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THE POTENTIAL OF CLEAN DEVELOPMENT MECHANISM FOR PETROLEUM EXPLORATION AND PRODUCTION INDUSTRY IN THAILAND

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering Program in Petroleum Engineering
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พัชรภรณ์ จารุสมบัติ : ศักยภาพของกลไกการพัฒนาที่สะอาดสำหรับอุตสาหกรรมสำรวจและผลิตปิโตรเลียมในประเทศไทย (THE POTENTIAL OF CLEAN DEVELOPMENT MECHANISM FOR PETROLEUM EXPLORATION AND PRODUCTION INDUSTRY IN THAILAND) อ.ที่ปรึกษา: ดร. ฐิติศักดิ์ บุญปราโมทย์, 119 หน้า.

เนื่องจากปริมาณการปล่อยก๊าซเรือนกระจกที่เพิ่มมากขึ้นในแต่ละปีส่งผลกระทบต่อสิ่งแวดล้อมต่างๆมากมาย กลไกการพัฒนาที่สะอาดจึงเป็นอีกหนึ่งทางเลือกที่กำหนดขึ้นภายใต้พิธีสารเกียวโต เพื่อช่วยให้ประเทศอุตสาหกรรมที่มีพันธกรณีในการลดก๊าซเรือนกระจกสามารถบรรลุพันธกรณีได้ และเพื่อส่งเสริมการพัฒนาที่ยั่งยืนของประเทศกำลังพัฒนา ในประเทศไทย กลไกการพัฒนาที่สะอาดมีความสำคัญต่อการพัฒนาอย่างยั่งยืน ดังนั้นหัวใจสำคัญของการดำเนินโครงการกลไกการพัฒนาที่สะอาด จึงมิใช่เพื่อส่งเสริม การลงทุนจากต่างชาติในการซื้อขาย คาร์บอนเครดิต แต่เป็นการส่งเสริมการพัฒนาอย่างยั่งยืน ของประเทศกำลังพัฒนาเป็นสำคัญ

ในอุตสาหกรรมการสำรวจและผลิตปิโตรเลียม ก๊าซคาร์บอนไดออกไซด์จำนวนไม่น้อยถูกปล่อยออกมาในแต่ละปี ดังนั้นจึงมีความจำเป็นในการคิดค้นแนวทางในการลดและยับยั้งการปล่อยก๊าซเรือนกระจก การประเมินศักยภาพของประเทศไทยในอุตสาหกรรมการสำรวจและผลิตปิโตรเลียม ในการดำเนินโครงการกลไกการพัฒนาที่สะอาด เริ่มจากการศึกษาปริมาณการปล่อยก๊าซเรือนกระจกโดยรวมในปัจจุบัน และแนวโน้มในอนาคต ของแหล่งศึกษา บริเวณอ่าวไทยโดยจำแนกให้เห็นประเภทก๊าซ และวิธีการต่างๆที่ยังมีศักยภาพที่จะสามารถลดการปล่อยก๊าซเรือนกระจกลงได้ รวมทั้งการศึกษาถึงตัวแปรและปัจจัยที่มีผลกระทบต่อการลงทุนในโครงการกลไกการพัฒนาที่สะอาด จากงานวิจัยสามารถสรุปได้ว่า ประเทศไทยมีศักยภาพเพียงพอสำหรับดำเนินโครงการทั้งในแง่ของความน่าสนใจในการลงทุน และผลกำไรตอบแทนจากการดำเนินโครงการที่จะได้รับ แต่ในทางกลับกันค่าใช้จ่ายในการลงทุนยังคงมีบทบาทสำคัญเป็นอย่างมากต่อการลงทุนดำเนินโครงการ

ภาควิชาวิศวกรรมเหมืองแร่และปิโตรเลียม ลายมือชื่อนิสิต.....

สาขาวิชาวิศวกรรมปิโตรเลียม ลายมือชื่ออาจารย์ที่ปรึกษา.....

ปีการศึกษา 2550

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PATCHARAPORN CHARUSOMBAT. THE POTENTIAL OF CLEAN DEVELOPMENT MECHANISM FOR PETROLEUM EXPLORATION AND PRODUCTION INDUSTRY IN THAILAND. THESIS ADVISOR: THITISAK BOONPRAMOTE, Ph.D., 119 pp.

The increasing of Greenhouse Gas emission has the effect on the environment problem. The Clean Development Mechanism (CDM) is one choice of alternatives established by the Kyoto Protocol to assist the industrialized nations with commitments for reducing greenhouse gas emissions to meet their targets, and to promote sustainable development in the developing nations. In Thailand, CDM is important to the sustainable development including the transferring facilitate technology and knowledge from developed to developing countries. The CDM theme doesn't focus on the supplementation of Certified Emission Reduction (CERs) trading between investor countries and the developing countries but interest in promoting of sustainable development of the country.

In the petroleum Exploration and Production (E&P) industry, the amount of carbon dioxide has been emitting continuously from the past to the present. As the result of the GHG emission, it is necessary to find the methods or processes to reduce the amount of GHG emission to atmosphere. This study provides an overview of the CDM potential in Thailand for petroleum E&P industry by the study from the big source of gas emission located in the Gulf of Thailand. In addition, the study describes the potential of the CDM methodologies that suitable methodology including CDM background, structure, and project cycle, and examines the potential value for Thailand. The study concludes that Thailand has the potential for cleaning development mechanism project while the effect of investment cost still have many important roles for the project.

Department: Mining and Petroleum Engineering
Field of study: Petroleum Engineering
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Advisor's signature: .....

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LIST OF ABBREVIATIONS

API	American Petroleum Institute
BTU	British thermal unit
BUA	business as usual
CAPEX	Operating Expenditure
CCS	carbon capture and storage
CDM	Clean Development Mechanism
CERs	Certified Emissions Reduction
CFCs	chloroflurocarbons
CNG	compressed natural gas
DNA	Designated National Authorities
DOE	Designated Operational Entity
EB	Executive board
EGR	enhanced gas recovery
ENCON	Energy Conservation and Promotion
ERUs	Emission Reduction Units
EUAs	European Union Allowances
EU ETS	EU Directive on the Emission Trading Scheme
FGRU	flare gas recovery unit
GFR	gas flare reduction
GHG	Greenhouse Gas
IGES	Institute for Global Environment Strategy
IRR	internal rate of return
JI	Joint Implementation
LNG	liquefied natural gas
LOA	Letter of Approval
LPG	liquefied petroleum gas
MoU	Memoranda of Understanding
MtCO2-eq	million of carbon dioxide equivalent
NM	new methodology
NPV	net present value

O&M	Operation and management
OPEX	Capital Expenditure
PDD	Project Design Document
RE	Renewable Energy
RET	Renewable Energy Technologies
RPS	Renewable Portfolio Standard
tCO_2	ton of carbon dioxide
TGO	Thailand Greenhouse Gas Management Organization
UNFCCC	United Nations Framework Convention on Climate Change

NOMENCLATURE

$	dollar
€	Euro
BHP	brake horsepower
km	kilometer
hr	hour
in	inch
K	degree kalvin
m	meter
Pa	pascal
t	ton
y	year

CHAPTER I
INTRODUCTION

The earth's climate has been evolving continuously over million years but the last two centuries have the development of the greenhouse problem. The greenhouse problem is created due to excessive accumulation of greenhouse gases in the atmosphere. The main greenhouse gases are carbon dioxide, methane, nitrous oxide, ozone and chloroflurocarbons (CFCs).

Carbon dioxide (CO_2) produced from combustion of fossil fuels has been increasing intensively. The concerns with the emission of CO_2 and other pollutants discussed in several forums demonstrate the importance of stabilization scheme of these gases, although there is much uncertainly regarding the impacts of these Green House Gas emissions (GHG) and global warming. One of the international responses to climate change is Kyoto Protocol which is an agreement made under the United Nations Framework Convention on Climate Change (UNFCCC). Countries that ratify this protocol commit to reduce their emissions of carbon dioxide and five other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases.

In petroleum exploration and production industries, there are amount of greenhouse gases emitted from the process such acid gas recovery facility, treatment facility as well as flaring facility. These become to a very serious problem for the environment which effect to our climate change due to greenhouse gas emission. Now a day it becomes to worldwide environmental concern, most E&P companies start to consider on the projects which help them to reduce amount of greenhouse gas emission. In the same time, the Kyoto Protocol to the UNFCCC created three cooperative mechanisms which is Clean Development Mechanism (CDM)

The Clean Development Mechanism or CDM is one of the mechanisms defined by the Kyoto Protocol which encourages this same greenhouse gas emission reduction to take place in developing countries, which have no obligation to reduction greenhouse gas emission under the current Kyoto requirements. Specifically, Non-Annex 1 countries have the opportunity to host projects that reduce greenhouse gas, where the reduced emission can be turned into Certified Emission Reduction credits

(CER's and be sold to Annex-1 countries, which would the Non-Annex 1 countries to also meet the requirements. CDM project must be a project that would never be invested in without the CDM mechanism in place, i.e. a project below the hurdle rate (uneconomic). Thailand is a Non-Annex 1 country and has ratified the Kyoto Protocol, and thus can participate in this carbon market within the CDM scheme. Unfortunately, Thailand is a developing country, therefore, the Clean Development Mechanism is important for Thailand as allows Annex I countries (Developed countries who have accepted GHG emission reduction obligations and must submit an annual greenhouse gas inventory) to meet their emission reduction targets by paying for green house gas emission reduction which is called "certified emissions reduction credits (CER's)" in non-Annex I countries (Developing countries who have no GHG emission reduction obligations but may participate in the CDM).

The flowchart below shows you the relationship and benefit under CDM project

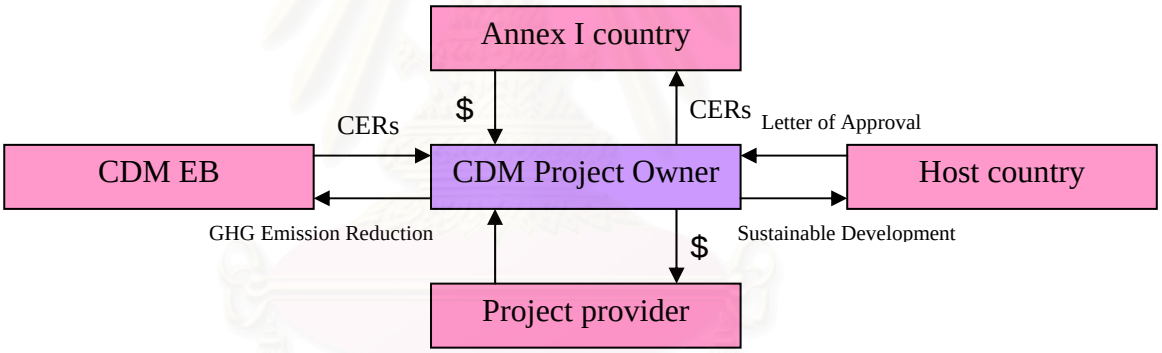

Figure 1.1: CDM activity flow chart

One source of CO_2 emission is from petroleum industry which has been increasing intensively with emission of CO_2 to the atmosphere as the oil and gas production have been produced. To meet the objective of CDM project under Kyoto Protocol will create more opportunities for cost reduction in the process of reducing CO_2 emission. If the carbon credit is internalized, which provide an efficient way to reduce greenhouse gas emissions, a credit will gives the owner a monetary value. The cost of recovery of gas will be offset and recovery process may become attractive. It may be necessary to implement a CO_2 tax regime in order to generate incentive for the reduction of CO_2 emissions into the atmosphere.

This thesis focused on the opportunities and the potential of CDM project for

petroleum exploration and production to reduce the amount of CO_2 emission from the flaring gas recovery unit that otherwise to be flare. The main objective is to provide an overview of the approved CDM methodology of recovery gas process which is applicable to the oil and gas field in Thailand as well as cost of gas recovery process has considered and to analyze the economic feasibility of gas recovery process in oil and gas reservoir in term of CDM project.

1.1 Objective

1.1.1 To provide an overview of the approved CDM methodology of recovery gas process which is applicable to the petroleum exploration and production industry in Thailand.

1.1.2 To consider cost of gas recovery process and to analyze the economic feasibility of gas recovery process in term of CDM.

1.2 Methodology

1.2.1 Preparing gas production data

1.2.2 Analyzing amount of gas production and gas flaring for providing suitable CDM methodology.

1.2.3 Selecting suitable CDM approved methodology to apply at the study area.

1.2.4 Economical analysis for CDM project

1.2.5 Comparing the result obtained from 1.2.4 to study the potential of CDM in Thailand.

1.3 Thesis Outline

This thesis paper consists of seven chapters.

Chapter I Outline introduction of Clean Development Mechanism with this study and the methodology behinds this study process.

Chapter II Review previous works concerning with this study which are divided into two parts: (1) Review of exist methodologies from UNFCCC which is suitable for this study and other related works under the CDM projects and (2) Review of the previous under CDM project investment cost analysis.

Chapter III Describe CDM concepts used in this study including CDM background, guideline of CDM project baseline.

Chapter IV Discuss data preparation and CDM methodology selection including data sets, the choice of CDM methodologies and describe how the project running with selected CDM methodology.

Chapter V Describe the cost of investment including cash flow and sensitivity analysis.

Chapter VI Present the study results from CDM methodologies and economic analysis study.

Chapter VII Provide conclusions of the study and recommendations for the further study based on this study point of view.

CHAPTER II
LITERATURE REVIEW

2.1 CDM Methodology

The Petroliam Nasional Berhad (hereinafter “PETRONAS”) participate with JGC Corporation (2006) propose the CDM project activity under the recovery CO_2 emitted from the liquefied natural gas (LNG) complex located in Malaysia and inject it into an aquifer below the seabed offshore. This project involves installing additional facilities to the LNG complex to compress the recovered CO_2 which would otherwise have been released and transfer it to a new sub-sea facility through a pipeline and inject it into an underground aquifer and store the CO_2 in safe, sound and stable condition in underground geologic formations and thus reduce the CO_2 emissions to the atmosphere.

Mitsubishi Heavy Industries LTD and Vietsovpetro (2005) propose the CDM project activity under the carbon capture and storage (CCS) in an oil reservoir. This project involves the collection of CO_2 from combined cycle natural gas power plant in industries area and its transport via pipeline to the injection site at the White Tiger Oil Field.

The Vietnam oil and Gas Corporation participate with Japan Vietnam petroleum CO.LTD and Petrovietnam Exploration & Production Company (2003) propose the CDM project activity under the recovery and utilization of gases produced as a by-product of oil production activities at the Rang Gong oil field. This by-product gas was disposed at the platform via a combustion process known in the industry as flaring. Project activity includes construction of a gas pipeline and compressor facilities to recover and transport the by-product gas, which would otherwise have been flared. As a result of this reduction in flaring activities, CO_2 emissions will be reduced. The gas recovered is processed into dry gas (mostly methane), as well as LPG (butane and propane), and condensate (hydrocarbon molecules containing five or more carbons).The elimination of flaring will result in atmospheric pollution. Finally by reducing the volume of CO_2 emissions, the carbon credit will be transferred to the project participants.

IEA Greenhouse GasR&D Programme (2007) published the report to guideline CCS projects under the Clean Development Mechanism. Their general principles ensure development of a consistent set of CDM methodologies for this type of project and also promote their quality and integrity. The guidelines propose in broad terms a common way to address all of the issue surrounding CCS when preparing CDM submissions for CCS projects. The guidelines propose main principles to be followed, particularly when considering the integrity of CO2 geological storage sites and their long tern monitoring. The main issues addressed are Project boundaries, baselines, additionality, leakage, project emissions, permanence and monitoring. In addition, the report address issues and suggestions relating to the overall project approval process, particularly the competencies and expertise that will need to be in place to ensure that high quality CCS projects are implemented under the Clean Development Mechanism.

C. Scharf et al. (2006) presented CO_2- sequestration potential in Austrian oil and gas field by evaluate the potential of CO_2 geology in Austria first, the maximum storage capacity was estimated based on expected total hydrocarbon production. Next the eleven largest oil thirteen largest gas fields in Austria were investigated in more detail. The results indicate that CO_2 geological storage might significantly contribute to achieving the Kyoto targets of Austria. [5]

Karin Ritter et al. (2003) present a compendium of greenhouse gas emission estimation methodologies for the oil and gas industry. This paper examines technical considerations associated with estimating pre- and post-project emissions for a variety of emission reduction scenarios. There are several methodologies used in this paper such as gas recovery process and glycal dehydration process etc.

2.2 Economical Analysis

The World Bank group (2004) studied on the utilization of flared gas. The main objective of this study is to assess the technical feasibility and economic viability of using associated gas in various applications for commercial and industrial usage. A major deliverable of this study is the selection of two pilot projects which can progress to detailed feasibility studies and, if the projects are viable, implementation. This report gives an overview of the market opportunities for flared gas use and the corresponding impact on the environment and opportunities for sustainable development and poverty reduction. The report contains an initial set of

project unit costs and a model for financial and economic analyses. In addition, the case study reports include the draft conceptual designs for the associated gas recovery systems.

A.T.F.S. Gaspar et al. (2005) presents a physical description and economic analysis of a project to capture CO_2 in oil production and its storage in the depleted oil reservoir located in mature field in Brazil. The main of this project is reduction in the emission of CO_2 in mature field base on economic analysis which can indicate the results by removing greenhouse gas from the atmosphere at the same. Economic analysis of the project focuses on those oil price, oil production, OPEX and CAPEX..

The Intergovernmental Panel on Climate Change (2005) published special report on carbon dioxide capture and storage. This paper is intended to provide an overview of the costs of the technology of capture and storage of CO_2. This technology has recently been attracting an increasing amount of interest for a number of reasons, not least of which is that it can be implemented by combination of known technologies developed for other, if related, purposes. The corollary of this is that the cost of the technology can be relatively accurately predicted by standard chemical engineering procedures. Thus much of the data quoted here, especially on capture and transmission, has been obtained from the cost estimating departments of engineering contractors.

The World Bank/GGFR (2006) presented the screening and economic analysis report under the Associated Gas Survey for Utilization of Flare Gas in Indonesia. This report identify the conditions which various flare gas utilization options are economically and financially attractive in Indonesia and provide recommendations to help make economically attractive flare gas utilization options financially attractive and institutionally feasible.

Steven L. et al. (2000) present the decision support framework for greenhouse gas abatement in LNG industry by identifying options available to reduce greenhouse emission such as “co-firing upstream of the power generation gas turbines” and “the high temperature catalytic de-NO_x process”. This paper describes the methodology to calculate the net benefit of each option and consider the private cost (those costs incurred in doing business), emission related cost and social cost in a benefit cost analysis. The outputs of NPV value compared with base case.

CHAPTER III
CLEAN DEVELOPMENT MECHANISM CONCEPT

This chapter presents Clean Development Mechanism (CDM) theory and concept including CDM strategy for Thailand and general overview of the CDM project planning. It's involved 3 parts which are CDM state-of-play, strategy for Thailand and the guideline to baselines and additionality.

3.1 CDM State-of-Play

3.1.1 General Overview of the CDM State-of-Play

The CDM portfolio has been growing quite rapidly. As of December 2006, the number of projects submitted and registered is about 1,400 and their total CER generation volume until 2012 is estimated to be more than 1.5 billion US$. Most of the registered projected are concentrated in Asia and Latin America. Asia, China and India are leading countries in term of both the number of CDM projects and volume of CERs to be generated, whereas South East Asian countries are lagging behind.

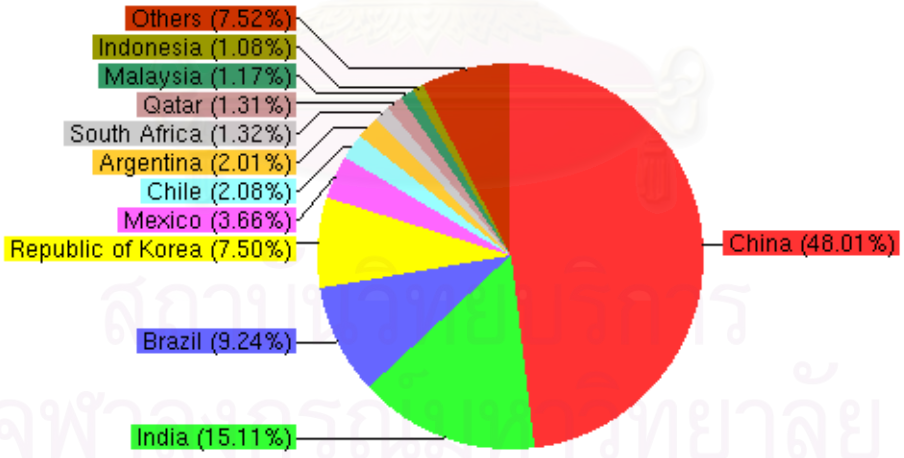

Figure 3.1: Expected average annual CERs from registered projects by host party (February 2008)

Source: UNFCCC website

In terms of the number of projects, the shares of small and large-scale projects in the CDM market is almost equal, which implies that proponents have not

necessarily been discouraged by the lower emission reduction potential of small-scale projects.

Figure 3.2: Registered projects activities by scale (February 2008)

Source: UNFCCC website

Despite the strong increase in CDM project activities during 2004-2006, it remains to be seen how important the mechanism has been in terms of stimulating the transfer of sustainable energy technologies to developing countries. Preferred projects are those with easy data availability, relatively simple monitoring procedures, and straightforward baseline assessments, so that the CDM EB can quickly process the projects and the achieved emission reductions. This has resulted in a large share in the CDM portfolio of projects that do not generate substantial development revenues for the host country other than the CERs. The CDM may thus far not have been able to clearly utilize its potential to match developing countries demand for sustainable technologies with technology supply industrialized countries, e.g., the EU. Finally it is important to note that since 2005, most proposed CDM projects have been developed unilaterally, which implies that developing countries develop projects, possibly in corporation with a specialized (international) intermediary, and sell the GHG emission reductions as CERs to a CER buyer at a later date. In these cases, the future buyer of CERs could both be a national government (for compliance with the Kyoto Protocol commitments) and an EU installation (for compliance with the EU ETS).

3.1.2 Forms of CDM

CDM projects can be executed either through bilateral, multilateral, or unilateral cooperation. The main difference between the bilateral/multilateral CDM on the one hand, and unilateral CDM on the other hand, is that CERs under the first two types and sold to a CER buyer before project implementation (via a forward contract or Emission Reduction Purchase Agreement); whereas under unilateral cooperation, the CERs are sold either during, or after project implementation (which could take place via a forward or spot contract). An important advantage of unilateral CDM is that host countries are encouraged to perform technology needs assessments (TNAs) to be better able to match CDM projects with their domestic development needs and priorities; under multilateral and bilateral CDM, Project choices are largely driven by the interests of the CER buyer (i.e. CER potential). Such TNAs would result in a list of sustainable energy technologies which would best fulfill the host country's needs and priorities and deliver an optimized contribution to sustainable development in the country. Particularly suitable for CDM would be those technologies that would not be implementable under business-as-usual circumstances due to all kinds of economic, cultural and institutional barriers. Such technologies would deliver a clearly assessable contribution to sustainable development and are additional to business-as-usual circumstances

However, potential challenges to unilateral CDM's are that it required more capacity within the host countries to develop projects themselves and could imply relatively high upfront costs incurred by local project participants before being able to sell the CERs.

While unilateral CDM's could generally be seen as a way to bring host countries national priorities and investor countries' CER demand closer together, it nay be restricted, just as bilateral and multilateral CDM's, by the limited availability and/or acceptability o GHG accounting methodologies (baselines and additionality) for several project technologies. Thus far, as explained above the most popular CDM projects (and technologies) have been those for which baselines and additionality of emission reduction could relatively easily be determined.

Finally, in December 2006, the CDM EB provided more clarity on programmaes CDM. Programs of CDM activities could represent a promising option for Thailand. For instance, the country's up coming voluntary programmes for the promotion of renewable energy could become eligible as a CDM programme.

Programmatic CDM could also be very relevant for energy efficiency activities, (e.g. thermal performance improvement of building units, and efficient lighting and water heating) and transport plans (e.g. bus rapid transit systems). Thailand has been successful in the past with the implementation of energy efficiency programmes and these could serve as showcases for future Thai CDM programmes.

3.1.3 DNA Setting in Non-Annex B Parties.

During 2006, the CDM has shown a big increase in the number of project activities. At the institutional level it could be also be noticed that a large number of developing countries (non-Annex I Parties in the UNFCCC context) have recently established their Designated National Authorities (DNA) to participate in the CDM. The latter is a requirement for being able to host CDM projects (as per the modalities and procedures set by the Marrakech Accords). Essential questions to enable efficient operation of a host country DNA are: i) how to expedite an approval process without losing the quality of approved projects, ii) how to attract foreign investors, and iii) how to become financially sustainable in order to be able to carry out these tasks?

