Handling and allocation of Business Risks

Special Report to the Global Carbon Capture and Storage Institute

ROAD | Maasvlakte CCS Project C.V.

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Title
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Executive Summary

Because of the innovative characteristics of the Maasvlakte CCS project, it faces more risks than usual utilities projects. On the one hand, capturing, transporting and storing CO_2 at this scale involves managing new technical risks as the combination of the technologies involved has not yet been demonstrated. On the other hand, dealing with a project where the regulatory framework still has to be developed also creates business risks for the ROAD Project. Therefore, regarding the particular challenges of risk management, MCP committed itself to develop a risk management approach that would carefully identify, evaluate and mitigate by adequate measures the identified risks.

An explanation on the project cost estimates, budget firmness and contingencies are given. The construction contract for Capture, the main contract of the ROAD Project, has been derived via an extensive FEED study and has therefore the lowest percentage of contingency of the project. The storage area has the highest percentage of contingency in the FID phase of the project.

A summary of the main business risk categories were given and four main project areas were defined;

- Capture (CAPEX and OPEX period)
- Transport (CAPEX and OPEX period)
- Storage (CAPEX and OPEX period)
- Permitting/ regulatory
- Funding

In this report, the risk management methodology developed by the ROAD project team is described and evaluated, including the description of the business risks, mitigating actions and residual risks. Since the beginning of 2011, the ROAD project started with an extensive Risk management approach to list, evaluate and treat the identified risks. Also, by using the knowledge within the parent companies and third parties, ROAD tried to identify unknown risks that had not been identified before. With the use of the knowledge from the Parent companies and third parties, ROAD started the process of completing the Risk Register and initiated successful mitigating actions to eliminate/ downsize the risks where possible.

A short overview of the consortium structure is given, explaining the roles of the parent companies via the Joint Venture Agreement. Also, a short overview of the other project partners is included with their roles and responsibilities within the ROAD project.

Finally, the local, national and European policy considerations and incentives are explained.

The Project Management Board is confident that the ROAD risk register is as complete as possible. Therefore, we expect that project risks will be mitigated to an acceptable level, set by the parent companies and the ROAD Project.

Table of Contents

1. Introduction

In July 2009, Maasvlakte CCS Project C.V. ('MCP') submitted its project proposal to the European Commission, to apply for funding under the framework of the European Energy Programme for Recovery ('EEPR'). This marked the start of the 'ROAD Project' ('Rotterdam Opslag en Afvang Demonstratieproject'; Rotterdam Storage and Capture Demonstration project).

Because the ROAD Project is innovative, it faces more risks than usual utilities project. On one hand, capturing, transporting and storing CO_2 at this scale involves managing new technical risks as the combination of the technologies involved has not yet been demonstrated. On the other hand, dealing with a project where the regulatory framework still has to be developed also creates risks. Therefore, regarding the particular challenges of the risk management, MCP committed itself to develop a risk management approach that would carefully identify, evaluate and mitigate by adequate measures the identified risks.

In this report, the business risks managed by the ROAD Project team are described, including the description of the cost estimates, the consortium structure of the project and the local and European policy considerations and incentives. This is done with the aim of helping similar projects to identify and treat their own business risks.

Please note that this report is written based on the risk situation as of February 2012.

The structure of this report is as follows:

- In Chapter 3, an overview of the project cost estimates are explained resulting in a budget firmness and contingency.
- In Chapter 4, the high level commercial risk analysis are summarized and explained,
- In Chapter 5, the key risks for the Final Investment Decision (FID) are summarized and explained, as well as their corresponding mitigating actions, resulting in a residual risk level that is described. This analysis is done for each of the 3 main parts of the project, as well as for other general critical themes:
    - Capture
    - Transport
    - Storage
    - Permitting

  The risks are presented using ColibriWeb. This is the web based risks management tool ROAD is using (at least) for the FID phase of the project. A short explanation of the risk management process within the ROAD is given as well in this chapter.
- In Chapter 6, a high level description on the consortium structure is given. The parent companies, the intended partners and their incentives are explained.
- In Chapter 7, the local, national and European policy considerations and incentives are explained that are important for the ROAD project in the short and the long term.

Since August 2011, ROAD has hired a specialized (offshore) Risk Management company, CL Risk Solutions, to support a more professionalized Risk Management Process (Phase 2).. The company supported the project risk management process by initiating comprehensive Risk workshops, organizing a web based system for Risk management, an individual risk assessment and follow-up assessments via their web based system.

This report is written for the Global CCS Institute and is part of the knowledge to be shared under the Funding Agreement between the Institute and Maasvlakte CCS Project C.V.

2. Project Factsheet

2.1 Project Overview

ROAD is the **R**otterdam **O**pslag and **A**fvang **D**emonstratieproject (Rotterdam Capture and Storage Demonstration Project) and is one of the largest integrated Carbon Capture and Storage (CCS) demonstration projects in the world.

2.1.1 Project objectives

The main objective of ROAD is to demonstrate the technical and economic feasibility of a large-scale, integrated CCS-chain. In the power industry, to date, CCS has primarily been applied in small-scale test facilities. Large-scale demonstration projects are needed to show that CCS is an efficient and effective CO_2 abatement technology within the next 5 to 10 years. With the knowledge, experience and innovations gained by projects like ROAD, CCS could be deployed on a larger and broader scale: not only on power plants, but also within energy intensive industries. CCS is one of the transition technologies expected to make a substantial contribution to achieving climate objectives.

2.1.2 Partners

ROAD is a joint project initiated by E.ON Benelux N.V. and Electrabel Nederland N.V. (GDF SUEZ Group). Together they constitute the limited partnership Maasvlakte CCS Project C.V. ROAD intends to work with GDF SUEZ E&P Nederland B.V. for the CO_2 transport and TAQA Energy B.V. for the CO_2 injection and permanent storage. The ROAD-project is co-financed by the Government of the Netherlands, the European Commission within the framework of the European Energy Programme for Recovery (EEPR) and the Global CCS Institute.

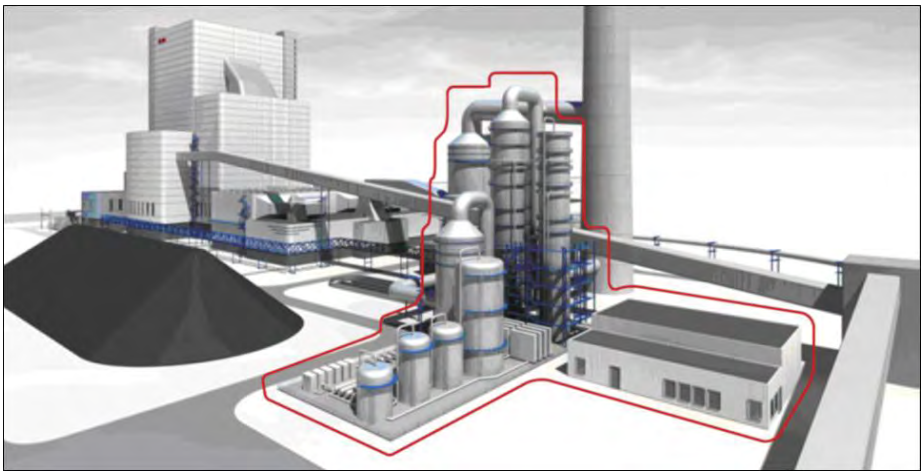
2.1.3 Project specifications

ROAD applies post combustion technology to capture the CO_2 from the flue gases of a new 1,100 MWe coal-fired power (Maasvlakte Power Plant 3) in the port and industrial area of Rotterdam. The capture unit has a capacity of 250 MWe equivalents and aims to capture 1.1 million tonnes of CO_2 per year. The capture installation is planned to be operational in 2015.

Location of the ROAD-project CCS chain: Rotterdam port and industrial area and North Sea

Location of the capture unit: Maasvlakte Power Plant 3 (photo: E.ON)

From the capture unit the CO_2 will be compressed and transported through a pipeline: 5 kilometers over land and 20 kilometers across the seabed to the P18 platform in the North Sea. The pipeline has a transport capacity of around 5 million tonnes per year. It is designed for a pressure of 175 bar and a maximum temperature of approximately 80 °C.



250 MWe capture unit (post-combustion)

ROAD plans to store the captured CO_2 in depleted gas reservoirs under the North Sea. These gas reservoirs are located in block P18 (P18-6, P18-4 and P18-2) of the Dutch continental shelf, approximately 20 kilometers off the coast. The depleted gas reservoirs are at a depth of around 3,500 meters under the seabed of the North Sea. The CO_2 will be injected from the platform into depleted gas reservoirs. The estimated storage capacity is approximately 35 million tonnes.

2.1.4 Rationale for Rotterdam port and industrial area

The Rotterdam port and industrial area has a number of advantages that create favorable conditions to implement a CCS demonstration project like ROAD. The Rotterdam port and industrial area has many CO_2 point sources. Several new power stations prepared for the application of CCS (capture ready) are under construction. The Port of Rotterdam is relatively close to a large number of (almost) depleted gas reservoirs on the continental shelf under the North Sea, allowing for a small transport distance. These gas reservoirs meet the physical and geological properties for CO_2 storage and will become available in the next few years (from 2014 onwards). The Netherlands has extensive of knowledge and experience with both oil and gas extraction and storage of gas in aquifers and gas reservoirs. In addition, the complete CCS-chain is remote from residential areas.

