Guidance on CCS permitting, including description of Permitting Guidance Tool

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Executive Summary (restricted)

This report was produced as part of WP4.2 in the CATO2 Research Programme; the focus of this work package is on *permitting and best practices* for Carbon Capture and Storage (CCS) projects in the Netherlands. The underlying goal is to make the permitting process for the operators of CCS projects as efficient and smooth as possible. This report aims to provide a *guidance on the permitting process* for the most likely CCS chains - combinations of one or more components, i.e. CO_2 capture, transport, and storage - for interested companies, authorities, NGOs, etc., based on:

- Differentiation between the components in the permitting process, with due attention to relevant permits and their timelines from application to draft or final permit;
- A specification of the applicability of the National Coordination Scheme (NCS, Rijkscoördinatieregeling), and the Competent Authorities for individual permits;
- Summaries of relevant information from existing cases, to enable also a quick overview of relevant information for other and new projects, including permitting issues reported by stakeholders, such as the ROAD consortium, TAQA, Essent (RWE), and Air Liquide;
- A 'Permitting Guidance Tool', reflecting the items bulleted above and showing decisions in the various stages of the permitting process for the defined case.

Various CCS chains may be realised in the Netherlands. For each of them, the permitting procedure may be different, *inter alia* because some CCS chains do not encompass all three components. However, there may also be comparable demands with respect to permitting. This report and the 'Permitting Guidance Tool' show the main characteristics of permitting, with due attention for the National Coordination Scheme, the Environmental Impact Assessment, both of which use to be mandatory but give some options to choose. Also, a few acts and permits are highlighted:

- General Environmental Conditions Act (Wabo);
- Emission permit (EU ETS);
- Permit in the framework of the Nature Conservation Act.

Furthermore, issues with regard to permitting of CCS chains are reported based on interviews with stakeholders (the emphasis on and the wording of these issues are the responsibility of the authors).

The report and 'Permitting Guidance Tool' show that the ROAD project requires a total number of thirteen permits or exemptions. For comparable CCS chains a similar number of permits or exemptions may apply. However, if onshore CO_2 storage would be chosen, a much larger number of permits or exemptions may apply. It turns out that the timeline for permitting up to the draft permit ('ontwerpvergunning') is approximately two years (ROAD project) . The ROAD project showed that causes for delay in the permitting process are:

- Permits may be interrelated, despite a 'smoothing' effect of the National Coordination Scheme;
- The European Commission is entitled to give its opinion on the draft storage permit, which may cause delay (actually, it did in case of the ROAD project).

Finally, the report highlights the contents of the 'Permitting Guidance Tool'. This tool provides a concise overview of the permitting procedure(s) for CCS chains, based on experience with the ROAD project and the (cancelled) Air Liquide project. The contents of reporting in the tool are the following:

- Summary of the administrative data;
- Summary of the chain characteristics;
- Permitting and competent authorities for the components capture, transport, and storage (if applicable);
- National Coordination Scheme (if mandatory) by component;
- EIA (if mandatory) by component;
- Issues by component;
- Timeline of permitting (up to draft decision);
- References and links to permitting procedures.

Distribution List

(this section shows the initial distribution list)

External	Copies	Internal	Copies

Document Change Record

(this section shows the historical versions, with a short description of the updates)

Version	Nr of pages	Short description of change	Pages
	1 - 32		

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Applicable/Reference documents and Abbreviations

Applicable Documents

(Applicable Documents, including their version, are the "legal" basis to the work performed)

	Title	Doc nr	Version
AD-01d	Toezegging CATO-2b	FES10036GXDU	2010.08.05
AD-01f	Besluit wijziging project CATO2b	FES1003AQ1FU	2010.09.21
AD-02a	Consortium Agreement	CATO-2-CA	2009.09.07
AD-02b	CATO-2 Consortium Agreement	CATO-2-CA	2010.09.09
AD-03h	Program Plan 2014	CATO2-WP0.A-D.03	2013.12.29

Reference Documents

(Reference Documents are referred to in the document)

	Title	Doc nr	Version
RD-01			

Abbreviations

(this refers to abbreviations used in this document)

CA	Competent Authority
CCP	CO_2 Capture Project
CCS	Carbon Capture and Storage
CC(U)S	Carbon Capture (Use) and Storage
DCMR	Milieudienst Rijnmond (Environmental Protection Agency for the Rotterdam Area)
EA	Environmental Assessment
EC	European Commission
EGR	Enhanced Gas Recovery
EIA	Environmental Impact Assessment
EOR	Enhanced Oil Recovery
EPA	Energy Projects Agency (RVO, Rijksdienst voor Ondernemend Nederland)
ETS	EU Emissions Trading System
EUA	EU Emission Allowance
FID	Final Investment Decision
GCCSI	Global Carbon Capture and Storage Institute
I&E	Infrastructure and Environment (Ministry of)
MEA	Mono-Ethylamine
Ministry of EA	Ministry of Economic Affairs
NCEA	Netherlands Commission for Environmental Assessment (Commissie m.e.r.)
NEa	Netherlands Emission Authority
NGO	Non-Governmental Organisation
NCS	National Coordination Scheme (Rijkscoördinatieregeling)
PM	Particulate matter
RCR	Rijkscoördinatieregeling (National Coordination Scheme)
ROAD	Rotterdam Opslag en Afvang Demonstratieproject
RVO	Rijksdienst voor Ondernemend Nederland
SEA	Strategic Environmental Assessment
Wabo	Wet Algemene Bepalingen Omgevingsrecht (General Environmental Conditions Act)
ZEP	Zero Emissions Platform

1 Introduction

This report was produced as part of WP4.2 in the CATO2 Research Programme; the focus of this work package is on *permitting and best practices* for Carbon Capture and Storage (CCS) projects in the Netherlands. The underlying goal is to make the permitting process for the operators of CCS projects as efficient and smooth as possible. This goal requires a comprehensive overview of all aspects involved in the permitting process.

In previous reports of WP4.2 - e.g., [CATO2, 2012] - the permitting process has been dealt with in a thematic way, i.e. focusing on acts, regulations and updates which are of interest for CCS projects. In this report, following the recommendations of the stakeholders, the focus is on the synthesis of the whole permitting process for CCS projects.

Aim

This report aims to provide a guidance on the permitting process for the most likely CCS chains for the Netherlands. This is done by producing:

- A differentiation between the components CO_2 capture, transport, and storage in the permitting process, with due attention to relevant permits and their timelines from application to draft or final permit[1];
- A specification of the applicability of the National Coordination Scheme (NCS, Rijkscoördinatieregeling), and the Competent Authorities (CAs) for individual permits;
- Summaries of relevant information from existing cases, to enable also a quick overview of relevant information for other and new projects, including permitting issues reported by stakeholders, such as the ROAD consortium, TAQA, Essent (RWE), and Air Liquide;
- A 'Permitting Guidance Tool', reflecting the items bulleted above and showing decisions in the various stages of the permitting process for the defined case.

Intended users

The 'Permitting Guidance Tool' is intended for a group of users ranging from companies that consider starting a CCS project and authorities involved in permitting, to non-governmental organisations (NGOs). Companies and authorities may want to check which permits are needed and which timelines may be expected. They may dispose of in-house knowledge, data, and relevant experience - sometimes related to a different kind of project, e.g. natural gas storage. NGOs may be interested to know about environmental aspects related to permitting, for which the 'Permitting Guidance Tool'~~'Guidance on CCS Permitting tool'~~ gives directions. The report is primarily intended as an introduction to and a manual for the 'Permitting Guidance Tool'.

Scope and limitations

The 'Permitting Guidance Tool' is a prototype rather than a thoroughly tested and complete Excel tool. Information on CCS permitting is still relatively scarce, as legislation and regulation are of recent date, and solely the ROAD project has been permitted. The Shell/Barendrecht project also had permitting experience but it was terminated prematurely with the approval of the Environmental Impact Assessment (EIA) report[2]. Although the CCS-related legislation and regulation was not enforced nationally at the time of preparing the Shell/Barendrecht permits, the project initiator did consider all the relevant requirements in the EU CCS and ETS Directives.