With respect to the first question, it is concluded that a balance between the level of scrutiny and approval speed and criteria is essential. The following approaches are recommended: i) integration of expertise of existing climate change or sustainable development units within the government of the host country, ii) uniform formats for documents required for host country approval to increase transparency and expedite the approval process, iii) a two-step approval procedure, with a quick initial feedback and final approval process, to avoid wasting time and resources to fully develop a project idea that might not be approved in the end, iv) standardized approval criteria and timeframes to increase transparency of the approval process, v) sector-specific sustainable development criteria to set clearer guidelines for project participants and to enable a DNA to efficiently carry out sustainable development assessment and vi) through assessment of additionality and stakeholder consultation elements to ensure sustainable development benefits for the country.

As to the second question, a quick and transparent approval process is one of the key factors to attract foreign investors. A careful choice of promotional functions should be made to ensure a balance between a host country's needs and resource availability. Importantly, a host country DNA at an early stage of development should first focus on the operationalization of its approval system and is not recommended to

expand it scope to promotional activities. Later on during the process of operationalization, a host country DNA could take up the following important promotional functions: i) provision of a good website, ii) marketing to the project opportunities to investors at international carbon fairs, iii) conclusion of Memorandum of Understanding (MoU) with investor countries to build a framework of mutual understanding of project cooperation, iv) coordination of project portfolio and partner information to reduce project search costs (e.g. developing databases on project portfolio and offering workable CDM project ideas to potential buyers), v) capacity building on CDM formulation rules such as PDD writing and methodology development, vi) collection of data on GHG emission factors under business-as-usual circumstances that would help project developers to determine the baseline emission for project in the country, vii) establishment of standardized project risk assessment procedures, and viii) support of domestic entities' application to become a Designated Operational Entity (DOE, designated by the CDM EB) for the validation of project plans in the country or verification of projects' emission reduction performance; this could be a strong support (especially for unilateral CDM projects in the country) if a country has significant CDM potential.

Concerning the third question, a host country DNA should contemplate a balance among its CER supply potential, related service fee volumes, and choices of DNA function. Also, it is important to consider a DNA structure which is able to effectively achieve financial independency. Countries with sufficient financial resources from governments tend to establish their DNAs within the government. Provided that the private sector as the capacity and willingness to carry out the tasks of the DNAs, DNA functions can also b outsourced to private entities in order to widen the range of financing options (e.g. funding through entry and monthly fees from association members).

3.1.4 The Linking Directive of the EU.

Initially, an important reason for linking the CDM to the EU ETS was the possibility for EU installations to acquire relatively cheap GHG emission reduction credits from outside the EU. It was generally assumed that the EU ETS allowance price would be higher than CER prices. This provided arbitrage opportunities for both the EU installations and CDM project developers in developing countries.

At the beginning of 2006, the price difference between CERs and EU ETS allowances amounted to approximately €10 to €15 per ton pf CO_2-eq. Through the Linking Directive this offered, in principle, scope for arbitrage by selling relative cheap CERs to installations within the EU ETS. However, these arbitrage opportunities could not yet be used due to the absence of the International Transaction Log, which is necessary to transfer CERs to ETS installations. In April-May 2006, EU ETS prices suddenly dropped on the basis of the reports submitted by Member States on the ETS compliance during 2005, which shoed unexpected surpluses for a large number of installations. More or less at the same time, CER prices slowly increased (especially prices for low-risk CER contracts). As a consequence, for the period 2005-2007 the arbitrage opportunities between EU TES and the CDM have largely disappointed. Consequently, the study's focus shifted toward the period after 2008. For this period, the EU ETS forward market expects a price level closer to €20 per allowances because f the expectation that EU ETS installations will face tighter caps during 2008-2012.

It is also important to note that the legislative differences in each member state's transposition of the Linking Directive are considered to be ineffective due to possibilities of juridical shopping (entities within the EU ETS can request approval of their CDM projects in any country under the EU ETS) and swapping of CERs and ERUs against European Union Allowances (EUAs). The opportunity to use CERs (as well as emission reduction units from Joint Implementation projects in Central and Eastern Europe) for compliance, combined with the emerging secondary market, may increase the interest in CDM projects among private buyers in Europe during period 2008-2012.

3.2 Strategy for Thailand

3.2.1 Thailand Policy Related to CDM

Balance between economic and social development, while conserving natural resources and the environment, has been the basis for sustainable development in Thailand. The 5-year National Economic and Social Development Plans have been used to guide the social and economic development of the country since the 1960s. Sustainable development efforts have been intensified in the 1980s and early 1990s to cope with the deterioration of natural resources and the environment.

New energy and environment laws and legislations were enacted in 1992, in response to the high economic growth during the early 1990s. Later the economic crisis in the late 1990s new regulations and laws concerning corporate structure and behavior were introduced. Moreover, as a result of the crisis, legislation was passed to increase public sector performance and governance (including the Ministry of Natural Restructuring Act that has led to establishment of e.g. the Ministry of Energy and the Ministry of Natural Resources and Environment). These laws notably include the Energy Conservation and promotions Act (1992), which defines the basics for providing financial and logistic support for energy conservation, and for energy efficiency and renewable energy projects, and defines the ENCON programme and ENCON fund; and Regulations for the purchase of power from small power producers (published in 1992, revised in 1994 and 1998).

Additionally, several programmes have been initiated to promote the use of renewable energy. They consist mainly of individual programmes for solar energy, wind energy, biogas, biomass, ethanol and biodiesel and the utilization of agricultural residues as fuel. Among the most recent of these programmes, the RPS (Renewable Portfolio Standard) contains the obligation for power producers that 5% of each new installed capacity has to be RE-based. This standard, in combination with the recent Energy Strategy, which outlines a target for the share of RE energy in the final energy consumption, is a further step towards promoting RETs. Thailand's Energy Strategy is described below. However, the action plans implement this strategy are still under development.

3.2.2 CDM Status in Thailand

Thailand has been known for its complex CDM approval procedure which requires Cabinet approval before a Letter of Approval (LOA) can be signed. A new approval procedure has been prepared and is expected to be implemented by the proposed one-stop-shop and autonomous organization (Public Organization) called "Thailand Greenhouse Gas Management Organization" (hereafter the TGO). The TGO would act as the DNA for CDM project in Thailand; project approval will take place within 30 working days. Figure 1.2 below shows this new, more practical approval procedure for CDM project Thailand.

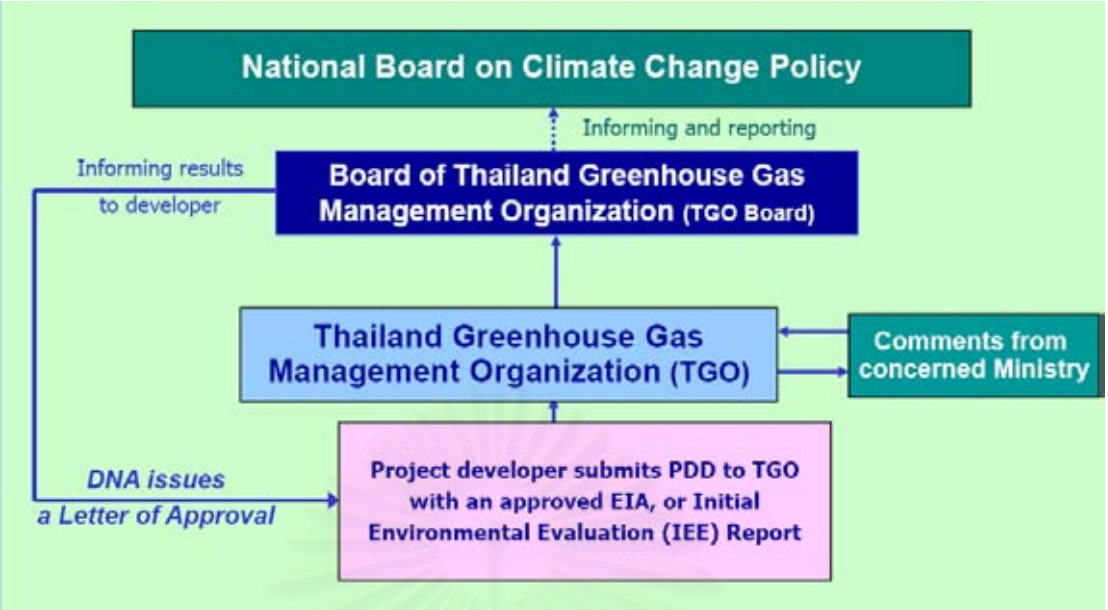

Figure 3.3: New approval procedure for CDM projects in Thailand

The institutional framework for approval and operation of the CDM is therefore progressively being put in place in Thailand. A number of Project Design Documents (PDDs) have been already prepared, and 15 projects of which have been submitted for approval. From such projects in the CDM pipeline, 7 projects have been approved by the Cabinet on 30 January 2007, while the others are expected to be approved soon

3.2.3 Most Promising CDM Project Opportunities in Thailand

Numerous studied have been conducted to estimate the GHG mitigation potential of Thailand within the framework of the CDM: ALGAS, the national GHG inventory, the national CDM strategy study, and, more recently the IGES “CDM country guide for Thailand”. Thirty-nine GHG mitigating options have been identified for several GHG emitting sectors: power generation, industry, transport, residential, and commercial sectors. The results of those studies have been analyzed from the perspective of private sector investors in order to estimate the potential for implementation of CDM projects by the Thai private sector. Several criteria have been used, such as amount of CERs to be expected from the projects, technical/economic feasibility of the projects, and number of projects that can be implemented in total within each project category in Thailand.

All the GHG mitigating options identified for Thailand to date have been reviewed. In addition, an analysis of their potential to mobilize private sector investment in the framework of the CDM in also provided. It has been concluded, based on the above set of criteria, that of all the options identified, only few of them would be attractive to private sector investment in the framework of the CDM. There are:

- Biomass production project from industrial wastewater, mainly in the tapioca starch industry and in palm oil mills. Such project generate CERs in amounts that repay the investment within two to three years, as the GHG emission reduction occurs at several stages of the project: methane avoidance and ethanol production.
- Production of biodiesel and ethanol: several projects in this category in Thailand have already started the CDM preparation process. However, there are still no approval methodologies for biodiesel and ethanol production.
- Cogeneration in industries, using biomass.

Further potential CDM opportunities are in the field of process improvement, in particular in cement factories (improving the clinker-to-cement ratio in order to reduce fuel consumption). According to the study, the potential of large-scale CDM projects in Thailand is rather limited; most potential CDM activities are small to medium scale projects.

Detailed criteria are given as well as estimate of CERs per size of project. In additional, CDM activities that could be framed into a programme of CDM activities are also analyzed.

3.2.4 CDM Financial Issues in Thailand

Several Thai financial institutions have already acquired some basic experience in participating in CDM projects. The interest of these institutions in CDM moreover seems to be growing. Nine commercial banks and two other financing institutions have been identified as active in the field of CDM in Thailand.

Different options and setups can thus be considered for financing CDM projects in Thailand. The selection of particular financing set-ups will vary, depending on the characteristics of the projects and their developers. However, as far

as commercial banks are concerned, the provision of loans to projects based only on CDM revenues is not yet envisaged.

A key barrier to financing project and the rapid development of the CDM in Thailand remains the perception of high risks by potential financiers and project developers. This perception of the risks related notable to uncertainties both at country and project level. Complementary revenues for the sales of CERs, based, for example, on incomes from sales of electricity to the grid, offer a means to reduce these risks.

In the mean time, the need remains for the continuation and extension of the supporting programmes already undertaken, especially the programmes for capacity building and provision of technical and financial support, in order to support both the private and the public sectors.

3.3 The Guideline to Baselines and Additionality

In order to generate carbon credits, we need to meet certain requirements. Two of the most fundamental requirements are:

3.3.1 Baseline

Developers must establish a baseline scenario that represents the emissions of greenhouse gases that would occur in the absence of the proposed project activity, commonly referred to as the business as usual (BAU) or baseline scenario.

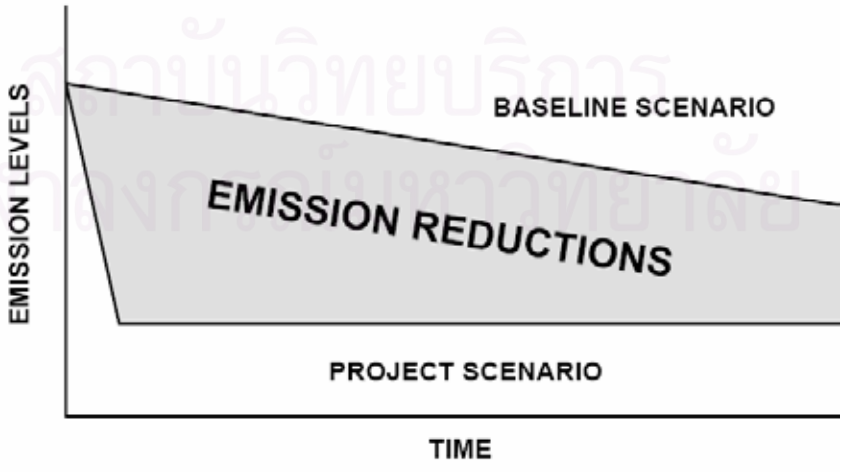

Figure 3.4 Baseline project emission scenarios

The emissions for both a baseline scenario and a CDM project are shown in Figure 3.4. The introduction of the JI/CDM project leads to a significant decrease in emissions compared to the baseline. The difference between the two scenarios represents the emission reductions. Here it is assumed that the baseline emissions slowly decrease over time because of business-as-usual efficiency improvements.

However, the baseline scenario will vary depending on specific circumstances. We summarize the baseline, or business as usual (BAU), scenario is the hypothetical emissions scenario describing what would have happened in the absence of a project's implementation. CDM project developers must demonstrate that their project is additional to the BAU scenario.

3.3.2 Additionality

Project developers must demonstrate that their project reduces emissions compared to the baseline scenario. This is commonly referred to as 'additionality'.

The basic steps to developing a baseline and demonstrating the additionality of a project are:

a) Establishing a variety of potential scenario options;
b) Characterizing one of these options as the most likely (i.e. the baseline);
c) Proving that the project itself is not the most likely scenario (i.e demonstrating additionality).

Once the baseline and project scenarios have been defined, an estimation of the quantity of emission reductions (i.e. carbon credits) that a project generates can be made by comparing the emissions from both the baseline and project scenarios *(see Figure 3.4).* This brochure focuses on how to develop baselines and assess whether a project is additional. Because the CDM is the only formally operational mechanism under the Kyoto Protocol, this brochure focuses on the CDM.

3.3.3 Developing a Baseline Methodology Under the CDM

To be able to obtain carbon credits for a particular activity, project developers need to prove that there is a scenario that would have occurred in the absence of the proposed project (i.e., the baseline). To determine this scenario, project developers need to use a methodology that will lead to the determination of that baseline. The baseline methodology is thus a series of steps and analyses that serve to narrow the

list of potential scenarios down to one baseline. According to guidance from the CDM Executive Board (EB), the core of the methodology is to be based on one of three broad approaches:

a) Existing actual or historical emissions, as applicable;
b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment; or
c) The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

The baseline approach provides a framework within which a specific methodology is developed. For example, approach (b) above would lead the developer towards a methodology designed around testing alternative investment scenarios. In practice, a number of scenarios would be established, and a process for identifying the most likely one based on transparent criteria (e.g., internal rates of return) would be set out. In this way the project baseline may be defined and the project additionality tested.

A methodology also describes each of the steps that are taken to characterize baseline emissions, and ultimately calculate the project emission reductions. For example, a methodology for a project that captures and destroys landfill gas needs to establish the procedures for calculating the emissions that would have taken place at the landfill in the absence of the project. Likewise, a renewable energy project that displaces electricity from an electricity grid would need to have a methodology that sets out how to calculate the emissions of the grid in the absence of the project (a.k.a., the grid emissions factor).

To facilitate project development, the EB has set out a process through which methodologies developed under one project can be used for other, similar activities. Thus, baseline methodologies should be developed generically; projectspecific elements should be excluded. Typically, methodologies should include the following key elements:

- An overview of each of the steps needed to develop the baseline scenario.
- A test to demonstrate additionality.
- Data to be collected and included in the baseline.
- Formulae to use for calculating the emission reductions.

- Key parameters and assumptions to be considered.
- Definition of the emissions sources in the baseline (the project boundary).
- Dealing with uncertainties and emissions that have not been taken into account in the calculations (leakage).
- Ensuring that the emission reductions calculated for the project are conservative (i.e., are not overestimated).

3.3.4 Demonstrating Project Additionality

The baseline methodology must deal explicitly with additionality because not all projects that reduce GHG emissions are additional. In practice, demonstrating project additionality means that the project developer needs to make a compelling case that the project is not the baseline. To accomplish this, project developers can rely on the following kinds of arguments.

- The CDM helps to remove barriers for implementation of the project. These barriers can include investment, technological, regulatory, competitive disadvantage and managerial barriers. For example, the introduction of a new technology to a country could be considered particularly risky, and the CDM could help mitigate that risk.
- The project activity is beyond regulatory and policy requirements.
- The project has been developed with the intent to reduce GHG emissions. This can be demonstrated by initial discussions with the relevant international and national authorities so as to enable the subsequent realization of a CDM project, as well as by feasibility studies and business plans that address the issues of CDM and its positive impacts on the project.

3.3.5 Selecting a Baseline Methodology

As indicated above, in the course of overseeing CDM projects the EB has already approved several methodologies that could be applied to other similar project activities (see box). Project developers have two options in selecting a methodology for their project.

a) Use an approved methodology (AM).

If a methodology exists that is approved by the EB and that is applicable to the project, the existing methodology can be used. The project developer

should justify the choice of applying an approved methodology and describe how it is applied to the proposed project. The Designated Operational Entity (DOE), an independent third party that helps to ensure project submissions meet the relevant criteria, will ensure that the project developer is indeed using and correctly applying an existing methodology.

b) Propose a new methodology (NM).

If none of the previously approved methodologies is applicable to the project activity, or the project developer does not want to apply an approved methodology, a new methodology must be developed and proposed to the EB for consideration and approval. Section 5 further discusses the procedures for developing a new methodology and where this development fits within the project cycle.

3.3.6 Proposing a new methodology

Once a new methodology has been developed it must first be approved by the EB before it can be applied, and before a project can ultimately be validated and registered as a CDM project. Proposing a new CDM baseline methodology involves the following steps:

Step 1 - Presenting a new methodology

A new methodology has to be prepared in the format set out in Annex 3 of the PDD. As indicated above, this methodology must:

- Be generic and replicable to similar projects
- Contain no project specific information
- Be transparent
- Test additionality
- Set out a process to characterize baseline emissions and project emissions reductions

Step 2 - Contract a Designated Operational Entity.

Only a Designated Operational Entity (DOE) can submit a methodology for approval to the EB. The project developer thus needs to select and contract a DOE for validation of the project. A list of DOEs can be found at http://cdm.unfccc.int/DOE/.

Step 3 - Submit the new methodology

The DOE that is contracted by the project developer determines whether the draft PDD and relevant annexes have been completed as required and then forwards the proposed new methodology to the Executive Board.

Step 4 - Administration

The UNFCCC Secretariat receives the submitted methodology, checks if the documentation is complete, and forwards it to the Executive Board and the Meth Panel. At the same time, the Secretariat makes the new methodology publicly available on the UNFCCC website and invites public comments for a period of 15 working days. The comments received are forwarded to the Meth Panel and also made available on the same website page.

Step 5 - Provisional decision

Methodologies submitted before the deadlines are dealt with at the next Meth Panel meeting, unless more than 10 new methodologies are submitted. In that case the analysis of some submissions may be postponed until the next Meth Panel meetings. Upon receipt of a proposed new methodology, the Meth Panel selects two experts, who prepare draft recommendations. The Meth Panel then prepares a preliminary recommendation, taking into consideration public comments. Within 10 working days after receiving the preliminary recommendations from the Meth Panel, the project developer can submit clarifications to the Meth Panel via the DOE. After that the Meth Panel sends its final recommendations to the EB.

Step 6 - Final decision

The EB considers a proposed new methodology at its next meeting after the receipt of the recommendation from the Meth Panel. The Executive Board reviews the methodology and sets out a decision via a grade:

a) Approval of the methodology
b) Reconsideration once project participants have made required changes
c) Non-approva

CHAPTER IV
THE APPLICATION OF CDM METHODOLOGY TO CASE STUDY

Cleaning development mechanism (CDM) studies were conduct by using CDM methodologies base on UNFCCC to analyze gas production data for providing suitable CDM methodology which is suitable for our study. The studies doing follow the steps below:

4.1 Describe of the Existing gas Facilities and Gas Emission Data for Study Area

- The gas production data were selected from "PB gas field" in the Gulf of Thailand. The distance from field to the shore in the north approximately 600 km and in the west is approximately 200 km. The area of the field is approximately 2500 km^2.
- The Data are assuming PB conceptual study of Deep cut@10% CO_2+Blending case meaning that CO_2 in feed gas will be removed from 35% down to 10% before exported to commingle with gas from other field (PN) to meet sale specification of 23% CO_2.
- The CO_2 in feed gas will be removed by CO_2 removal system on board of PB production facility employing membrane technology.
- The CO_2 treatment will be done by 1-stage membrane system. The removed (permeate) waste stream will be routed and disposed by flaring.

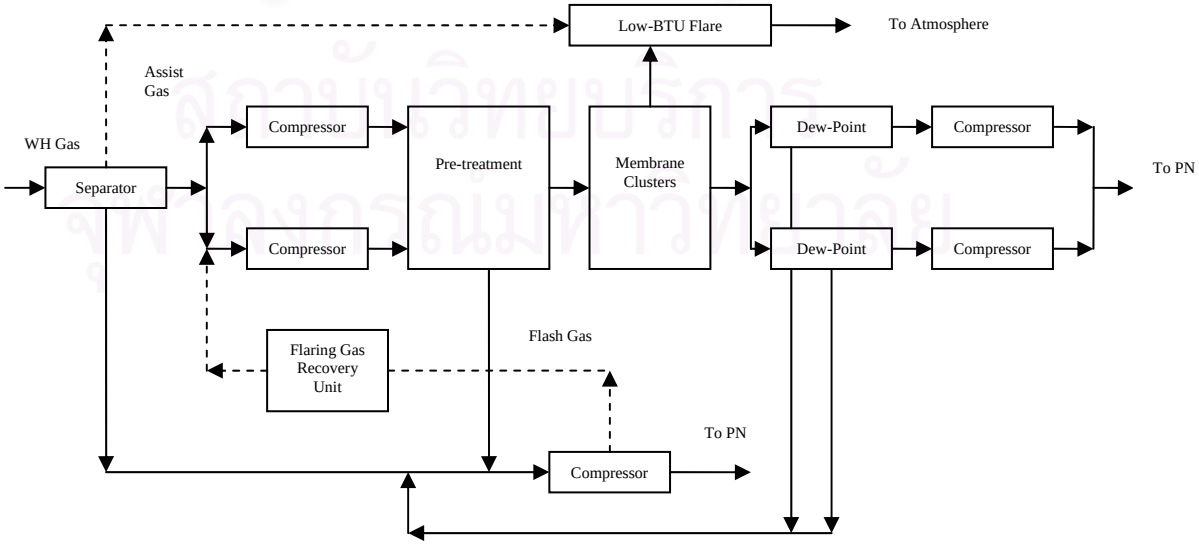

Figure 4.1: Flare gas recovery unit diagram

* Assume GBS will come on stream in 2009. Production will last until 2023.

Table 4.1: Amount of gas emission (permeate gas) from flaring facility ($M=10^6$)

Flared Year	Amount of gas emission MSm^3/y
2004	0
2005	0
2006	0
2007	0
2008	0
2009	1395.3
2010	1912.1
2011	2025.8
2012	2108.5
2013	1901.8
2014	1777.7
2015	1457.3
2016	878.5
2017	547.8
2018	413.4
2019	289.4
2020	206.7
2021	144.7
2022	82.7
2023	62

Table 4.2: Permeate composition

Nature	Permeate composition
H_2O	0.277
H_2S	0.017
N_2	0.172
CO_2	72.046
Methane	23.942
Ethane	2.014
Propane	0.967
i-Butane	0.242
n-Butane	0.175
i-Pentane	0.065
n-Pentane	0.037
Hexanes Plus	0.046
Mole Weight	37.044
CH_4, wt %.	10.369
VOC, wt %	3.756
CO_2, wt %	85.595
Sulfur, ppm wt	143.5

4.2 Identification of Opportunities to the CDM Project

To identify the options that can be apply to the field area for case study by matching to the choice of the methodology shown as below:

Opportunity 1. Recovery and gas utilization, gas processing facilities (Capture and process the gas into liquids that is, liquefied natural gas (LNG), compressed natural gas (CNG), Liquefied petroleum gas (LPG).

