' including establishment of Skanled and Baltic Pipe as well as an upgrading of domestic gas infrastructure. The visual presentation from the scoping report is reproduced in figure 2. The scoping report was sent to domestic authorities for consultation and to Germany and Sweden, since the plan was expected to have impact on these countries.

[C] In the autumn of 2008, the economic problems in the Skanled project became evident among the partners.

Reaction: The insight from partnership in the Skanled project lead the SEA team in Energinet.dk to choose to await the development of the Skanled project in order to avoid

ending up with an outdated SEA report. Consequently, the original schedule for the SEA process was postponed beyond the 2008 NGSSP, however, the consultation process on the scoping continued.

[D] In November, the Danish Energy Agency (DEA) published an updated five-year prognosis (DEA, 2008b), which amplified the decline in domestic natural gas production.

Reaction: The decline again brought biogas into the discussions in the SEA team, but due to the postponed SEA schedule, no actions were taken.

The suspension of SEA in 2009

[E] In January, the European Commission reacted on the global financial crisis by presenting the European Economic Recovery Plan (Europa, 2009), which was granting Community financial assistance to projects in the field of energy. This programme allocated 150 million euro to the Baltic interconnection and the Skanled connection.

Reaction: In terms of the NGSSP, the relevance of the Skanled and Baltic Pipe alternatives increased due to the allocation of recovery aid to these connections. The economy of the connections and thereby also the basis for framing of alternatives in the SEA were, however, highly ambiguous.

[F] Despite the EU grant, the Skanled project was suspended in April due to economic problems (Norwegian Ministry of Petroleum and Energy, 2009); the economic crisis had led to decreased interests for gas transmission through that connection.

Reaction: The suspension made the connections to Poland and the Baltic irrelevant, so the only infrastructure in play in terms of the SEA process was the strengthening of the connection to Germany. A member of the SEA team explained: "We noticed that the projects were being suspended and then an SEA did not make sense anymore" (Nybroe, 2011). The SEA process was therefore suspended.

[G] The Energinet.dk initiative of bringing energy systems together (Energinet.dk, 2009), which was initiated by the end of 2008, became part of the NGSSP process in 2009. The initiative led to considerations on the role of natural gas as regulation power, replacing individual gas furnaces with heat pumps or district heating, and use of natural gas and biogas in the transport sector.

Reaction: These aspects were not determined significant enough by the SEA team to enter the SEA of the infrastructure development in the NGSSP, since the consequences for the infrastructure were regarded too uncertain to assess and discuss.

[H] The Russian-Ukrainian conflict and the Russian cut of gas supply in January 2009 led to a proposal by the European Commission of a new decree for emergency prevention and response (European Commission, 2009), which put up requirements on capacity that entered into force in 2010. The regulation required security of supply in N-1 cases, where the biggest supplier dropped out, and in a Danish context this urged a supplement to the supply from the Danish part of the North Sea.

Reaction: The requirements to consider supply in N-1 cases emphasised the relevance of multiple supply areas and storage facilities. Like the planning, the SEA thereby was forced to consider a wider range of alternatives for supply. In 2009, this increased the relevance of the Skanled alternative, but the economy of this connection was still uncertain.

[I] In the autumn of 2009, Energinet.dk's management board followed the Open Season results and decided to work for an expansion of the connection to Germany (Brabo, 2010). This was in line with the Government's emphasis of a need for importing natural gas in 2007 (Danish Government, 2007). Energinet.dk initiated an EIA process in the late 2009.

Reaction: The decision to work for a connection to Germany in practice meant that it was too late for considerations about strategic alternatives in an SEA process. Since the decision to strengthen the connection to Germany was made prior to the security of supply plan, the SEA team found that the NGSSP09 did not include any decisions that set frames for development consent as formulated in scope of the EU Directive on SEA. Therefore, the SEA team judged that the 2009 plan was not within the scope of the Directive, and consequently, an SEA was not made of the plan.

The nuanced framing in 2010

[J] In January, a regulation on biogas upgrading plants and quality was issued to pave the way for the first commercial biogas in the transmission system (Energinet.dk, 2010a). It was expected to lead to injection of biogas into the transmission system by the end of 2010 and biogas therefore became highly topical in the planning for development of the transmission system. The NGSSP10 ended up including thoughts of integration of biogas in the gas supply with upgrading of the quality of biogas prior to injection and transportation in the transmission system.