Currently, there is only one demonstration CCS project in an advanced stage of preparation in the Netherlands. It is the ROAD project (Rotterdam Capture and Storage Demonstration Project), initiated by E.ON Benelux N.V. and Electrabel Nederland N.V. (the so-called ROAD consortium) together with TAQA. In 2012, another demonstration project, the Green Hydrogen project initiated by Air Liquide, was prematurely cancelled. Both projects are in the Rotterdam area (Maasvlakte).

[1] In Dutch: 'ontwerpvergunning' and 'definitieve vergunning' (final permit) or 'onherroepelijke vergunning' (irrevocable permit), respectively).

[2] In Dutch: Milieueffectrapportage, MER.

The preliminary 'Permitting Guidance Tool' is largely based on experience with these demonstration CCS projects (to the extent available). A final investment decision with respect to the ROAD project has been postponed due to a financial-economic hurdle for E.ON Benelux and Electrabel.

Chapter 2 presents a number of characteristic building blocks for the permitting procedure for CCS chains is briefly explained. *Inter alia*, the organisation of permitting of CO_2 capture, transport and storage is highlighted, with reference to the so-called 'National Coordination Scheme' (NCS, Rijkscoördinatieregeling). Generally, the granting of permits is dependent on the outcome of the Environmental Impact Assessment (EIA), of which the general requirements are presented. The provision of a number of building- and environmental requirements is arranged in the General Environmental Conditions Act (Wabo, Wet Algemene Bepalingen Omgevingsrecht). Specific options related to the National Coordination Scheme and the Environmental Impact Assessment are elucidated. A summary is presented of the permitting procedure for the ROAD project, as ROAD serves as the best reference (possibly later on best practice) for permitting of CCS in the Netherlands.

After that, permitting issues are highlighted for CO_2 capture, transport, and storage (Chapter 3). Finally, the report presents a concise description of Permitting Guidance Tool (Chapter 4).

Availability
The information has been summarised in a prototype tool (Excel-based). That tool will be made available to CATO partners and possibly other interested stakeholders in the course of 2014.

Acknowledgement
The authors wish to express gratitude for the way in which Ad Seebregts led WP4.2. Also, they highly value the information and insights in the CCS permitting process, gained from interviews and feed-back at a consultation meeting in various stages of the development of the Permitting Guidance Tool:

- Interviews with several representatives of ROAD and TAQA, but also Air Liquide and RWE as well as the government (Ministry of EA);
- Feed-back at a consultation meeting with partners in the WPs 4.2, 4.3, and 4.5 together with representatives of ROAD and DCMR, December 10, 2013, ROAD/DCMR office, Schiedam;
- Comments and suggestions for improvement on permitting timelines, after the consultation meeting, from representatives of ROAD, TAQA, and Bureau Energieprojecten.

2 Permitting procedure for CCS chains and its components

2.1 Considered CCS chains

Various CCS chains may be realised in the Netherlands. For each of these CCS chains, the permitting procedure may be different. However, there may also be comparable demands with respect to permitting for different CCS chains. Table 2.1 gives a view of the combinations of CCS components that may apply and gives a few comments on each of them.

Table 2.1 Explanation of combinations of CCS components

Combinations of CCS components	Explanation
Shipping with offshore storage	CO_2 shipping is combined with pipeline transport on the source side
Shipping with onshore storage	CO_2 shipping is combined with pipeline transport on the source side and storage side
CO_2 use	Most of the CCS chains can be combined with a CO_2 stream for use in other industries or greenhouses
EOR/EGR	Storage in oil- or gas field can be combined with EOR (Enhanced Oil Recovery) or EGR (Enhanced Gas Recovery); in most cases injection of CO_2 in an oil field will be for EOR
Preference for NCS[3]	This can be simulated by choosing 'capture >500 MW'; CO_2 transport by pipeline and storage require the NCS
Consequences small/big pipeline	This will become clear when consulting the Competent Authority

Figure 2.1 shows CCS chains considered in WP4.2, which provide insight into the differences in the permitting processes.

A CCS chain starts either with a source of pure CO_2 as a by-product from an industrial activity (for instance from a hydrogen plant), or with a source of impure CO_2 with an aligned CO_2 capture process. The permitting process does depend on the scale of CO_2 capture but not on the type of capture process. If the CO_2 is already available as a by-product of an industrial activity, the permitting process only relates to the next stages of CO_2 transport and storage (if applicable). The next step in the chain is the transport of CO_2 by pipeline in gaseous or supercritical state or by shipping in a liquid state. The final step is the storage of CO_2 in an onshore or offshore reservoir, which is generally an offshore depleted gas field in the Netherlands. Alternatively, the CO_2 can be stored in a saline aquifer at the site where the CO_2 source (captured or pure stream) is available and hence the CCS chain has no transport stage.

[3] The purpose and scope of the NCS (Rijkscoördinatieregeling) and its relation with the Competent Authority are explained in paragraph 2.3.1.

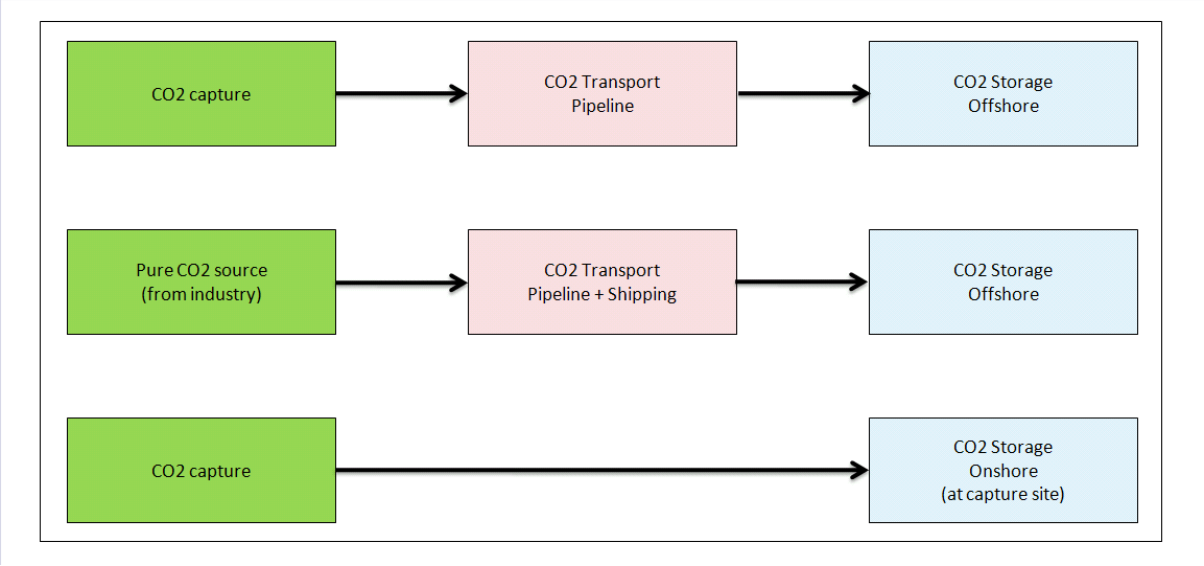

Figure 2.1 CCS chains considered

By describing the permitting processes of these different CCS chains, we expect that the permitting process for other chains can be derived.

2.2 Full CCS chain

Figure 2.2 shows the decision tree for CO_2 capture, and Figure 2.3 shows the decision tree for CO_2 transport. Figure 2.2 shows that in case of the NCS there is only one Competent Authority (i.e., the Ministry of EA). Also, the public consultation procedure is streamlined (one stop shop). Furthermore, final permits become irrevocable simultaneously. Figure 2.3 shows that shipping of CO_2 only requires an Emission Permit (EU ETS). For CO_2 storage, no figure comparable to Figures 2.2 or 2.3 is shown.