Opportunity 2. CO_2 capture and storage takes place using CCS technology.

Opportunity 3. Capture and delivery through a pipeline to an end user.

Opportunity 4. Capture and re-injecting the gas into the reservoir

In general, choosing the appropriate opportunity(s) depends on upstream conditions, such as field characteristics and the oil-to-gas ratio, downstream market opportunities for the recovered gas, and the legal and fiscal frameworks that may include various incentives and penalties. Understanding and documenting how these factors influence decisions made by the petroleum industry are critical for the CDM to become an effective instrument that supports the objectives of the Kyoto Protocol and the UNFCCC

Available CDM methodologies were selected by matching to the options

Table 4.3: Choice of Methodology

Opportunity	**CDM methodology**
1) Recovery and gas utilization, gas processing facilities	NM0024 - Rang dong oil field associated gas recovery and utilization project NM0145 - Reduction of flaring and use of recovered gas for methanol production
2) CO_2 capture and storage takes place using CCS technology	NM0168 - The capture of the CO_2 from the liquefied natural gas (LNG) complex and its geological storage in the aquifer located in Malaysia NM0167 - The White tiger oil field carbon capture and Storage (CCS) project in Vietnam

Opportunity	CDM methodology
3) Capture and delivery through a pipeline to an end user	No any CDM methodology available yet
4) Capture and re-injecting the gas into the reservoir	No any CDM methodology available yet

4.2.1 Recovery and Gas Utilization, Gas Processing Facilities

Currently, only one baseline methodology for gas flaring reduction (GFR) projects is approved by the EB: AM0009, derived from the Rang Dong gas flare reduction project in Vietnam (NM0026). Although elements of this methodology are relevant and useful for other projects particularly the monitoring methodology.

We find it difficult to apply the baseline methodology in total. The methodology is applicable to CDM projects recovering gas at oil wells under the following applicability conditions:

- Gas at oil wells is recovered and transported by pipeline to a processing plant where dry gas, LPG and condensate are produced
- Energy required for transport and processing of the recovered gas is generated by using the recovered associate gas
- The products (dry gas, LPG and condensate) are likely to substitute in the market only the same type of fuels or fuels with a higher carbon per energy intensity
- The substitution of fuels due to the project activity is unlikely to lead to an increase of fuel consumption in the respective markets
- In the absence of the project activity, the gas is mainly flared
- Data is accessible on the products of the gas processing plant and on the gas recovered from other oil exploration facilities in cases where the facilities supply associate gas to the same plant

In this study mainly focus on a non- associated gas flaring in the Gulf of Thailand which mainly produced from gas field. Unfortunally the condition of this methodology is has to be associate gas at oil reservoir which recovered and transported by pipeline to a processing plant where dry gas, LPG and condensate are produced following the condition above that make this methodology not applicable.

4.2.2 The Capture of the CO_2 from the Natural Gas and Underground Storage.

CO_2 can be capture from a range of anthropogenic sources, transported and stored in a variety of sub-surface geological media. Depending on its source, raw natural gas extracted from reservoirs often contains varying concentrations of CO_2, which, along with hydrogen sulphide (H_2S), must be reduced for technical and safety reasons where present (gas sweetening). Pipeline specifications often require that the CO_2 concentration be lowered to around 2% by volume (although this amount varies in different places) to avoid excess energy use in transport and to increase the heating value of the gas. As such, CO_2 removal (or capture) is sometimes an integral part if natural field development engineering, regardless of whether the CO_2 is stored or not i.e. the CO_2 is usually stripped and vented. Appropriate incentives such as the CDM could provide the trigger to mitigate the not insignificant volumes of CO_2 emissions form this source which are currently vented worldwide every year.

Capture of CO_2 is only economically feasible from large point sources of emissions such as power generation, natural gas processing, liquefied natural gas production, refineries, synthetic fuel production, cement production, iron and steel production and chemical manufacture. In this thesis we focus on CO_2 which generated from natural gas processing.

There are only one methodology regarding carbon dioxide capture and storage (CCS) for gas reservoir, a new baseline methodology NM0168 is proposed for the project, title “The capture of CO_2 natural gas processing plant and liquefied natural gas (LNG) plants and its storage in underground aquifers or abandon oil/gas reservoirs”. This methodology involves installing additional facilities to LNG complex to compress the recovered CO_2 which would otherwise have been released, to over the supercritical pressure, transfer it to a new sub-sea facility through a pipeline and inject it into an underground aquifer in the Pudina field, and store the CO_2 in safe, sound and stable condition in underground geologic formations, and thus reduce the CO_2 emission to the atmosphere.

The methodology is applicable to CO_2 capture and storage project under the following conditions:

- This methodology applies to CO_2 capture and transferred to storage sites via pipeline and tankers (e.g. marine vessels or road or rail tankers).
- This methodology applies to CO_2 storage in well-selected, designed and

managed geological storage sites, including saline formations, depleted oil and gas reservoir, or deep coal seams.

- This methodology applies to projects utilizing CO_2 for enhanced hydrocarbon recovery, including but not limited to the following activities:
    - Enhanced oil recovery (EOR)
    - Enhanced gas recovery (EGR)
    - Enhanced coal bed methane (ECBM)
- This methodology is not applicable to projects capturing CO_2 and transferring it for other than geological storage

The matching set between applicable condition in the NM 0068 and the situation of the project.

Table 4.4: Eligibility of the project for NM0068

Applicable condition in the NM0068	**Eligibility of the project**
The CO_2 source is acid gas containing CO_2 from acid gas removal facilities of natural gas processing or liquefied natural gas (LNG)	The CO_2 source of this project is the acid gas from the acid gas removal facilities
The acid gas containing CO_2 is stored in geological formations which are saline aquifers or abandoned oil/gas fields.	The acid gas containing CO_2 is stored in as abandoned gas field below the sea bed.
The host country has no regulations with regards to CO_2 emissions	Thailand is has no regulations with regard to CO_2 emissions
The CO_2 is transported from the source (acid gas removal facilities) to the injection site via pipeline systems.	The CO_2 is transported from the source to abandon gas field below the off-shore area via the pipeline systems
Only projects that source and store CO_2 in the same host country, are applicable for this methodology.	The source and storage site of this project is in Thailand

4.3 Application of CDM Methodology (NM0068) to Case Study

4.3.1 Baseline

Production of natural gas from high CO_2 gas field usually requires processing of the gas to remove some or all of the CO_2. In this project, high CO_2 gas from the gas field is removed by CO_2 removal system on board of production facility employing membrane technology near the well head to reduce transportation cost and reduce corrosion risks in the pipeline. The baseline scenario for this project is considered straightforward as the business as usual before CDM project activity begins.

CO_2 removal system (The baseline scenario)

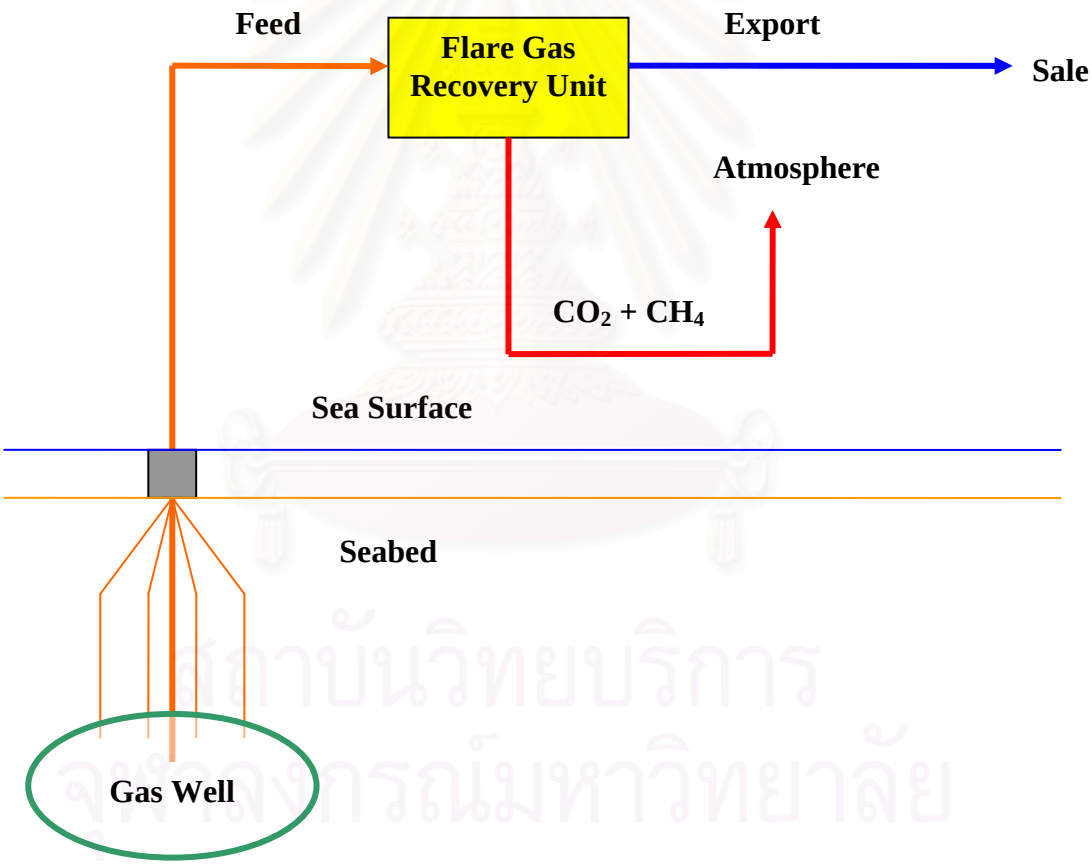

Figure 4.2: Block Flow Diagram of the Current System

At present, the CO2 removed from the natural gas is vented to the atmosphere after the CO2 treatment system to meet gas sale specification. The facility detail is shown in section 4.1

4.3.2 Project Activity and Boundary

The project activity includes the installation of and additional facility (2nd phase of FGRU) that recycles all the emission gases from 1st flare gas recovery unit otherwise being led to the flare system to put them to the recovery system in order to recover the valuable hydrocarbons and inject it back in to subsurface in field area, and therefore reduce flaring to zero level. The propose of the project activity is to recover and capture CO_2 which emits from flare gas recovery unit (FGRU) located at **Bongkot** gas field in gulf of Thailand by installing 2nd flare gas recovery unit in order to achieve technical zero flaring

2nd phase of flare gas recovery unit (The project scenario)

In the project, the gas separated at the 1st phase of CO_2 removal facility is passed through 2nd phase of CO_2 removal system then transported through pipelines, injected and store in subsurface.

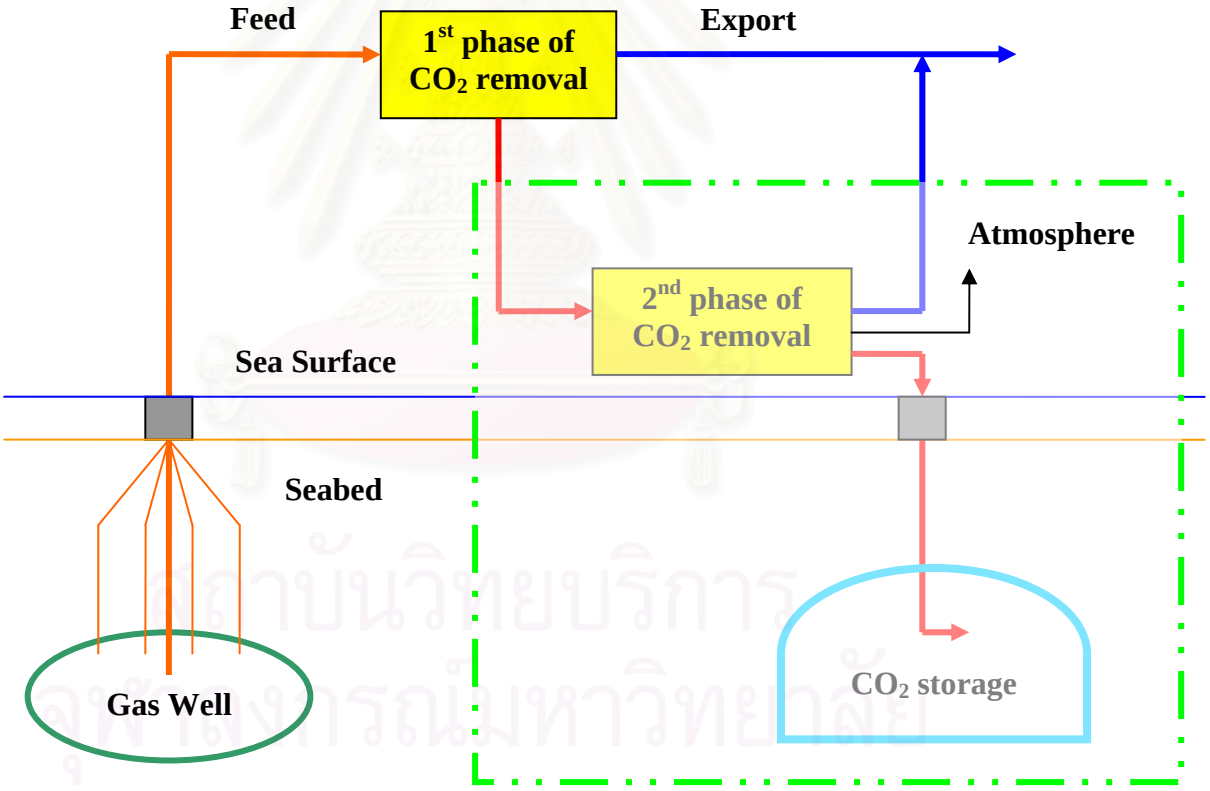

Figure 4.3: Block Flow Diagram of 2nd flare gas recovery unit and CO_2 re-injection

Instead of venting and flaring, the gas containing high CO_2 content from flare gas recovery unit is transported to the 2nd phase of recovery unit which consist of compressors and membrane removal.

The gas is pressurized at the compression before passing to the membrane cluster. After separation the gases are pressurized again 1) to allow CO_2 injection into the reservoir and 2) to transfer HC gas to meeting the export gas from 1st phase FGRU

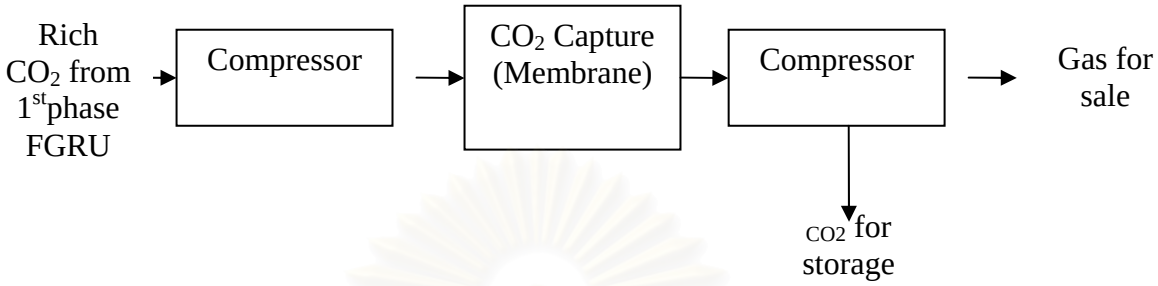

Figure 4.4: Block Flow Diagram of 2nd flare gas recovery unit

4.3.3 Emission Reduction

GHG emissions from the project are due to fuel consumption by CO_2 capture and compression process such the gas turbines (for gas compression) and CO_2 capture equipment. The project emission in this project is calculated by using the same assumption following NM0068 methodology. The calculation is shown in Appendix I.

Emission reduction = Baseline GHG emission - Project emission

Table 4.5: Baseline and project activity emission

Year	**Estimation of project activity emissions** (tonnes of CO2 e)	**Estimation of baseline emissions** (tonnes of CO2 e)	**Estimation of overall emission reductions** (tonnes of CO2 e)
2009	119,000	1,872,562	1,753,562
2010	119,000	2,566,134	2,447,134
2011	119,000	2,718,725	2,599,725
2012	119,000	2,829,713	2,710,713
2013	119,000	2,552,311	2,433,311
2014	119,000	2,385,762	2,266,762
2015	119,000	1,955,770	1,836,770
2016	119,000	1,178,991	1,059,991
2017	119,000	735,175	616,175
2018	119,000	554,803	435,803
Total (tonnes of CO_2e)	1,190,000	19,349,946	18,159,946

CHAPTER V
ECONOMIC EVALUATION

Economic Evaluations

(For carbon dioxide capture and storage)

To evaluate the investment opportunities, the economic evaluation is taken into account for determining whether a proposed investment is economically justifiable and for selecting the most economically attractive of the project. Economic evaluation of investment alternatives is based on assessment of benefits and costs of the project which requires that all opportunities be appraised on the same basis, and the time value of money.

Economic modeling

The analysis of economic benefits of carbon capture and storage is expressed in economic model which mainly used for the investment decisions and sensitivity analysis of the project. The modeling is based on empirical data, knowledge of fundament elements in technology and economics. In this project, discounted cash flow model is applied.

Basic cash flow calculation

Gross revenue	=	Total gas revenues
Net revenues	=	Gross revenues
		- Royalties
Net revenue (%)	=	100% - Royalty rate (%)
Taxable income	=	Gross revenues
		- Royalties
		- OPEX (Operating Expenditure)
		- CAPEX (Capital Expenditure)
		- Depreciation
Net Cash Flow	=	Gross revenues
		- Royalties
		- CAPEX
		- OPEX
		- Taxes

Sensitivity Analysis

The most common method of handling uncertainty (i.e., where the range of outcomes is known but the probability of each outcome is not) is known as, “sensitivity analysis”. Sensitivity analysis goes beyond simple indicators of uncertainty exposure through the alternative forecasts of uncertain elements in the economic evaluation. These are designed to cover the range of possibilities in each of factors whose sensitivity is studied. It is possible through sensitivity analysis to develop a great deal of information from relatively straight forward analyses repeated on an optimistic, pessimistic and most likely estimate of the key variables.

The simplest sensitivity analysis relies on those responsible for the development of the case under study merely to selected alternative forecasts in any combination that they regard as optimistic and pessimistic. The difficulty here stems from the fact that people who are uncertain about the possible outcome of particular event usually have no real perception as to the degree, or level, of their uncertainty. If the basic for optimism and pessimism is clearly set out and explained, such sensitivities can be meaningful and quite useful. The sensitivity analysis become more useful, however, when particular elements of the forecasts of input data are identified and assumed to change in specific ways and to specific extent. Elements included in sensitivity analysis typically include item such as the required investment, operating costs, reserve size, producing rates prices, etc. Combinations of elements also are sometimes used.

There are 3 types of sensitivity analysis classified as follow:

- Tabulation Basis (Matrix Table)
- Spider Diagram
- Tornado Chart

Scenario Analysis

Scenario analysis is a process of analyzing possible future events by considering alternative possible outcomes (scenarios). A scenario is a description of the current situation as well as of a series of events that could lead from a current to a future scenario. Scenario Analysis Method involved forward projection which allows us to progress from the current situation to a series of alternative, future scenarios. In

this study, we first look at an extreme version of scenario analysis where we consider the value in the best-case and the worst-case scenarios.

5.1 Description of Economic Model

According to complex and highly uncertain of the CCS system, a comprehensive feasibility study of such a system requires multidisciplinary evaluations of technical and economic impacts. Specifically, the economic feasibility of the system is affected by uncertain economic parameters, including capital costs and maintenance costs of the infrastructure, current and future prices for natural gas, and CO_2 credits.

5.1.1 Components of the CCS Cost

Carbon capture – natural gas sweetening (treatment or CO_2 removal)

Depending upon the level of CO_2 in raw natural gas, there are different processes for natural gas processing are available

- Compressor for compression from 2-4 bar to 30 bar
  - Compression is required to bring the gas that has been separated from the stream to pressure suitable for injection to the storage and pipeline transport.
- Dehydration facilities
  - Dehydration is required to remove moisture from gas stream
- CO_2 removal facilities
  - CO_2 removal membrane is required to in this project to remove CO_2 from the natural gas.
- CO_2 removal facilities platform

Transportation

There are two main cost elements to be considered related to the transportation of the injecting gas from the capture site to the injection site

- CO_2 Compression
  - It is less expensive to transport CO_2 as a liquid, therefore for pure CO_2, pumping is assumed to occur. If nitrogen is included in the mixture, it is assumed that it would be transported as a gas, and therefore

compression would be used. In this project consider CO_2 as a gas therefore compression is applied to use.

- The pipeline itself
    - Transportation is required for moving the CO_2 from the source to the sink. In general, 6 inch pipeline assumed for all cases.

Storage

- Booster compression / pumping

In some case the injection gas well require booster compression (or booster pumping in the case of pure CO_2) to the required well head injection pressure.

- Geological storage

Geological storage of CO_2 in this study case takes place offshore in Depleted or partially gas fields without enhanced gas recovery (EGR)

5.1.2 CCS Project Expenditures (Investment cost)

Project expenditures can be classified to

- Capital Expenditure (CAPEX)
    - Construction - Capture facility, Compressor
    - Pipeline for transport CO_2
- Operating Expenditure (OPEX)
    - The cost of running operation

Based on the components of CCS costs presented in Section 5.1, the economic investment cost for CCS is estimated as the following:

CAPEX and OPEX of carbon capture and compression

A great contribution to the total cost formation in the CCS system comes from the capital and operation cost for the compression, associated dehydration equipment. For estimating capture costs the amount of required compression and dehydration as well as the unit cost of compression should be considered. The new building facility platform can be used in case there is no more available space for the capture equipment on existing facility board. The cost of new platform is approximately 200 million US dollar.

OPEX of capture depend on labor, maintenance, purchase of chemicals, etc. Capture costs depends on the amount of CO_2 to e emissions source, and the nature of the capture process (membranes) while CAPEX of capture is associated with the equipment vary from US$ 7.4 to 12.4/tonne. (≈ 9-10 million US dollar)

CAPEX and OPEX of Transportation

Transportation n this project is considered as short distance, all processes will take place on board and transport to underground storage site. Some factors should be considered for estimating operation costs for transportation of CO_2 by pipeline: CO_2 flow rate and distance from the source to the storage site. For capital cost parameters should be considered: pipeline geometry (internal diameter).

Table 5.1: CAPEX and OPEX of CO_2 transportation by pipeline

Cost	**Throughput (million t/y)**	**Length of pipeline (km)**	
		100	**400**
CAPEX (million $)	0.1	9	33
	5	31	135
	50	137	753
OPEX (million $/y)	0.1	1.3	5.1
	5	5.3	21
	50	21	110

CAPEX and OPEX of Storage

Cost component for CO_2 injection into storage sites include mainly CAPEX for drilling wells and costs related to the operation and maintenance of the system. In this study mainly focus on abandon gas wells near the source site. Therefore the cost of storage depends on the cost of pumping including the operation and maintenance of the for CAPEX and ≈ $3/ton for OPEX. In the most case of CO_2 storage in geological reservoir range from below US$5 to above US$ 10 per ton for offshore.

Table 5.2: Total cost of CCS system (all number are representative of the large-scale, new installation, with gas prices)

CCS components	**Cost range (US$/t CO2)**
CAPEX	
- Capture cost and Compression cost	9 million $
- Transportation cost	15 million $
- Storage cost	1 million $
OPEX	
- Capture cost	1.5-4.5 $/ ton CO_2
- Compression cost	3.75-11.25 $/ton CO_2
- Transportation cost	2-12 $ / ton CO_2
- Storage cost	5-12 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs

5.1.3 General Assumptions

a) Carbon credit Prices

A few studies have attempted to estimate the prices of carbon credit under various hypothetical scenarios. Their estimates of the price range from € 5 to €30 per tonne of carbon.

b) Calculation Period

The production of this field is assumed to be at least 15 years.

c) Crediting Period

The project operator has two options for choosing the crediting period.

- Renewable Crediting Period - a maximum of 7 years but which can be renewed twice if the baseline of the project is still valid or has been improved taking account of new information; or
- Fixed Crediting Period - a maximum of 10 years with no option for extension.

