

1. PUBLISHABLE SUMMARY

Summary of the context and overall objectives of the project (For the final period, include the conclusions of the action)

The European Union has set itself a long-term goal of reducing greenhouse gas (GHG) emissions by 80-95% when compared to 1990 levels by 2050. In December 2015, at the United Nations Climate Change Conference (COP 21), the Paris Agreement was adopted, whereby Parties agreed to "pursue efforts" to limit global temperature increase caused by human-induced climate change to 1.5°C. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. At the same time, the demonstration of carbon capture and storage (CCS) technologies, highlighted to be an indispensable mitigation technology by the vast majority of global climate models, is losing traction, especially in Europe.

Although a full chain has yet to be demonstrated in Europe, CCS technology is available and could be applied in power generation sector as well as in industrial sectors, but so far there has been no viable business case to facilitate deployment. ETIP ZEP (Zero Emission Platform, now a European Technology and Innovation Partnership), advisor to the European Commission on the research, demonstration and deployment of CCS, has put considerable effort in developing a strategy and providing an action plan for the future CCS deployment in Europe. The actions proposed by ZEP are: 1) Decouple the capture of CO₂ from transport and storage; 2) Develop CCS in phases through (expanding) infrastructure hubs; 3) Optimize available funding and create mechanisms to commercialize CCS; 4) Engage Member States through 2050 decarbonisation plans to enable the development of transport and storage infrastructure.

The 2-year H2020 project GATEWAY, which started in May 2015, aims to set the ZEP Executable plan into action and accelerate the deployment of CCS, notably by developing a model case aimed at commencing an initial cross-border gateway connecting available CO₂ sources and possible sinks.

The objectives of GATEWAY are:

1. To define a Pilot Case, providing a model for establishing a European CO₂ infrastructure project, targeting a gateway transferring CO₂ from source to sink.
2. Define a subsequent EU CO₂ Project of Common Interest (PCI), which if selected, can benefit from accelerated permitting procedures and improved regulatory conditions, and may be eligible for financial support from the Connecting Europe Facility (CEF).
3. Align the stakeholder's interests and engage Member States strategies.
4. Develop a business case for the Pilot Case project by addressing the risks and proposing measures for de-risking as well as assessing the funding needs and proposing possible financing mechanisms.

There are many stakeholders and factors involved that will affect a CCS project's technical and financial viability. Economic and policy conditions are vital for the realization of CCS. Furthermore, due to the considerable capital investment requirements of CCS and current political uncertainty concerning EU climate policy, stronger incentives for private enterprises are needed to increase pace of CCS development. In addition, the assessment of safety, risk, and environmental effects will also be crucial for gaining public acceptance of CCS. The CCS chain, if not wholly owned by one company, will involve several different stakeholders who will have different business goals and strategies. Clear models for ownership, risk and profit sharing, and liabilities are also desired. The GATEWAY project is addressing these factors by organising the work along the following five main axes ('The GATEWAY landscape'): 1. CCS technology, 2. CCS market, 3. Public perception of CCS, 4. Legal and regulatory framework, 5. Public funding schemes and policy makers.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far (For the final period please include an overview of the results and their exploitation and dissemination)

Initially, an implementation plan was made by adopting a phase-gate process development model, which is an established project management technique. This model breaks up the process into series of phases that are individually reviewed in a sequence and at the end of each phase the project is evaluated against a number of criteria and decisions are made on further progress. This model provides a roadmap that helps to move the project forward from identifying the Pilot Case to development of a Business Case and a PCI proposal.

In the first reporting period we have defined a Pilot Case. It was considered important to first look into a range of possible cases with different types of configurations. Both in terms of technical aspects, but also in terms of some of the key criteria, such as legal issues, public acceptability and structure of a business case. Each of the candidate cases were also designed to meet the minimum PCI requirements. The final candidate cases were reduced to four and these were then subjected to an analysis of their merits against some defined key criteria. Based on the scoring results and discussion, it was decided to pursue 'Rotterdam Nucleus' as our Pilot Case. The Rotterdam Nucleus Pilot Case will be refined and developed during the second (and last) reporting period of the GATEWAY project, with key technologies, a Business Case description and a PCI proposal.