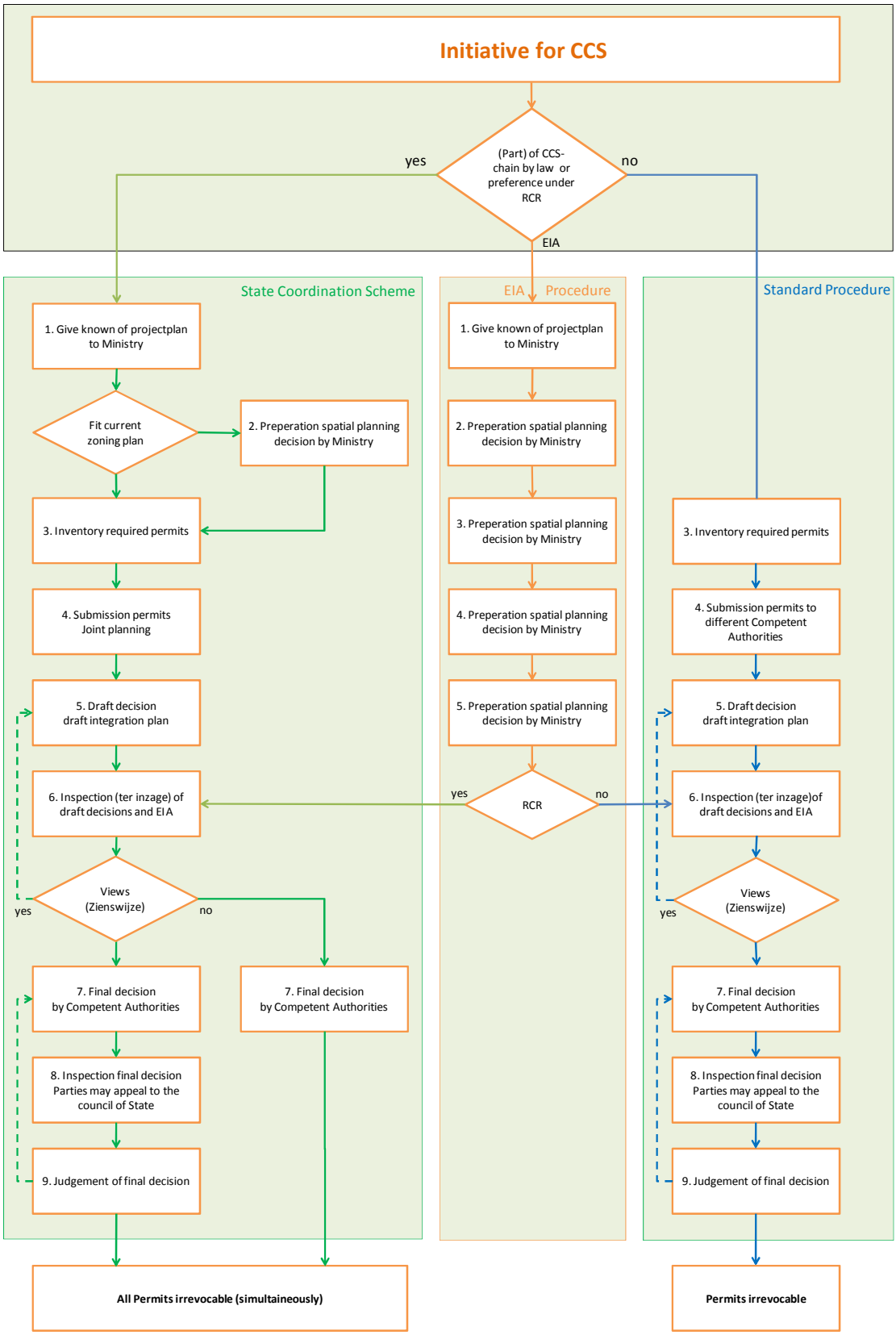

Figure 2.2 Decision Tree for permitting procedure CO2 capture in case of a CCS project

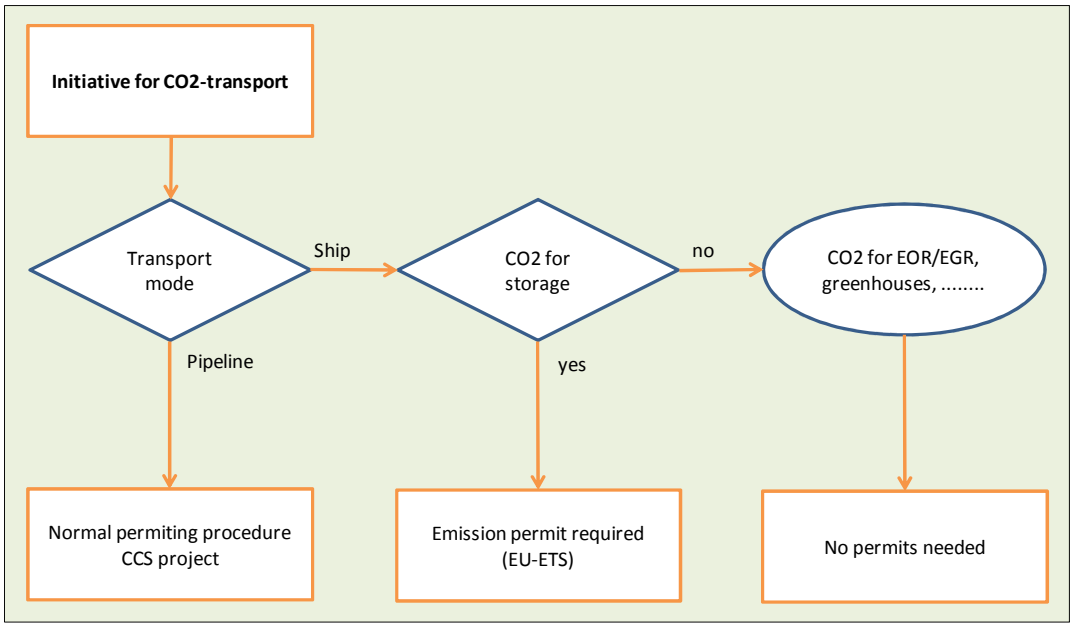

Figure 2.3 Decision Tree for permitting procedure CO2 transport in case of a CCS project

2.3 Permitting of CO_2 capture, transport, and storage

A common phenomenon for stages of a CCS chain is the 'National Coordination Scheme' (NCS, Rijkscoördinatieregeling), which is the subject of paragraph 2.3.1. An Environmental Impact Assessment (EIA) commonly may cover CO_2 capture, transport, and storage (if applicable), which is explained in paragraph 2.3.2. An act which is often a common building block for stages of a CCS chain is the General Environmental Conditions Act (Wabo), which is briefly explained in paragraph 2.3.3.

2.3.1 National Coordination Scheme

According to the Mining Act [Mijnbouwwet, 2002], the procedure called 'National Coordination Scheme' (NCS) (reference) applies to (only sentences of interest are copied hereinafter):

a. (...)
b. a mining facility for the storage of materials
c. pipelines exclusively or primarily meant for the transport of minerals or the transport of materials in connection with the exploration or production of minerals or the storage of materials with use of a mining facility as described in (...) section b.

Based on legislation related to the NCS, the government is entitled to coordinate as the Competent Authority projects of national interest, *inter alia* complex projects related to energy infrastructure, such as CCS projects. Through the NCS, the permit process becomes one procedure. This means *inter alia* that the various decisions regarding permits and exemptions are coordinated and published simultaneously. The same holds for decisions on permits and exemptions that are delegated to other authorities within the NCS procedure. It also means that comments on all draft permits can be submitted at one time and the Competent Authority decides on all permits simultaneously.

All procedures that can be coordinated fall under the uniform public preparation procedure as per Section 3.4 of the General Administrative Act. After the application has been submitted, the Ministry of Economic Affairs (Ministry of EA) determines the way in which the draft permits and final permits are formulated and provides for a coordinated notification and disclosure process. If an implementation

order of a delegated authority is held up by unforeseen problems, the Coordinating Minister may, in agreement with the competent Minister, decide instead of the delegated authority. This overruling is applied with restraint.

The final permits can be appealed by affected parties once, in one procedure, to the Administrative Division of the Council of State. The total appeal process can last from one year to one and a half years. This means that the NCS based on the Spatial Planning Act (Wet Ruimtelijke Ordening) applies anyhow to CO_2 transport and storage. Public consultations and approval of permits needed for the transport (and storage) of CO_2 as named in the NCS Implementation Decision for energy infrastructure projects are coordinated by this regulation. For 'ROAD', this applies to the All-in-one permit for physical aspects (Wabo), the Water Permit, and the Flora and Fauna Act exemption.

Table 2.2 shows the various stages in the National Coordination Scheme (NCS) time schedule. For the RCR, nine stages are considered.