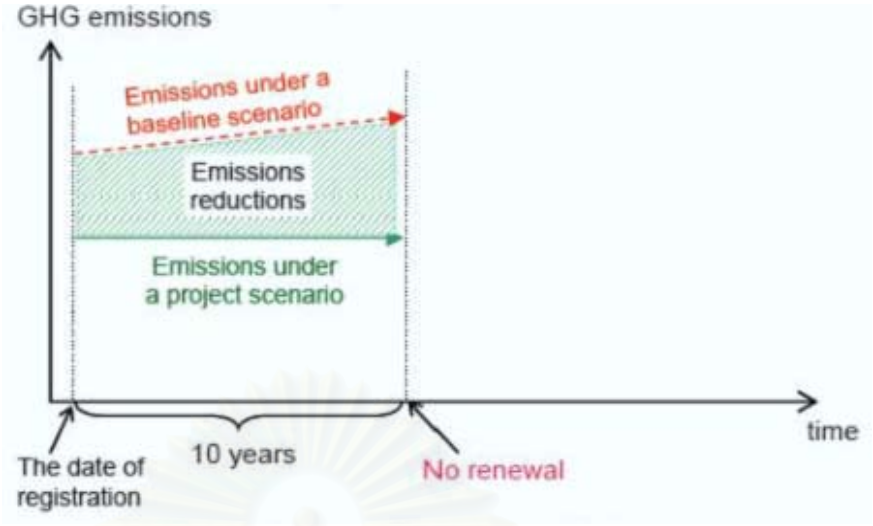

Figure 5.1: A maximum of 1 year with no option of renewal

Owning to production life, Renewable Crediting period is chosen in this study.

d) Gas Price

The technology screening CCS a range of economic values for gas based on the historical relationship between gas and petroleum prices in liberalized markets. For the analysis, their estimates of the price rage from $5 to $10 per million BTU for natural gas sale.

e) Economic Discount Rate

The real economic discounting rate for projects in emerging economies is country specific and is normally given by the local planning agency or Ministry of Finance. The Bank generally estimates the economic discounting rate at between 10 and 12 percent per year in emerging economies. An economic discounting rate of 12 percent per year has been used.

f) Fiscal Regime

At present, the operation of petroleum business in Thailand is governed by two major group enactments, namely, the Petroleum Act, B.E. 2514 (Thailand I Regime), and the Petroleum Income Tax Act, B.E.2514 (Thailand III Regime) as shown on the table below. For this study case, Thailand I is taken into account for the analysis.

Table 5.3: Thailand Fiscal Regime

Payment	Thailand I (concessions award before B.E. 2532)	Thailand III (concessions award after B.E. 2532)
Royalty	12.5%	5-15%
Tax	50%	50%
SRB	-	0-75%

g) Currency Denomination

All calculations have been made in U.S. dollars, which the currency exchange rate from EURO to US dollar = 1.47 (January 2008)

h) Operation and Management (O&M)costs

The O&M costs have been estimated at 2-5 percent of the investment cost.

i) Price

Table 5.4: Economic Model – Fiscal and Economic Assumptions

Assumption	**Price**
Useful life of the project (years)	15
Crediting period (years)	7,10
Carbon credits price (Euro/tonne of carbon)	€ 10-22.5
Gas price ($/million BTU)	$ 5-12
Discount rate	15%

5.2 Economic Calculation

The following results are then provided for each case.

- Net present value (NPV), in $
- Internal rate of return (IRR), in $

For CO_2 capture and storage in this study is divided into 3 cases:

- Emitting or venting the CO_2 directly to the atmosphere
- Capturing and injection the CO_2 for climate change mitigation benefits not as CDM project activity
- Capturing and injection the CO_2 into subsurface as CDM project activity
    a. Capture and injection the CO_2 into underground storage under the sea near site facility. The distance of pipeline transportation approximately

50 km. (this case is set as base case)

b. Capture and injection the CO_2 into underground storage on the shore. The distance of pipeline transportation approximately 200 and 600 km.
c. Same condition as a. except building new platform for capture facility.
d. Same condition as b. except building new platform for capture facility.

5.3 Sensitivity to Economic Parameters

A number of sensitivity tests have been carried out including decreasing and increasing all parameter below under the assumption range based on data from the literature shown in Table 5.6. The base case is set as the mean of each range which is shown in Table 5.7.

Table 5.6: Economic model: Parameters for sensitivity analysis

Parameter	**Assumption**
CAPEX	10-30 million $
OPEX	
- Capture cost	1.5-4.5 $/ ton CO_2
- Compression cost	3.75-11.25 $/ton CO_2
- Transportation cost	2-12 $ / ton CO_2
- Storage cost	5-12 $ / ton CO_2
- Maintenance cost	6-10% of total OPEX costs
Gas price	$ 5-12 /ton CO_2
Credits	€ 10-22.5 /ton CO_2
Discount rate	11-16%

With these economic parameters, sensitivities were performed to answer the following question:

How sensitive are results to CERs, gas price, OPEX and CAPEX ?

How would CO2 credits improve the results?

Is it worth to own benefit from CDM project comparing to the project without CD

5.4 Scenario Analysis to Economic Parameters

For the purpose of scenario analysis: 3 different scenarios have been defined. In these scenarios are assumed that all parameters below are under the assumption range following the sensitivity analysis and 15% discount cash flow is used to scenario cases. In this scenario analysis study we first look at an extreme version of scenario analysis where we consider the value in the best-case and the worst-case scenarios.

The 2 scenarios are defined as follows:

Scenario 0: Base case is assumed as same as in sensitivity analysis

Scenario 1: Best case is assumed to be extremely low in every cost and the highest in gas price and CERs are taken in account.

Scenario 2: Worst case is assumed that all CAPEX and OPEX costs are extremely high and the lowest in gas and CERs are used.

Base case scenario

Table 5.7: Parameter for Best case scenario

Parameter	Assumption
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ ton CO_2
- Compression cost	7.5 $/ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%
Crediting period (years)	10 years

Best case scenario

Table 5.8: Parameter for Best case scenario

Parameter	Assumption
CAPEX	10 million $
OPEX	
- Capture cost	1.5 $/ ton CO_2
- Compression cost	3.75 $/ton CO_2
- Transportation cost	2 $ / ton CO_2
- Storage cost	5 $ / ton CO_2
- Maintenance cost	6% of total OPEX costs
Gas price	12 $ /ton CO_2
CERs	22.5 € /ton CO_2
Discount rate	15%
Crediting period (years)	10 years

Worst case scenario

Table 5.9: Parameter for worst case scenario

Parameter	Assumption
CAPEX	30 million $
OPEX	
- Capture cost	4.5 $/ ton CO_2
- Compression cost	11.25 $/ton CO_2
- Transportation cost	12 $ / ton CO_2
- Storage cost	12 $ / ton CO_2
- Maintenance cost	10% of total OPEX costs
Gas price	5 $ /ton CO_2
CERs (US$/ ton CO_2)	10 € /ton CO_2
Discount rate	15%
Crediting period (years)	10 years

CHAPTER VI
RESULT AND DISCUSSION

6.1 Results of Economic analysis

The results of the economic analysis are presented as the net present value (NPV) (using an economic discounting rate of 15 percent in the base case) as well as the interest rate of return (IRR) expressed by using cash flow analysis including depreciations and taxes (Figure 6.1).

The two most-used measures for evaluating an investment are the NPV and IRR. It is often assumed that higher is better for both of the NPV and IRR. In particular, it is usually stated that investments with higher internal rates of return are more profitable that investment with lower internal rates.

Base case

Table 6.1: Economic analysis results, Base case

Parameter	Assumption
With CERs	
- NPV@15%	19,500,898
- IRR	28.6%
Without CERs	
- NPV@15%	-106,593,269

The results in NPV and IRR from base case indicate that the project is economically viable to use carbon capture and storage (CCS) as the project development to earn the profit from the CDM. The comparison between the project "with" and "without" the CO_2 credits or CERs expresses that without earning CERs the project will not economic by itself as the result becomes negative NPV. On the other hand, the project with CERs makes the project become economic which positive NPV and 28.6% of interest rate of return illustrate in the table 6.1.

Table 6.2: Economic analysis results for case study scenarios

Installing new platform	Distance for pipeline transportation (km)	NPV	IRR (%)
No	50 (base case)	19,500,898	28.6
	200	-58,845,980	-
	600	-321,081,616	-
Yes	50 (base case)	-107,939,018	-
	200	-186,285,897	-
	600	-448,521,532	-

Table 6.2 indicates the NPV of installing new platform comparing to using the same production facility board. The results of NPV indicate that the project is feasible only incase of using the same production facility platform.

Mathematically, IRR is defined as any discount rate that results in a net present value of zero of a series of cash flows. In addition, IRR of the project is determined as the x-axis intercept of the graph between NPV versus discount rate shown in Figure 6.1.

Table 6.3: Economic analysis results of different discount rate from 0-40%

Discount Rate	NPV
0	38,714,661
5	26,947,407
10	18,223,626
15	11,602,448
20	6,470,954
25	2,419,134
30	-833,960
35	-3,485,094
40	-5,674,850

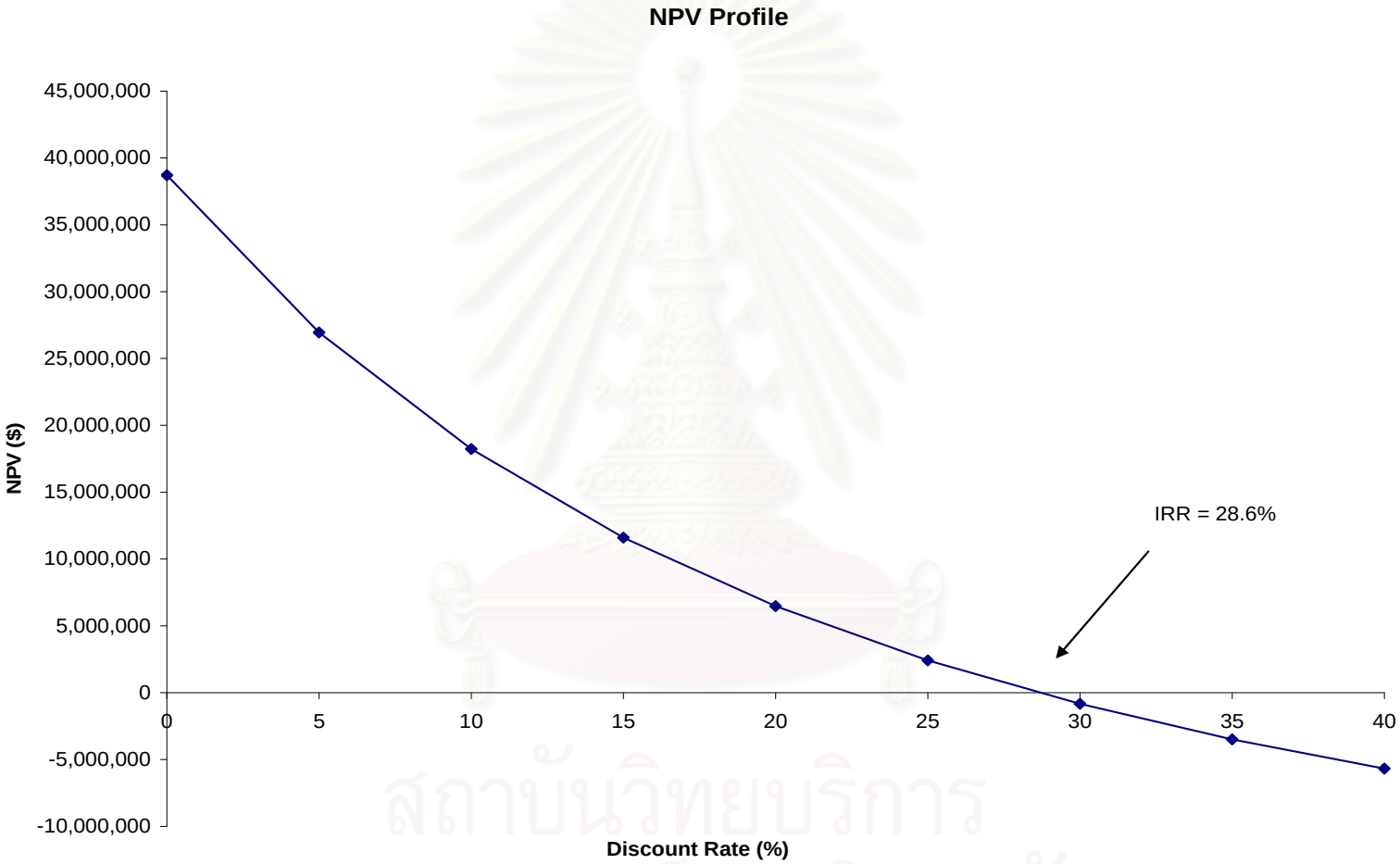

Figure 6.1: NVP Profile for the project

Table 6.4: Transportation via pipeline 50 km to the underground storage (base case)

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Investment assumptions		**4E+06**	**ton of CO_2 emission**											
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture			6,000,000	$	3.0	$/t								
Compression			3,000,000	$	7.5	$/t								
Transport			15,000,000	$	5.0	$/t								
Storage			1,000,000	$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY	12.5%			0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE														
CAPEX				25,000,000	0	0	0	0	0	0	0	0	0	0
OPEX					52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	5,291,185	10,259,320	11,706,890	12,883,714	11,532,999	10,903,689	8,559,948	3,959,413	1,525,716	806,448
Income tax	50%			0	2,645,592	5,129,660	5,853,445	6,441,857	5,766,499	5,451,844	4,279,974	1,979,707	762,858	403,224
NET INCOME AFTER TAX				0	2,645,592	5,129,660	5,853,445	6,441,857	5,766,499	5,451,844	4,279,974	1,979,707	762,858	403,224
NET CASH FLOW				-25,000,000	7,191,047	9,220,569	9,489,809	9,623,675	8,493,772	7,724,572	6,098,156	3,343,343	1,671,949	857,770
PRESENT VALUE @	15.0%		Discount rate	-25,000,000	6,253,084	6,972,075	6,239,703	5,502,368	4,222,906	3,339,545	6,098,156	3,343,343	1,671,949	857,770

Base case

	NPV	**IRR**
For 7 year	13,627,837	27.4%
For 10 year	19,500,898	28.6%

6.2 The result of sensitivity analysis

The above results depend on the correctness of a number of assumptions. In order to test the sensitivity of some key assumptions eight sensitivity tests have been carried out.

All investments are decreased and increased by 10 percentage points (vary from -30%, -20%, -10%, 10%, 20%, 30%) from base case assumption. This is particularly relevant since some of the investment estimates are based on the quotations of regional contractors which seem to be somewhat below world market prices.

- Changing in the CAPEX from 17.5-32.5 million US$
- Changing in the OPEX of Capture from 2.1-3.9 US$/ton CO_2
- Changing in the OPEX of Compression from 5.25-9.75 US$/ton CO_2
- Changing in the OPEX of Transportation from 3.5-6.5 US$/ton CO_2
- Changing in the OPEX of Storage from 5.95-11.05 US$/ton CO_2
- Changing in the OPEX of maintenances from 5.6-11.4 percent of total OPEX costs

All gas and CERs prices are decreased and increase by 10 percentage as same as all investment costs. The assumption of both prices follow the current market (January 2007).

- Changing in the gas price from 4.998-9.282 US$/Million BTU
- Changing in the CERs price from 10.745-19.955 Euro/ton CO_2

The results of the sensitivity analysis in 8 different parameters with NPV 10 years are shown in the table 6.2.1-6.2.8.

Base on base case:

6.2.1 Change in CAPEX costs

Table 6.5: Sensitivity analysis results for changing in CAPEX cost

Parameter	**Assumption**
CAPEX	-30 to 30% change in CAPEX costs
OPEX	
- Capture cost	3 $/ ton CO_2
- Compression cost	7.5 $/ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.6 indicates the sensitivity of NPV and IRR, the selected variable were submitted to parameters above (See table 6.5).

Table 6.6: Sensitivity analysis results of NPV and IRR for changing in CAPEX cost

Change in OPEX	CAPEX (Million US$)	10 years	
		NPV@15%	IRR
-30%	17.5	24,279,895	41.5%
-20%	20	22,686,896	36.3%
-10%	22.5	21,093,897	32.1%
0%	25	19,500,898	28.6%
10%	27.5	17,907,899	25.7%
20%	30	16,314,901	23.2%
30%	32.5	14,721,902	21.0%

An increase in CAPEX cost of the investment of 10 percent in all cases leads to a small reduction of the NPV and IRR the project remains economically viable for all cases. In contrast, decreasing in CAPEX cost have a slightly effect to the NPV and IRR in all case above.

6.1.2 Change in OPEX for capture costs.

Table 6.7: Sensitivity analysis results for changing in OPEX cost of capture

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	-30 to 30% change in capture costs
- Compression cost	7.5 $/ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.8: Economic analysis results of NPV and IRR
for changing in OPEX cost of capture

Change in OPEX	OPEX of capture (US$/ton CO_2)	10 years	
		NPV@15%	IRR
-30%	2.1	27,279,229	35.0%
-20%	2.4	24,686,452	32.9%
-10%	2.7	22,093,675	30.8%
0%	3	19,500,898	28.6%
10%	3.3	16,908,122	26.4%
20%	3.6	14,315,345	24.1%
30%	3.9	11,722,568	21.8%

Increasing in capture cost of the investment from 0-30% has the effect on a reduction of the NPV and IRR. From table 6.7, the project still remains economically until the changing in OPEX of capture cost 30% from 3 (base case) to 3.9 US$/ton CO_2, the smallest NPV show up with the value equal US$ 11,722,568. Even the NPV in this case is not negative but the value of IRR becomes less than the discount rate which makes the project become uneconomic immediately. The overall cases of changing in OPEX cost of capture are a little bit stronger than the changing in CAPEX cost when comparing both cases together.

6.1.3 Change in OPEX for compression cost

Table 6.9: Sensitivity analysis results for changing in OPEX cost of compression

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	-30 to 30% change in compression costs
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.10: Economic analysis results of NPV and IRR for changing in OPEX cost of compression

Change in OPEX	OPEX of compression (US$/ton CO_2)	10 years	
		NPV@15%	IRR
-30%	5.25	38,946,724	44.0%
-20%	6	32,464,782	39.1%
-10%	6.75	25,982,840	34.0%
0%	7.5	19,500,898	28.6%
10%	8.25	13,018,957	26.4%
20%	9	6,537,015	16.8%
30%	9.75	55,073	10.0%

Decreasing in compression cost of the investment from 0 to -30% by 10 percentages making the project more economic. In the opposite way, increasing in compression cost from 0 to 30% the project starts uneconomic (See table 6.9) even 10% changing in the compression cost from 7.5 to 8.25 US$/ton of CO_2. At the first 10% increase in cost, IRR of the project becomes lower than discount rate suddenly. The overall case of changing in OPEX cost of compression has a stronger effect than the previous when comparing all cases together.

6.1.4 Change in OPEX for transportation cost

Table 6.11: Sensitivity analysis results for changing in OPEX cost of transportation

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	7.5 $ / ton CO_2
- Transportation cost	-30 to 30% change in transportation costs
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.12 indicates the sensitivity of NPV and IRR, the selected variable were submitted to parameters above (See table 6.11).

Table 6.12: Economic analysis results of NPV and IRR for changing in OPEX cost of transportation

Change in OPEX	OPEX of transportation (US$/ton CO_2)	10 years	
		NPV@15%	IRR
-30%	3.5	32,464,782	39.1%
-20%	4	28,143,487	35.7%
-10%	4.5	23,822,193	32.2%
0%	5	19,500,898	28.6%
10%	5.5	15,179,604	24.9%
20%	6	10,858,309	21.0%
30%	6.5	6,537,015	16.8%

The effect of changing in OPEX of transportation is almost exactly the same as changing in OPEX of compression meaning that two parameters give almost the same results in NPV and IRR of the project. The OPEX cost of transportation can reduce incase of the distance of pipe change.

6.1.5 Change in OPEX for storage cost

Table 6.13: Sensitivity analysis results for changing in OPEX cost of storage

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	7.5 $ / ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	-30 to 30% change in storage costs
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.14 indicates the sensitivity of NPV and IRR, the selected variable were submitted to parameters above (See table 6.13).

Table 6.14: Economic analysis results of NPV and IRR for changing in OPEX cost of storage

Change in OPEX	OPEX of storage (US$/ton CO_2)	10 years	
		NPV@15%	IRR
-30%	5.59	41,539,500	45.9%
-20%	6.8	34,193,300	40.4%
-10%	7.65	26,847,099	34.7%
0%	8.5	19,500,898	28.6%
10%	9.35	12,154,698	22.2%
20%	10.2	4,808,497	15.1%
30%	11.05	-2,537,703	7.1%

When compare the OPEX cost of compression, transportation and storage, we found that the effect is almost exactly the same in three cases changing in OPEX cost meaning that three parameters give almost the same results in NPV and IRR of the project. The OPEX cost of capture can increase in case of increasing the size storage size.

6.1.6 Change Safety, Maintenance cost from 6%-12% of OPEX

Table 6.15: Sensitivity analysis results for changing in OPEX cost of maintenance cost

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	7.5 $ / ton CO_2
- Transportation cost	3 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	-30 to 30% change in Maintenance costs
Gas price	7.14 $ /ton CO_2
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.16: Economic analysis results of NPV and IRR for changing in OPEX cost of maintenance

Change in OPEX	OPEX cost of Maintenance (% of total OPEX cost)	10 years	
		NPV@15%	IRR
-30%	5.6	24,110,279	32.4%
-20%	6.4	22,573,819	31.2%
-10%	7.2	21,037,359	29.9%
0%	8	19,500,898	28.6%
10%	8.8	17,964,438	27.3%
20%	9.6	16,427,978	26.0%
30%	10.4	14,891,518	24.6%

Changing in OPEX of maintenance cost has a slightly effect to the project NPV and IRR. The overall of the project still remains the same even the cost of maintenance increases. The effect of maintenance cost is almost exactly the same as changing in CAPEX of the project meaning that two parameters give almost the same results in NPV and IRR of the project.

6.1.7 Change gas price

Table 6.17: Sensitivity analysis results for changing in gas price

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	7.5 $ / ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	-30 to 30% change in gas price
CERs	15.35 € /ton CO_2
Discount rate	15%

Table 6.18 indicates the sensitivity of NPV and IRR, the selected variable were submitted to parameters above (See table 6.18).

Table 6.19: Economic analysis results of NPV and IRR for changing in gas price

Change in Gas Price	Gas price (US$/million BTU)	10 years	
		NPV@15%	IRR
-30%	4.99	-15,657,581	-15.6%
-20%	5.71	-3,883,579	5.4%
-10%	6.43	7,890,424	18.2%
0%	7.14	19,500,898	28.6%
10%	7.85	31,111,373	38.0%
20%	8.57	42,885,375	46.9%
30%	9.28	54,495,850	55.2%

The reduction in gas price of 10% percent leads to a rapid reduction of the NPV and IRR of the project. In the opposite way, if the gas price keeps on increasing, the NPV and IRR of the project will become very low meaning that project will be not economically viable for CDM. Comparing to the investment cost, the cost of gas price has extremely effect to the whole NPV and IRR of the project in all cases above.

6.1.8 Change in CERs

Table 6.20: Sensitivity analysis results for changing in CERs

Parameter	**Assumption**
CAPEX	25 million $
OPEX	
- Capture cost	3 $/ton CO_2
- Compression cost	7.5 $ / ton CO_2
- Transportation cost	5 $ / ton CO_2
- Storage cost	8.5 $ / ton CO_2
- Maintenance cost	8% of total OPEX costs
Gas price	7.14 $ /ton CO_2
CERs (US$/ ton CO_2)	-30 to 30% change in CERs
Discount rate	15%

Table 6.21 indicates the sensitivity of NPV and IRR, the selected variable were submitted to parameters above (See table 6.20).

Table 6.21: Economic analysis results of NPV and IRR for changing in CERs

Change in CERs	CERs (€/ton CO_2)	10 years	
		NPV@15%	IRR
-30%	10.75	-18,286,279	-
-20%	12.28	-5,717,935	2.8%
-10%	13.82	6,932,555	17.1%
0%	15.35	19,500,898	28.6%
10%	16.88	32,069,242	38.9%
20%	18.42	44,719,732	48.6%
30%	19.95	57,288,076	57.6%

Consider in changing in CERs and gas price, the results from both cases have the extremely effect on the NPV and IRR of the project. It can be exemplified as follow: a rise of €/ton CO_2 from 15.35 to 16.88 in CERs can result in a NPV of about US$ 12 million higher from the base case. While the decrease in CERs of 0 to -30 percents leads to rapidly decrease in NPV and IRR.