Along the way GATEWAY has kept the dissemination level high, making sure to spread the word about the GATEWAY project. Key stakeholders have been invited both to interactive stakeholder meetings, representatives of the project team have been present at relevant events and conferences, and we have communicated online through our web page (<https://www.sintef.no/projectweb/gateway/>), blog posts at the #SINTEFenergy blog and through our Twitter account (@GATEWAY_CCS). We have also kept a close dialogue with members of the European Commission, representatives from the Port of Rotterdam, North Sea Basin Task Force, and with ETIP ZEP, among others.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

The GATEWAY PCI aims to become a facilitator for CO₂ capture and storage in the regions it links, Antwerp, Rotterdam, and the UK. Late 2015 the UK cancelled the CCS competition, delaying the construction of pipelines from UK industrialised regions into the UK North Sea. This affects public perception of CCS and of CO₂ transport; this also delays the opportunities for connecting the GATEWAY PCI to other CCS infrastructure. The conclusion from these recent events in the UK should be that the GATEWAY PCI becomes even more relevant for the early development of CCS in north-west Europe. Generating positive public perception will be more challenging, but the impact of the GATEWAY PCI will be even stronger than anticipated at the start of the GATEWAY project.

As an additional activity, GATEWAY has become a member of the Thematic Area Cross-border carbon dioxide network that is managed by DG-ENER and that supports DG-ENER in the management of the submission process for CO₂ PCIs. Membership of this Thematic Area will help

GATEWAY to not only focus its efforts on providing material dedicated to the PCI submission, but also to help shape the submission process.