Table 2.2 National Coordination Scheme (NCS) time schedule

Stage	
1	The initiator notifies the Minister of EA in an early stage of the planned energy project. The NCS applies to a CCS project. For this announcement the initiator shall use a standard reporting form.
2	If the project does not fit in the current zoning, the Ministries of EA and I&E prepare a spatial decision in consultation with the initiator and the designated authorities. For this, an EIA is often prepared.
3	The Energy Projects Agency (EPA) examines with the initiator and the designated authorities which permits and exemptions for the project are required.
4	The initiator submits all permits and exemptions to the appropriate authorities. The coordinating Minister deliberates with the designated authorities on joint planning.
5	The relevant authorities draft in consultation their draft decisions. The Ministers of EA and I&E propose, if necessary, a draft integration plan.
6	The draft decisions are bundled for inspection, together with any EIA. During this period, anyone can give his comments. Often one or more information meetings are organized.
7	The authorities process the advices and make their final decisions.
8	The final decisions are submitted for inspection. Interested parties may appeal against this decision to the Council of State.
9	The Division of jurisdiction of the Council of State shall decide on appeals against one or more of the decisions. In case of state coordination with a spatial decision of the state, this is done in a judgment within 6 months after the end of the appeal period. If the determination of a spatial decision is not part of the decision on a project, the Council of State rules within six months after receipt of the defense of the authorities concerned.

In case of a CCS project, the National Coordination Scheme applies to CO_2 transport and CO_2 storage. For a new coal- or gas-fired power plant with CO_2 capture, it also applies to CO_2 capture, presumed that the scale exceeds the threshold value of 500 MW_e. For CO_2 capture added to an existing power plant (the coal-fired MPP3 for 'ROAD'), the RCR is not mandatory as the scale of this particular CO_2 capture plant was below the threshold value of 500 MW_e for application of the NCS. Therefore, for ROAD it was decided that the NCS does not apply to CO_2 capture. In case of ROAD, addition of CO_2 capture may be considered as 'retrofitting': addition of a *demonstration* CO_2 capture plant, which may occur a few years after commissioning of MPP3 (if the ROAD project would go ahead). A new coal-fired power plant, such as MPP3, has to be 'capture ready'. Addition of CO_2 capture is relatively straightforward.

2.3.2 Environmental Impact Assessment (EIA)

An *Environmental Impact Assessment (EIA)* provides the information needed to allow full consideration of environmental interests likely to have significant environmental impact. The EIA

report shows how proposals will affect the environment and whether alternatives would achieve the goals in a more sustainable way. A *Strategic Environmental Assessment (SEA)* focuses on consideration of environmental consequences in plans and programs, with specific emphasis on environment in the strategic stage.

The *Netherlands Commission for Environmental Assessment (NCEA)* prepares mandatory and voluntary advisory reports for government (national, provincial and local) on the scope and quality of environmental assessments (EA).

We distinguish) two procedures in the Environmental Management Act[4]:

- Environmental Impact Assessment for (relatively) simple permit procedures: *the simplified procedure*;
- Environmental Impact Assessment for complex decisions and SEA for plans and programs: *the full-fledged procedure*.

'*Simplified*' does not necessarily mean 'easy'. For EIA the type of permit determines whether the simplified or the full procedure applies. For example, a permit procedure for a nuclear power plant will be classed as a simplified procedure. The preparation and granting of the permit itself is far from 'simple', but the simplified procedure suffices.

For all projects that require an appropriate assessment based on the Nature Conservation Act which requires an EIA for complex decisions, and projects in which a government agency is the proponent (e.g. expansion of airport, projects concerning infrastructure, housing programs) the '*full-fledged procedure*' is required. The Nature Conservation Act was applicable to the ROAD project and therefore the '*full-fledged procedure*' was mandatory.

The full-fledged procedure for an EIA is as follows:

1. *Announcement of the Project and Notice of Scope and Level of Detail*
   The draft Notice of Scope and Level of Detail is drawn up by the applicant, after which the appropriate authority draws up the Notice of Scope and Level of Detail. This document describes which alternatives are possible for the operation, which impacts it could have on the environment and how these impacts will be researched in the EIA.
2. *Notice*
   The competent authority gives notice that the decision is being prepared and announces the public consultation for the Notice of Scope and Level of Detail
3. *Consultation and Advice on the Notice of Scope and Detail*
   The competent authority consults the governmental agencies and advisors that are involved in the Notice of Scope and Level of Detail of the EIA. The Notice of Scope and Level of Detail is available for inspection. The consultation in this phase is meant to gain insight into the affected parties' ideas of what should be studied in the EIA. The Notice of Scope and Level of Detail and the comments from the consultation are submitted to the *Netherlands Commission for Environmental Assessment*, NCEA. The NCEA is composed of independent experts in different disciplines. This Commission submits its advice on the contents of Advisory Scope and Level of Detail for the composition of the EIA to the Authority.
4. *Advisory Scope and Level of Detail*
   The competent authority, on the basis of the consultation comments and the opinion of the NCEA establishes the Advisory Scope and Level of Detail of the proposed EIA. This document states which alternatives and which environmental themes and impacts must be covered by the EIA. The Authority takes the advice and incorporates it into the Notice of Scope and Level of Detail.
5. *The Environmental Impact Assessment (EIA)*
   The applicant then draws up the EIA; there is no time limit for this procedure. The point of departure for the EIA is the Advisory Scope and Level of Detail. The EIA is submitted to the competent authority.

[4] In addition to EIA and Strategic Environmental Assessment, SEA; the differences and similarities between them are explained in Table 2.2.

6. *Publication of the EIA and Request for the Draft Decision*
   The competent authority publishes the EIA and the request for the draft decision, and opens both for comments.
7. *Consultation*
   The EIA is open for comments for six weeks. Parties wishing to comment on the EIA have the possibility to react in writing on the quality and completeness of the EIA.
8. *Advice of the Commission for Environmental Assessment (NCEA)*
   The NCEA assesses the EIA on completeness and quality and submits an opinion to the competent authority. In the ROAD project, the Commission also submitted a (positive) interim assessment in May 2011. The applicant incorporated remarks from that assessment in the EIA.
9. *Decision*
   When the EIA process is completed successfully, the appropriate authority gives its decision on the project and the conditions under which the project may be started.
10. *Evaluation of the Environmental Impact after Completion*
    The decision contains an evaluation procedure, which is started by the applicant in the EIA. It is assessed during and after the completion of the project whether the environmental impacts remain within the limits given in the decision. Commonly, the results of these evaluations are published in an evaluation report.

In case of CO_2 transport by pipeline, an amendment to the zoning plan is needed for the laying of one section of the CO_2 pipeline. This is an important precondition for permitting of the CO_2 pipeline. In addition, the appellation 'CO_2 pipeline' needs to be added to the utility access corridor. Therefore, a State Zoning Plan is needed, which is to be supported by an Environmental Impact Assessment (EIA), as required by the Environmental Management Act and the Environmental Impact Assessment Act.

Table 2.3 summarizes the different steps and differences and similarities in the simplified and full-fledged EIA procedures (ROAD, 2012).

Table 2.3 Differences and similarities in the simplified and full-fledged EIA procedures [ROAD, 2012]

Simplified procedure	Full-fledged procedure
EIA for permits (e.g. Environmental Management Act)	• SEA • EIA for complex projects • government is initiator of the project • all projects which require an appropriate assessment based on the Nature Conservation Act
Procedure step-by-step	**Procedure step-by-step**
proponent notifies designated authorities	proponent notifies designated authorities (EIA)
	public announcement, start of procedure
optional: consultation designated authorities	• consultation designated authorities • public consultation
optional: scoping advice NCEA	*optional: scoping advice NCEA*
• write EIA report, including description of alternatives • present report to competent authority	write EIA report, including description of alternatives
competent authority publishes EIA report and concept decision	competent authority publishes SEA/EIA report and concept decision
public consultation EIA report	• public consultation SEA/EIA report • consultation EIA report designated authorities
optional: review advice NCEA	review advice NCEA mandatory
competent authority publishes decision and justification	competent authority publishes decision and justification
evaluation	evaluation

2.3.3 General Environmental Conditions Act (Wabo)

Both the environment and building sections of the All-in-one permit for physical aspects for the CO_2 capture plant (compare Section 2.4) follow the expanded procedure according to the General Environmental Conditions Act (Wabo). After the request has been submitted, the competent authority holds a consultation for the draft Environmental Permit. For six weeks, any person can submit comments regarding the draft All-in-one permit for physical aspects. The final All-in-one permit for physical aspects is then granted by the authority. The time for the procedure, including the draft stage and until the final All-in-one permit for physical aspects is granted, is six months, with a possible extension of six weeks. The final All-in-one permit for physical aspects can be brought before the courts by affected parties and appealed to the Administrative Division of the Council of State. The total appeal process can last from one and a half year to two years.