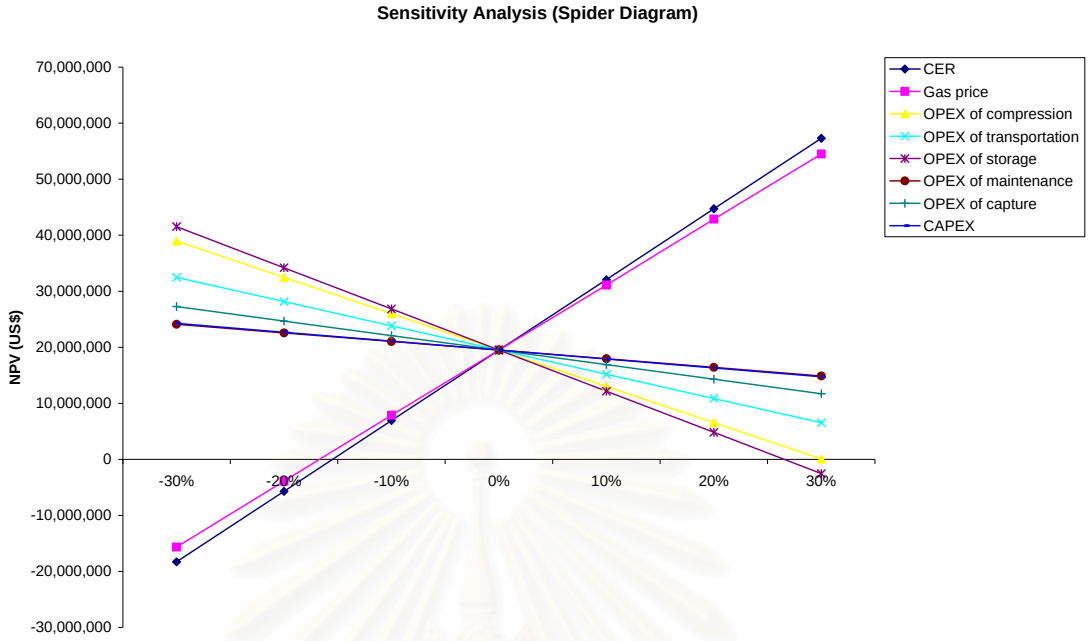

Figure 6.2: Spider Diagram for sensitivity analysis

Figure 6.2 indicates sensitivity analysis of NPV in relation to gas price, CAPEX and OPEX of capture, compression, transportation, storage and maintenance, as well as CO_2 credits (CERs). In this project, it can be noted that uncertainties in the gas prices and CERs play an important role in the project. However, in this hypothetical case, due to the limited range of values considered (i.e. for the base case value assumed), the values of CAPEX and OPEX of capture, compression, transportation, storage and maintenance are very small resulting in NPV relatively les sensitive to changes in these variables. Taking this into account, CAPEX and OPEX of capture, compression, transportation, storage and maintenance were isolated and submitted to an additional sensitivity analysis. From the figure 6.2 it also can be seen that OPEX of compression, transportation and storage are a significant parameter and a decrease in these parameters results in a decrease in the NPV.

6.3 Scenario analysis result

6.3.1 Best Scenario

Table 6.22: Scenario analysis results, Best case

Parameter	Assumption
CAPEX	10 million $
OPEX	
- Capture cost	1.5 $/ ton CO_2
- Compression cost	3.75 $/ton CO_2
- Transportation cost	2 $ / ton CO_2
- Storage cost	5 $ / ton CO_2
- Maintenance cost	6% of total OPEX costs
Gas price	12 $ /ton CO_2
CERs (US$/ ton CO_2)	22.5 € /ton CO_2
Discount rate	15%
Crediting period (years)	10 years
NPV@15%	261,858,040
IRR	189.6%

6.3.2 Worst Scenario

Table 6.23: Scenario analysis results, Worst case

Parameter	Assumption
CAPEX	30 million $
OPEX	
- Capture cost	4.5 $/ ton CO_2
- Compression cost	11.25 $/ton CO_2
- Transportation cost	12 $ / ton CO_2
- Storage cost	12 $ / ton CO_2
- Maintenance cost	10% of total OPEX costs
Gas price	5 $ /ton CO_2
CERs (US$/ ton CO_2)	10 € /ton CO_2
Discount rate	15%
Crediting period (years)	10 years
NPV@15%	-167,853,421
IRR	-

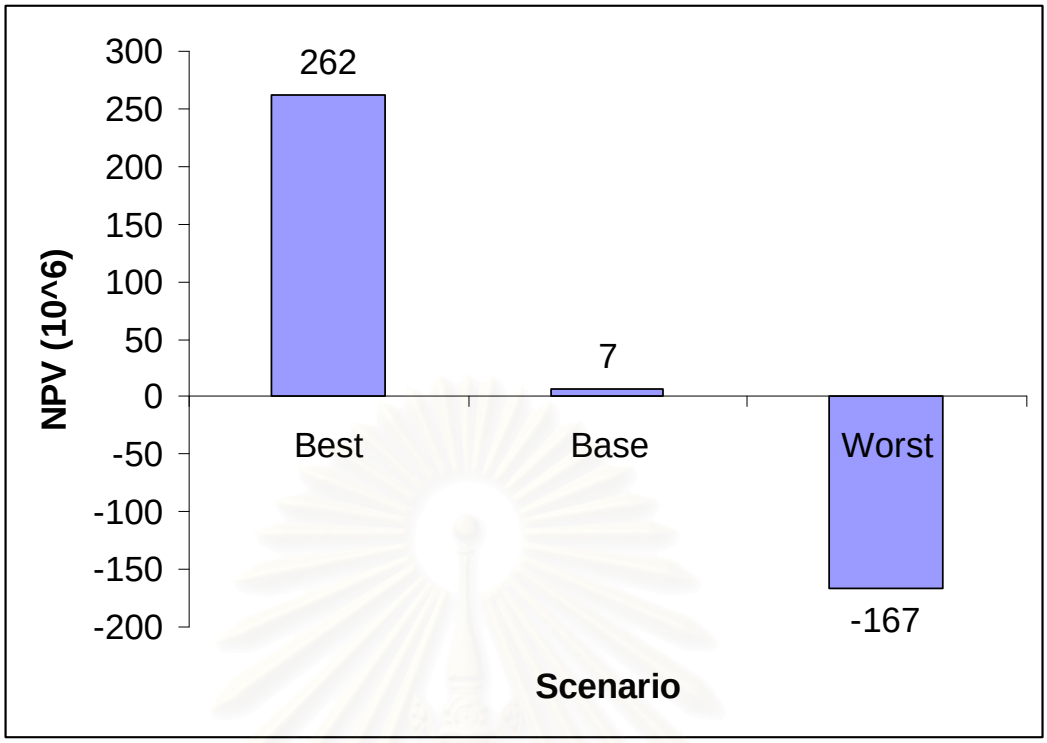

Figure 6.3: Scenario analysis result

The results from scenario analysis indicate two cases of the optimistic and pessimistic view. In the optimistic case is assumed that all gas price and CERs rise to the highest value about 12US$/ million BTU and 22.5€/ton CO_2 following the highest value in the assumption range. At the same time all investment costs become very low. From this case, we found the NPV of the project becomes very positive with IRR more than 100%. In this optimistic case, the project will become feasible for all kind which in fact this case will not be possible because of the variable of all market prices. Even in the worst case, all parameters are assumed to be opposite to the best case and the result becomes uneconomic immediately.

CHAPTER VII
CONCLUSION AND RECOMMENTATION

This chapter presents the conclusions of the parameters that can be evaluated using sensitivity analysis test under the assumption and data in particular scenarios as well as the recommendations for future works.

7.1 Conclusion

A large source of CO_2 emission in petroleum exploration and production industry exist in Thailand which might be suitable for CDM, are located in gulf of Thailand. In this study has been assessed and correlated to the CO_2 emission profile from the gas field in gulf of Thailand under the flaring gas recovery unit operation (FGRU). Base on assumptions which reflect “Business as Usual”, the total amount of CO_2 emitted from the FGRU is estimated to be some 2 million tonne CO_2 equivalent/year. More detailed studies have to be performed to select suitable CDM methodology and economic feasibility for CDM project.

The selected methodology considered the private costs (those costs incurred in doing business), emission related costs and market costs in sensitivity and scenario analysis. The valuation of these costs and benefits have been obtained from published studies, however the uncertainty surrounding such estimates have been accommodated by running the economic cash flow model with a range of sensitivities. The outputs of the economic cash flow model for sensitivity and scenario analysis are a range of NPV and IRR values compared with a base case. The projects are viable with a positive NPV to negative NPV as well as IRR at a selected discount rate (15%). Conclusions from this study include the following:

1 An investigation of some of the gas fields in Thailand revealed that only some of them could be applied for CDM project within a short period of time depending on production life of the field.

2 From the study, CO_2 capture and storage (CCS) contribute substantially to achieving the GHG reduction emission by selling carbon credits as the

alternative way to increase the possibility in CDM project for E&P industry in Thailand.

3 From the study, the project itself cannot achieve in GHG reduction emission without CDM. The outcome of the project is very dependant on the assumptions made for CAPEX, OPEX, the discount rate, CERs, and gas price.

4 The project will not possible for investment if new building CCS platform is required as well as long distance of pipeline for transporting CO_2 to the storage will make the project not worth to invest.

5 The outputs of sensitivity reveal that both carbon credit and gas price have extremely influent to the possibility of the project while other investment cost can be considered small, not having a great effect on NPV. However, high values for investment costs would have a significant impact in CCS project. E&P industry can gain good returns in CDM project if the values of credits increase substantially.

6 In addition, The NPV and IRR from the base case are proved that the project is suitable for carbon capture and storage in term of CDM. Results from the project cash flow showed that the NPV is around US$ 19.5 million and IRR around 28.6% when comparing to the project without carbon credits which showed negative NPV around US$ -106 million. Moreover the project will reduce approximately 18 million tonne of CO_2 equivalent that normally would be emitted into the atmosphere. Moreover the CDM project can be economically viable if costs of CO_2 can be reduced and carbon credits increased.

7 From all results indicate that Thailand has potential for CDM project and economic attractiveness in exploration and production industry.

7.2 Recommendations

As a recommendation for further study on this subject

1 In this study, the specific emission reduction may not be applicable to all locations, and potential emission reduction will vary for each situation. Emission reductions require examining emissions from specific sources for the

purpose of quantifying emission before and after a reduction project have been implemented.

2 Calculating emission reductions associated with production life of the reservoir and the energy uses in the process requires a project-by project evaluation. The selection of an appropriate methodology depends on location-specific conditions, how the emissions will be used, any associated reporting specifications, and requirements of the host country and the buyer of emission reductions in the carbon market. In this manner, the accuracy of the estimated will be improved in accordance with the amount of input information.

3 For further study, recommends for onshore CDM project in case of reduction of CO_2 from sale gas that produce from the gas field in this CDM study.

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APPENDICES

APPENDIX A

A.1 Estimate of GHG emission by sources:

GHG emissions from the project are due to fuel consumption by CO2 capture and compression process such the gas turbines (for gas compression) and CO2 capture equipment. The project emission in this project is calculated by using the same assumption following NM0068 methodology.

CO_2 emission from fuel consumption ($CO2\_PF_y$):

$CO2\_PF_y = (F_{GT\,y} + F_{DH\,y}) \times CN\_F_y / MW\_F_y \times 44$ [t-CO_2/y]

Fuel consumption in the facility will be approximately 16.0 t-Fuel/hr of fuel gas for the three trains based on the estimation made in the preliminary feasibility study.

	Per one train	Facility total (Three trains)
$F_{GT\,y}$: Gas turbine (Power source for compressors for injection)	5,280 kg-Fuel/hr	Assume using only one train
$F_{MC\,y}$: CO2 removal (membrane clusters)	56 kg-Fuel/hr	
Total	5,336 kg-Fuel/hr	5,336 kg-Fuel/hr

Parameters:

- Based on the typical composition of the fuel gas used for equipment in the complex, the molecular weight and carbon number are set below:
  - Molecular weight of fuel gas (MW_F_y): 17.1 [g-Fuel/mol-Fuel]
  - Carbon number of fuel gas (CN_F_y): 1.03 [mol-C/mol-Fuel]
- Assumed operating hours per year are 8,280 [hr/y] (345 days × 24 hr/day).

CO_2 emissions from fuel consumption are as calculated below:

5336 kg-Fuel/hr × 8,280 hr/y × (1.03 / 17.1)× 44 = 117×10^3 [t-CO_2/y]

CO_2 emission from electricity consumption ($CO2\_PE_y$):

$CO2\_PE_y = E_{EQ\,y} \times CEF_y$

Electricity consumption in the facility will be approximately 303 kWh/hr for one trains based on estimates made in the preliminary feasibility study.

Parameters:

- Based on the typical data for a power generation facility of simple cycle gas turbine using natural gas, the carbon emission factor is set below[14]:

  - Carbon emission factor of electricity in the LNG complex (CEF_y) : 0.644×10^{-3} [t-CO_2/kWh]

  CO_2 emission from electricity consumption is as calculated below:

  $303 \times 8{,}280 \times 0.644 \times 10^{-3} = 1.617 \times 10^{3}$ [t-CO_2/y]

CO_2 escape from the pipeline and injection well ($CO2\_ESCPI_y$):

CO_2 escape from the pipeline and the injection wells will be considered to be negligible, since the pipeline and the injection wells are assumed to have been appropriately installed and to have started operation only after testing and commissioning. In the event that there is any escape, it will be categorized as the project emissions.

CO_2 escape from the reservoir ($CO2\_ESCRE_y$):

CO_2 escape will be considered to be negligible, since the reservoir will be selected appropriately as defined in the applicability conditions of the methodology. In the event that there is any escape, it will be categorized as the project emissions.

Thus, the Project emissions (*CO2_PRJ*) can be calculated as below.

$CO2\_PRJ_y = CO2\_PF_y + CO2\_PE_y + CO2\_ESCPI_y + CO2\_ESCRES_y$ [t-CO_2/y]

$= 117 \times 10^{3} + 1.617 \times 10^{3} + 0 + 0$ [t-CO_2/y]

$$= 119 \times 10^{3} \quad [\text{t-}CO_2/y]$$

The parameters, MW_F_y, CN_F_y, $E_{EQ\,y}$, CEF_y, will be monitored during the project for actual calculation.

A.2 Estimated leakage

There are no potential sources of leakages.

A.3 The sum of A.1 and A.2 representing the project activity emission

$$A3 = A1 + A2 = 119 \times 10^{3} + 0 = 119 \times 10^{3} \quad [\text{t-}CO_2/y]$$

A.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

Baseline GHG emissions ($CO2\_BASE_y$) can be expressed as below:

$$CO2\_BASE_y = CO2\_INJ_y + CO2\_INC_y \quad [\text{t-}CO_2/y]$$

CO_2 emissions from acid gas removal facility ($CO2\_INJ_y$):

In the baseline scenario, CO_2 emissions from the acid gas removal facility are equal to the amount of CO_2 injected by the project. The CO_2 injection quantity ($CO2\_INJ_y$) can be calculated by the equation below.

$$CO2\_INJ_y = Q_{ACID\,y} \times C_{CO2\,y} \quad [\text{t-}CO_2/y]$$

where $Q_{ACID\,y}$ is the amount of the injected acid gas and will be directly measured by a flow meter at the inlet of the pipeline, and $C_{O2\,y}$ is the weight fraction of CO_2 in the acid gas and will be directly measured by a component analyzer at the inlet of the pipeline.

Parameters:

- The amount of the injected emitted is assumed to be 2,187,701 [t-emitted/hr] based on data estimated in the preliminary feasibility study.

- Typical composition of the injected acid gas after compression and dehydration is estimated in the preliminary feasibility study as below. Thus, the weight fraction of CO_2 in the emitted gas is set as 0.8560 [g-CO2/g-emitted Gas].

- Other components of the CO_2-rich gas (including CH_4) are not counted as GHG for reasons of conservativeness.

  $2{,}187{,}701 \times 0.8560 = 1{,}872 \times 10^3$ [t-CO_2/y]

Estimated composition of emitted gas

	Component (wt%)
CO_2	85.595
CH_4	10.369
VOC	3.756
other	0.28
Total	100

Thus, the baseline emissions ($CO2\_BASE_y$) are as calculated below.

$CO2\_BASE_y = CO2\_INJ_y$ [t-CO_2/y]

$= 1{,}872 \times 10^3$ [t-CO_2/y]

A.5 Difference between A.4 and A.3 representing the emission reductions of the project activity:

$A5 = A4 - A3$

$= 1{,}872 \times 10^3 - 119 \times 10^3$ [t-CO_2/y]

$= 1{,}753 \times 10^3$ [t-CO_2/y]

APPENDIX B

The case flows of the project are expressed in the appendix

Table B.1: -30% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	17,500,000	$	24.0	$/t

Change in CAPEX to 17.5 million $

	NPV	**IRR**
For 7 year	18,815,925	40.6%
For 10 year	24,279,895	41.5%

Gas price 7.14 million BTU

REVENUES OF CER SALES	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)	0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs	0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)	0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale	0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL REVENUES	**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY 12.5%	0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET REVENUES	0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE											
CAPEX	17,500,000	0	0	0	0	0	0	0	0	0	0
OPEX		52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs 8.0% of operating cost		4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL DIRECT OPEX COSTS	0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION (SOYD) Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation 17,500,000	0	3,181,818	2,863,636	2,545,455	2,227,273	1,909,091	1,590,909	1,272,727	954,545	636,364	318,182
NET INCOME BEFORE TAX	0	6,654,821	11,486,592	12,797,799	13,838,260	12,351,180	11,585,507	9,105,403	4,368,504	1,798,443	942,812
Income tax 50%	0	3,327,411	5,743,296	6,398,899	6,919,130	6,175,590	5,792,753	4,552,701	2,184,252	899,221	471,406
NET INCOME AFTER TAX	0	3,327,411	5,743,296	6,398,899	6,919,130	6,175,590	5,792,753	4,552,701	2,184,252	899,221	471,406
NET CASH FLOW	-17,500,000	6,509,229	8,606,933	8,944,354	9,146,403	8,084,681	7,383,663	5,825,429	3,138,798	1,535,585	789,588
PRESENT VALUE @ 15.0% Discount rate	-17,500,000	5,660,199	6,508,078	5,881,058	5,229,485	4,019,515	3,192,161	5,825,429	3,138,798	1,535,585	789,588

Table B.2: -20% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CAPEX to 20 million $**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	17,086,562	35.3%				
Compression				$	7.5	$/t		**For 10 year**	22,686,896	36.3%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			20,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

REVENUES OF CER SALES			**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)			0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs			0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)			0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale			0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**		**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%	0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**		0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX		20,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX			52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost		4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS		0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			20,000,000	0	3,636,364	3,272,727	2,909,091	2,545,455	2,181,818	1,818,182	1,454,545	1,090,909	727,273	363,636
NET INCOME BEFORE TAX				0	6,200,276	11,077,501	12,434,162	13,520,078	12,078,453	11,358,234	8,923,585	4,232,141	1,707,534	897,357
Income tax		50%		0	3,100,138	5,538,751	6,217,081	6,760,039	6,039,227	5,679,117	4,461,792	2,116,070	853,767	448,679
NET INCOME AFTER TAX				0	3,100,138	5,538,751	6,217,081	6,760,039	6,039,227	5,679,117	4,461,792	2,116,070	853,767	448,679
NET CASH FLOW			-20,000,000	6,736,501	8,811,478	9,126,172	9,305,494	8,221,045	7,497,299	5,916,338	3,206,979	1,581,040	812,315
PRESENT VALUE @		15.0%	Discount rate	-20,000,000	5,857,827	6,662,743	6,000,606	5,320,446	4,087,312	3,241,289	5,916,338	3,206,979	1,581,040	812,315

Table B.3: -10% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CAPEX to 22.5 million $**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	15,357,200	31.0%				
Compression				$	7.5	$/t		**For 10 year**	21,093,897	32.1%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			22,500,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX		22,500,000	0	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			22,500,000	0	4,090,909	3,681,818	3,272,727	2,863,636	2,454,545	2,045,455	1,636,364	1,227,273	818,182	409,091
NET INCOME BEFORE TAX				0	5,745,730	10,668,411	12,070,526	13,201,896	11,805,726	11,130,961	8,741,767	4,095,777	1,616,625	851,903
Income tax		50%		0	2,872,865	5,334,205	6,035,263	6,600,948	5,902,863	5,565,481	4,370,883	2,047,888	808,312	425,951
NET INCOME AFTER TAX				0	2,872,865	5,334,205	6,035,263	6,600,948	5,902,863	5,565,481	4,370,883	2,047,888	808,312	425,951
NET CASH FLOW				-22,500,000	6,963,774	9,016,023	9,307,990	9,464,584	8,357,408	7,610,935	6,007,247	3,275,161	1,626,494	835,042
PRESENT VALUE @		15.0%	Discount rate	-22,500,000	6,055,456	6,817,409	6,120,155	5,411,407	4,155,109	3,290,417	6,007,247	3,275,161	1,626,494	835,042

Table B.4: 10% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CAPEX to 17.5 million $**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	11,898,475	24.4%				
Compression				$	7.5	$/t		**For 10 year**	17,907,899	25.7%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			27,500,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			27,500,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			27,500,000	0	5,000,000	4,500,000	4,000,000	3,500,000	3,000,000	2,500,000	2,000,000	1,500,000	1,000,000	500,000
NET INCOME BEFORE TAX				0	4,836,639	9,850,229	11,343,253	12,565,533	11,260,271	10,676,416	8,378,130	3,823,050	1,434,806	760,994
Income tax		50%		0	2,418,320	4,925,114	5,671,627	6,282,766	5,630,136	5,338,208	4,189,065	1,911,525	717,403	380,497
NET INCOME AFTER TAX				0	2,418,320	4,925,114	5,671,627	6,282,766	5,630,136	5,338,208	4,189,065	1,911,525	717,403	380,497
NET CASH FLOW				-27,500,000	7,418,320	9,425,114	9,671,627	9,782,766	8,630,136	7,838,208	6,189,065	3,411,525	1,717,403	880,497
PRESENT VALUE @		15.0%	Discount rate	-27,500,000	6,450,713	7,126,741	6,359,252	5,593,328	4,290,703	3,388,674	6,189,065	3,411,525	1,717,403	880,497

Table B.5: 20% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CAPEX to 30 million $**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	10,169,112	21.8%				
Compression				$	7.5	$/t		**For 10 year**	16,314,901	23.2%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			30,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			30,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			30,000,000	0	5,454,545	4,909,091	4,363,636	3,818,182	3,272,727	2,727,273	2,181,818	1,636,364	1,090,909	545,455
NET INCOME BEFORE TAX				0	4,382,094	9,441,138	10,979,617	12,247,351	10,987,544	10,449,143	8,196,312	3,686,686	1,343,897	715,539
Income tax		50%		0	2,191,047	4,720,569	5,489,809	6,123,675	5,493,772	5,224,572	4,098,156	1,843,343	671,949	357,770
NET INCOME AFTER TAX				0	2,191,047	4,720,569	5,489,809	6,123,675	5,493,772	5,224,572	4,098,156	1,843,343	671,949	357,770
NET CASH FLOW				-30,000,000	7,645,592	9,629,660	9,853,445	9,941,857	8,766,499	7,951,844	6,279,974	3,479,707	1,762,858	903,224
PRESENT VALUE @		15.0%	Discount rate	-30,000,000	6,648,341	7,281,406	6,478,800	5,684,289	4,358,500	3,437,802	6,279,974	3,479,707	1,762,858	903,224

Table B.6: 30% change in CAPEX

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			32,500,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in CAPEX to 32.5 million $		
	NPV	**IRR**
For 7 year	8,439,749	19.6%
For 10 year	14,721,902	21.0%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			32,500,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			32,500,000	0	5,909,091	5,318,182	4,727,273	4,136,364	3,545,455	2,954,545	2,363,636	1,772,727	1,181,818	590,909
NET INCOME BEFORE TAX				0	3,927,548	9,032,047	10,615,981	11,929,169	10,714,817	10,221,871	8,014,494	3,550,322	1,252,988	670,085
Income tax		50%		0	1,963,774	4,516,023	5,307,990	5,964,584	5,357,408	5,110,935	4,007,247	1,775,161	626,494	335,042
NET INCOME AFTER TAX				0	1,963,774	4,516,023	5,307,990	5,964,584	5,357,408	5,110,935	4,007,247	1,775,161	626,494	335,042
NET CASH FLOW				-32,500,000	7,872,865	9,834,205	10,035,263	10,100,948	8,902,863	8,065,481	6,370,883	3,547,888	1,808,312	925,951
PRESENT VALUE @		15.0%	Discount rate	-32,500,000	6,845,970	7,436,072	6,598,348	5,775,250	4,426,296	3,486,930	6,370,883	3,547,888	1,808,312	925,951