P18-A platform at the North Sea (photo: TAQA)

2.1.5 Facts & Figures

Base installation: E.ON Maasvlakte Power Plant 3 (Rotterdam, The Netherlands)

- Output : 1.070 MWe
- Efficiency : 46%
- Operational : End 2012
- Capture ready

Capture Plant

- Technology : Post-combustion
- Capacity : 250 MWe equivalent
- Capture rate : 90%
- CO_2 captured : ~ 1.1 megatonnes / year
- Operational : 2015

Transport

- Pipeline
- Diameter : 16 inch
- Distance : 5 km onshore, 20km offshore
- Capacity : Gas phase :1.5 megatonnes/year
  Dense phase : 5 megatonnes/year
- Design specifications : 175 bar, 80 °C

Storage

- Depleted gas reservoir : P18
- Operator : TAQA
- Depth : 3,500 meters

- Estimated capacity : ~ 35 megatonnes
- Available : 2014

2.1.6 Planning

The high level schedule of the ROAD project is as follows:

14 July 2009	:	Application submitted for funding under European Energy Programme for Recovery
September 2009	:	Project selected for funding by European Commission
May 2010	:	Ministerial order Dutch funding published
	:	Grant Agreement signed by European Commission and ROAD Project
September 2010	:	Front-End Engineering Design studies Capture Plant completed
		Starting note Environmental Impact Assessment published
Q1 2012	:	Submitting Environmental Impact Assessment, permit applications definitive (not irrevocable)
Q1 2012	:	Final Investment Decision
Q2 2012	:	Start execution phase (procurement, construction, etc.)
2014	:	CCS chain mechanically complete
2015	:	Start of operation CCS chain
2015-2019	:	Demonstration operation phase CCS chain
2020	:	Start commercial operation CCS chain

2.2 Maasvlakte CCS Project C.V.

The initiating parties of the ROAD project are E.ON Benelux and Electrabel Nederland / GDF SUEZ Group. Together they constitute the limited partnership Maasvlakte CCS Project C.V.

2.2.1 E.ON Benelux

E.ON Benelux concentrates on the production and supply of electricity and gas to private customers and business customers in the Netherlands and Belgium. E.ON Benelux is primarily an electricity-generating company; the company can trade internationally and has its own professional sales organisation. The company was established in 1941 and since 2000 has been part of E.ON Energie AG. E.ON Benelux's power stations with a total capacity of 1,850 MW are located in the province of South Holland, the economic heart of the Netherlands. The company has approximately 600 employees. E.ON Benelux is based in Rotterdam.

2.2.2 Electrabel Nederland

Electrabel Nederland is a leading player in the Dutch energy market and part of the GDF SUEZ Group. With six state-of-the-art production locations and a total capacity of 5,103 MW Electrabel is the largest electricity producer in the Netherlands. Electrabel is a supplier of elektricity and gas to both private and business customers. Electrabel Nederland has 1,250 employees.

2.3 Intended Partners

Intended partners of Maasvlakte CCS Project C.V. are GDF-SUEZ E&P Nederland B.V. for the CO_2 transport and TAQA Energy B.V. for the CO_2-injection and the permanent storage under the sea bed of the North Sea.

TAQA Energy
TAQA Energy is part of the Abu Dhabi National Energy Company PJSC (TAQA), an energy company that has worldwide interests in power generation, combined heat and water, desalination, upstream oil & gas, pipelines, services and structured finance. TAQA has a workforce of 2,800 employees and is located in Abu Dhabi, The Hague, Ann Arbor: Michigan, Aberdeen, Calgary and Amsterdam. In addition, TAQA has sustainable partnerships with companies in Africa, the Middle-East, Europe, North-America and India. TAQA is listed at the Abu Dhabi Securities Exchange (ADX).

In the Netherlands, TAQA Energy explores and produces gas and condensates from wells located onshore in the Alkmaar region and offshore in the Dutch North Sea. TAQA also operates a gas storage facility in Alkmaar and has interests in Dutch North Sea pipelines. 200 people work for TAQA directly and indirectly in the Netherlands both onshore and offshore.

GDF SUEZ E&P Nederland
GDF SUEZ E&P Nederland is one of the largest operators in the Dutch sector of the North Sea. With more than thirty production platforms and 300 employees, it is at the basis of the provision of energy to the Netherlands and several other countries.

Since its first successful drilling results in the Dutch North Sea, approximately forty years ago, GDF SUEZ E&P Nederland has grown into a leading operator. It has ample expertise and experience, always chooses the safest option and is continuously working towards the development of new techniques and improved methods. Continuity is ensured through exploration, takeovers and acquisition.

2.4 Financial contributors

The ROAD-project is co-financed by the European Commission within the framework of the European Energy Programme for Recovery ("EEPR"), the Government of the Netherlands and the Global CCS Institute.

In response to the economic crisis, the European Council and the European Parliament adopted the Commission proposal for a European Energy Programme for Recovery ("EEPR") in July 2009. The EEPR funds projects in the field of gas and electricity infrastructure as well as offshore wind energy and CO2 capture and storage (CCS). In total 12 CCS projects applied for assistance under the EEPR. In December 2009, the European Commission granted financial assistance to six projects that could make substantial progress with project development in 2010. These projects will receive overall funding of € 1 billion under the EEPR.

3. Overview of cost estimates for the Project

3.1 Introduction

In order to determine the actual (possible) Risk uplift on the project budget the uncertainty on the budget has to be decided. The approach, uncertainties, price scenarios and contingencies will be explained in this chapter in order to properly explain the Risk uplift that could be expected on top of the contingencies that are already taken into account in the project budget.

3.2 Approach

Due to the collaborative nature of the project none of the parent company guidelines have strictly been followed in the build-up of cost estimates and contingencies. The project budget both for CAPEX as well as for OPEX phase have been composed through either internal or external consulting of experts based on the available level of engineering detail.

3.3 Uncertainties in the CAPEX budget

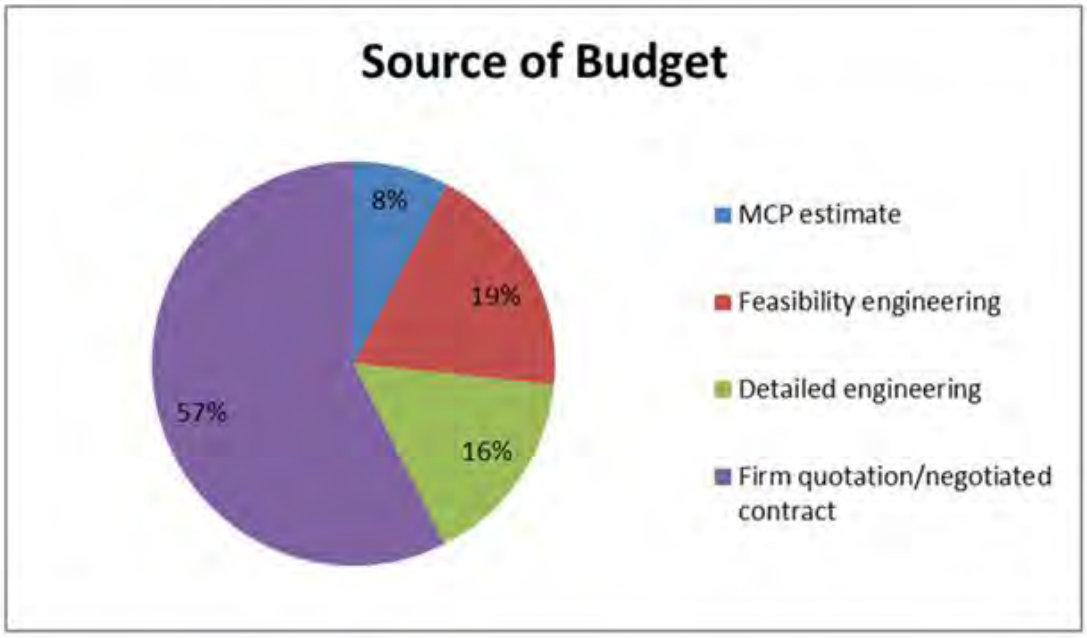
The basis of all estimates both in engineering amounts and budgetary amounts has been the projects FEED study and Capture EPC concept design. The budget also includes money spent to date on the project. In determining uncertainties the following distinctions were made in budget firmness:

- Item was estimated by internal professional based on available conceptual design data (FEED)
- Estimate was obtained through external engineering or design house or consultant that executed the feasibility engineering and possibly supported by budgetary market information or market budget quotations
- Estimate was obtained through external engineering or design house or consultant that executed the detailed engineering and possibly supported by budgetary market information or market budget quotations
- Budget information was based on a firm market quotation or negotiated contract ready for signing

In the graph below, a summary is given of the firmness of the CAPEX budget for capture, transport and storage. The costs for the project office and stakeholder management are not included since the costs for these areas are relatively easy to predict.

The 57% ‘Firm Quotation’ portion includes:

- Fluor
- Power plant interfaces
- Site preparation
- Engineering support from parent companies
- Small scale tests and studies



Per cost item the P99 cost uncertainty was established by the relevant internal or external expert. In this assessment, a distribution describes the range of possible values, and shows which values within the range are most likely. The uncertainty budget was established following the rationale that the relevant package manager should feel comfortable in managing the package for the item budget + uncertainty budget total. The contingency and cost uncertainty is as such determined in a deterministic way; however the uncertainties determined in this deterministic assessment have been used as input for the probabilistic risk assessment and quantification (see paragraph 5.2.4). The rationale behind this split approach is that by challenging the relevant discipline managers on the cost uncertainties the risks and events are not taken into account, but the aggregate of uncertainties on individual price items are overestimated. Not all items will simultaneously encounter a cost escalation. As such the contingency is considered as a worst case price uncertainty. By including the maximum spread in prices into the probabilistic approach and including also the quantified risks an overall spread on budget is obtained. The contingency (3.6) therefore contains the inherent risks of the project line items. The quantitative risk assessment (5.2.4) contains both inherent and contingent risks.