Address (URL) of the project's public website

<https://www.sintef.no/projectweb/gateway/>

Pipeline routes and fields for the pilot case, Rotterdam Nucleus

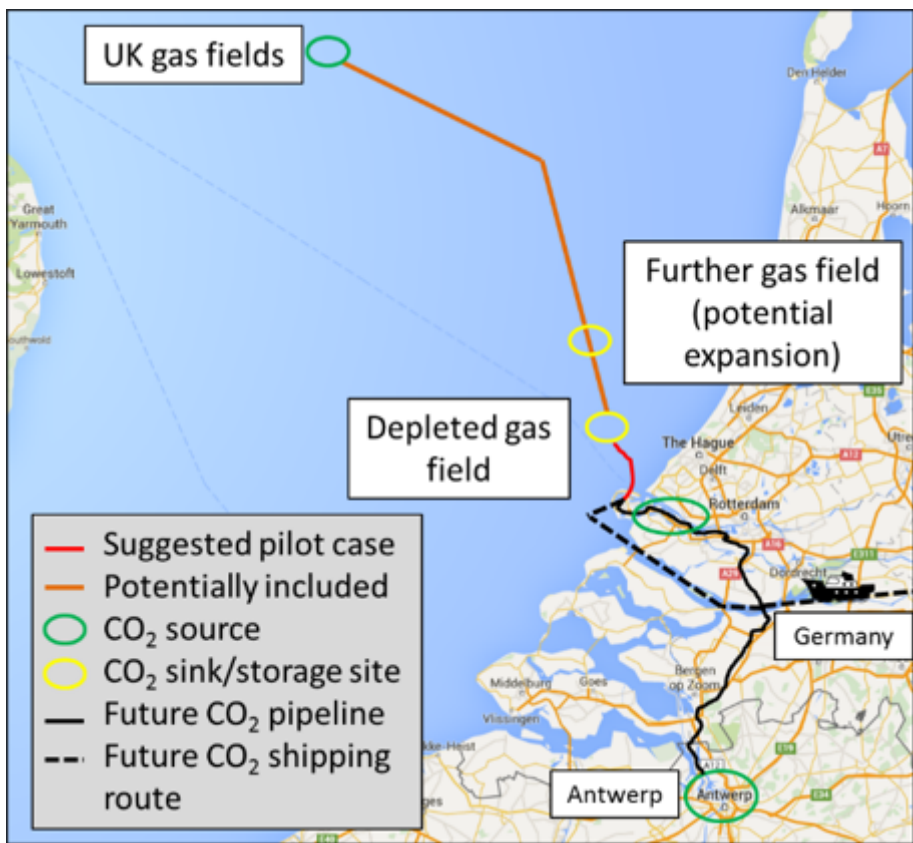
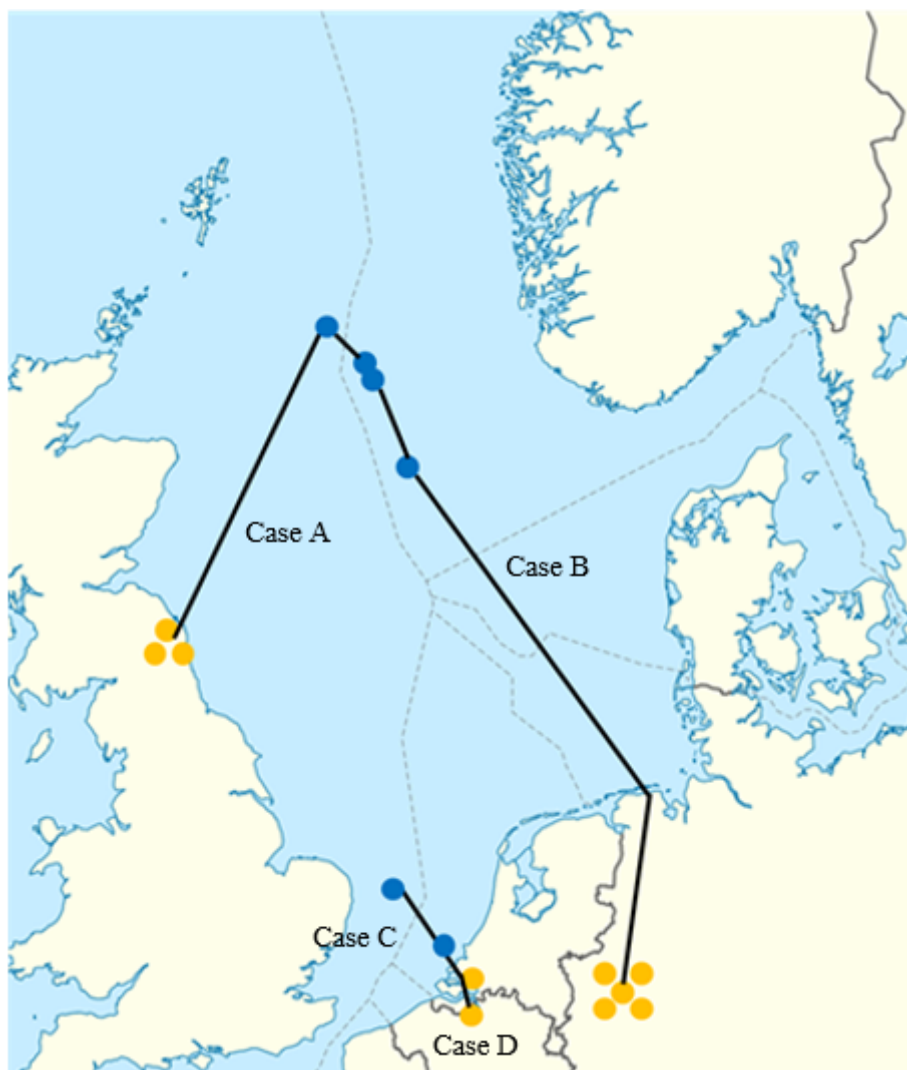