Table B.7: -30% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	2.1	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.1	$/t								
Gas price	7.14	million BTU												

Change in OPEX of capture to 2.1 $/ton of CO2	**NPV**	**IRR**
For 7 year	20,004,311	34.0%
For 10 year	27,279,229	35.0%

REVENUES OF CER SALES			**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)			0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs			0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)			0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale			0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**		**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%	0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**		0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX		25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX			50,535,887	69,253,688	73,371,749	76,367,031	68,880,635	64,385,901	52,781,444	31,818,087	19,840,578	14,972,791
Maintenance Costs	8.0%	of operating cost		4,042,871	5,540,295	5,869,740	6,109,362	5,510,451	5,150,872	4,222,516	2,545,447	1,587,246	1,197,823
TOTAL	DIRECT OPEX COSTS		0	54,578,758	74,793,983	79,241,488	82,476,394	74,391,086	69,536,773	57,003,959	34,363,534	21,427,825	16,170,615
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	7,417,630	13,173,371	14,794,220	16,097,080	14,431,353	13,612,914	10,780,882	5,298,252	2,360,566	1,436,472
Income tax		50%		0	3,708,815	6,586,685	7,397,110	8,048,540	7,215,676	6,806,457	5,390,441	2,649,126	1,180,283	718,236
NET INCOME AFTER TAX				0	3,708,815	6,586,685	7,397,110	8,048,540	7,215,676	6,806,457	5,390,441	2,649,126	1,180,283	718,236
NET CASH FLOW			25,000,000	-8,254,269	10,677,595	11,033,474	11,230,358	9,942,949	9,079,184	7,208,623	4,012,763	2,089,374	1,172,782
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-7,177,626	8,073,796	7,254,688	6,420,994	4,943,403	3,925,182	7,208,623	4,012,763	2,089,374	1,172,782

Table B.8: -20% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	2.4	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.4	$/t								
Gas price	7.14	million BTU												

Change in OPEX of capture to 2.4 $/ton of CO2	**NPV**	**IRR**
For 7 year	17,878,819	31.8%
For 10 year	24,686,452	32.9%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				51,192,198	70,153,086	74,324,628	77,358,811	69,775,189	65,222,081	53,466,917	32,231,309	20,098,248	15,167,243
Maintenance Costs	8.0%	of operating cost			4,095,376	5,612,247	5,945,970	6,188,705	5,582,015	5,217,766	4,277,353	2,578,505	1,607,860	1,213,379
TOTAL	DIRECT OPEX COSTS			0	55,287,573	75,765,333	80,270,599	83,547,516	75,357,204	70,439,848	57,744,271	34,809,814	21,706,108	16,380,623
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	6,708,815	12,202,021	13,765,110	15,025,958	13,465,235	12,709,839	10,040,571	4,851,973	2,082,282	1,226,464
Income tax		50%		0	3,354,407	6,101,010	6,882,555	7,512,979	6,732,617	6,354,919	5,020,285	2,425,986	1,041,141	613,232
NET INCOME AFTER TAX				0	3,354,407	6,101,010	6,882,555	7,512,979	6,732,617	6,354,919	5,020,285	2,425,986	1,041,141	613,232
NET CASH FLOW				-25,000,000	7,899,862	10,191,919	10,518,919	10,694,797	9,459,890	8,627,647	6,838,467	3,789,623	1,950,232	1,067,778
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,869,445	7,706,555	6,916,360	6,114,785	4,703,237	3,729,970	6,838,467	3,789,623	1,950,232	1,067,778

Table B.9: -10% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in OPEX of capture to 2.7 $/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	2.7	$/t		**For 7 year**	15,753,328	29.7%				
Compression				$	7.5	$/t		**For 10 year**	22,093,675	30.8%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.7	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				51,848,508	71,052,485	75,277,508	78,350,590	70,669,743	66,058,262	54,152,391	32,644,531	20,355,918	15,361,695
Maintenance Costs	8.0%	of operating cost			4,147,881	5,684,199	6,022,201	6,268,047	5,653,579	5,284,661	4,332,191	2,611,562	1,628,473	1,228,936
TOTAL	DIRECT OPEX COSTS			0	55,996,389	76,736,683	81,299,709	84,618,638	76,323,322	71,342,923	58,484,582	35,256,094	21,984,392	16,590,631
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	6,000,000	11,230,670	12,736,000	13,954,836	12,499,117	11,806,764	9,300,260	4,405,693	1,803,999	1,016,456
Income tax		50%		0	3,000,000	5,615,335	6,368,000	6,977,418	6,249,558	5,903,382	4,650,130	2,202,846	902,000	508,228
NET INCOME AFTER TAX				0	3,000,000	5,615,335	6,368,000	6,977,418	6,249,558	5,903,382	4,650,130	2,202,846	902,000	508,228
NET CASH FLOW				-25,000,000	7,545,454	9,706,244	10,004,364	10,159,236	8,976,831	8,176,109	6,468,312	3,566,483	1,811,090	962,774
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,561,265	7,339,315	6,578,031	5,808,576	4,463,072	3,534,758	6,468,312	3,566,483	1,811,090	962,774

Table B.10: 10% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.3	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	24.3	$/t
Gas price	7.14	million BTU		

Change in OPEX of capture to 3.3 $/ton of CO2

	NPV	**IRR**
For 7 year	11,502,346	25.2%
For 10 year	16,908,122	26.4%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				53,161,128	72,851,282	77,183,268	80,334,150	72,458,850	67,730,623	55,523,337	33,470,975	20,871,258	15,750,599
Maintenance Costs	8.0%	of operating cost			4,252,890	5,828,103	6,174,661	6,426,732	5,796,708	5,418,450	4,441,867	2,677,678	1,669,701	1,260,048
TOTAL	DIRECT OPEX COSTS			0	57,414,019	78,679,384	83,357,929	86,760,882	78,255,558	73,149,072	59,965,204	36,148,653	22,540,958	17,010,647
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	4,582,370	9,287,969	10,677,780	11,812,592	10,566,881	10,000,614	7,819,637	3,513,134	1,247,432	596,440
Income tax		50%		0	2,291,185	4,643,985	5,338,890	5,906,296	5,283,440	5,000,307	3,909,819	1,756,567	623,716	298,220
NET INCOME AFTER TAX				0	2,291,185	4,643,985	5,338,890	5,906,296	5,283,440	5,000,307	3,909,819	1,756,567	623,716	298,220
NET CASH FLOW				-25,000,000	6,836,639	8,734,894	8,975,253	9,088,114	8,010,713	7,273,034	5,728,000	3,120,203	1,532,807	752,766
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,944,904	6,604,835	5,901,375	5,196,159	3,982,740	3,144,333	5,728,000	3,120,203	1,532,807	752,766

Table B.11: 20% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.6	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	24.6	$/t

Change in OPEX of capture to 3.6 $/ton of CO2

	NPV	**IRR**
For 7 year	9,376,855	22.9%
For 10 year	14,315,345	24.1%

Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				53,817,439	73,750,680	78,136,148	81,325,929	73,353,404	68,566,803	56,208,810	33,884,197	21,128,928	15,945,051
Maintenance Costs	8.0%	of operating cost			4,305,395	5,900,054	6,250,892	6,506,074	5,868,272	5,485,344	4,496,705	2,710,736	1,690,314	1,275,604
TOTAL	DIRECT OPEX COSTS			0	58,122,834	79,650,735	84,387,040	87,832,004	79,221,676	74,052,147	60,705,515	36,594,933	22,819,242	17,220,655
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	3,873,555	8,316,619	9,648,669	10,741,470	9,600,763	9,097,539	7,079,326	3,066,854	969,149	386,432
Income tax		50%		0	1,936,777	4,158,309	4,824,335	5,370,735	4,800,381	4,548,769	3,539,663	1,533,427	484,574	193,216
NET INCOME AFTER TAX				0	1,936,777	4,158,309	4,824,335	5,370,735	4,800,381	4,548,769	3,539,663	1,533,427	484,574	193,216
NET CASH FLOW				-25,000,000	6,482,232	8,249,218	8,460,698	8,552,553	7,527,654	6,821,497	5,357,845	2,897,063	1,393,665	647,762
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,636,723	6,237,594	5,563,046	4,889,950	3,742,574	2,949,121	5,357,845	2,897,063	1,393,665	647,762

Table B.12: 30% changes in OPEX cost of capture

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in OPEX of capture to 3.9 $/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.9	$/t		**For 7 year**	7,251,364	20.5%				
Compression				$	7.5	$/t		**For 10 year**	11,722,568	21.8%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.9	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				54,473,749	74,650,079	79,089,028	82,317,709	74,247,958	69,402,984	56,894,284	34,297,419	21,386,598	16,139,502
Maintenance Costs	8.0%	of operating cost			4,357,900	5,972,006	6,327,122	6,585,417	5,939,837	5,552,239	4,551,543	2,743,793	1,710,928	1,291,160
TOTAL	DIRECT OPEX COSTS			0	58,831,649	80,622,085	85,416,150	88,903,126	80,187,794	74,955,222	61,445,826	37,041,212	23,097,525	17,430,663
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	3,164,740	7,345,268	8,619,559	9,670,348	8,634,645	8,194,464	6,339,015	2,620,574	690,865	176,424
Income tax		50%		0	1,582,370	3,672,634	4,309,780	4,835,174	4,317,322	4,097,232	3,169,507	1,310,287	345,433	88,212
NET INCOME AFTER TAX				0	1,582,370	3,672,634	4,309,780	4,835,174	4,317,322	4,097,232	3,169,507	1,310,287	345,433	88,212
NET CASH FLOW				-25,000,000	6,127,824	7,763,543	7,946,143	8,016,992	7,044,595	6,369,959	4,987,689	2,673,924	1,254,524	542,758
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,328,543	5,870,354	5,224,718	4,583,741	3,502,409	2,753,909	4,987,689	2,673,924	1,254,524	542,758

Table B.13: -30% changes in OPEX cost of compression

Main Assumptions	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)		2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	5.3	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	21.8	$/t
Gas price 7.14 million BTU				

Change in OPEX of compression to 5.25 $/ton of CO2

	NPV	**IRR**
For 7 year	29,569,021	43.1%
For 10 year	38,946,724	44.0%

REVENUES OF CER SALES	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)	0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs	0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)	0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale	0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL REVENUES	**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY 12.5%	0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET REVENUES	0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE CAPEX	25,000,000	0	0	0	0	0	0	0	0	0	0
OPEX		47,582,491	65,206,394	69,083,789	71,904,023	64,855,144	60,623,088	49,696,814	29,958,589	18,681,064	14,097,758
Maintenance Costs 8.0% of operating cost		3,806,599	5,216,512	5,526,703	5,752,322	5,188,412	4,849,847	3,975,745	2,396,687	1,494,485	1,127,821
TOTAL DIRECT OPEX COSTS	0	51,389,091	70,422,906	74,610,492	77,656,345	70,043,555	65,472,935	53,672,559	32,355,276	20,175,549	15,225,579
DEPRECIATION (SOYD) Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation 25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX	0	10,607,297	17,544,448	19,425,217	20,917,129	18,778,884	17,676,751	14,112,282	7,306,511	3,612,841	2,381,508
Income tax 50%	0	5,303,649	8,772,224	9,712,608	10,458,565	9,389,442	8,838,375	7,056,141	3,653,255	1,806,421	1,190,754
NET INCOME AFTER TAX	0	5,303,649	8,772,224	9,712,608	10,458,565	9,389,442	8,838,375	7,056,141	3,653,255	1,806,421	1,190,754
NET CASH FLOW	-25,000,000	9,849,103	12,863,133	13,348,972	13,640,383	12,116,715	11,111,103	8,874,323	5,016,892	2,715,512	1,645,300
PRESENT VALUE @ 15.0% Discount rate	-25,000,000	8,564,438	9,726,377	8,777,166	7,798,933	6,024,149	4,803,636	8,874,323	5,016,892	2,715,512	1,645,300

Table B.14: -20% changes in OPEX cost of compression

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in OPEX of compression to 6 $/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	24,255,293	38.1%				
Compression				$	6.0	$/t		**For 10 year**	32,464,782	39.1%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	22.5	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				49,223,267	67,454,891	71,465,989	74,383,472	67,091,528	62,713,540	51,410,497	30,991,643	19,325,239	14,583,888
Maintenance Costs	8.0%	of operating cost			3,937,861	5,396,391	5,717,279	5,950,678	5,367,322	5,017,083	4,112,840	2,479,331	1,546,019	1,166,711
TOTAL	DIRECT OPEX COSTS			0	53,161,128	72,851,282	77,183,268	80,334,150	72,458,850	67,730,623	55,523,337	33,470,975	20,871,258	15,750,599
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	8,835,260	15,116,072	16,852,441	18,239,324	16,363,589	15,419,064	12,261,504	6,190,812	2,917,133	1,856,488
Income tax		50%		0	4,417,630	7,558,036	8,426,220	9,119,662	8,181,794	7,709,532	6,130,752	3,095,406	1,458,566	928,244
NET INCOME AFTER TAX				0	4,417,630	7,558,036	8,426,220	9,119,662	8,181,794	7,709,532	6,130,752	3,095,406	1,458,566	928,244
NET CASH FLOW				-25,000,000	8,963,084	11,648,945	12,062,584	12,301,480	10,909,067	9,982,259	7,948,934	4,459,042	2,367,657	1,382,790
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,793,987	8,808,276	7,931,345	7,033,411	5,423,734	4,315,606	7,948,934	4,459,042	2,367,657	1,382,790

Table B.15: -10% changes in OPEX cost of compression

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	6.8	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.3	$/t								
Gas price	7.14	million BTU												

Change in OPEX of compression to 6.75 $/ton of CO2

	NPV	**IRR**
For 7 year	18,941,565	32.9%
For 10 year	25,982,840	34.0%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				50,864,043	69,703,387	73,848,188	76,862,921	69,327,912	64,803,991	53,124,181	32,024,698	19,969,413	15,070,017
Maintenance Costs	8.0%	of operating cost			4,069,123	5,576,271	5,907,855	6,149,034	5,546,233	5,184,319	4,249,934	2,561,976	1,597,553	1,205,601
TOTAL	DIRECT OPEX COSTS			0	54,933,166	75,279,658	79,756,044	83,011,955	74,874,145	69,988,310	57,374,115	34,586,674	21,566,966	16,275,619
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	7,063,222	12,687,696	14,279,665	15,561,519	13,948,294	13,161,376	10,410,726	5,075,112	2,221,424	1,331,468
Income tax		50%		0	3,531,611	6,343,848	7,139,833	7,780,760	6,974,147	6,580,688	5,205,363	2,537,556	1,110,712	665,734
NET INCOME AFTER TAX				0	3,531,611	6,343,848	7,139,833	7,780,760	6,974,147	6,580,688	5,205,363	2,537,556	1,110,712	665,734
NET CASH FLOW				-25,000,000	8,077,066	10,434,757	10,776,196	10,962,578	9,701,420	8,853,415	7,023,545	3,901,193	2,019,803	1,120,280
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,023,535	7,890,175	7,085,524	6,267,889	4,823,320	3,827,576	7,023,545	3,901,193	2,019,803	1,120,280

Table B.16: 10% changes in OPEX cost of compression

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	8.3	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.8	$/t								
Gas price	7.14	million BTU												

Change in OPEX of compression to 8.25 $/ton of CO2

	NPV	**IRR**
For 7 year	8,314,109	21.7%
For 10 year	13,018,957	22.9%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				54,145,594	74,200,380	78,612,588	81,821,819	73,800,681	68,984,893	56,551,547	34,090,808	21,257,763	16,042,277
Maintenance Costs	8.0%	of operating cost			4,331,647	5,936,030	6,289,007	6,545,746	5,904,054	5,518,791	4,524,124	2,727,265	1,700,621	1,283,382
TOTAL	DIRECT OPEX COSTS			0	58,477,241	80,136,410	84,901,595	88,367,565	79,704,735	74,503,685	61,075,671	36,818,072	22,958,384	17,325,659
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	3,519,147	7,830,944	9,134,114	10,205,909	9,117,704	8,646,001	6,709,170	2,843,714	830,007	281,428
Income tax		50%		0	1,759,574	3,915,472	4,567,057	5,102,955	4,558,852	4,323,001	3,354,585	1,421,857	415,003	140,714
NET INCOME AFTER TAX				0	1,759,574	3,915,472	4,567,057	5,102,955	4,558,852	4,323,001	3,354,585	1,421,857	415,003	140,714
NET CASH FLOW				-25,000,000	6,305,028	8,006,381	8,203,421	8,284,773	7,286,125	6,595,728	5,172,767	2,785,493	1,324,094	595,260
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,482,633	6,053,974	5,393,882	4,736,846	3,622,492	2,851,515	5,172,767	2,785,493	1,324,094	595,260

Table B.17: 20% changes in OPEX cost of compression

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in OPEX of compression to 8.25 $/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	8,314,109	21.7%				
Compression				$	8.3	$/t		**For 10 year**	13,018,957	22.9%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.8	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				54,145,594	74,200,380	78,612,588	81,821,819	73,800,681	68,984,893	56,551,547	34,090,808	21,257,763	16,042,277
Maintenance Costs	8.0%	of operating cost			4,331,647	5,936,030	6,289,007	6,545,746	5,904,054	5,518,791	4,524,124	2,727,265	1,700,621	1,283,382
TOTAL	DIRECT OPEX COSTS			0	58,477,241	80,136,410	84,901,595	88,367,565	79,704,735	74,503,685	61,075,671	36,818,072	22,958,384	17,325,659
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	3,519,147	7,830,944	9,134,114	10,205,909	9,117,704	8,646,001	6,709,170	2,843,714	830,007	281,428
Income tax		50%		0	1,759,574	3,915,472	4,567,057	5,102,955	4,558,852	4,323,001	3,354,585	1,421,857	415,003	140,714
NET INCOME AFTER TAX				0	1,759,574	3,915,472	4,567,057	5,102,955	4,558,852	4,323,001	3,354,585	1,421,857	415,003	140,714
NET CASH FLOW				-25,000,000	6,305,028	8,006,381	8,203,421	8,284,773	7,286,125	6,595,728	5,172,767	2,785,493	1,324,094	595,260
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,482,633	6,053,974	5,393,882	4,736,846	3,622,492	2,851,515	5,172,767	2,785,493	1,324,094	595,260

Table B.18: 30% changes in OPEX cost of compression

Main Assumptions	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)		2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	9.8	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	26.3	$/t
Gas price 7.14 million BTU				

Change in OPEX of compression to 9.75 $/ton of CO2

	NPV	**IRR**
For 7 year	-2,313,347	8.7%
For 10 year	55,073	10.0%

REVENUES OF CER SALES	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)	0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs	0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)	0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale	0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL REVENUES	**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY 12.5%	0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET REVENUES	0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE CAPEX	25,000,000	0	0	0	0	0	0	0	0	0	0
OPEX		57,427,145	78,697,372	83,376,987	86,780,717	78,273,449	73,165,796	59,978,914	36,156,917	22,546,112	17,014,536
Maintenance Costs 8.0% of operating cost		4,594,172	6,295,790	6,670,159	6,942,457	6,261,876	5,853,264	4,798,313	2,892,553	1,803,689	1,361,163
TOTAL DIRECT OPEX COSTS	0	62,021,316	84,993,162	90,047,146	93,723,175	84,535,325	79,019,060	64,777,227	39,049,471	24,349,801	18,375,699
DEPRECIATION (SOYD) Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation 25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX	0	-24,928	2,974,191	3,988,563	4,850,299	4,287,114	4,130,626	3,007,615	612,316	-561,410	-768,612
Income tax 50%	0	-12,464	1,487,096	1,994,281	2,425,150	2,143,557	2,065,313	1,503,807	306,158	-280,705	-384,306
NET INCOME AFTER TAX	0	-12,464	1,487,096	1,994,281	2,425,150	2,143,557	2,065,313	1,503,807	306,158	-280,705	-384,306
NET CASH FLOW	-25,000,000	4,532,990	5,578,005	5,630,645	5,606,968	4,870,830	4,338,040	3,321,989	1,669,794	628,386	70,240
PRESENT VALUE @ 15.0% Discount rate	-25,000,000	3,941,731	4,217,773	3,702,241	3,205,802	2,421,663	1,875,455	3,321,989	1,669,794	628,386	70,240

Table B.19: -30% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	3.5	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	22.5	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 3.5 $/ton of CO2

	NPV	**IRR**
For 7 year	24,255,293	38.1%
For 10 year	32,464,782	39.1%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				49,223,267	67,454,891	71,465,989	74,383,472	67,091,528	62,713,540	51,410,497	30,991,643	19,325,239	14,583,888
Maintenance Costs	8.0%	of operating cost			3,937,861	5,396,391	5,717,279	5,950,678	5,367,322	5,017,083	4,112,840	2,479,331	1,546,019	1,166,711
TOTAL	DIRECT OPEX COSTS			0	53,161,128	72,851,282	77,183,268	80,334,150	72,458,850	67,730,623	55,523,337	33,470,975	20,871,258	15,750,599
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	8,835,260	15,116,072	16,852,441	18,239,324	16,363,589	15,419,064	12,261,504	6,190,812	2,917,133	1,856,488
Income tax		50%		0	4,417,630	7,558,036	8,426,220	9,119,662	8,181,794	7,709,532	6,130,752	3,095,406	1,458,566	928,244
NET INCOME AFTER TAX				0	4,417,630	7,558,036	8,426,220	9,119,662	8,181,794	7,709,532	6,130,752	3,095,406	1,458,566	928,244
NET CASH FLOW				-25,000,000	8,963,084	11,648,945	12,062,584	12,301,480	10,909,067	9,982,259	7,948,934	4,459,042	2,367,657	1,382,790
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,793,987	8,808,276	7,931,345	7,033,411	5,423,734	4,315,606	7,948,934	4,459,042	2,367,657	1,382,790

Table B.20: -20% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	4.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 4 $/ton of CO2		
	NPV	**IRR**
For 7 year	20,712,808	34.7%
For 10 year	28,143,487	35.7%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				50,317,117	68,953,888	73,054,122	76,036,438	68,582,451	64,107,174	52,552,953	31,680,347	19,754,689	14,907,974
Maintenance Costs	8.0%	of operating cost			4,025,369	5,516,311	5,844,330	6,082,915	5,486,596	5,128,574	4,204,236	2,534,428	1,580,375	1,192,638
TOTAL	DIRECT OPEX COSTS			0	54,342,487	74,470,199	78,898,452	82,119,353	74,069,047	69,235,748	56,757,189	34,214,774	21,335,064	16,100,612
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	7,653,901	13,497,154	15,137,257	16,454,121	14,753,392	13,913,939	11,027,652	5,447,012	2,453,327	1,506,475
Income tax		50%		0	3,826,951	6,748,577	7,568,629	8,227,060	7,376,696	6,956,969	5,513,826	2,723,506	1,226,664	753,237
NET INCOME AFTER TAX				0	3,826,951	6,748,577	7,568,629	8,227,060	7,376,696	6,956,969	5,513,826	2,723,506	1,226,664	753,237
NET CASH FLOW				-25,000,000	8,372,405	10,839,486	11,204,992	11,408,879	10,103,969	9,229,697	7,332,008	4,087,142	2,135,754	1,207,783
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,280,352	8,196,209	7,367,464	6,523,063	5,023,458	3,990,253	7,332,008	4,087,142	2,135,754	1,207,783

Table B.21: -10% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	4.5	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	23.5	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 4.5 $/ton of CO2