3.4 Price scenarios Electricity and CO2

The price scenarios used in the project (mainly OPEX) valuation have been based on information received through KEMA that carried out dispatch calculations for the period 2015-2020. The basis for these scenarios (3) has been the World Energy Outlook scenario 2010. To establish plausible data for the business case a three stage approach was carried out consisting of:

- Forecast of yearly average Dutch baseload power, baseload gas and EUA pricing in the period 2015-2020
- Calculation dispatch of MPP3 2015-2020 based on a least cost simulation of Dutch electricity market
- Calculation of dispatch of MPP3 2015-2035 based on market pricing

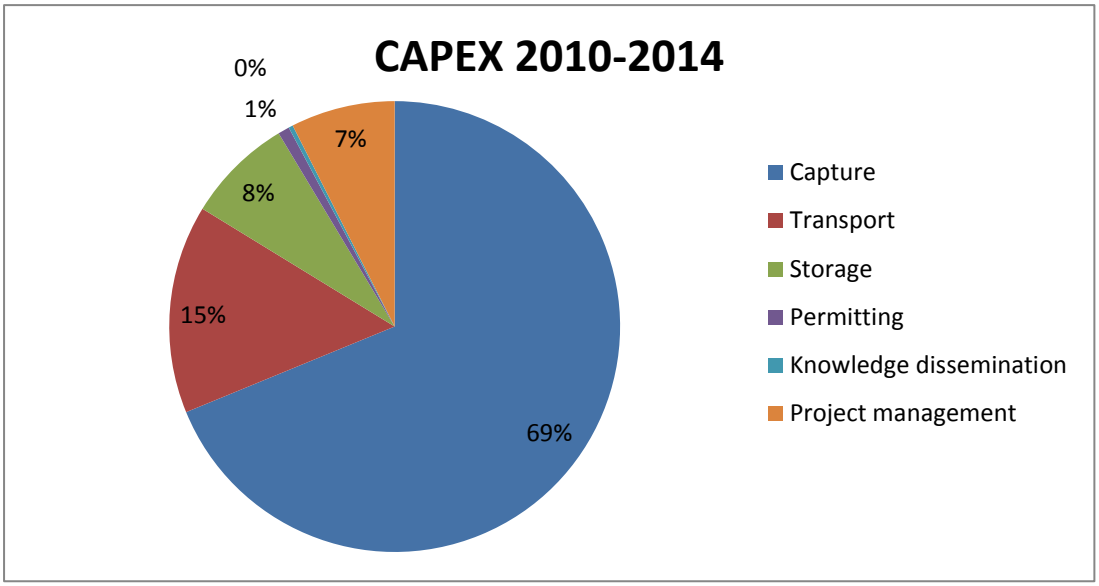
The following input data and assumptions were incorporated in the model:

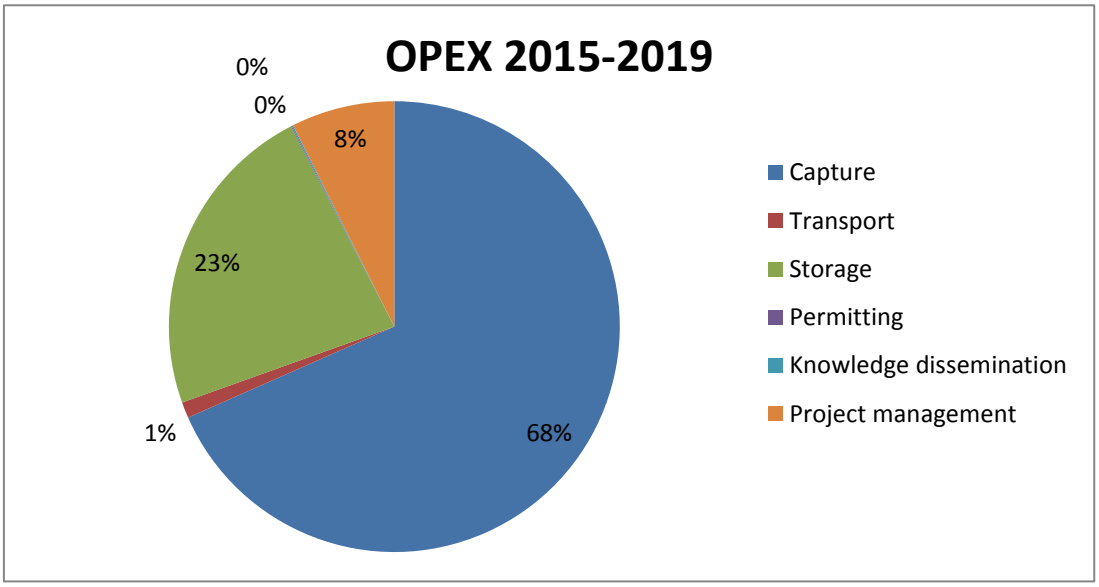
- In the simulation were included for the EU: Austria, Belgium, Switzerland, Czech Republic, Germany, France, Iberia, Italy, Netherlands, Norway, Poland, UK
- Efficiency and load data of MPP3 were incorporated
- Assumed wind power Netherlands 2015: 0.8 GW offshore and 2.8GW onshore
- Assumed wind power 2020: 2.5GW offshore and 3.3GW onshore

As explained in the budget paragraph (3.6) MCP took a yearly fixed price for Electricity and CO2. Price volatilities and therefore the risk of price fluctuations for electricity and CO2 were not taken into account. These fluctuations are included in the project business cases of the Parent companies. The costs (with fixed prices) for Electricity and CO2 are included in the OPEX.

3.5 Budget

The total budget for all three phases is €643m (all values in this section are nominal values 2010). However, this includes both the anticipated utility costs (electricity and steam) and costs related to the transport contract injection fee that is coupled to the CO_2 price. The CO_2 price used in this base case budget is €27/tonne on average.





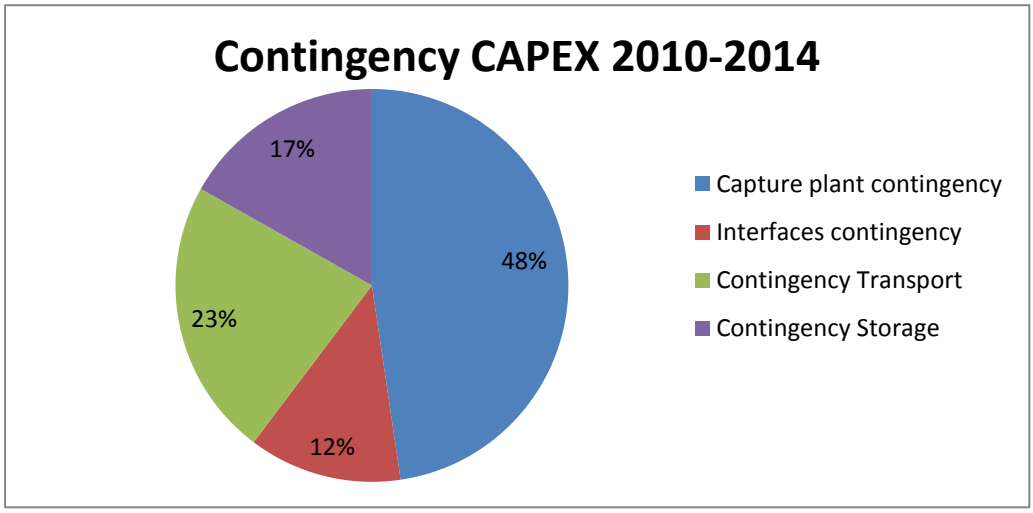
The CAPEX budget, including contingencies, adds up to a total of €417m (inflation of 2% is used). The OPEX budget adds up to a total of €226m (including abandonment). The remaining €19m in the ABEX phase is budgeted for abandoning the offshore facilities (plugging the well and monitoring and handover). For budgeting purpose actual CO_2 injection is assumed to cease at the end of 2019, but platform facilities will be kept alive for monitoring and plugging and abandonment purposes until end of 2023. In reality, the parent companies have the opportunity to continue operation after 2019 if this is then considered economically or strategically beneficial.

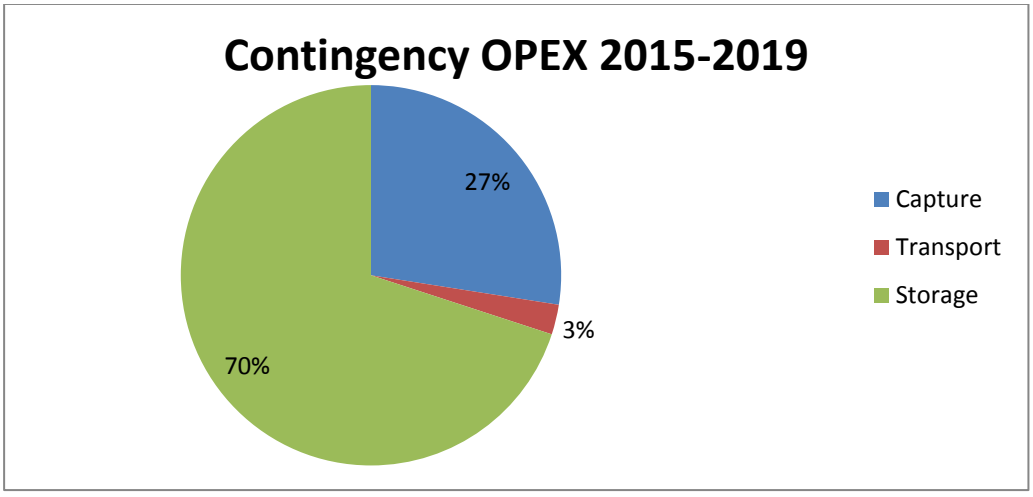
3.6 Contingency

The total project contingency has been determined through a bottom-up approach indicating the maximum spread on each expense line item. The cost spread arbitrated on each expense line item represents the exposure due to:

- Market price exposure resulting in cost spread
- Current state of engineering detail: concept design (40% contingency), basic design (pre-FEED, 25% contingency), detailed design and fixed quotes have lower (or no) contingencies again.
- Planning uncertainties (weather risk, mobilization of equipment)
- Other issues

Individual line item cost uncertainties have been determined incorporating advice from the relevant discipline experts and external experts. These numbers have been extensively reviewed and scrutinized and are currently considered to be the best judgment of possible cost spread on these items. The budgeted contingencies covering these cost uncertainties are now consolidated on a project and work package level. The estimated contingencies was split as follows:





OPEX contingency excludes uncertainty of Electricity or CO_2 prices. These are handled within the Parent companies using price scenarios.