2.3.4 Emission permit

If the installation falls (or will fall) under the scope of the system of EU Emissions Trading System (EU ETS), it is required to apply for an emission permit. The installation must have an emission permit when the first emissions occur. Before an emission permit, it may be useful to determine whether your organization meets the criteria for CO_2 emissions.

Timely applications
The NCEA recommends to apply for an emission permit (or any amendment thereof, in case the applicant already disposes of a similar permit) timely; at least four months before it enters into force. The NEa (Netherlands Emission Authority) has enough time for a substantive assessment and completion of the legal procedures. The duration of the substantive assessment is highly dependent on the quality and complexity of the monitoring

Procedure
1. Drafting of the monitoring plan
2. Submission of permit applications
3. Examination of the monitoring plan
4. Granting of the draft permit (draft decision)
5. Granting of final permit (final decision)
6. Period of appeal, after which the permit is revoked or becomes irrevocable.

2.3.5 Permit in the framework of the Nature Conservation Act

The Nature Conservation Act 1998 provides for the purposes of the conservation of biodiversity in rules protecting valuable nature. The Crisis and Recovery Act provides a number of amendments to the Nature Conservation Act. These changes aim to render application for a permit under this law better manageable, without compromising the goals of the Nature Conservation Act and the guidelines.

2.4 Options in permitting procedure

With regard to the permitting procedure for a CCS project, there are decisions to make about options related to the National Coordination Scheme (NCS) and the Environmental Impact Assessment (EIA).

National Coordination Scheme (NCS)
The National Coordination Scheme generally applies to the whole CCS chain, i.e. to CO_2 capture, transport and storage. An exception, however, is 'retrofitting' of CO_2 capture at an existing gas- or coal-fired power plant, if the CO_2 capture plant represents a capacity of less than 500 MW_e in terms of CO_2 captured equivalence. This is the case for 'ROAD', which has an envisioned CO_2 capture plant with a capacity of 250 MW_e. The coal-fired power plant MPP3 itself has a net capacity without CO_2 capture of 1,070 MW_e. In other circumstances, the NCS will automatically apply to the CO_2 capture stage, at least if the applicant decides to make use of the NCS, which is beneficial in terms of permitting for a complex project such as a large energy plant based on fossil fuels including CCS.

Environmental Impact Assessment (EIA)
The procedure for the Environmental Impact Assessment (EIA) may be the *simplified* or the *full-fledged* procedure. This depends on the type of CCS project. If the CCS project requires a permit based on the Nature Conservation Act, the '*full-fledged procedure*' applies. The '*simplified procedure*' may be used if the Nature Conservation Act does not apply to one of the stages of the CCS chain.

2.5 Summary of permitting procedure for the ROAD project

For the present study, the demonstration CCS project 'ROAD' at the Maasvlakte served as the main reference for describing the permitting process. Table 2.4 shows a summary of legislative requirements, acts of interest, competent authorities, and applicants in case of permitting for 'ROAD' [ROAD, 2012].

Table 2.4 Regulatory overview for the ROAD project [ROAD, 2012]

Legislative requirement	Act	Competent authority	Applicant
General			
Environmental Impact Assessment (EIA)	Environmental Management Act	Ministry of EA and Ministry of I&E; Province of Zuid-Holland (delegated to DCMR)	Proponent
Emission permits (for capture, transport and storage)	Environmental Management Act	Netherlands Emission Authority (NEA)	Proponent
Capture			
All-in-one permit for physical aspects	General Environmental Conditions Act (Wabo)	Province of Zuid-Holland (delegated to DCMR)	Proponent
Environmental permit			
Building permit			
Permit under the Nature Conservation Act	Nature Conservation Act 1998	Province of Zuid-Holland	Proponent
Water permit	Water Act	Ministry of I&E (delegated to the State Water Authority, Department Zuid-Holland)	Proponent
Transport			
State Zoning Plan	Spatial Planning Act	Ministry of EA and Ministry of I&E	Ministry of EA
Environmental Impact Assessment	Environmental Management Act	Ministry of EA and Ministry of I&E	Ministry of EA
Water permit	Water Act	Ministry of I&E (delegated to the State Water Authority, Department Zuid-Holland)	Proponent
Railway permit	Railway Act	ProRail	Proponent
Flora and Fauna Act exemption	Flora and Fauna Act	Ministry of EA	Proponent
Storage (offshore)			
All-in-one permit for physical aspects	General Environmental Conditions Act	Ministry of EA	TAQA (storage operator)
Storage permit	Mining Act	Ministry of EA	TAQA (storage operator)

As Table 2.4 shows, there are two common requirements and permits covering CO_2 capture, transport, and storage, i.e. the Environmental Impact Assessment (EIA), and the emission permits for the three stages of the CCS chain, both of which are based on the Environmental Management Act.

A few remarks are needed to provide a framework for the time required for permitting of a CCS project, based on the experience with the ROAD project until today (July 2014). It should be kept in mind that this experience is on the one hand extensive and valuable, but on the other hand is still incomplete, as a Final Investment Decision (FID) for ROAD has not yet been taken.

Demonstration project
ROAD is a demonstration CCS project. Therefore, delays in permitting may have a 'first-of-a-kind' character. Follow-up CCS projects may not be hampered by such delays, at least in principle. The reasons for delays are various, e.g. the European Union had to give its opinion on the draft CO_2 storage permit, which caused delay. Also, permits related to the stages of CO_2 transport and CO_2 storage are submit to the National Coordination Scheme procedure (NCS). The National Coordination Scheme would enable a smooth permitting process, but this is not always realised in practice due to a multitude of permits and exemptions.

Appendix A provides more detailed information on permits for ROAD and the timeline for permitting.

Basic attitude of consortium
A second remark is related to the basic attitude of the ROAD consortium regarding the permitting procedure. The initiators of the ROAD project - the ROAD consortium (E.ON Benelux and Electrabel) and TAQA - opted for a thorough permitting process, taking the 'royal route' instead of cutting off the corner, in order to avoid unwanted appeal(s) to the court (Council of State). This was at the expense of time needed for preparation and processing, but with the benefit of limiting the risk of further delays.

Causes for delay
(Possible) causes for delay in the permitting process are not always obvious (in case of ROAD):

- Permits may be interrelated. The National Coordination Scheme may reduce delays by multiple consultation procedures but it does not exclude that the processing of a specific permit is delayed by interrelation with another permit, which is delayed for some reason.
- The ROAD consortium and TAQA were not always able to specify reasons for delays. However, the regulation enabling the European Commission to give its opinion, within four months, on the draft CO_2 storage permit required more time than envisioned [Internet Source 1]. This is a clear example of a delay in case of 'ROAD', which occurred and could not be anticipated.

3 Permitting issues

3.1 Introduction

Issues with respect to CCS permitting are problems encountered or anticipated in the permitting procedure that are not yet addressed by acts or regulations as far experts are informed. Issues are distinguished by the stage in the CCS chain: CO_2 capture, transport, and storage. Identification of an issue with respect to permitting of a CCS stage does not necessarily imply that permitting is delayed or even hampered. It may also be a comment which deserves attention in order to prevent a delay or possible conflict.

It is noted that permitting issues are to some extent reported by stakeholders, such as the ROAD consortium, TAQA, RWE/Essent, and Air Liquide. However, the emphasis on and the wording of each of these issues are the responsibility of the authors of this CATO2 WP4.2 report.

3.2 CO_2 capture

With respect to CO_2 capture, two issues have been reported by stakeholders, notably unknown impacts of new (CCS-related) technology and Natura 2000 regulation.