Reaction: The SEA team determined biogas relevant for the SEA process and included it as a strategic aspect to consider. In the SEA report, the biogas potential were translated into one of the benefits of expanding the gas transmission infrastructure. However, biogas issues did not influence the framing of alternatives; knowledge about biogas generation in different areas of Denmark was seen as still too ambiguous to suggest alternatives, e.g. alternative routing of pipes covering areas with high production or high potential of biogas.

[K] In April, the European Commission announced that Energinet.dk was allocated 100 million euro of the recovery plan grants to expansion of gas infrastructure (Energinet.dk, 2010b). The EU funding would cover half of the decided investments of the expansion of the connection to Germany. Whereas the bidding in the Open Season process only made a compressor station economically viable, the recovery aid made it viable expand the capacity with another gas pipeline.

Reaction: The new pipeline was at this stage in the development process seen as a 'project' and not a 'plan' and was therefore not subject to an SEA process. To minimise environmental impacts, the pipeline was to be located parallel to the existing pipe to and an EIA was made.

[L] In May 2010, the DEA published a report on the expansion of infrastructure for future import of natural gas (DEA, 2010). It identified a need for a connection to the Norwegian natural gas resources and it recommended further investigation of solutions for import from Norway. Moreover, the report pointed at the possibilities for using gas fields in the North Sea as gas storage. These ideas were later reproduced in the NGSSP10 (Energinet.dk, 2010c)

Reaction: The infrastructure requirements and perspectives in the DEA report and in the development of the NGSSP10 made an SEA highly relevant. The 2008 scoping report was reused and the public consultation was initiated in the late summer. The decided expansion of the connection to Germany made it relevant to expand the system towards Norwegian resources without constructing any connection to Poland, although the Norwegian-Poland transmission still was the intension. Furthermore, the suspension of the Skanled connection gave room for rethinking connections to Norway. The framing of alternatives in the NGSSP and SEA work was formed into three parts: Expansion of the system towards the Norwegian gas resources (new concept compared to Skanled), expansion of the east-west connection in Denmark, and a new connection to Poland (previous termed Baltic Pipe). Each of these parts included two or more alternatives as seen in figure 3. Compared to the alternatives mentioned in NGSSP10, the alternatives in the SEA report were less but more specified, e.g. only mentioning two compared to three connection possibilities into the North Sea from Nybroe (A1 and A2). The specification was based on pragmatic and communicative reasons, arguing

that it was not relevant to assess more than the mentioned alternatives; more alternatives would hamper comparison.

[M] During 2010, focus on carbon capture and storage (CCS) increased due to EU priority on CCS, which e.g. was expressed by the Commission's support to large-scale demonstration projects (Europe Rapid, 2010). CCS was part of Energinet.dk's planning and a potential for using the transmission system for transporting CO₂ was considered.

Reaction: The SEA team did not find the formulations in the draft versions of the NGSSP10 sufficiently concrete to be included in the SEA.

The SEA report as well as the NGSSP10 was published in December 2010 (Energinet.dk, 2010d).

Contextual changes and reactions by the SEA team

Based on the analyses, table 1 summarises the answer to the research questions of what kinds of contextual changes influence the framing of alternatives in the SEA process and how are these contextual changes handled by the SEA team and with what reasons.

The investigation of the pilot SEA shows that motivations for proposing and changing the framing of alternatives stem from national politics, financial developments, geo-politics, market developments, and other actors' activities.

Table 1. Strategic developments, their implication for planning, the reaction by the SEA team and the reason for this reaction. Letters in square brackets refer to figure 1.

Contextual change	Example of implication for planning	Example of reaction in SEA and the reason why
Economic changes [C, F]	Suspension of plans on infrastructure expansion	Suspension of SEA process, since the planning no longer includes frames for projects with significant impacts
Structural changes [E, H, J, K]	Attention to EU funds for infrastructure	Inclusion of funded infrastructure due to an increased likelihood of a decision on establishing these infrastructures
Changes in political priorities [A, J]	Increased subsidy to biogas increases the role of biogas in the long term planning	Due to uncertainties about quality, biogas was not explicitly mentioned in the SEA scoping.
Changes in other actors' planning [D, J]	DEA prognosis on a considerable potential of biogas increases the relevance of biogas	Biogas was included in the SEA as a strategic aspect to consider, but not as an alternative as biogas was seen to play a minor role in the years to come.
Changes in market signals [B, I]	Limited need for infrastructure in market bids	Realisation of the interdependency between the alternatives.