4. High level commercial risk analysis CCS chain

4.1 Introduction

In this chapter the high level commercial risks will be explained. These risks are mainly in the regulatory field of the project. MCP is analysing the business risk that could have an effect on the Final Investment Decision (FID) of the project. These risks were identified by closely following the national and international policies and laws. Also, by closely following the political views during sessions and discussions on CCS and sustainable energy the project was able to mitigate the possible risks as soon as possible.

4.2 Co-firing biomass in MPP3 in combination with CCS

This risk is not a technical risk. ROAD is confident that it is possible to capture, transport and store CO_2. The combination of CCS and Biomass is good for the planet and it can enable negative emissions.

MPP3 intends to co-fire biomass in the period that ROAD will capture CO_2. Although it is unclear at this moment how much biomass will be co-fired, any amount will have a negative impact on ROAD due to the way it is regulated. The EU-ETS currently does not incentivise Bio-CCS. In fact, there is a negative incentive in the EU-ETS for Bio-CCS while an emitter does not receive allowances for negative emissions. This leads to the situation that the emitter must choose whether it want to co-fire biomass or capture CO_2 (not both together). Due to the plans for co-firing biomass in MPP3, the EU-ETS allowances that ROAD would receive for reducing CO_2 will be reduced in proportion to the amount of biomass co-fired. This will lead, depending on the amount of biomass, to a substantial loss of income for ROAD.

Furthermore, the Netherlands are struggling to achieve the renewable energy targets of 20% renewable energy in 2020. The current minister of Economic, Agriculture and Innovation recently agreed with the energy sector upon a so called 'green deal' to increase the renewable energy percentage in the coming years. This green deal in principle expires in 2015. For the period between 2015 and 2020 an even more extensive voluntary agreement or obligatory regulations are expected. The co-firing of biomass is already the key instrument to achieve the targets in 2015 and will gain more importance in the period between 2015 – 2020. As high as average percentages of 40% co-firing biomass in coal-fired power plants in 2020 are already forecasted. MPP3 will probably also have to significantly co-fire biomass in the same period ROAD is capturing CO2. This is a serious financial risk for ROAD.

Although Bio-CCS could contribute significantly to the reduction of CO_2-emissions and, as explained above, would even result in negative emissions, regulations prevent the development of Bio-CCS. The EC (see for example the roadmap 2050, published in December 2011) and other key decision makers consider Bio-CCS at this moment even necessary to keep the average surface temperature increase below 2°. However, the perverse incentive in the EU-ETS needs to be removed in order to support the development of Bio-CCS. The obvious and most realistic solution is to provide allowances for negative emissions. ROAD and other stakeholders are discussing this adjustment and try to reach an agreement in 2012. But until these regulations are adjusted, it remains a serious risk.

4.3 Leakage of CO_2

The total amount of CO_2 stored in the period 2015-2020 is in the range of 4 Mton CO_2. This CO_2 will be permanently and indefinitely stored in the P18-4 reservoir. All the risks for potential leakage have been identified and all possible measures will be taken to prevent leakage. The injection of CO_2 will be constantly monitored and also after the abandonment of the well,

monitoring will continue. Finally, a corrective measures plan is being developed to ensure that in case of a leakage sufficient measures can be taken to prevent further leakage.

However, if CO_2 at any time would leak out of the reservoir and reach the atmosphere (for example due to a blowout) the emission permit holder (i.c. TAQA) must surrender EU-ETS allowances for the amount of CO_2 that has leaked.

With a view to the storage permit application, the applicant needed to prove that the reservoir is sealed, but also what the leakage pathways would be in case CO_2 would leak unexpectedly.. The applicant also needed to calculate the amount of CO_2 that could leak to the atmosphere in case of a leakage. Furthermore, the permit holder needs to handover a financial security that covers the value of the EU-ETS allowances that is equivalent to the amount of CO_2 that could leak. Therefore, ROAD already has to take the financial risks into account that it is going to suffer in case of a leakage. The risk is:

Risk = (1) amount of CO_2 x (2) allowance price

The uncertainty for ROAD mainly lies in (2) the allowance price, while ROAD has a reasonable estimation of the maximum amount of CO2 that could leak to the atmosphere in case of a leakage. A sufficient and well thought corrective measure plan has been developed and ROAD is confident that in case of a leakage, ROAD can take sufficient corrective measures to stop the leakage.

However, the price of an EU-ETS allowance is a serious risk for ROAD. Because the handover of the EU-ETS allowances must be in the year that the leakage occurs, ROAD needs to pay the price at that time (this risk could to some extent be covered by hedging). For example, if a leakage occurs in 2022, ROAD needs to pay the price in that year. At this moment almost everybody agrees that the price will increase over time but nobody knows how high the price will be. Estimations differ from 15 euro in 2020 to 140 euro in 2020. Furthermore, ROAD remains liable for leakage after the well and platform have been abandoned until the handover of responsibilities to the competent authority. According to the CCS-directive, this could take 20 years after the end of injection. Under certain conditions, ROAD could even be liable for leakage after the handover of responsibilities. The extended period of liability even increases the risk of high costs in case of leakage. The biggest concern is that an accurate estimation of the development of the EU-ETS price not possible is, but the amount of CO_2 that could leak will remain the same over time.

4.4 National and EU developments in energy legislation and regulations

As stated above, the Netherlands are struggling to reach the 14% renewable target in 2020. At this moment voluntary agreements with the energy sector have been agreed upon, but as stated before, this so called 'green deal' expires in principle in 2015. It is very difficult to predict what will happen after 2015. However, in the past years several proposals of the coalition parties, as well of the opposition parties, have been put forward. Examples of these proposals are a coal-tax, emission limits, obligatory co-firing of biomass percentages, CCS-mandatory regulations, moratorium on coal fired power plants, 'Hybride leveranciersverplichting' (obligation for electricity suppliers to supply a certain percentage of renewable energy), 'producentenverplichting' (obligation for electricity producers to produce a certain percentage of renewable energy) etc.

If the 2020 targets look to be unachievable the Dutch Government is expected to introduce additional legislation so a change in legislation must be expected.

In principle, this would not per se have a negative impact on CCS nor ROAD. For example, if legislation will be introduced that sets an extra tax on the emissions of CO_2, this will create a positive incentive for CCS. However, the problem is not that the CO_2-reduction targets will not be met (most of the emissions are regulated by the EU-ETS and therefore it is certain that the reduction targets will be met), but the problem is that the renewable energy target will

probably not be met. The main problem for ROAD is that CCS is not considered as a renewable technology. It is a CO_2-reduction technology, which is needed to achieve the reduction targets for the mid- and long-term in the most cost-effective way. But this CO_2-reduction target is regulated by the EU-ETS and not by national targets. Therefore, new legislation that probably will be introduced will focus on the increase of renewable energy percentages and will probably not give an incentive to the development of CCS. In fact, it will probably always create a negative incentive for ROAD because the current proposals seem to have a focus on discouraging fossil power plants in order to promote renewable energy. Even if legislation would be introduced that only in a positive way tries to increase the percentage of renewable, for example by additional subsidies for wind farms, this could have a negative impact on CO_2-reduction technologies for fossil fired power plants because the running hours of the fossil plant are reduced.

Also it is not clear yet if additional regulations or other incentives will be proposed by the EC. The most important incentive for the development of CCS remains the EU-ETS. With phase III approaching and the inclusion of new industries (aviation), it is very probable the EU-ETS price will rise soon.

However, ROAD's opinion is that the EU ETS still suffers from the over allocation of allowances. Also the economic recession keeps the price of allowances low. But it is probably not realistic to assume that the EU-ETS will be adjusted in the coming years. Therefore, other possibilities should be examined. The United Kingdom for example recently published plans for introducing a "carbon price floor" to give investors some security and minimize risks in the nearby future. If the allowances price decreases below the minimum price, participants in the EU-ETS must pay the difference. Such regulations could reduce the risks for ROAD significantly. It is not expected that the Netherlands will follow this example. We are hoping that the EC will come up with additional plans. As stated above, another important adjustment the EC could make, is solving the problem of Bio-CCS (provide allowances for negative emissions).

In conclusion, it is realistic to assume that additional EU and/or Dutch legislation and regulations will enter into force the coming years. It is not clear yet what these exactly will be, but ROAD and other CCS stakeholders are trying to constantly raise awareness of the importance of the development of CCS (and Bio-CCS).