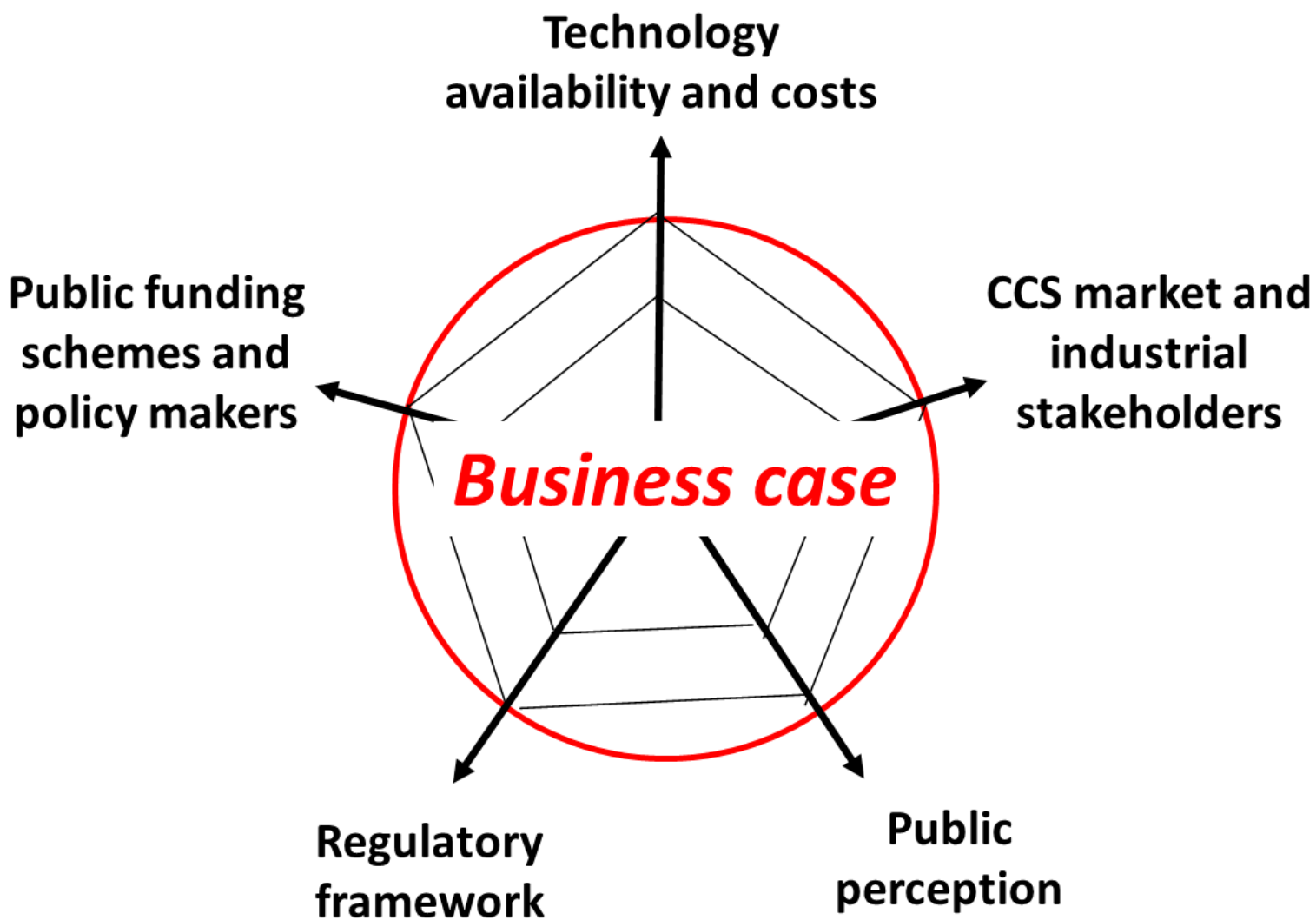


Diagram illustrating the location of possible candidate cases



GATEWAY landscape - axes forming the Business Case for the pilot case



GATEWAY pilot case implementation plan