	NPV	**IRR**
For 7 year	17,170,322	31.1%
For 10 year	23,822,193	32.2%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				51,410,968	70,452,886	74,642,255	77,689,404	70,073,374	65,500,808	53,695,408	32,369,050	20,184,138	15,232,061
Maintenance Costs	8.0%	of operating cost			4,112,877	5,636,231	5,971,380	6,215,152	5,605,870	5,240,065	4,295,633	2,589,524	1,614,731	1,218,565
TOTAL	DIRECT OPEX COSTS			0	55,523,845	76,089,117	80,613,635	83,904,556	75,679,244	70,740,873	57,991,041	34,958,574	21,798,869	16,450,625
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	6,472,543	11,878,237	13,422,073	14,668,918	13,143,195	12,408,814	9,793,800	4,703,213	1,989,521	1,156,462
Income tax		50%		0	3,236,272	5,939,119	6,711,037	7,334,459	6,571,598	6,204,407	4,896,900	2,351,606	994,761	578,231
NET INCOME AFTER TAX				0	3,236,272	5,939,119	6,711,037	7,334,459	6,571,598	6,204,407	4,896,900	2,351,606	994,761	578,231
NET CASH FLOW				-25,000,000	7,781,726	10,030,028	10,347,400	10,516,277	9,298,870	8,477,134	6,715,082	3,715,243	1,903,852	1,032,776
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,766,718	7,584,142	6,803,584	6,012,716	4,623,182	3,664,899	6,715,082	3,715,243	1,903,852	1,032,776

Table B.22: 10% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.5	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.5	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 5.5 $/ton of CO2

	NPV	**IRR**
For 7 year	10,085,352	23.6%
For 10 year	15,179,604	24.9%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				53,598,668	73,450,881	77,818,521	80,995,336	73,055,219	68,288,076	55,980,319	33,746,456	21,043,038	15,880,233
Maintenance Costs	8.0%	of operating cost			4,287,893	5,876,070	6,225,482	6,479,627	5,844,418	5,463,046	4,478,426	2,699,716	1,683,443	1,270,419
TOTAL	DIRECT OPEX COSTS			0	57,886,562	79,326,951	84,044,003	87,474,963	78,899,637	73,751,122	60,458,745	36,446,173	22,726,481	17,150,652
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	4,109,826	8,640,402	9,991,706	11,098,511	9,922,802	9,398,564	7,326,096	3,215,614	1,061,910	456,435
Income tax		50%		0	2,054,913	4,320,201	4,995,853	5,549,256	4,961,401	4,699,282	3,663,048	1,607,807	530,955	228,217
NET INCOME AFTER TAX				0	2,054,913	4,320,201	4,995,853	5,549,256	4,961,401	4,699,282	3,663,048	1,607,807	530,955	228,217
NET CASH FLOW				-25,000,000	6,600,368	8,411,110	8,632,217	8,731,074	7,688,674	6,972,009	5,481,230	2,971,443	1,440,046	682,763
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,739,450	6,360,008	5,675,823	4,992,020	3,822,630	3,014,192	5,481,230	2,971,443	1,440,046	682,763

Table B.23: 20% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	6.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	25.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 6 $/ton of CO2		
	NPV	**IRR**
For 7 year	6,542,867	19.7%
For 10 year	10,858,309	21.0%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				54,692,519	74,949,878	79,406,654	82,648,302	74,546,142	69,681,711	57,122,775	34,435,159	21,472,488	16,204,320
Maintenance Costs	8.0%	of operating cost			4,375,402	5,995,990	6,352,532	6,611,864	5,963,691	5,574,537	4,569,822	2,754,813	1,717,799	1,296,346
TOTAL	DIRECT OPEX COSTS			0	59,067,920	80,945,869	85,759,187	89,260,166	80,509,834	75,256,247	61,692,597	37,189,972	23,190,287	17,500,665
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	2,928,468	7,021,485	8,276,522	9,313,308	8,312,605	7,893,439	6,092,245	2,471,814	598,104	106,422
Income tax		50%		0	1,464,234	3,510,742	4,138,261	4,656,654	4,156,303	3,946,719	3,046,122	1,235,907	299,052	53,211
NET INCOME AFTER TAX				0	1,464,234	3,510,742	4,138,261	4,656,654	4,156,303	3,946,719	3,046,122	1,235,907	299,052	53,211
NET CASH FLOW				-25,000,000	6,009,688	7,601,652	7,774,625	7,838,472	6,883,575	6,219,447	4,864,304	2,599,544	1,208,143	507,756
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,225,816	5,747,941	5,111,942	4,481,672	3,422,354	2,688,838	4,864,304	2,599,544	1,208,143	507,756

Table B.24: 30% changes in OPEX cost of transportation

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	6.5	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	25.5	$/t								
Gas price	7.14	million BTU												

Change in OPEX of transportation to 6.5 $/ton of CO2

	NPV	**IRR**
For 7 year	3,000,381	15.5%
For 10 year	6,537,015	16.8%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				55,786,369	76,448,876	80,994,787	84,301,268	76,037,065	71,075,345	58,265,230	35,123,863	21,901,937	16,528,406
Maintenance Costs	8.0%	of operating cost			4,462,910	6,115,910	6,479,583	6,744,101	6,082,965	5,686,028	4,661,218	2,809,909	1,752,155	1,322,272
TOTAL	DIRECT OPEX COSTS			0	60,249,279	82,564,786	87,474,370	91,045,370	82,120,030	76,761,372	62,926,449	37,933,772	23,654,092	17,850,679
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	1,747,109	5,402,568	6,561,339	7,528,104	6,702,409	6,388,314	4,858,393	1,728,015	134,298	-243,592
Income tax		50%		0	873,555	2,701,284	3,280,669	3,764,052	3,351,204	3,194,157	2,429,196	864,007	67,149	-121,796
NET INCOME AFTER TAX				0	873,555	2,701,284	3,280,669	3,764,052	3,351,204	3,194,157	2,429,196	864,007	67,149	-121,796
NET CASH FLOW				-25,000,000	5,419,009	6,792,193	6,917,033	6,945,870	6,078,477	5,466,884	4,247,378	2,227,644	976,240	332,750
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	4,712,182	5,135,874	4,548,061	3,971,324	3,022,077	2,363,485	4,247,378	2,227,644	976,240	332,750

Table B.25: -30% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	5.95	$/t								
Total			25,000,000	$	21.5	$/t								
Gas price	7.14	million BTU												

Change in OPEX of storage to 5.59 $/ton of CO2

	NPV	**IRR**
For 7 year	31,694,512	45.1%
For 10 year	41,539,500	45.9%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				46,926,181	64,306,996	68,130,909	70,912,243	63,960,590	59,786,908	49,011,341	29,545,367	18,423,394	13,903,306
Maintenance Costs	8.0%	of operating cost			3,754,094	5,144,560	5,450,473	5,672,979	5,116,847	4,782,953	3,920,907	2,363,629	1,473,872	1,112,265
TOTAL	DIRECT OPEX COSTS			0	50,680,276	69,451,555	73,581,382	76,585,223	69,077,437	64,569,860	52,932,248	31,908,996	19,897,266	15,015,571
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	11,316,113	18,515,798	20,454,327	21,988,251	19,745,002	18,579,826	14,852,593	7,752,790	3,891,125	2,591,516
Income tax		50%		0	5,658,056	9,257,899	10,227,163	10,994,126	9,872,501	9,289,913	7,426,297	3,876,395	1,945,562	1,295,758
NET INCOME AFTER TAX				0	5,658,056	9,257,899	10,227,163	10,994,126	9,872,501	9,289,913	7,426,297	3,876,395	1,945,562	1,295,758
NET CASH FLOW				-25,000,000	10,203,511	13,348,808	13,863,527	14,175,944	12,599,774	11,562,640	9,244,478	5,240,032	2,854,653	1,750,304
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	8,872,618	10,093,617	9,115,494	8,105,142	6,264,314	4,998,848	9,244,478	5,240,032	2,854,653	1,750,304

Table B.26: -20% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	6.80	$/t
Total	25,000,000	$	22.3	$/t
Gas price	7.14	million BTU		

Change in OPEX of storage to 6.8 $/ton of CO2

	NPV	**IRR**
For 7 year	25,672,287	39.5%
For 10 year	34,193,300	40.4%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				48,785,727	66,855,292	70,830,736	73,722,286	66,495,159	62,156,086	50,953,515	30,716,162	19,153,459	14,454,253
Maintenance Costs	8.0%	of operating cost			3,902,858	5,348,423	5,666,459	5,897,783	5,319,613	4,972,487	4,076,281	2,457,293	1,532,277	1,156,340
TOTAL	DIRECT OPEX COSTS			0	52,688,585	72,203,715	76,497,194	79,620,068	71,814,772	67,128,573	55,029,796	33,173,455	20,685,736	15,610,593
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	9,307,803	15,763,639	17,538,514	18,953,406	17,007,667	16,021,114	12,755,045	6,488,331	3,102,655	1,996,494
Income tax		50%		0	4,653,902	7,881,819	8,769,257	9,476,703	8,503,834	8,010,557	6,377,522	3,244,166	1,551,328	998,247
NET INCOME AFTER TAX				0	4,653,902	7,881,819	8,769,257	9,476,703	8,503,834	8,010,557	6,377,522	3,244,166	1,551,328	998,247
NET CASH FLOW				-25,000,000	9,199,356	11,972,728	12,405,621	12,658,521	11,231,106	10,283,284	8,195,704	4,607,802	2,460,418	1,452,792
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,999,440	9,053,103	8,156,897	7,237,550	5,583,845	4,445,747	8,195,704	4,607,802	2,460,418	1,452,792

Table B.27: -10% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	7.65	$/t								
Total			25,000,000	$	23.2	$/t								
Gas price	7.14	million BTU												

Change in OPEX of storage to 7.65 $/ton of CO2		
	NPV	**IRR**
For 7 year	19,650,062	33.6%
For 10 year	26,847,099	34.7%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				50,645,272	69,403,587	73,530,562	76,532,328	69,029,728	64,525,264	52,895,689	31,886,958	19,883,523	15,005,200
Maintenance Costs	8.0%	of operating cost			4,051,622	5,552,287	5,882,445	6,122,586	5,522,378	5,162,021	4,231,655	2,550,957	1,590,682	1,200,416
TOTAL	DIRECT OPEX COSTS			0	54,696,894	74,955,874	79,413,007	82,654,914	74,552,106	69,687,285	57,127,345	34,437,914	21,474,205	16,205,616
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	7,299,494	13,011,479	14,622,702	15,918,560	14,270,333	13,462,401	10,657,497	5,223,872	2,314,185	1,401,471
Income tax		50%		0	3,649,747	6,505,740	7,311,351	7,959,280	7,135,166	6,731,201	5,328,748	2,611,936	1,157,093	700,735
NET INCOME AFTER TAX				0	3,649,747	6,505,740	7,311,351	7,959,280	7,135,166	6,731,201	5,328,748	2,611,936	1,157,093	700,735
NET CASH FLOW				-25,000,000	8,195,202	10,596,649	10,947,715	11,141,098	9,862,439	9,003,928	7,146,930	3,975,573	2,066,184	1,155,281
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,126,262	8,012,589	7,198,300	6,369,959	4,903,375	3,892,646	7,146,930	3,975,573	2,066,184	1,155,281

Table B.28: 10% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	9.35	$/t								
Total			25,000,000	$	24.9	$/t								
Gas price	7.14	million BTU												

Change in OPEX of storage to 9.35 $/ton of CO2		
	NPV	**IRR**
For 7 year	7,605,612	20.9%
For 10 year	12,154,698	22.2%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				54,364,364	74,500,179	78,930,214	82,152,412	74,098,865	69,263,620	56,780,038	34,228,548	21,343,653	16,107,094
Maintenance Costs	8.0%	of operating cost			4,349,149	5,960,014	6,314,417	6,572,193	5,927,909	5,541,090	4,542,403	2,738,284	1,707,492	1,288,568
TOTAL	DIRECT OPEX COSTS			0	58,713,513	80,460,193	85,244,631	88,724,605	80,026,775	74,804,710	61,322,441	36,966,832	23,051,145	17,395,661
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	3,282,875	7,507,160	8,791,077	9,848,869	8,795,664	8,344,976	6,462,400	2,694,954	737,246	211,426
Income tax		50%		0	1,641,438	3,753,580	4,395,539	4,924,434	4,397,832	4,172,488	3,231,200	1,347,477	368,623	105,713
NET INCOME AFTER TAX				0	1,641,438	3,753,580	4,395,539	4,924,434	4,397,832	4,172,488	3,231,200	1,347,477	368,623	105,713
NET CASH FLOW				-25,000,000	6,186,892	7,844,489	8,031,902	8,106,253	7,125,105	6,445,215	5,049,382	2,711,113	1,277,714	560,258
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,379,906	5,931,561	5,281,106	4,634,776	3,542,436	2,786,444	5,049,382	2,711,113	1,277,714	560,258

Table B.29: 20% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	10.20	$/t								
Total			25,000,000	$	25.7	$/t								
Gas price	7.14	million BTU												

Change in OPEX of storage to 10.2 $/ton of CO2

	NPV	**IRR**
For 7 year	1,583,387	13.7%
For 10 year	4,808,497	15.1%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				56,223,909	77,048,475	81,630,041	84,962,455	76,633,434	71,632,798	58,722,213	35,399,344	22,073,717	16,658,041
Maintenance Costs	8.0%	of operating cost			4,497,913	6,163,878	6,530,403	6,796,996	6,130,675	5,730,624	4,697,777	2,831,948	1,765,897	1,332,643
TOTAL	DIRECT OPEX COSTS			0	60,721,822	83,212,353	88,160,444	91,759,451	82,764,109	77,363,422	63,419,990	38,231,291	23,839,615	17,990,684
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	1,274,566	4,755,001	5,875,265	6,814,023	6,058,330	5,786,264	4,364,852	1,430,495	-51,224	-383,597
Income tax		50%		0	637,283	2,377,500	2,937,633	3,407,012	3,029,165	2,893,132	2,182,426	715,248	-25,612	-191,798
NET INCOME AFTER TAX				0	637,283	2,377,500	2,937,633	3,407,012	3,029,165	2,893,132	2,182,426	715,248	-25,612	-191,798
NET CASH FLOW				-25,000,000	5,182,738	6,468,409	6,573,996	6,588,830	5,756,438	5,165,859	4,000,608	2,078,884	883,479	262,747
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	4,506,728	4,891,047	4,322,509	3,767,185	2,861,967	2,233,343	4,000,608	2,078,884	883,479	262,747

Table B.30: 30% changes in OPEX cost of storage

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	11.05	$/t								
Total			25,000,000	$	26.6	$/t								
Gas price	7.14	million BTU												

Change in OPEX of storage to 11.05 $/ton of CO2

	NPV	**IRR**
For 7 year	-4,438,838	5.7%
For 10 year	-2,537,704	7.1%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				58,083,455	79,596,771	84,329,867	87,772,497	79,168,003	74,001,977	60,664,387	36,570,139	22,803,782	17,208,988
Maintenance Costs	8.0%	of operating cost			4,646,676	6,367,742	6,746,389	7,021,800	6,333,440	5,920,158	4,853,151	2,925,611	1,824,303	1,376,719
TOTAL	DIRECT OPEX COSTS			0	62,730,131	85,964,513	91,076,256	94,794,297	85,501,443	79,922,135	65,517,538	39,495,750	24,628,084	18,585,707
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	-733,743	2,002,841	2,959,453	3,779,177	3,320,996	3,227,551	2,267,304	166,036	-839,694	-978,620
Income tax		50%		0	-366,872	1,001,421	1,479,726	1,889,589	1,660,498	1,613,776	1,133,652	83,018	-419,847	-489,310
NET INCOME AFTER TAX				0	-366,872	1,001,421	1,479,726	1,889,589	1,660,498	1,613,776	1,133,652	83,018	-419,847	-489,310
NET CASH FLOW				-25,000,000	4,178,583	5,092,330	5,116,090	5,071,407	4,387,771	3,886,503	2,951,834	1,446,654	489,244	-34,764
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	3,633,550	3,850,533	3,363,912	2,899,593	2,181,497	1,680,243	2,951,834	1,446,654	489,244	-34,764

Table B.31: -30% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of maintenance to 5.6%

	NPV	**IRR**
For 7 year	17,406,488	31.3%
For 10 year	24,110,279	32.4%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	5.6%	of operating cost			2,940,270	4,029,305	4,268,902	4,443,173	4,007,601	3,746,089	3,070,920	1,851,234	1,154,361	871,144
TOTAL	DIRECT OPEX COSTS			0	55,445,088	75,981,189	80,499,290	83,785,543	75,571,897	70,640,531	57,908,784	34,908,987	21,767,949	16,427,291
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	6,551,300	11,986,165	13,536,419	14,787,931	13,250,542	12,509,155	9,876,057	4,752,799	2,020,442	1,179,796
Income tax		50%		0	3,275,650	5,993,082	6,768,210	7,393,966	6,625,271	6,254,578	4,938,029	2,376,400	1,010,221	589,898
NET INCOME AFTER TAX				0	3,275,650	5,993,082	6,768,210	7,393,966	6,625,271	6,254,578	4,938,029	2,376,400	1,010,221	589,898
NET CASH FLOW				25,000,000	-7,821,105	10,083,992	10,404,573	10,575,784	9,352,544	8,527,305	6,756,210	3,740,036	1,919,312	1,044,443
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-6,800,961	7,624,946	6,841,176	6,046,739	4,649,867	3,686,589	6,756,210	3,740,036	1,919,312	1,044,443

Table B.32: -20% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of maintenance to 6.4%		
	NPV	**IRR**
For 7 year	16,146,938	30.1%
For 10 year	22,573,819	31.2%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	6.4%	of operating cost			3,360,308	4,604,921	4,878,745	5,077,912	4,580,115	4,281,244	3,509,623	2,115,696	1,319,270	995,593
TOTAL	DIRECT OPEX COSTS			0	55,865,126	76,556,804	81,109,133	84,420,282	76,144,412	71,175,686	58,347,487	35,173,449	21,932,858	16,551,740
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	6,131,262	11,410,550	12,926,576	14,153,192	12,678,027	11,974,000	9,437,354	4,488,337	1,855,533	1,055,347
Income tax		50%		0	3,065,631	5,705,275	6,463,288	7,076,596	6,339,014	5,987,000	4,718,677	2,244,169	927,766	527,673
NET INCOME AFTER TAX				0	3,065,631	5,705,275	6,463,288	7,076,596	6,339,014	5,987,000	4,718,677	2,244,169	927,766	527,673
NET CASH FLOW				-25,000,000	7,611,085	9,796,184	10,099,652	10,258,414	9,066,286	8,259,727	6,536,859	3,607,805	1,836,857	982,219
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,618,335	7,407,322	6,640,685	5,865,282	4,507,547	3,570,908	6,536,859	3,607,805	1,836,857	982,219

Table B.33: -10% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of maintenance to 7.2%		
	NPV	**IRR**
For 7 year	14,887,387	28.8%
For 10 year	21,037,359	29.9%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	7.2%	of operating cost			3,780,347	5,180,536	5,488,588	5,712,651	5,152,629	4,816,400	3,948,326	2,380,158	1,484,178	1,120,043
TOTAL	DIRECT OPEX COSTS			0	56,285,165	77,132,419	81,718,976	85,055,021	76,716,926	71,710,842	58,786,190	35,437,911	22,097,766	16,676,190
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	5,711,223	10,834,935	12,316,733	13,518,453	12,105,513	11,438,844	8,998,651	4,223,875	1,690,624	930,897
Income tax		50%		0	2,855,612	5,417,467	6,158,366	6,759,227	6,052,757	5,719,422	4,499,326	2,111,938	845,312	465,449
NET INCOME AFTER TAX				0	2,855,612	5,417,467	6,158,366	6,759,227	6,052,757	5,719,422	4,499,326	2,111,938	845,312	465,449
NET CASH FLOW				-25,000,000	7,401,066	9,508,376	9,794,730	9,941,045	8,780,029	7,992,149	6,317,507	3,475,574	1,754,403	919,994
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,435,710	7,189,699	6,440,194	5,683,825	4,365,226	3,455,227	6,317,507	3,475,574	1,754,403	919,994

Table B.34: 10% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of maintenance to 8.8%

	NPV	**IRR**
For 7 year	12,368,287	26.1%
For 10 year	17,964,438	27.3%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.8%	of operating cost			4,620,424	6,331,766	6,708,274	6,982,129	6,297,658	5,886,711	4,825,732	2,909,082	1,813,996	1,368,941
TOTAL	DIRECT OPEX COSTS			0	57,125,242	78,283,649	82,938,662	86,324,499	77,861,955	72,781,153	59,663,596	35,966,835	22,427,584	16,925,088
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	4,871,146	9,683,705	11,097,047	12,248,975	10,960,484	10,368,533	8,121,245	3,694,951	1,360,807	681,999
Income tax		50%		0	2,435,573	4,841,852	5,548,523	6,124,488	5,480,242	5,184,267	4,060,623	1,847,476	680,403	341,000
NET INCOME AFTER TAX				0	2,435,573	4,841,852	5,548,523	6,124,488	5,480,242	5,184,267	4,060,623	1,847,476	680,403	341,000
NET CASH FLOW				-25,000,000	6,981,028	8,932,761	9,184,887	9,306,306	8,207,515	7,456,994	5,878,805	3,211,112	1,589,494	795,545
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	6,070,459	6,754,451	6,039,212	5,320,911	4,080,585	3,223,864	5,878,805	3,211,112	1,589,494	795,545

Table B.35: 20% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in OPEX of maintenance to 9.6%**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	11,108,737	24.8%				
Compression				$	7.5	$/t		**For 10 year**	16,427,978	26.0%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	9.6%	of operating cost			5,040,463	6,907,381	7,318,117	7,616,868	6,870,172	6,421,866	5,264,435	3,173,544	1,978,904	1,493,390
TOTAL	DIRECT OPEX COSTS			0	57,545,281	78,859,264	83,548,505	86,959,238	78,434,469	73,316,309	60,102,299	36,231,297	22,592,492	17,049,537
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	4,451,108	9,108,090	10,487,204	11,614,236	10,387,970	9,833,378	7,682,543	3,430,489	1,195,898	557,550
Income tax		50%		0	2,225,554	4,554,045	5,243,602	5,807,118	5,193,985	4,916,689	3,841,271	1,715,245	597,949	278,775
NET INCOME AFTER TAX				0	2,225,554	4,554,045	5,243,602	5,807,118	5,193,985	4,916,689	3,841,271	1,715,245	597,949	278,775
NET CASH FLOW				-25,000,000	6,771,008	8,644,954	8,879,965	8,988,936	7,921,258	7,189,416	5,659,453	3,078,881	1,507,040	733,320
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,887,833	6,536,827	5,838,721	5,139,454	3,938,265	3,108,183	5,659,453	3,078,881	1,507,040	733,320

Table B.36: 30% changes in OPEX cost of maintenance

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in OPEX of maintenance to 10.4%		
	NPV	**IRR**
For 7 year	9,849,186	23.4%
For 10 year	14,891,518	24.6%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	76,047,820	105,209,443	111,625,226	116,291,763	104,628,242	97,625,615	79,546,312	46,886,198	28,225,693	20,641,866
ROYALTY		12.5%		0	9,505,978	13,151,180	13,953,153	14,536,470	13,078,530	12,203,202	9,943,289	5,860,775	3,528,212	2,580,233
NET	**REVENUES**			0	66,541,843	92,058,263	97,672,073	101,755,292	91,549,712	85,422,414	69,603,023	41,025,423	24,697,482	18,061,632
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	10.4%	of operating cost			5,460,501	7,482,996	7,927,960	8,251,606	7,442,687	6,957,022	5,703,138	3,438,006	2,143,813	1,617,839
TOTAL	DIRECT OPEX COSTS			0	57,965,319	79,434,879	84,158,348	87,593,977	79,006,983	73,851,464	60,541,002	36,495,759	22,757,401	17,173,986
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	4,031,069	8,532,474	9,877,360	10,979,497	9,815,456	9,298,222	7,243,840	3,166,027	1,030,989	433,101
Income tax		50%		0	2,015,535	4,266,237	4,938,680	5,489,749	4,907,728	4,649,111	3,621,920	1,583,014	515,495	216,550
NET INCOME AFTER TAX				0	2,015,535	4,266,237	4,938,680	5,489,749	4,907,728	4,649,111	3,621,920	1,583,014	515,495	216,550
NET CASH FLOW				-25,000,000	6,560,989	8,357,146	8,575,044	8,671,567	7,635,000	6,921,838	5,440,102	2,946,650	1,424,586	671,096
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	5,705,208	6,319,203	5,638,231	4,957,997	3,795,945	2,992,502	5,440,102	2,946,650	1,424,586	671,096

Table B.37: -30% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	4.99	million BTU												