5. Key risks for FID

5.1 Introduction

In this chapter the risk management process and the key risks active during the FID phase will be presented. ROAD will explain these risks using the outcome of the Risk register web based tool. MCP uses this tool for (at least) the FID phase of the project. Undesired occurrence, cause, effect, mitigation strategy, actions and responsible functions will be presented on the following areas:

- Capture
- Transport
- Storage
- Permitting/ regulatory
- Funding

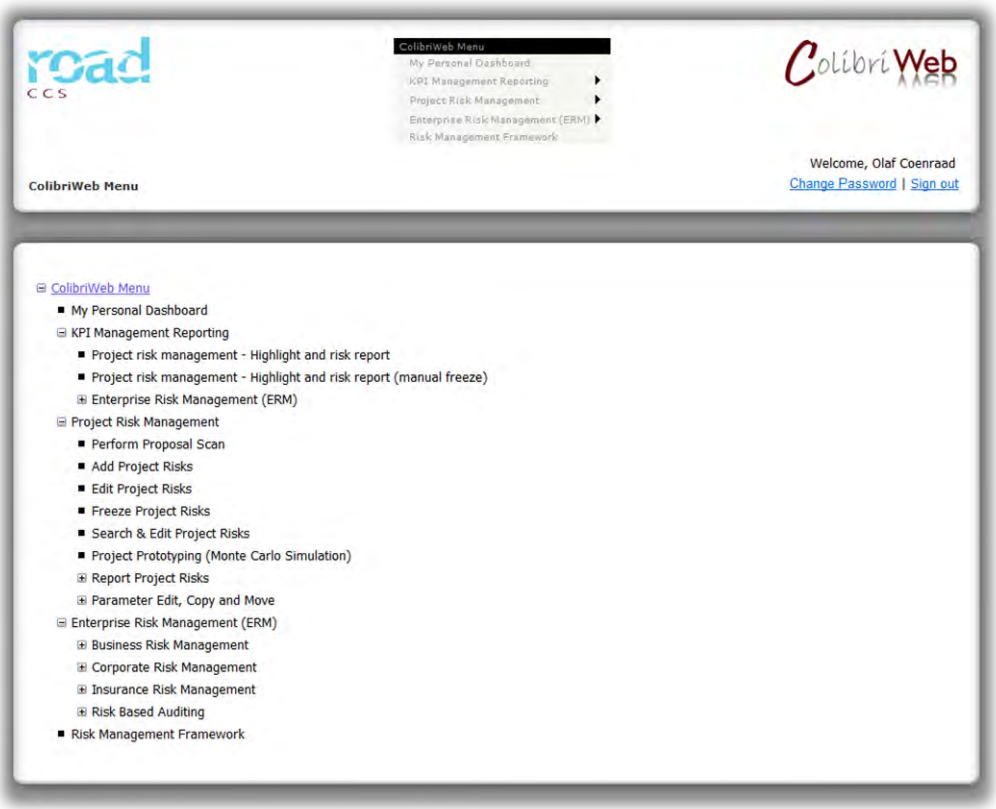
The Top Risks of the areas above will be presented in risk register extracts included at sections 5.4, 5.5, 5.6, 5.7 and 5.8.

5.2 Risk management process

5.2.1 Integration into daily primary processes

Risk management activities within the ROAD CCS organisation are considered as an inherent part of the daily work of every project staff member, under the supervision of Discipline Managers and the Risk Manager. Both the identification of new emerging risks and risk control follow-up activities are divided into in manageable portions and allocated to organisational units or staff members that are responsible for managing particular sets of risks within their disciplines. Integration of the risk management process into daily work is aimed at establishing risk ownership with staff members and avoiding lengthy, extensive risk workshops, and enabling ROAD CCS project team members to act accountably in preventing risks from occurring and controlling their possible adverse effects.

In order to guarantee the quality of the risk analysis and risk control follow-up process, frequent validations of additions and changes to the Risk register take place during regular (multi)disciplinary meetings, already existing in the organisational and decision making structures. Exceptionally, for specific purposes and at the discretion of the responsible Discipline Manager or Director, a separate risk analysis workshop may take place outside regular meeting structures.



Self-active risk management is supported by the web based tool ColibriWeb

5.2.2 Risk analysis

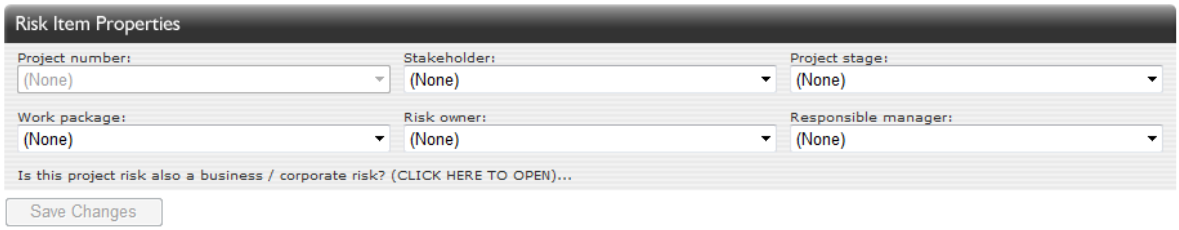
The process of qualitative risk analysis focuses on obtaining or updating a precise but concise description of a risk event and is comprised of following 5 steps:

1. Identify and describe the risk event (or opportunity) as a risk item decomposed into:

    1.a. *(Un)desired Occurrence*: an (un)anticipated situation that may or may not materialise
    1.b. *Cause(a)*: one or more conditions that may contribute to the event occurring
    1.c. *Effect(s)*: possible adverse effects of the event impacting project objectives

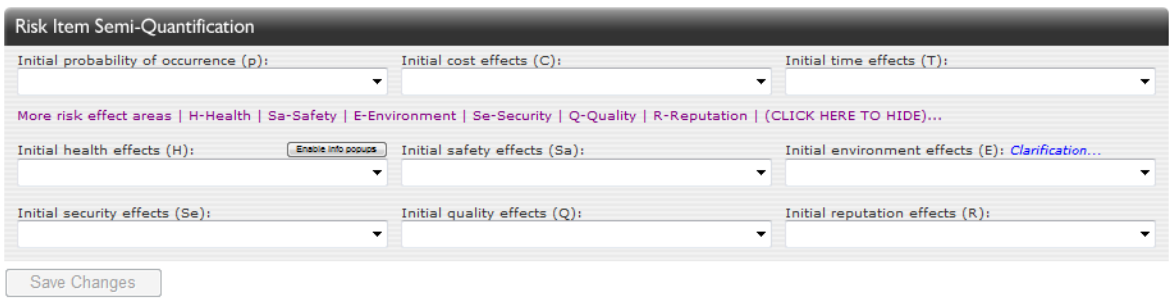
2. Select risk properties / reporting parameters from a predefined list:

    2.a. *Stakeholder*: possibly affected internal or external stakeholders
    2.b. *Work package*: the discipline work package within which the risk should be managed
    2.c. *Project stage*: the point in time or phase in which the event will likely occur
    2.d. *Risk owner*: party or parties that bear(s) the effects of the event
    2.e. *Responsible manager*: person responsible for the risk item as a whole



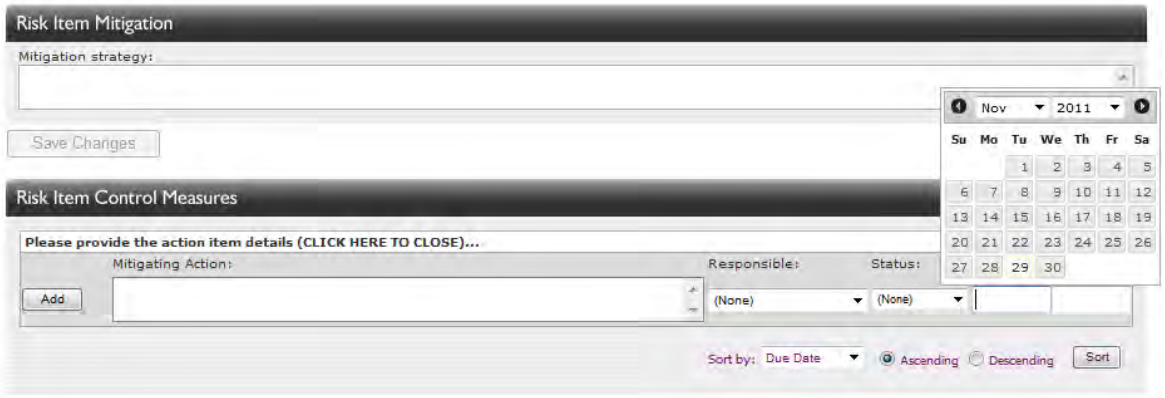
3. Assess the initial risk exposure level, i.e. before mitigation, (predefined in 5-10 categories) for:

    3.a. *Probability of occurrence (p)*: likelihood that the event will occur at some point
    3.b. *Cost effects (C)*: possible direct cost effects (out-of-pocket) of the event occurring
    3.c. *Time effects (T)*: possible delays incurred by the event occurring
    3.d. *Health effects (H)*: possible discomfort or damage to people or wellbeing
    3.e. *Safety (Sa)*: possible injury inflicted to persons, or fatality
    3.f. *Environment (E)*: possible environmental effects due to emissions and leakage
    3.g. *Security (Se)*: possible crime and corruption impacting personnel and assets
    3.h. *Quality (Q)*: possible effects on the quality and operability of the end product
    3.i. *Reputation (R)*: possible negative publicity causing defection of partners and clients



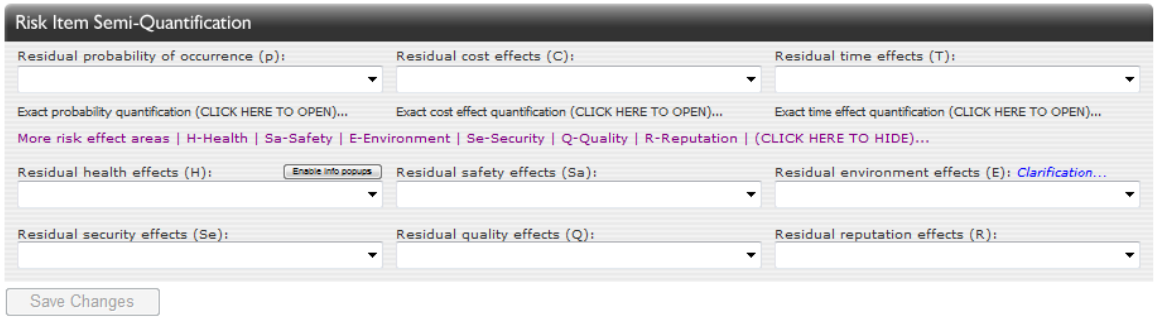
4. Define a generic risk mitigation strategy followed by a set of actionable risk control measures:

4.a. *Risk mitigation strategy*: generic risk control approach aimed at causes and/or effects
4.b. *Mitigating action*: task(s) that need to be executed to fulfil the mitigation strategy
4.c. *Action responsible*: person responsible for executing the risk mitigating task
4.d. *Action status*: current status of task follow-up (selectable from a predefined list)
4.e. *Start date*: Scheduled date of commencement of the task
4.f. *Due date*: Scheduled date of completion of the task



5. Assess the residual risk exposure level, i.e. after mitigation, for:

3.a. *Probability of occurrence (p)*: likelihood that the event will occur at some point
3.b. *Cost effects (C)*: possible direct cost effects (out-of-pocket) of the event occurring
3.c. *Time effects (T)*: possible delays incurred by the event occurring
3.d. *Health effects (H)*: possible discomfort or damage to people or wellbeing
3.e. *Safety (Sa)*: possible injury inflicted to persons, or fatality
3.f. *Environment (E)*: possible environmental effects due to emissions and leakage
3.g. *Security (Se)*: possible crime and corruption impacting personnel and assets
3.h. *Quality (Q)*: possible effects on the quality and operability of the end product
3.i. *Reputation (R)*: possible negative publicity causing defection of partners and clients



Risks are recorded in the online web based ColibriWeb Risk register. Recording of the above risk item definition elements is largely self-explanatory. Project team members are requested to be pro-active and self-active and fill out the 'Add project risk item' page promptly upon identification of a risk during their daily activities within their disciplines, or the 'Edit project risk item' form upon changed status of a risk control measure.