3.2.1 New technology - unknown impacts

CCS is a relatively new technology. The environmental impacts of the implementation are not always fully known. An example is the use of solvents as MEA (Mono-Ethylamine) in the capture process. The emitted components and reaction products are partly unknown. Also the composition of the solvent can be unknown.

In a report on permitting from the ROAD consortium [ROAD, 2011] the following is stated: ‘MEA degradation studies, identification of degradation products, liquid analysis of pilot plant samples and pilot plant emissions monitoring campaigns have been performed by a wide range of industrial technologists and academics all over the world. Also, the parent companies have experience with MEA as solvent on a pilot scale. Although the use of MEA does not avoid all emissions, the extensive knowledge base enables effective emission management. Countermeasures can be targeted at the expected degradation products in the expected quantities. Furthermore, this publicly available knowledge is a reliable source for the permitting authorities to base their permitting decision on.’

3.2.2 Natura 2000 regulation

According to the Natura 2000 regulation, a ‘habitat check’ is required to verify whether an activity in or nearby a Natura 2000 area is allowed [Natura 2000, 2010]. Absolute values of non CO_2 emissions (SO_x, NO_x, PM) will not increase. Because of the efficiency penalty they can increase (probably NO_x) per produced kWh. Solvent related emissions as MEA can have a slightly negative impact on N-deposition.

3.3 CO_2 transport

There are two main areas where potential permitting issues related to CO_2 transport in the CCS chain are identified:

- Nature protection areas and pipeline routing;
- Cross-border transport of CO_2.

3.3.1 Nature protection areas and pipeline routing

The existence of protected areas, particularly those designated as Natura 2000 areas according to the EU's habitat directive, may have a significant effect on the laying of pipelines from some of the major CO_2 point sources. E.g., this has been identified as a potential problem for the Skagerrak/Kattegat region [EU, 2012].

The applicant will have to address this problem at the start of the permitting procedure by performing (a) assessment(s), and if needed, (b) provide compensating measures.

3.3.2 Cross-border transport

Cross-border transport of CO_2 may lead to issues which are described in [CATO, 2011a]. Permitting issues regarding transboundary transport that still need to be addressed are related to:

- Siting and construction;
- Environmental and safety standards;
- Use of the infrastructure
- Financial liability;
- EU ETS (EU Emissions Trading System).

3.3.2.1 Siting and construction

Within their borders, Member States, have the jurisdiction to determine the regulation with regard to siting and construction of onshore pipelines, taking into account some EU laws.. The consequence of this is that in case of cross-border transport, the applicable rules vary per Member State. The main risk for the potential operator is that it has to deal with multiple authorities and possibly different permit demands [CATO, 2011a].

3.3.2.2 Environmental and safety standards

For environmental and safety issues, the situation is approximately the same as the previously described case of siting and construction. Member States have jurisdiction within their territory. Environmental demands are regulated through European Directives, but for some of these Directives Member States are allowed to create more stringent demands. Especially with regard to environmental demands, the regulation per Member State differs.

In the case of offshore CO_2 transport, the coastal State is responsible for preventing, reducing and controlling pollution from activities at sea and on the seabed.

For the operator of a cross-border transport network this might result in different demands per Statewhich complicates the operation and use of the pipeline. This can result in higher costs for the operator. It is to be expected that this also may complicate and delay the permitting process.

3.3.2.3 Use of infrastructure

With regard to the use of the pipeline, there is no difference between onshore and offshore. The actual function of the pipeline is to transport CO_2 to the storage location. Thus, central to a potential operator is the question which authority has jurisdiction and will regulate the use or access to the pipeline. If the sending State has a different regime than the receiving State, this might cause problems for the operator for example in defining the situations in which access has to be provided.

3.3.2.4 Financial liability

CCS permit applicants are required to provide concrete financial liabilities, securities and contributions. The CCS directive does not provide detailed specification or regulation in this area. Individual Member States have the opportunity to provide additional specification and regulation. This means that in different Member States different choices will be made, resulting in different regimes with regard to the financial security that has to be provided, and the financial contribution that has to be paid.

See CATO [2011a] and CATO [2011b] for more detailed information on these cross-border transport issues and the Industry survey on European transboundary network developments.

3.3.2.5 EU ETS

The permitting issues of cross-border CO_2 transport networks in relation to monitoring, verification and accounting under EU-ETS are discussed in [CATO, 2011a and b]. From a legal point of view there are several complexities to overcome, in terms of possible conflicting jurisdiction and conflicting regulation. These possible barriers can be resolved by closing bilateral or multilateral agreements between the countries that are involved.

3.4 CO_2 storage

Several sources of information were used in the identification of possible issues with permitting of CO_2 storage. These sources are personal communications of industrial stakeholders within the CATO2 project, CATO reports from workshops in WP4.1 and WP4.2, references from GCCSI, ZEP (Zero Emissions Platform), IEA Regulator network, CCP (CO_2 Capture Project), UK Carbon Capture and Storage Association and the European CCS Demonstration Project Network.

The potential issues relate to:

- Storage permit process vs. FID;
- Long-term liability;
- Financial security;
- Transfer of responsibility;
- Public engagement;
- EOR and CO_2 storage.

3.4.1 Storage permit versus FID

The Directive requires that fully detailed plans are available at the time of submitting the permit application. In reality these plans will be completed once the Final Investment Decision (FID) will be taken and the FID requires that a permit has been granted according to experiences in the ROAD project [ROAD, 2013a].

ROAD [ROAD, 2013a] proposes that a lower level of detail for the plans in the permit application is provided, which will be updated before the start of injection. The details could be provided in the storage plan. The Netherlands could suggest an amendment of the Storage Directive to the EU as part of the reviewing process which should be finalized in 2015.

3.4.2 Long-term liability

ROAD [ROAD, 2013a] states that the environmental and climate liabilities will be transferred to the state when the responsibility for the storage site according to the Storage Directive will be transferred to the state as well. This liability remains with the operator in case of negligence. A concern is with the climate liability and the surrender EU allowances for emissions resulting from leakage of the storage site.

The CATO2 Legal Expert Meeting [Air Liquide et al., 2012] states that the liability of the ETS in case of CO_2 storage relates to the risk of leakage on the short or medium (decadal) term. More details are to be found in deliverables of the work package CATO2 WP4.1 [CATO2, 2011a and b].

ROAD [ROAD, 2013a] identified three items which need to be settled for financial security:
- Activities that need to be covered;
- Amount of money to secure these activities;
- Financial instrument.

ROAD successfully settled the financial security for the operational phase and post-operational phase until transfer of responsibility and the security for the post-transfer phase. ROAD concluded that the following activities that must be covered with the Financial Security are [ROAD, 2013a]:
- Monitoring;
- Contingency monitoring;
- Abandonment;
- Financial contribution;
- EUAs (EU Emission Allowances) in case of CO_2 leakage.

ClimateWise [ClimateWise, 2012] concludes that 'neither insurers nor storage operators will be able to bear unlimited liabilities, so where liabilities are not limited in size, risk sharing with government will be required to develop CCS at scale in Europe.' According to ClimateWise, 'off the shelf' insurance does not exist for CCS. Therefore, the leakage risk might be contained by new innovative insurance products. These issues are also covered by deliverables of CATO WP4.1 [CATO2, 2011a and b].

3.4.3 Financial security

ROAD [ROAD, 2013a] identified several issues that relate to the transfer of responsibility of the project after closure and abandonment of the storage site:
- How can the duration of the period from closure to transfer (default 20 years) be minimized?
- Which evidence has to be taken into account?
- What if the CA (competent authority) is not convinced?
- Who is going to assess the evidence?

3.4.4 Transfer of responsibility

The license for the P18 gas field (TAQA) does not yet include a specific description of the conditions for transfer of responsibility at the end of the project. Although no fundamental barriers were identified, the details still have to be settled in the storage plan. The EU project CO2CARE [CO2CARE, 2011] provides ideas for the practical implementation of the transfer criteria in the Storage Directive.