Change in gas price to 4.99		
	NPV	**IRR**
For 7 year	-15,194,173	-13.3%
For 10 year	-15,657,581	-15.6%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	25,494,819	34,937,750	37,015,268	38,526,356	34,749,549	32,482,003	26,627,678	16,051,887	10,009,361	7,553,614
TOTAL	**REVENUES**			**0**	65,063,079	90,156,104	95,676,764	99,692,230	89,655,991	83,630,364	68,073,465	39,970,054	23,913,043	17,387,302
ROYALTY		12.5%		0	8,132,885	11,269,513	11,959,595	12,461,529	11,206,999	10,453,795	8,509,183	4,996,257	2,989,130	2,173,413
NET	**REVENUES**			0	56,930,194	78,886,591	83,717,168	87,230,701	78,448,992	73,176,568	59,564,282	34,973,797	20,923,912	15,213,890
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	-4,320,464	-2,912,352	-2,248,015	-1,640,876	-1,567,721	-1,342,157	-1,478,793	-2,092,213	-2,247,854	-2,041,295
Income tax		50%		0	-2,160,232	-1,456,176	-1,124,007	-820,438	-783,860	-671,078	-739,396	-1,046,106	-1,123,927	-1,020,647
NET INCOME AFTER TAX				0	-2,160,232	-1,456,176	-1,124,007	-820,438	-783,860	-671,078	-739,396	-1,046,106	-1,123,927	-1,020,647
NET CASH FLOW				-25,000,000	2,385,222	2,634,733	2,512,356	2,361,380	1,943,412	1,601,649	1,078,785	317,530	-214,836	-566,102
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	2,074,106	1,992,237	1,651,915	1,350,127	966,219	692,437	1,078,785	317,530	-214,836	-566,102

Table B.38: -20% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in gas price to 5.71 $/million BTU**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	-5,542,151	4.1%				
Compression				$	7.5	$/t		**For 10 year**	-3,883,579	5.4%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	5.71	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	29,173,430	39,978,868	42,356,148	44,085,270	39,763,512	37,168,785	30,469,748	18,367,991	11,453,598	8,643,515
TOTAL	**REVENUES**			**0**	68,741,690	95,197,222	101,017,644	105,251,143	94,669,954	88,317,146	71,915,535	42,286,158	25,357,279	18,477,203
ROYALTY		12.5%		0	8,592,711	11,899,653	12,627,205	13,156,393	11,833,744	11,039,643	8,989,442	5,285,770	3,169,660	2,309,650
NET	**REVENUES**			0	60,148,979	83,297,569	88,390,438	92,094,750	82,836,210	77,277,502	62,926,093	37,000,388	22,187,619	16,167,552
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	-1,101,679	1,498,626	2,425,256	3,223,173	2,819,497	2,758,778	1,883,018	-65,622	-984,147	-1,087,632
Income tax		50%		0	-550,840	749,313	1,212,628	1,611,586	1,409,748	1,379,389	941,509	-32,811	-492,073	-543,816
NET INCOME AFTER TAX				0	-550,840	749,313	1,212,628	1,611,586	1,409,748	1,379,389	941,509	-32,811	-492,073	-543,816
NET CASH FLOW				-25,000,000	3,994,615	4,840,222	4,848,991	4,793,404	4,137,021	3,652,116	2,759,691	1,330,826	417,018	-89,270
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	3,473,578	3,659,903	3,188,291	2,740,645	2,056,831	1,578,911	2,759,691	1,330,826	417,018	-89,270

Table B.39: -10% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**		**Change in gas price to 6.43 $/million BTU**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	4,109,871	16.8%				
Compression				$	7.5	$/t		**For 10 year**	7,890,424	18.2%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	6.43	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	32,852,041	45,019,987	47,697,029	49,644,183	44,777,475	41,855,567	34,311,818	20,684,095	12,897,834	9,733,415
TOTAL	**REVENUES**			**0**	72,420,301	100,238,340	106,358,524	110,810,056	99,683,917	93,003,928	75,757,604	44,602,262	26,801,516	19,567,103
ROYALTY		12.5%		0	9,052,538	12,529,793	13,294,816	13,851,257	12,460,490	11,625,491	9,469,701	5,575,283	3,350,189	2,445,888
NET	**REVENUES**			0	63,367,763	87,708,548	93,063,709	96,958,799	87,223,428	81,378,437	66,287,904	39,026,979	23,451,326	17,121,215
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	2,117,105	5,909,605	7,098,526	8,087,222	7,206,715	6,859,712	5,244,829	1,960,969	279,560	-133,969
Income tax		50%		0	1,058,553	2,954,802	3,549,263	4,043,611	3,603,357	3,429,856	2,622,415	980,485	139,780	-66,985
NET INCOME AFTER TAX				0	1,058,553	2,954,802	3,549,263	4,043,611	3,603,357	3,429,856	2,622,415	980,485	139,780	-66,985
NET CASH FLOW				25,000,000	-5,604,007	7,045,711	7,185,627	7,225,429	6,330,630	5,702,583	4,440,596	2,344,121	1,048,871	387,561
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-4,873,050	5,327,570	4,724,666	4,131,162	3,147,442	2,465,384	4,440,596	2,344,121	1,048,871	387,561

Table B.40: 10% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	24.0	$/t

Change in gas price to 7.85 $/million BTU

	NPV	**IRR**
For 7 year	23,145,803	37.0%
For 10 year	31,111,373	38.0%

Gas price	7.85	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	40,107,079	54,962,192	58,230,432	60,607,595	54,666,125	51,098,943	41,889,233	25,251,967	15,746,189	11,882,940
TOTAL	**REVENUES**			**0**	79,675,340	110,180,546	116,891,927	121,773,469	109,572,567	102,247,303	83,335,020	49,170,133	29,649,871	21,716,628
ROYALTY		12.5%		0	9,959,417	13,772,568	14,611,491	15,221,684	13,696,571	12,780,913	10,416,877	6,146,267	3,706,234	2,714,579
NET	**REVENUES**			0	69,715,922	96,407,978	102,280,436	106,551,785	95,875,996	89,466,390	72,918,142	43,023,867	25,943,637	19,002,050
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	8,465,264	14,609,035	16,315,254	17,680,207	15,859,283	14,947,666	11,875,068	5,957,857	2,771,871	1,746,866
Income tax		50%		0	4,232,632	7,304,517	8,157,627	8,840,104	7,929,641	7,473,833	5,937,534	2,978,929	1,385,936	873,433
NET INCOME AFTER TAX				0	4,232,632	7,304,517	8,157,627	8,840,104	7,929,641	7,473,833	5,937,534	2,978,929	1,385,936	873,433
NET CASH FLOW				-25,000,000	8,778,087	11,395,426	11,793,990	12,021,922	10,656,914	9,746,560	7,755,716	4,342,565	2,295,026	1,327,978
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	7,633,119	8,616,579	7,754,740	6,873,573	5,298,370	4,213,707	7,755,716	4,342,565	2,295,026	1,327,978

Table B.41: 20% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in gas price to 8.57 $/million BTU**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	32,797,826	46.1%				
Compression				$	7.5	$/t		**For 10 year**	42,885,375	46.9%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	8.57	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	43,785,691	60,003,310	63,571,312	66,166,508	59,680,088	55,785,725	45,731,303	27,568,071	17,190,426	12,972,841
TOTAL	**REVENUES**			**0**	83,353,951	115,221,664	122,232,808	127,332,382	114,586,530	106,934,085	87,177,090	51,486,237	31,094,107	22,806,529
ROYALTY		12.5%		0	10,419,244	14,402,708	15,279,101	15,916,548	14,323,316	13,366,761	10,897,136	6,435,780	3,886,763	2,850,816
NET	**REVENUES**			0	72,934,707	100,818,956	106,953,707	111,415,834	100,263,213	93,567,325	76,279,953	45,050,458	27,207,344	19,955,713
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	11,684,049	19,020,013	20,988,524	22,544,256	20,246,500	19,048,600	15,236,879	7,984,448	4,035,578	2,700,528
Income tax		50%		0	5,842,024	9,510,007	10,494,262	11,272,128	10,123,250	9,524,300	7,618,439	3,992,224	2,017,789	1,350,264
NET INCOME AFTER TAX				0	5,842,024	9,510,007	10,494,262	11,272,128	10,123,250	9,524,300	7,618,439	3,992,224	2,017,789	1,350,264
NET CASH FLOW				25,000,000	-10,387,479	13,600,916	14,130,626	14,453,946	12,850,523	11,797,027	9,436,621	5,355,860	2,926,880	1,804,810
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-9,032,590	10,284,246	9,291,116	8,264,091	6,388,981	5,100,180	9,436,621	5,355,860	2,926,880	1,804,810

Table B.42: 30% changes in gas price

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €	15.35 €
CER trading values (US$/Ton CO_2)				$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56	$22.56
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	24.0	$/t
Gas price	9.28	million BTU		

Change in gas price to 9.28 $/million BTU

	NPV	**IRR**
For 7 year	42,315,792	54.6%
For 10 year	54,495,850	55.2%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	39,568,260	55,218,354	58,661,495	61,165,874	54,906,442	51,148,360	41,445,787	23,918,167	13,903,681	9,833,688
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	47,413,210	64,974,413	68,838,014	71,648,214	64,624,412	60,407,413	49,520,011	29,852,007	18,614,604	14,047,603
TOTAL	**REVENUES**			**0**	86,981,470	120,192,767	127,499,509	132,814,088	119,530,854	111,555,773	90,965,797	53,770,173	32,518,285	23,881,291
ROYALTY		12.5%		0	10,872,684	15,024,096	15,937,439	16,601,761	14,941,357	13,944,472	11,370,725	6,721,272	4,064,786	2,985,161
NET	**REVENUES**			0	76,108,786	105,168,671	111,562,070	116,212,327	104,589,497	97,611,302	79,595,073	47,048,902	28,453,499	20,896,130
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	14,858,128	23,369,728	25,596,888	27,340,749	24,572,784	23,092,577	18,551,998	9,982,892	5,281,733	3,640,946
Income tax		50%		0	7,429,064	11,684,864	12,798,444	13,670,374	12,286,392	11,546,288	9,275,999	4,991,446	2,640,867	1,820,473
NET INCOME AFTER TAX				0	7,429,064	11,684,864	12,798,444	13,670,374	12,286,392	11,546,288	9,275,999	4,991,446	2,640,867	1,820,473
NET CASH FLOW				25,000,000	11,974,519	15,775,773	16,434,807	16,852,193	15,013,665	13,819,016	11,094,181	6,355,082	3,549,958	2,275,018
PRESENT VALUE @		15.0%	Discount rate	25,000,000	10,412,625	11,928,751	10,806,153	9,635,296	7,464,445	5,974,342	11,094,181	6,355,082	3,549,958	2,275,018

Table B.43: -30% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €	10.75 €
CER trading values (US$/Ton CO_2)				$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80	$15.80
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in CERs to 10.75 euro/ton of CO2

	NPV	**IRR**
For 7 year	-17,911,342	-20.7%
For 10 year	-18,286,279	#NUM!

REVENUES OF CER SALES			**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)			0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs			0	27,710,671	38,670,834	41,082,155	42,836,035	38,452,394	35,820,513	29,025,551	16,750,508	9,737,106	6,886,785
Gas sale production (BTU)			0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale			0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**		**0**	64,190,231	88,661,923	94,045,885	97,961,924	88,174,194	82,297,768	67,126,076	39,718,538	24,059,118	17,694,962
ROYALTY		12.5%	0	8,023,779	11,082,740	11,755,736	12,245,241	11,021,774	10,287,221	8,390,760	4,964,817	3,007,390	2,211,870
NET	**REVENUES**		0	56,166,452	77,579,183	82,290,149	85,716,684	77,152,420	72,010,547	58,735,317	34,753,721	21,051,728	15,483,092
EXPENSE	CAPEX		25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX			52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost		4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS		0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	-5,084,206	-4,219,760	-3,675,033	-3,154,894	-2,864,293	-2,508,178	-2,307,758	-2,312,288	-2,120,038	-1,772,092
Income tax		50%		0	-2,542,103	-2,109,880	-1,837,517	-1,577,447	-1,432,147	-1,254,089	-1,153,879	-1,156,144	-1,060,019	-886,046
NET INCOME AFTER TAX				0	-2,542,103	-2,109,880	-1,837,517	-1,577,447	-1,432,147	-1,254,089	-1,153,879	-1,156,144	-1,060,019	-886,046
NET CASH FLOW			-25,000,000	2,003,352	1,981,029	1,798,847	1,604,371	1,295,126	1,018,638	664,303	207,492	-150,928	-431,501
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	1,742,045	1,497,943	1,182,771	917,304	643,907	440,385	664,303	207,492	-150,928	-431,501

Table B.44: -20% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €	12.28 €
CER trading values (US$/Ton CO_2)				$18.05	$18.05	$18.05	$18.05	$18.05	$18.05	$18.05	$18.05	$18.05	$18.05	$18.05
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**			**OPEX**								
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in CERs to 12.28 euro/ton of CO2

	NPV	**IRR**
For 7 year	-7,421,137	1.2%
For 10 year	-5,717,935	2.8%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	31,654,608	44,174,683	46,929,196	48,932,699	43,925,154	40,918,688	33,156,629	19,134,533	11,122,945	7,866,950
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	68,134,168	94,165,772	99,892,927	104,058,588	93,646,954	87,395,943	71,257,155	42,102,564	25,444,957	18,675,128
ROYALTY		12.5%		0	8,516,771	11,770,722	12,486,616	13,007,323	11,705,869	10,924,493	8,907,144	5,262,821	3,180,620	2,334,391
NET	**REVENUES**			0	59,617,397	82,395,051	87,406,311	91,051,264	81,941,084	76,471,450	62,350,010	36,839,744	22,264,337	16,340,737
EXPENSE	CAPEX		25,000,000	0	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	-1,633,261	596,108	1,441,128	2,179,686	1,924,371	1,952,726	1,306,936	-226,266	-907,429	-914,447
Income tax		50%		0	-816,630	298,054	720,564	1,089,843	962,186	976,363	653,468	-113,133	-453,714	-457,224
NET INCOME AFTER TAX				0	-816,630	298,054	720,564	1,089,843	962,186	976,363	653,468	-113,133	-453,714	-457,224
NET CASH FLOW				25,000,000	-3,728,824	4,388,963	4,356,928	4,271,661	3,689,458	3,249,090	2,471,650	1,250,503	455,377	-2,678
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-3,242,456	3,318,687	2,864,751	2,442,336	1,834,313	1,404,671	2,471,650	1,250,503	455,377	-2,678

Table B.45: -10% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €	13.28 €
CER trading values (US$/Ton CO_2)				$19.52	$19.52	$19.52	$19.52	$19.52	$19.52	$19.52	$19.52	$19.52	$19.52	$19.52
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CERs to 13.28 euro/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	-564,794	11.0%				
Compression				$	7.5	$/t		**For 10 year**	2,496,669	12.5%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	34,232,345	47,771,970	50,750,792	52,917,446	47,502,121	44,250,829	35,856,681	20,692,720	12,028,722	8,507,582
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	70,711,905	97,763,059	103,714,522	108,043,335	97,223,920	90,728,084	73,957,206	43,660,751	26,350,734	19,315,759
ROYALTY		12.5%		0	8,838,988	12,220,382	12,964,315	13,505,417	12,152,990	11,341,011	9,244,651	5,457,594	3,293,842	2,414,470
NET	**REVENUES**			0	61,872,917	85,542,677	90,750,207	94,537,918	85,070,930	79,387,074	64,712,555	38,203,157	23,056,892	16,901,289
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	622,259	3,743,734	4,785,024	5,666,340	5,054,217	4,868,349	3,669,481	1,137,148	-114,874	-353,895
Income tax		50%		0	311,129	1,871,867	2,392,512	2,833,170	2,527,109	2,434,174	1,834,740	568,574	-57,437	-176,947
NET INCOME AFTER TAX				0	311,129	1,871,867	2,392,512	2,833,170	2,527,109	2,434,174	1,834,740	568,574	-57,437	-176,947
NET CASH FLOW				-25,000,000	4,856,584	5,962,776	6,028,876	6,014,988	5,254,381	4,706,902	3,652,922	1,932,210	851,654	277,598
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	4,223,116	4,508,715	3,964,084	3,439,089	2,612,356	2,034,923	3,652,922	1,932,210	851,654	277,598

Table B.46: 10% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €	16.88 €
CER trading values (US$/Ton CO_2)				$24.81	$24.81	$24.81	$24.81	$24.81	$24.81	$24.81	$24.81	$24.81	$24.81	$24.81
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79

Cost of the Projects	**CAPEX(US$)**		**OPEX**	
	value	unit	value	unit
Capture		$	3.0	$/t
Compression		$	7.5	$/t
Transport		$	5.0	$/t
Storage		$	8.50	$/t
Total	25,000,000	$	24.0	$/t

Change in CERs to 16.88 euro/ton of CO2

	NPV	**IRR**
For 7 year	24,118,042	38.0%
For 10 year	32,069,242	38.9%

Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	43,512,197	60,722,203	64,508,537	67,262,537	60,379,201	56,246,536	45,576,865	26,302,192	15,289,521	10,813,854
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	79,991,758	110,713,292	117,472,267	122,388,426	110,101,001	102,723,791	83,677,391	49,270,223	29,611,532	21,622,031
ROYALTY		12.5%		0	9,998,970	13,839,161	14,684,033	15,298,553	13,762,625	12,840,474	10,459,674	6,158,778	3,701,442	2,702,754
NET	**REVENUES**			0	69,992,788	96,874,130	102,788,234	107,089,873	96,338,376	89,883,317	73,217,717	43,111,445	25,910,091	18,919,277
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	8,742,130	15,075,187	16,823,051	18,218,295	16,321,663	15,364,592	12,174,642	6,045,436	2,738,325	1,664,093
Income tax		50%		0	4,371,065	7,537,594	8,411,526	9,109,148	8,160,832	7,682,296	6,087,321	3,022,718	1,369,162	832,047
NET INCOME AFTER TAX				0	4,371,065	7,537,594	8,411,526	9,109,148	8,160,832	7,682,296	6,087,321	3,022,718	1,369,162	832,047
NET CASH FLOW				25,000,000	-8,916,519	11,628,503	12,047,889	12,290,966	10,888,104	9,955,023	7,905,503	4,386,354	2,278,253	1,286,592
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-7,753,495	8,792,819	7,921,683	7,027,400	5,413,312	4,303,831	7,905,503	4,386,354	2,278,253	1,286,592

Table B.47: 20% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €	18.42 €
CER trading values (US$/Ton CO_2)				$27.08	$27.08	$27.08	$27.08	$27.08	$27.08	$27.08	$27.08	$27.08	$27.08	$27.08
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**									
			value	unit	value	unit								
Capture				$	3.0	$/t								
Compression				$	7.5	$/t								
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												

Change in CERs to 18.42 euro/ton of CO2

	NPV	**IRR**
For 7 year	34,676,811	47.8%
For 10 year	44,719,732	48.6%

REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	47,481,912	66,262,024	70,393,794	73,399,049	65,887,730	61,378,032	49,734,944	28,701,800	16,684,418	11,800,426
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	83,961,472	116,253,114	123,357,525	128,524,937	115,609,530	107,855,288	87,835,470	51,669,831	31,006,429	22,608,603
ROYALTY		12.5%		0	10,495,184	14,531,639	15,419,691	16,065,617	14,451,191	13,481,911	10,979,434	6,458,729	3,875,804	2,826,075
NET	**REVENUES**			0	73,466,288	101,721,475	107,937,834	112,459,320	101,158,339	94,373,377	76,856,036	45,211,102	27,130,626	19,782,528
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	12,215,630	19,922,532	21,972,651	23,587,742	21,141,626	19,854,652	15,812,961	8,145,092	3,958,860	2,527,344
Income tax		50%		0	6,107,815	9,961,266	10,986,326	11,793,871	10,570,813	9,927,326	7,906,481	4,072,546	1,979,430	1,263,672
NET INCOME AFTER TAX				0	6,107,815	9,961,266	10,986,326	11,793,871	10,570,813	9,927,326	7,906,481	4,072,546	1,979,430	1,263,672
NET CASH FLOW				25,000,000	-10,653,270	14,052,175	14,622,689	14,975,689	13,298,086	12,200,053	9,724,662	5,436,183	2,888,521	1,718,217
PRESENT VALUE @		15.0%	Discount rate	25,000,000	-9,263,713	10,625,463	9,614,656	8,562,399	6,611,499	5,274,420	9,724,662	5,436,183	2,888,521	1,718,217

Table B.48: 30% changes in CERs

Main Assumptions				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CER trading values (Euro/Ton CO_2)				19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €	19.95 €
CER trading values (US$/Ton CO_2)				$29.33	$29.33	$29.33	$29.33	$29.33	$29.33	$29.33	$29.33	$29.33	$29.33	$29.33
CO2 emission (ton)					2187700.75	2997995.14	3176266.17	3305932.09	2981845.69	2787268.42	2284910.99	1377406.37	858899.50	648172.79
Cost of the Projects			**CAPEX(US$)**		**OPEX**			**Change in CERs to 19.95 euro/ton of CO2**						
			value	unit	value	unit			**NPV**	**IRR**				
Capture				$	3.0	$/t		**For 7 year**	45,167,017	57.0%				
Compression				$	7.5	$/t		**For 10 year**	57,288,076	57.6%				
Transport				$	5.0	$/t								
Storage				$	8.50	$/t								
Total			25,000,000	$	24.0	$/t								
Gas price	7.14	million BTU												
REVENUES OF CER SALES				**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Emission reduction (Ton)				0	1,753,562	2,447,134	2,599,725	2,710,713	2,433,311	2,266,762	1,836,770	1,059,991	616,175	435,803
Total sales of CERs				0	51,425,850	71,765,873	76,240,836	79,495,712	71,360,490	66,476,208	53,866,023	31,085,826	18,070,257	12,780,591
Gas sale production (BTU)				0	5,109,182	7,001,553	7,417,889	7,720,713	6,963,838	6,509,419	5,336,208	3,216,811	2,005,884	1,513,750
Other revenues from gas sale				0	36,479,560	49,991,089	52,963,730	55,125,889	49,721,800	46,477,255	38,100,525	22,968,031	14,322,012	10,808,178
TOTAL	**REVENUES**			**0**	87,905,410	121,756,963	129,204,566	134,621,601	121,082,290	112,953,463	91,966,548	54,053,857	32,392,269	23,588,769
ROYALTY		12.5%		0	10,988,176	15,219,620	16,150,571	16,827,700	15,135,286	14,119,183	11,495,818	6,756,732	4,049,034	2,948,596
NET	**REVENUES**			0	76,917,233	106,537,342	113,053,996	117,793,901	105,947,004	98,834,280	80,470,729	47,297,125	28,343,235	20,640,173
EXPENSE	CAPEX			25,000,000	0	0	0	0	0	0	0	0	0	0
	OPEX				52,504,818	71,951,883	76,230,388	79,342,370	71,564,297	66,894,442	54,837,864	33,057,753	20,613,588	15,556,147
Maintenance Costs	8.0%	of operating cost			4,200,385	5,756,151	6,098,431	6,347,390	5,725,144	5,351,555	4,387,029	2,644,620	1,649,087	1,244,492
TOTAL	DIRECT OPEX COSTS			0	56,705,204	77,708,034	82,328,819	85,689,760	77,289,440	72,245,998	59,224,893	35,702,373	22,262,675	16,800,639
DEPRECIATION	(SOYD)		Investment	Years=	10	9	8	7	6	5	4	3	2	1
Total depreciation			25,000,000	0	4,545,455	4,090,909	3,636,364	3,181,818	2,727,273	2,272,727	1,818,182	1,363,636	909,091	454,545
NET INCOME BEFORE TAX				0	15,666,575	24,738,399	27,088,813	28,922,323	25,930,290	24,315,555	19,427,655	10,231,115	5,171,469	3,384,989
Income tax		50%		0	7,833,288	12,369,200	13,544,406	14,461,161	12,965,145	12,157,778	9,713,827	5,115,557	2,585,735	1,692,494
NET INCOME AFTER TAX				0	7,833,288	12,369,200	13,544,406	14,461,161	12,965,145	12,157,778	9,713,827	5,115,557	2,585,735	1,692,494
NET CASH FLOW				-25,000,000	12,378,742	16,460,109	17,180,770	17,642,980	15,692,418	14,430,505	11,532,009	6,479,194	3,494,825	2,147,040
PRESENT VALUE @		15.0%	Discount rate	-25,000,000	10,764,124	12,446,207	11,296,635	10,087,431	7,801,905	6,238,705	11,532,009	6,479,194	3,494,825	2,147,040

Vitae

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