5.2.3 Risk management follow-up

The risk analysis process is configured to make risk management as actionable as possible by allocating risk items and risk control measures to individual team members. Risk management follow-up consists of 2 elements:

1. Daily follow-up on management of risks and implementation of control measures:

   Project team members consult their 'Personal Dashboard' in ColibriWeb on a regular basis in order to perform tasks due and to report progress by updating action statuses.

2. Bi-weekly validation of discipline-cross sections of the Risk register within the peer groups:

   During regular meetings, a 30-minute validation will be performed on newly added and changed risk items and risk control measures. Following elements within each risk item will be challenged, validated and agreed in equal presence of (a) representative(s) of Party A[1] and Party B[2]:

   - The precise and complete description of the risk item (undesired occurrence, causes and effects)
   - The affected stakeholder, the risk owner and the staff member responsible for managing the risk
   - The level of initial risk exposure (semi-quantification of probability, cost effects, time effects, HSES effects, quality and reputation effects)
   - The proposed mitigation strategy, deliberating on whether to focus on controlling the causes or the effects of the risk, and whether to apply self-control (eliminate, avoid, reduce or accept) or to transfer risk control and/or exposure to a third party (partner, subcontractor, supplier, insurance)
   - The definition, appropriateness, possible cost and expected or realized effectiveness of risk control measures and the allocation to action owners and time window for realization
   - The level of residual risk exposure (semi-quantification of probability, cost effects, time effects, HSES effects, quality and reputation effects)
   - The current status of the risk: Active (risk control measure implementation in progress), Managed (risk control measures implemented, residual risk remaining), Closed Out (risk considered no longer present)

The chairman of this meeting will provide relevant cross sections of the Risk register including an overview of recent changes to the meeting attendees, obtained directly from ColibriWeb. On his request, the Risk Manager will provide support in preparation of this item on the agenda. The chairman shall record in the Decision register any decision taken around the status of the risk itself or its mitigation, referencing the unique risk identification number. The chairman shall also appoint a delegate to update the Risk register in order to reflect decisions and changes in the Risk register.

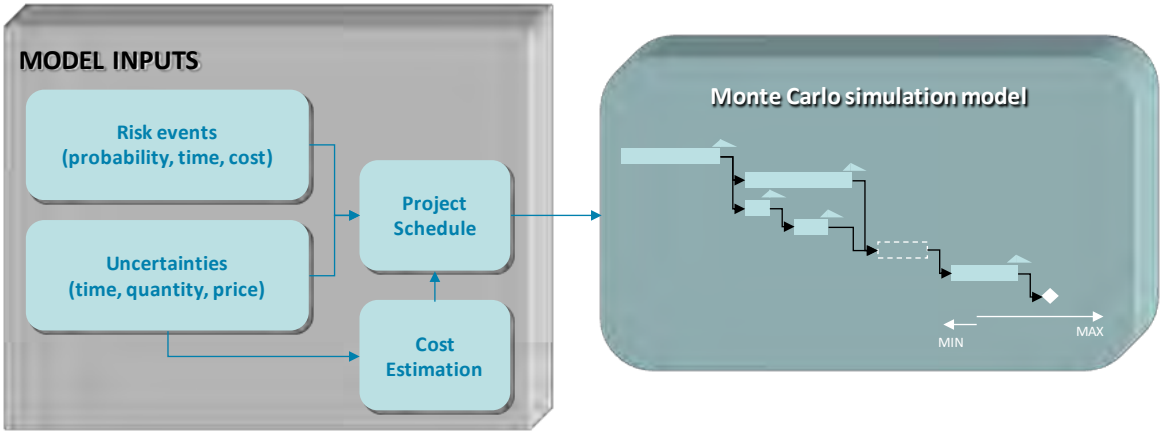
[1] Party A: E.ON Benelux
[2] Party B: Electrabel GDF Suez

5.2.4 Quantitative risk analysis and forecasting

Semi-quantification of initial and residual risk exposures, and ranking risks by means of applying a sort order to risk scores obtained by multiplying probability and cost (or time) consequences of individual risks provides an overview of risks that may attract priority or extra focus in risk control.

A more comprehensive quantitative risk analysis (QRA) is required to obtain an overview of the overall impact of these risks to project objectives. The quantitative risk analysis provides a forecast of the expected time of project completion and the expected total project cost, including risk and uncertainty. A QRA model, which effectively prototypes the project, is based on the following inputs as a minimum:

- The project schedule, including uncertainty ranges on selected activity durations
- The project budget, including uncertainty ranges on selected quantities and prices
- The full risk register, comprising residual probabilities of occurrences of risk events, and cost and time effects



The project prototyping model defining components

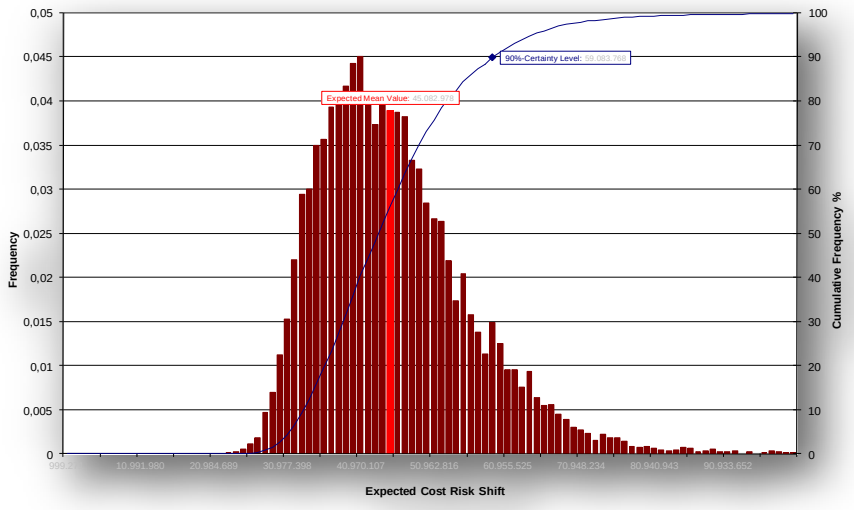
Project prototyping makes use of the validated project baseline planning as a backbone for modelling and fictitiously executing the project up to 10,000 times, in order to assess how different combinations and concurrences of risks and uncertainties impact alternative critical paths in the project schedule and subsequently impact the feasibility of schedule milestones and project costs. Some risks and uncertainties (considering their order of magnitude and impact on critical path activities) may cause larger contributions to overall risk shifts than others, resulting into an overall picture of schedule & cost sensitivities.

Essential for achieving a properly validated risk model and reliable risk simulation outputs is a full evaluation cycle of all project prototyping inputs, in close cooperation between the risk engineer, the project planner, the business controller and all key disciplines responsible for assessing individual risk items in the Risk register.

As a result of many possible combinations and concurrences of individual cost element uncertainties and risk events, the prototype model analyses the probability with which the project is likely to deliver a level of total budget overrun. Apart from the cost impact, the project prototype also examines the amount of days' time risk shift induced by risk events and activity duration uncertainties.

Prototyping the ROAD project and performing scenario simulations results in a number of key management inputs:

- Expected cost development vs. feasibility of overall CAPEX and OPEX budgets (mean values and 90%-certainties-of-not-exceeding, presented in probability density graphs)
- Sensitivity analysis on main contributors to budget risk shifts (risk events with direct cost effects, quantity & price uncertainties, time shifts causing indirect cost effects, liquidated damages)
- Expected feasibility of the project realization milestone by 31 December 2014 (mean values and 90%-certainties-of-not-exceeding)
- Sensitivity analysis on main contributors to risk shifts on schedule milestones
- A CAPEX S-curve cost distribution, indicating points in time at which cost of risk occurs



5.3 Explanation of the risk register

In this section an explanation of the different parts of the risk register is given.