3.4.5 Public engagement

Public acceptance can be a major issue for project developers, particularly in populated onshore areas (see Barendrecht). Public engagement not only relates to CO_2 storage, but may also relate to the stages of CO_2 capture and transport (albeit to a lesser extent). ROAD has not identified this as an issue for their offshore storage prospect P18. IEA [IEA, 2012] reports that the Dutch example (Barendrecht versus P18) - where the same regulatory provisions seem to have played a very different role in two separate projects - illustrates the potential complexity of the relationship between regulation and engagement, with regulation having the potential to help or hinder. International experts highlight the importance of flexibility and the ability to adapt to a project's social context - both in terms of project design and implementation and how a project is framed - as a key part of effective communications and outreach [CCS Network.eu, 2012] [ClimateWise, 2012]. This issue of flexibility - a characteristic that is not generally associated with law - is likely to be a key challenge for both regulators and project developers as enabling frameworks take form and projects move forward.

IEA launches the idea to go from 'decide, announce, defend' to 'investigate, adapt, engage'.
Early evaluation of this issue and early consultation of stakeholders are essential. CATO2 SP5 has resulted in very important messages for communicating CCS projects to the public and engaging the public in the decision making process. Experience from the Canadian QUEST project shows that early consultation of the local community - three years before permit application - is key [Internet Source 2].

3.4.6 EOR and CO_2 storage

Current regulation in the Netherlands explicitly excludes the simultaneous execution of EOR (Enhanced Oil Recovery) and CO_2 storage in one concession. However, in other countries like Denmark [Bech-Bruun, 2012], the combination of EOR and CO_2 storage is legally possible. The combination of EOR and CO_2 storage will require specific attention in the quantification of the avoided CO_2 stream and the definition of the system boundaries [IEA, 2012].

4 Description of Permitting Guidance Tool

4.1 Introduction

Based on the material outlined in the previous chapters, the project team developed a simple (Excel-based) tool to contain relevant information on the permitting process for CC(U)S projects (Carbon Capture (Use) and Storage), including:

- National coordination scheme;
- Environmental Impact Assessment;
- Permits per CCS component;
- Competent Authority;
- Timeline permitting;
- Permitting issues;
- References.

These items result either from recent CCS projects and planned projects or from relevant acts and regulations, and pertaining issues that need resolution according to stakeholders.

This chapter provides a brief description of the tool. Appendix B shows some screenshots of the tool. The intention of the project team is to make this prototype tool available for the CATO participants and stakeholders, in an 'as is' fashion, to be put on the restricted CATO website. We do not plan to develop the tool any further. However, comments on the tool are welcomed at: cato-permitting-tool-wp42@ecn.nl

4.2 Objectives

The tool named 'Permitting Guidance Tool' has been developed with the following objectives:

- Provide a short introduction to permitting of CCS projects to interested stakeholders;
- Enable stakeholders to feed in their preferred CCS chain(s) in order to check which permits are needed and (possibly) which timeline(s) for permits may be expected;
- Pass information on to stakeholders on permitting of a few recent CCS projects and plans in the Netherlands, among which the ROAD project, to facilitate comparison with the preferred CCS chain(s);
- Guide stakeholders to possible permitting issues for CO_2 capture, transport and storage, based on interviews with companies and authorities with a close interest in CCS permitting.

4.3 Intended users

The 'Permitting Guidance Tool' is intended for a group of users ranging from companies that consider starting a CCS project and authorities involved in permitting, to non-governmental organisations (NGOs). Companies and authorities may want to check which permits are needed and which timelines may be expected. They may dispose of in-house knowledge, data, and relevant experience - sometimes related to a different kind of project, e.g. natural gas storage. NGOs may be interested to know about environmental aspects related to permitting, for which the 'Permitting Guidance Tool' gives some directions.

4.4 Explanation

The 'Permitting Guidance Tool' is a prototype rather than a thoroughly tested and complete Excel tool. Information on CCS permitting is still relatively scarce, as legislation and regulation are of recent date and solely the ROAD has been permitted. The Shell/Barendrecht project has more limited permitting experience but it was terminated prematurely. It is evident that CCS-related legislation and regulation have changed a lot since then. Therefore, this project is not as representative as ROAD when it comes to permitting.

The 'Permitting Guidance Tool' is elucidated in the following, based on successive worksheets of the tool.

4.4.1 Pop-up screen

The 'Permitting Guidance Tool' starts with a pop-up screen categorising a project. First, a few administrative data have to be filled out. Then, the user should fill in:

- Description of CCS case: Name;
- CO_2 capture: Yes/No;
- Type of capture: pure CO_2, post combustion, pre combustion, or oxyfuel;
- Power (electric capacity) > 500 MW: Yes/No;
- Capture near Nature 2000: Yes/No;
- CO_2 transport: Yes/No;
- Transport mode: pipeline, ship, or combination thereof;
- Length of pipeline > 1 km: Yes/No;
- Cross-border transport: Yes/No;
- Tansport near Nature 2000: Yes/No;
- Location storage site: Onshore/Offshore;
- Type storage site: gas field/oil field/aquifer/EOR/EGR.

4.4.2 Definition

The worksheet 'definition' sums up the characteristics (entries) that define a CCS chain in the pop-up screen. It only includes chains that are initiated or contemplated in the Netherlands, or that are familiar to users for another reason, for instance as they CCS chains that are considered as alternatives for contemplated CCS chains.

4.4.3 Cases

The next worksheet, 'cases', includes a number of CCS chains such as the Shell/Barendrecht project, ROAD, and the 'Green Hydrogen' project of Air Liquide Rotterdam, based on the characteristics from the pop-up screen. Each of the CCS chains is shortly described. When another CCS chain would become seriously considered in the Netherlands or abroad, it may be added and shortly described too.

4.4.4 Reporting

The tool may provide a standard report for each CCS chain. The contents of the report(s) are the following:

- Summary of the administrative data;
- Summary of the chain characteristics;
- Permitting and competent authorities for the components capture, transport, and storage (if applicable);
- National Coordination Scheme (if mandatory) by component;
- EIA (if mandatory) by component;
- Issues by component;
- Timeline of permitting (up to draft decision);
- References and links to permitting procedures.

For the ROAD several additional reports are available. For the 'Green Hydrogen project' of Air Liquide (cancelled) one additional report on the timeline of permitting is available. These additional reports for the ROAD project are described below (paragraphs 4.4.5 – 4.4.7).

4.4.5 Timeline permitting

The following worksheet is the one describing characteristic timelines for permitting of the ROAD project. This worksheet gives useful information on the milestones and timelines for each permit that is requested. This includes an amendment of the State zoning plan, which is an important milestone in the permitting process. An amendment of the State zoning plan may also apply to other CCS projects.

On the Y-axis of the worksheet, the various permits and the so-called amendment of the State zoning plan (a duty for the competent authority) are summarised, with the applicable stage in the CCS chain:

- CO_2 capture;
- CO_2 transport;
- CO_2 storage.

Thirteen permits or exemptions are needed for the ROAD project (except the critical amendment of the state zoning plan which is an important milestone in CCS permitting): four permits for two stages (capture and storage) and five for the transport stage.

On the X-axis, the columns have the following captions:

- CCS chain component (capture, transport, or storage);
- Additional information, e.g. transport of CO_2 by *pipeline* or *ship*.
- Relevant permits;
- Additional information, e.g. 'expanded Wabo procedure', 'National Coordination Scheme', etc.
- Competent authority, e.g. Ministry of Economic Affairs, Province of Zuid-Holland, etc.
- Date permit application; this date marks the start of the permitting process for that permit;
- Draft decision ; this date marks the provisional ending of the process;
- Final decision ; this date marks the end of permitting, presumed that no appeal is lodged (see below).

The final decision can be subjected by an appeal to the Council of State. If an appeal proves to be groundless or if no appeal is lodged, the permit becomes irrevocable. In case of the ROAD project, no appeal has been lodged. At the time of writing this report in April 2014 all permits for ROAD were draft permits, except the final permit with respect to the Nature Protection Act 1998 for the CO_2 capture plant of the ROAD consortium as well as the final CO_2 storage permit for TAQA.

The worksheet also shows intermediate steps for the CO_2 storage permit, which in the ROAD project was originally included in the National Coordination Scheme but left out of the Scheme in a later stage. These intermediate steps precede the 'Final decision'. After the column with the date of the final decision (if known), the columns are:

- Timeline until draft decision;
- Timeline until final decision;
- Formal timeline; this period of time is the period needed according to acts or regulations;
- Appeal; this is the time needed for appeal to the Council of State (if applicable);
- Total timeline; this is again the period of time needed in accordance with official documents (acts or regulations), excluding or including appeal to the Council of State, if applicable.