The analyses indicate that the framing of alternatives were primarily technically motivated rather than environmentally. As an example, the alternatives for onshore expansion of capacity were motivated by model operations and the routes were partly motivated by considerations of the approval process (B1) and considerations of security of supply (B2). An exemption is the C2 alternative of avoiding the city of Copenhagen area, which was motivated by environmental, economical as well as technical concerns.

Development in the framing of alternatives

Figure 4 summarises the development in the framing of alternatives as a development from a wide range of different connections narrowed into a few “packages” in 2008, and then again split into sub-alternatives in 2010. To some extent, the development in the framing of alternatives reflects a learning process among the participants in the SEA team, but first of all, they reflect the contextual dynamics that made solutions relevant and irrelevant.

In the 2008 process, SEA played a role of facilitating identification of which infrastructure developments were to be seen as relevant alternatives. The framing process in 2008 ended with an understanding of alternatives being mutually dependent, why these were coupled into a main alternative. In 2010, the SEA framing played a role of determining the most realistic alternatives among the alternatives provided in the NGSSP. Partly, this role was motivated by the pragmatic consideration that it is neither relevant nor beneficial for the reader of the SEA report to judge a very wide range of alternatives. Consequently, the SEA framing adjusted the official announcement of what alternatives, Energinet.dk regarded as most relevant. Except these roles, SEA only had a minor influence on the planning process, which also is indicated in figure 1, where the arrows of influence are directed towards the SEA process and not to the planning process. Although the SEA application fulfilled the purpose of systematically considering environmental aspects during the preparation of the NGSSPs, the systematic considerations were overshadowed by the strategic dynamics.

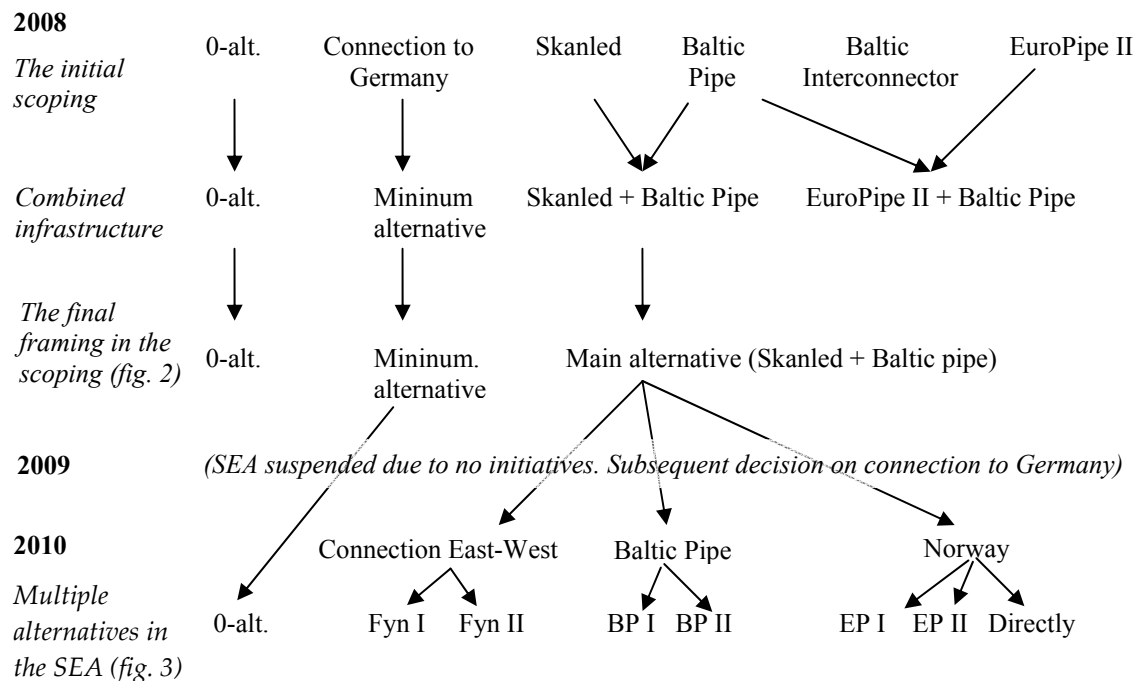


Figure 4. Development in alternatives presented in the SEA documents related to the NGSSPs from 2008 to 2010. The arrows show how specific infrastructure connections over time are combined, omitted or split.