Risk Item					*Risk Control Measures*					*Residual risk*		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T

No:	Unique risk number
(Un) desired occurrence:	Description of the risk
Cause(s):	What could be the cause(s) for the risk to occur
Effect(s):	What could be the effect on the project if the risk occurs
Mitigation strategy:	Project strategy to mitigate the risk
Action:	Action(s) from the project to mitigate the risk
Responsible:	Action responsible project member
Status:	Status of the action (waiting for action, in progress, concept, finished or not implemented)
Start Date:	Start date of the action
Due Date:	Date that the action should be finished
Residual Risk score:	p*C
p:	Probability of the risk (ranking)
C:	Cost effect of the risk (ranking)
T:	Time effect of the risk (ranking)
Traffic light status:	Green when the action is finished, orange when action is overdue or when the status is waiting for action and the start date is overdue, red when action <6weeks overdue
Traffic light risk:	Green when all the actions are finished in time, red when <50% of the actions is <6 weeks overdue

Risk Item					*Risk Control Measures*					*Residual risk*		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T
73	Capture plant energy supply cost may cause un-economic outcomes	Uncertainties in assumptions about consumption	OPEX increase	In-house technical design review; Design review and quality control during construction to prevent unfavorable performance	Complete process model to verify process design	Strategy & Interfaces	Finished	30/08/2011	31/01/2012	4	8	0
					Identify average energy consumption within consumer base in order to establish expected energy consumption	SAM / Lead MPP3	Finished	25/09/2011	31/01/2012			
					Process model including periods (summer, winter etc) to have a design with margin (heat exchange)	Director Capture	In progress	01/02/2012	29/02/2012			
	Risk Responsible:	*Director Capture*	*Project:*	*Road CCS integrated FID risk register*	On schedule 100%				*Residual risk score (p*C):*		*32*	
400	Carry out Modifications due to exceeding permitting limits	Exceeding limits set in the environmental permits	1) CAPEX increase 2) Not to able to go full load operation	Testing in other plant that uses a similar washing stage.	Testing washing stage	Project Engineer	Waiting for action	01/03/2012	30/04/2012	4	8	9
					Analyze a change of design of internals if necessary	Project Engineer	Waiting for action	01/05/2012	31/05/2012			
	Risk Responsible:	*Technical Project Manager*	*Project:*	*Road CCS integrated FID risk register*	On schedule 100%				*Residual risk score (p*C):*		*32*	

344	No match of critical interfaces within the capture scope	- MPP3 construction meeting set milestones;	1. Jeopardizing of timely completion of steam / condensate and flue gas interfaces 2. Significant MPP3 outage cost reimbursement	Shareholders to issue a notice to proceed separate from FID for time critical tie-ins	Request advance investment decision on critical tie-ins	Director Capture	Finished	12/08/2011	30/09/2011	2	10	0
					Expedite revised time slot from MPP3 and inform contractor subsequently	Commercial Interfaces	In progress	26/09/2011	31/01/2012			
	Risk Responsible:	*Director Capture*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 50%, Overdue(<6w) 50%				*Residual risk score (p*C):*	*20*		

Risk Item					Risk Control Measures					Residual risk		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T
399	Onshore pipeline rerouting required.	Environmental or engineering issues force project to consider other option	- Revert to an alternative pipeline route - Delay in project timeline	Continuing to progress outstanding issues for the Yangtze harbor crossing.	Evaluate and cost alternative for pipeline route	Project Manager Onshore	In progress	01/02/2012	01/05/2012	3	9	9
					Assess environmental impact related to dredging in the area.	Project Manager Onshore	In progress	01/11/2011	01/03/2012			
					Get agreement for the HD drilling	Director T&S	In progress	01/11/2011	01/03/2012			
	Risk Responsible:	*Director T&S*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*27*	
272	Increase in intelligent pigging scope during operations	Unforeseen additional regulatory pigging requirement set by authorities or internal stakeholders	- Increase of operational downtime windows - OPEX cost increase	Design facilitates pigging as per requirements	Develop a pigging scope and frequency proposal and clarify shareholder expectations	Pipeline Engineer	Waiting for action	01/03/2012	01/05/2012	3	7	5
	Risk Responsible:	*Project Manager Onshore*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*21*	

Risk Item					Risk Control Measures					Residual risk		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T
228	P18 jacket and platform structures not suitable for CO2 equipment packages	- Weight growth, scope growth (lay-out) and COG changes; - 1500# valves required instead of 900#.	CAPEX increase for additional primary structural and stiffening and/or design changes	Assess alternatives for improvements to the existing platform to prevent new building	Full FEED and detailed engineering study	Platform Modification Manager	Waiting for action	01/04/2012	31/12/2012	4	8	7
					Involve jacket corrosion, fatigue, anodes inspection assessment in FID	Technical Project Manager T&S	In progress	21/11/2011	01/03/2012			
					Assess possibilities for improvement of structural integrity of the topside	Technical Project Manager T&S	In progress	01/03/2012	01/04/2012			
					Optimizing start-up and shut-down procedures using Flow Assurance Study phase 3 results.	Technical Project Manager T&S	In progress	21/11/2011	15/02/2012			
	Risk Responsible:	*Technical Project Manager T&S*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 80%, Overdue(<6w) 20%				*Residual risk score (p*C):*			*32*

329	CO2 migration across P15-9/P18-4 fault	1) inherent seismic image (2) fault sealing capability by migration is necessary (3) observed production pressures still suggest fault sealing,	CO2 migrates to P15-9 reservoir, causing (4) monitoring up-scaling (5) abandonment of P15-9 following CO2 storage regulations (6) eventually reimbursing P15-9 gas producer for lost gas production (7) pause of injection	In-depth geological analysis	(2) in-depth geological analysis of process, core analysis to support /sealing evidence	Reservoir Engineer	In progress	01/09/2011	15/06/2012	2	10 10
					(3) pulse test	Reservoir Engineer	Waiting for action	01/01/2014	31/12/2019		
					(7) negotiate that reduced amount of stored CO2 is force majeure	Director T&S	Waiting for action	01/01/2015	31/12/2019		
					Assess possible consequences on operations and level of compensation	Director T&S	In progress	23/09/2011	31/12/2011		
					Generally full feasibility assessment of reservoir P15-9 to serve as CO2 storage reservoir.	Reservoir Engineer	In progress	01/01/2012	01/07/2014		
					Analysis on ceiling of the CATO R&D long term effect CO2 on fault	Reservoir Engineer	Waiting for action	03/09/2012	31/12/2013		
	Risk Responsible:	*Technical Project Manager T&S*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 83%, Late 17%				*Residual risk score (p*C):*		*20*

359	Competent authority insists on seismic survey at the end of the storage period (prior to hand-over)	Perception of the security of CO2 storage by the authority	- Extra costs for seismic survey - Subsequently delayed hand-over	Report performance data and work collaboratively to interpret data output, thereby knowledge of the storage performance throughout the injection period	Establish early acceptable hand-over criteria	Regulatory Framework Manager	Waiting for action	01/01/2013	01/07/2014	2	9	0
					Demonstrate that CO2 storage is secure and does not raise requirements for seismic survey	Reservoir Engineer	Waiting for action	01/01/2013	01/07/2014			
	Risk Responsible:	*Manager Business Development / Legal*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*18*	
385	Baseline seismic survey required by competent authority	Newly acquired insights with authorities, ROAD or external stakeholders with regard to usefulness of baseline seismic survey	Extra cost not foreseen	Inform authorities on expected results of a seismic survey with regard to geological resolution	Propose using methods other than seismic (for instance Permanent 2-D seismic lines) to assess a possible leakage and migration as a more valuable option.	Reservoir Engineer	Waiting for action	01/03/2012	01/06/2012	2	9	7
					Authorities to accept existing baseline seismic	Regulatory Framework Manager	In progress	01/09/2011	01/07/2013			
	Risk Responsible:	*Manager Business Development / Legal*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*18*	

Risk Item					*Risk Control Measures*					*Residual risk*		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T
384	CO2 proof abandonment of wells P15-9 required	Permit condition	- Extra cost; - Keep P15-9 wells open.	Change condition into contingency measure	Oppose SODM an TNO advice	Regulatory Framework Manager	Finished	01/09/2011	01/12/2011	3	9	0
					Draw-up alternative proposal (keep wells open until end of injection)	Regulatory Framework Manager	Finished	01/09/2011	01/12/2011			
					ROAD to file own 'zienswijze'	Regulatory Framework Manager	Not imple-mented	01/11/2011	01/12/2011			
	Risk Responsible:	*Director SHM, Permitting Mgr*	*Project:*	*Road CCS integrated FID risk register*	On schedule 100%				*Residual risk score (p*C):*		*27*	
366	Transfer of responsibilities: Dutch Government will not take over the responsibilities of the storage	- Leakage or significant irregularities during injection; - Changing political or public support for CCS.	- Extra 20 years (as a minimum) of monitoring + liabilities; - Extension of financial securities.	- - Reach agreement on handover criteria.	Obtain clarification from Ministry of ELI	Director SHM, Permitting Mgr	In progress	20/09/2011	14/10/2011	2	9	0
					SODM -> Monitoring plan with all the monitoring equipment + data to show that during injection CO2 was stored safely.	Manager Business Development / Legal	Concept	01/07/2014	31/12/2019			
					Baseline 3D seismic survey	Reservoir Engineer	Not imple-mented					
	Risk Responsible:	*Regulatory Framework Manager*	*Project:*	*Road CCS integrated FID risk register*	On schedule 67%, Late 33%				*Residual risk score (p*C):*		*18*	

401	ISO/TC 67	ISO will possibly come up with standards (norms) for materials, equipment, environmental planning and management, risk management, quantification and verification, and related activities in the field of all phases of CCS. The transfer of responsibilities could possibly also be included in the scope.	The standards could be adopted by EC or Dutch government. Depending on the outcome, this could lead to less/more costs for the storage operator. ISO can come up with norms for the handover	Follow the ISO TC closely and deliver input in the NEN committee.	(1) Participate in NEN	Regulatory Framework Manager	In progress	02/01/2012	31/12/2012	1	6	0
					(2) Communicate with Parent companies	Regulatory Framework Manager	Concept	02/01/2012	31/12/2012			
	Risk Responsible:	*Director SHM, Permitting Mgr*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 50%, Late 50%				*Residual risk score (p*C):*		*6*	
381	Change in permit conditions by 2018-2020	Review of the CCS directive in 2015 (new articles for which no compensation is available)	New articles can have an impact on the storage permit conditions.	Discussions during and actively provide input to current experiences with CCS directive	Provide input to member state experience input to EC	Director SHM, Permitting Mgr	Concept	01/01/2014	30/06/2014	1	4	0
					Discussions in Brussels on the amendments of the CCS directive	Director SHM, Permitting Mgr	Concept	30/06/2014	30/06/2015			
	Risk Responsible:	*Manager Business Development / Legal*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*4*	