These timelines give a broad view of the actual time needed for a permit, as well as the formal timeline for the draft or final decision exclusive or inclusive of appeal to the Council of State.

4.4.6 (Timeline) EIA procedure

The next worksheet has a structure which resembles that of the preceding worksheet 'Timeline permitting'. The worksheet focuses on the EIA procedure, e .g. for ROAD, also showing the cumulative timeline for the EIA procedure. On the Y-axis the various stages of the EIA procedure are depicted:

- Announcement of Project and Notice of Scope and Level of Detail;
- Notice (The competent authority gives notice that the decision is being prepared, etc.);
- Consultation and Advice on the Notice of Scope and Detail;
- Advisory Scope and Level of Detail;
- The Environmental Impact Assessment (EIA);
- Publication of the EIA and Request for the Draft Decision;
- Consultation;
- Advice of the 'Commissie-m.e.r'.;
- Decision;
- Evaluation of the Environmental Impact after Completion;

To complete the stages on the Y-axis, room has been reserved for another two items:

- Lessons learned; this is a kind of review of the EIA procedure for ROAD;
- Sources; here, references for the EIA procedure are summarised.

On the X-axis, the columns have the following captions:

- Stage; the aforementioned stages from announcement of project through evaluation etc.;
- Contents; the contents of each and every stage is explained;
- Date; the date marks the publication of some document or the start of an EIA procedure stage;
- Timeline (cumulative); as stages are successive, the timeline is shown cumulatively (months).

4.4.7 Acts and regulations

This worksheet has features that resemble the worktable 'Timeline permitting' but it does not dwell upon the timeline. It only briefly summarises the acts and regulations of interest for each permit.

4.4.8 Database

This worksheet contains all permits and issues, as well as the State Coordination Scheme and the Environmental Impact Assessment, with relevance for (components of) the CCS chain. Also the restrictions are shown, as some (generic) permits or issues are not applicable to a specific CCS chain.

5 References

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Internet Sources

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2 http://www.shell.ca/en/aboutshell/our-business-tpkg/business-in-canada/upstream/oil-sands/quest/consultation.htmlnl/subsidies-regelingen/road-project (Bureau Energieprojecten RVO)

Appendix A Permits for ROAD and timeline for permitting

This Appendix provides information on the permits and the timeline of permitting for the ROAD project. The information is largely based on reports published by the ROAD consortium: (ROAD, 2011) and (ROAD, 2013) and other public sources such as websites of authorities involved in permitting. The permits are presented and shortly described, including the actual and formal timeline until this date.

CO_2 capture:

1. All-in-one permit for physical aspects
   This permit is part of the expanded procedure Wabo. The competent authority is the province of Zuid-Holland. The time needed from application to the draft decision was 0.8 year, slightly longer than the 0.5 year according to the formal timeline but much less than the 2.0 year including appeal to the Council of State (based on acts or regulations).
2. Water permit
   This permit is related to the demand for cooling water for the CO_2 capture plant. The competent authority is the Ministry of I&E. The time needed from application to the draft decision was 0.3 year, slightly less than the 0.5 year according to the formal timeline.
3. Nature Protection Act 1998 permit
   The Nature Protection Act 1998 requires a permit because the CO_2 capture plant is near a Natura 2000 area. The time needed from application to the final decision was 2.0 year, significantly longer than the 0.25 year according to the formal timeline (without appeal). The timeline would have been equal to the formal timeline including appeal to the Council of State.
4. Emission permit EU ETS
   The emission permit EU ETS needed for a CO_2 capture plant is granted by the Netherlands Emission Authority. No timeline is available, but this permit is not regarded as critical.

CO_2 transport (pipeline):

5. Amendment State zoning plan
   Four permits are needed for CO_2 transport (pipeline). The first stage is a duty of the Ministry of I&E to amend the State zoning plan. As soon as this amendment has been made, the successive permits can be processed in the framework of the National Coordination Scheme.
6. Water permit
   A water permit is needed for a CO_2 pipeline and granted by the Ministry of I&E. The time needed from application to the draft decision was 1.2 year, longer than the 0.5 year according to the formal timeline (without appeal).
7. Railway act permit
   A railway act permit is needed in case the CO_2 pipeline crosses a railway. It is granted by the Ministry of I&E. The time needed from application to the draft decision was 0.8 year, longer than the 0.5 year according to the formal timeline (without appeal).
8. Flora and Fauna Act Exemption
   An exemption is needed from the Flora and Fauna Act for the CO_2 pipeline, granted by the Ministry of EA. The time needed from application to the draft decision was 0.5 year, equal to the formal timeline (without appeal).
9. Emission permit EU ETS
   The emission permit EU ETS needed for the CO_2 pipeline is granted by the Netherlands Emission Authority. No timeline is available, but this permit is not regarded as critical.

CO_2 storage (offshore):

10. All-in-one permit for physical aspects
    The first permit needed for CO_2 storage is the all-in-one permit for physical aspects in the framework of the National Coordination Scheme (NCS). Other permits are also integrated in the NCS, except the storage permit which has been left out of the Scheme in a later stage. The draft decision was filed by the Ministry of EA after approximately 0.5 year.
11. Storage permit
    The storage permit for CO_2 storage (TAQA) is considered as one of the most challenging permits in the CCS chain, as it is a permit form which risk assessment is crucial and as it is

unprecedented. The permit is granted by the Ministry of EA. The time needed from application to final decision was approximately 2 years.

12. Flora and Fauna Act Exemption
    For CO_2 capture, an exemption is needed from the Flora and Fauna Act. The Ministry of EA grants this exemption. The time needed from application to draft decision was 0.5 year.
13. Emission permit EU ETS
    The emission permit EU ETS needed for CO_2 storage is granted by the Netherlands Emission Authority. No timeline is available, but this permit is not regarded as critical.

A few remarks are made which are considered as lessons learned in the permitting process for ROAD:

- For a smooth permitting process, permits for CO_2 transport and storage are coordinated in the National Coordination Scheme (NCS), e.g. by organising one instead of several public inquiries. Permitting under the NCS was delayed by the onshore permitting process, not by offshore CO_2 storage permits.
- The application for the storage permit entered the NCS on October 18, 2011 (Agentschap NL). On March 25, 2013, it left the NCS to enable the Ministry to publish the permit independent of other permits. The regulation enabling the European Commission (EC) to give its opinion, within 4 months, on TAQA's draft storage permit proved to require more time than envisioned, because the draft permit did not provide all the information assessed by the EC. The EC also wanted to have a look at the storage EIA. When this was sent later to the EC, the clock started ticking. This is an important lesson learned.
- ROAD and TAQA started to apply for permits and to draft the EIA in 2010. The CO_2 storage permit was received on 29 July, 2013. It became irrevocable after 6 weeks (16 September 2013).

The main sources of information are three reports on the ROAD project, (ROAD, 2011), (ROAD, 2012) and (ROAD, 2013). Additional information was gathered from the Internet. Last but not least, representatives from ROAD and TAQA were so kind to provide additional information and insights in the CCS permitting process in various stages of the development of the Permitting Guidance Tool:

- Interviews with several representatives of ROAD and TAQA, but also Air Liquide and RWE as well as the government (Ministry of EA);
- Feed-back at a consultation meeting with partners in the WPs 4.2, 4.3, and 4.5 together with representatives of ROAD and DCMR, December 10, 2013, ROAD/DCMR office, Schiedam;
- Comments and suggestions for improvement on permitting timelines, after the consultation meeting, from representatives of ROAD, TAQA, and Bureau Energieprojecten.

Appendix B Input forms of the Permitting Guidance Tool

In the tool are two input forms, the first is to define the CCS chain, the second for some administrative data.

After defining the CCS chain it is possible to create a standard report as described in paragraph 4.4.4. This possible with the button 'Create report'. After creating this report you can open the report with the button 'Show report(s)'. For the cases Road and Air liquid also the additional reports (described in paragraph 4.4.5 – 4.4.7) are shown.

With the buttons 'New Case…' and 'Edit Case…' it is possible to enter the administrative data.