As the investigation shows, the natural gas security of supply planning - and thereby the SEA of it - is developed in interaction with many contextual aspects. Therefore, the 'problem' of the NGSSP seems to be characterised by what Cyert *et al.* (1956: 247) describe as "a whole series of "nested" problems": Natural gas planning is a problem of security of supply, but also a problem of market interests in capacity, a problem of predicting energy politics, a problem of determining potentials in biogas, etc. The strategic decision-making on natural gas infrastructure seems to have similarities with a 'commons' (Hardin, 1968) in the sense that a

range of actors have a stake in it, but no one controls it and it may not end up with an optimal solution for any actor. The character of a commons may be part of the explanation of a range of non-decisions (Bachrach and Baratz, 1962), e.g. on the use of transmission system for transport of CO₂. To the extent that the process has such a characteristic, responsibility for SEA application in the development of international gas infrastructure connection also risk becoming a tragedy of the commons.

The NGSSP represents a type of strategic decision-making processes in which the idea of applying SEA “early enough” (e.g. Sadler, 1996: ii) is diluted due to alternatives being in play in the planning in several years, although with a varying topicality. As the manager in Energinet.dk remarks: “Baltic Pipe has for instance been in play for 15 years now. It is a dynamic long-term process” (Nybroe, 2011). Environmental assessments of a certain set of alternative connections may become of less relevance in the short run due to contextual changes, but at the same time likely to become highly relevant in the future planning.

Concluding remarks

“Prospective decisiveness gets derailed over and over by unexpected events and unanticipated consequences of initial actions” (Weick, 1995: 184)

This study reveals a comprehensive dynamics at strategic level in a period of three years of the Danish natural gas security of supply planning. It shows how unexpected developments and strategic dynamics complicate the framing of relevant alternatives in SEA processes. According to a project manager in Energinet.dk, the strategic developments analysed in this study were not more influential or comprehensive than previous years; “In my view, the variation is normal. It changes from year to year” (Nybroe, 2011). There is thus no indication that the challenges of framing of alternatives on strategic level will be less in the years to come. Therefore, the practices of framing alternatives at this level need to learn how to adapt to these changes and to gain flexibility in the assessment process.

The study indicates that in some types of planning it may be relevant to balance the current focus in SEA literature on targeting decision-windows (e.g. Dalkmann *et al.*, 2004) with a longer-term perspective. Due to strategic dynamics, certain strategic alternatives in the natural gas planning may in some periods be relevant and in other periods be irrelevant: What is relevant may change in an unpredictable way, depending on the contextual changes. Therefore, considering what alternatives have been in play in a historical perspective may be a relevant supplement to focusing on the elements of a specific decision window at a specific moment. With the historical perspective comes knowledge about environmental impacts of certain solutions from previous studies that may contribute to the framing of alternatives.

Compared to Valve’s study about a Finnish infrastructure planning, this study sheds light on the unclearness about what decisions to orient the SEA towards, and thereby on what types of alternatives are relevant. In line with Deelstra *et al.* (2003), this unclearness is in the case of the NGSSPs approached by a stepwise adaptation to the strategic developments. However, the adaptation in the case of NGSSP exceeded the schedules of the annual formal plans and thus indicated an inappropriateness of orienting SEA towards scheduled plans in a dynamic context.

The unpredictability pointed at by de Bruijn and ten Heuvelhof (1999) and indicated in the study is challenging the formal requirements on SEA procedure, which in Denmark in practice means a minimum period of 3 months. Strategic dynamics as outlined in the study can make an SEA irrelevant within shorter time, and the study indicate a need for considering whether the requirements should allow for a shorter SEA process.

In terms of Hilding-Rydevik and Bjarnadóttir's emphasis on the importance of the context and Kørnøv and Thissen's argument that impact assessors need to adopt a flexible and adaptive approach, this article provides an empirical case of how context is coped with in practice. The case may increase the interest in the relation between the changes and the responses by the

people involved in the SEA process, especially in the framing of alternatives. The case is hoped to be an input to a refinement of the way we conceptualise strategic dynamics and how we understand adaptation of SEA in such settings.

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