5.8 Funding

Risk Item					Risk Control Measures					Residual risk		
No.	(Un)desired Occurrence	Cause(s)	Effect(s)	Mitigation Strategy	Action	Responsible	Status	Start Date	Due Date	p	C	T
218	Project sustains severe delays due to inherent uncertainties of CCS technology and Permitting process	- Delay in FID decision in 2012; - Delay of spending after 2014	Loss of funding EEPR and Dutch government	Continue communications with the EC.	Redefinition of the Action to reduce risk and potential impact, as discussed with the EC (after FID).	Director SHM, Permitting Mgr	Waiting for action	02/04/2012	01/05/2012	2	9	0
	Risk Responsible:	*Funding Agreement Manager*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*18*	
» WP.8 - R&D												
220	Project cost not covered by anticipated funding	Non eligibility of expenditures exceeds 27 mio EUR (417-390)	- 70% of non-eligible costs will not be covered by Funding - Parent companies have to cover the remaining amount	Review procurement and subcontracting policy	Perform Financial Audit by EC	Funding Agreement Manager	Finished	28/11/2011	02/12/2011	2	9	0
					Implement the (possible) results and advices from the EC following the financial audit	Funding Agreement Manager	Waiting for action	02/07/2012	03/09/2012			
					Verification by the EC on the ROAD process of financial reporting and eligibility of costs.	Funding Agreement Manager	Waiting for action	03/12/2012	31/12/2012			
	Risk Responsible:	*Funding Agreement Manager*	*Project:*	*Road CCS integrated FID risk register*	 On schedule 100%				*Residual risk score (p*C):*		*18*	

6. High-level description on the Consortium structure

6.1 Introduction

On 13 July 2009 E.ON Benelux Holding B.V., Electrabel Nederland Project B.V. and Maasvlakte CCS Project B.V. entered into a Limited Partnership Agreement ("LPA"), effective as of 10th July 2009 and founded the Limited Partnership MCP, short for Maasvlakte CCS Project CV. On 29th April 2010 E.ON Benelux Holding B.V. decided to participate as from now in MCP via a project company named E.ON Benelux CCS Project B.V. and transferred its partnership interest accordingly. This set up is still the current situation.

6.2 Scope

Object of the Limited Partnership is to implement the project, comprising the building of i) a capture unit for CO_2 emitted by the coal-fired power plant of E.ON Benelux N.V. at the Maasvlakte, or ii) a pipeline linking the capture unit with an offshore location for the storage of CO2 and iii) entering into agreements with a storage operator to secure the storage. These activities include also the procurement, operation, research and permitting necessary to complete the project.

In the above described Limited Partnership Maasvlakte CCS Project B.V. is acting as the general partner (beherend vennoot) and the other two mentioned partners are the limited partners (commanditaire vennoten). Electrabel Nederland Project B.V. and E.ON Benelux CCS Project B.V. are fully owned subsidiaries of respectively Electrabel Nederland N.V. and E.ON Benelux Holding B.V.

6.3 Joint Venture Agreement

At the 29th April 2010 Electrabel Nederland Project B.V., E.ON Benelux CCS Project B.V. and Maasvlakte CCS Project B.V. entered into a joint venture agreement ("JVA") for elaboration of the terms and conditions of their cooperation in the project. Maasvlakte CCS Project B.V and Maasvlakte CCS Project C.V. The joint venture partners have agreed that they shall use their best efforts to procure that the projected capital expenditure with Maasvlakte CCS Project C.V. is funded through subsidies to the fullest extent possible. Further, the JVA stipulates that the partners shall procure that pro rata to their limited partnership the partners shall fund the joint venture for the full amounts of the projected capital expenditure and operational expenditure (as defined in JVA) to the extent funding is required in excess of the subsidies. Each time additional funding is required the partners shall decide whether this is done through capital contributions or through partner loans to Maasvlakte CCS Project C.V.

6.4 Other project partners

The main technical contracts are with TAQA, Fluor, GDF Suez E&P and they are nearing their finalization after a period of intensive negotiations.

The contract with Fluor is a reimbursable contract that will be turned into an EPC contract covering the turnkey construction of the Carbon Capture Plant.

The contracts with TAQA have the following scope: development, construction and commissioning of all facilities needed for handling, transportation, injection, metering, monitoring and storage of CO2 via the TAQA P18-4 Platform.

GDF Suez E&P is engaged in the design, procurement, construction, installation, certification and commissioning of the pipeline necessary for transportation of the CO2 from MPP3/Capture Plant to the P18-4 TAQA platform.

All companies mentioned were present as from the start of the project; TAQA and E&P were already mentioned in the JV as suppliers of their part in the project. The JV was engaged in a tender procedure for the Carbon Capture Plant, with final acceptance of the bidding of Fluor, out of a number of competitors.

6.5 Additional measures for risk allocation implications

Following the description of the funding principles (paragraph 6.3) extra requirements were made by the providers of the subsidies. Part of the obligations under the subsidies is the issuing of guarantees to be provided on behalf of both E.ON and GDF SUEZ to cover the Partnerships obligations towards the Dutch State and the EU Commission in case the Consortium cannot fulfill part of its obligations under one or both of the subsidies. For this (providing of) security the Consortium pays a guarantee fee to its guarantors. Payment of the guarantee fee will be due until the release in full of the guarantor of any and all obligations under the Guarantees.

7. Local, national and European policy considerations and incentives

7.1 Introduction

The European Commission (EC) and national government are considering complementary policies and regulations to reduce carbon emissions in the short term, including further incentives for the development of CCS.

7.2 European policies

The EC acknowledges CCS as an essential part towards a decarbonized economy. In particular, it emphasizes its willingness to include "necessary policy changes to push for CCS, the role of funding to take demonstration projects to completion, the needed development of infrastructure and legal issues relating to cross-border transport." It is likely that supportive measures will soon follow the recently published Energy Roadmap 2050 (15/12/2011). Potential measures for stimulating CCS include a command and control instrument (CCS mandate), investment support (grant, tax credit, loan guarantee, subsidy by trust fund) and production subsidies (guaranteed carbon price, feed-in price, etc.).

7.3 National policies

Given the current political and economic climate in the Netherlands, it is not likely that the Dutch Government will be open for measures that require direct public investments. It is more probable that it will try to create more favourable conditions for decarbonizing technologies such as production subsidies or command and control instruments. Moreover, measures that will have negative implications on coal-fired power plants such as a coal tax, producer liability and bio-mass co-firing obligations could follow the government's recent 'Green Deal'.

For ROAD it is particularly important that a level playing field is created with other capacity without CCS and other climate change mitigation technologies. The current EU Emissions Trading Scheme (EU-ETS) is an example of a cost-effective instrument for limiting greenhouse gas emissions, helping CCS to become competitive. To this end, policy makers should be encouraged to appreciate electricity produced by coal-fired power plants with CCS as 'renewable'.

In addition, biomass co-firing in combination with CCS should be encouraged. At this moment, EU-ETS does not allow double counting for negative emissions. Therefore, Bio-CCS is punished within the system instead of supported. If this issue could be addressed, ROAD's business case could improve significantly. Especially since Dutch regulation is under way that will oblige coal-fired power plants to co-fire biomass.

Finally, of course there are other measures that would influence ROAD's business case, such as CCS-obligations, CO_2 -taxes, feed-in tariffs, tax breaks etc. in our opinion, these measures are not feasible at this time.

7.4 Risk mitigation

ROAD mainly monitors the above policy developments and brings issues to the attention of parent companies who take the lead in engaging with policy-makers at the EU and national level. Locally, ROAD has initiated a Regional Advisory Committee on CCS (RAC CCS) in close co-operation with regional authorities and other CCS projects in the Rotterdam port and industrial area. This regional CCS platform has the objective to structurally engage stakeholders with CCS projects on the long term.

8. Conclusions

Because of the innovative characteristics of the Maasvlakte CCS project, it faces more risks than usual utilities projects. On the one hand, capturing, transporting and storing CO_2 at this scale involves managing new technical risks as the combination of the technologies involved has not yet been demonstrated. On the other hand, dealing with a project where the regulatory framework still has to be developed also creates business risks for the ROAD Project. Therefore, regarding the particular challenges of risk management, MCP committed itself to develop a risk management approach that would carefully identify, evaluate and mitigate by adequate measures the identified risks.

The construction contract for Capture, the main contract of the ROAD Project, has been derived via an extensive FEED study and has therefore the lowest percentage of contingency of the project. The storage area has the highest percentage of contingency in the FID phase of the project.

Since the beginning of 2011, the ROAD project started with an extensive Risk management approach to list, evaluate and treat the identified risks. Also, by using the knowledge within the parent companies and third parties, ROAD tried to identify unknown risks that had not been identified before. With the use of the knowledge from the Parent companies and third parties, ROAD started the process of completing the Risk Register and initiated successful mitigating actions to eliminate/ downsize the risks where possible.

Following the description of the funding principles (paragraph 6.3) extra requirements were made by the providers of the subsidies. Part of the obligations under the subsidies is the issuing of guarantees to be provided on behalf of both E.ON and GDF SUEZ to cover the Partnerships obligations towards the Dutch State and the EU Commission in case the Consortium cannot fulfill part of its obligations under one or both of the subsidies.

ROAD mainly monitors above policy developments and brings issues to the attention of parent companies who take the lead in engaging with policy-makers at the EU and national level.

The Project Management Board is confident that the ROAD risk register is as complete as possible. Therefore, we expect that project risks will be mitigated to an acceptable level, set by the parent companies and the ROAD Project.

Acronyms

EU	European Commission
Global CCS Institute	Global Carbon Capture and Storage Institute
MCP	Maasvlakte CCS Project C.V.
MPP3	Maasvlakte Power Plant unit3 (EON)
ROAD	Rotterdam Opslag en Afvang Demonstratie
JVA	Joint Venture Agreement
CAPEX	Capital Expenditure
OPEX	Operational Expenditure