Web added value : support for projects analysis within BP Gas & Power

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web added value

Support for projects analysis within BP Gas & Power

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Assignment paper

web added value

Support for projects analysis within BP Gas & Power

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i Preface

Putting together this paper has taken a lot of my time and energy I would not have been able to do this without the support of my wife and friends. I would like to thank all of them for their support in this period I also want to give special thanks to Claire Berresford because she has been one of my colleagues that supported me very much in the completion of this assignment.

ii Executive Summary

The final stage of a study at the University of Eindhoven (faculty Technology Management (TEMA), section Technology and Policy) is the completion of a thesis. In the TEMA study, both technical science and social science are important.

As an employee of BP Gas & Power, I was offered this assignment as a thesis topic. The assignment links technical projects with economical analysis

BP Gas & Power is looking for a tool that assists them in analysing and valuing projects that are separate, but closely linked together. This tool should be able to demonstrate that additional value is created between two projects and their combined value is greater than the sum of the individual projects. Therefore this thesis will be looking at the value and linkages between projects

Looking at the value of and linkages between projects requires not only economic skills but also technical knowledge about these projects to understand how they are linked It is also important to be able understand technical inputs, outputs and links A TEMA engineer combines those skills.

In the UK, BP Gas & Power is one of the largest energy suppliers but in mainland Europe their position is small. BP Gas & Power aspiration is to become a "leading energy supplier in Europe". In order to achieve this status, BP Gas & Power will need to acquire some assets that give them a significant position in the market. The energy markets in Europe are currently in a liberalisation and de-regulation phase This creates a lot of uncertainty in the market, but at the same time this creates possibilities for third parties to enter

BP Gas & Power organises its work into distinct projects Common to all projects is that they require investment of resources, in the expectation that the investment will give rise to certain benefits over time. Since every organisation has limited resources, every organisation that undertakes projects is faced with a basic economic problem: *Which is the best way to invest our scarce resources*? Usually there are different, competing projects in which the limited resources of an organisation can be invested. Therefore, *investment choices* have to be made [1]. To make these choices BP Gas & Power uses NPV and IRR, which are frequently, used criteria to determine the feasibility of a project

Cost Benefit Analysis (CBA) is always done for each individual project. All costs and benefits, which a project gives rise to, are taken into account. However, any influence (costs or benefits) that this project could have on the feasibility of other projects, which might be expected to be executed together with that project, will not be taken into account in the CBA for that particular project. Likewise possible influences, which these other projects may have on the project in question, will not be taken into account when assessing the feasibility of this project by means of CBA. Currently BP Gas & Power has been evaluating some projects that have strong links with each other BP Gas & Power would like these projects to go ahead because they are very important in their business strategy However, with the current evaluation methodology these projects are not seen to generate sufficient income for BP. If the influence that one project has on the other would be taken into account the income might be sufficient for BP to go ahead

This assignment will focus on this assumed deficiency by introducing a methodology, which incorporates extra value that arises from implementing a cluster or **"web"** of (technically) related projects in a CBA for an individual project. This extra value is referred to as **web added value.**

Since BP Gas & Power assume there are linkages between the projects that they are looking to progress which are generating additional income to these projects and therefore the following problem definition has been defined for this assignment:

How can BP Gas & Power calculate the true expected returns on investment (or revenues) for BP, created by projects that are part of a web?

In this assignment, BP projects will be used to analyse the effects web added value has. The research approach used in this assignment is descriptive and uses real cases for the analysis. The set of projects chosen to be used as cases in this research approach are those that BP feels will enable it to become a significant player in the gas and power market of Europe. These projects are particularly important to BP Gas & Power since they assist BP Gas & Power in overcoming some of the constraints they encounter in the market.

Since it is assumed that web added value comes from linkages between the projects three linked projects are selected The projects are linked economically and technically, which makes them suitable projects for this assignment.

If BP Gas & Power wants to become a major energy supplier in the Netherlands they have three major issues to overcome·

- They need to supply gas to customers;
- They need to cover a full supply, which implicates covering for swing and flexibility[1];
- They need to transport gas from the market to the customers

The first project is acquiring a customer base in the Netherlands (also known as the Botlek Project) The aspiration of BP Gas & Power is to become one of the biggest energy suppliers in mainland Europe. The supply of gas to customers in the Netherlands is a start. The second project is acquiring capacity in an offshore storage project in the Netherlands. This project is economically and technically linked to the customer base since BP Gas & Power will be able to use the services from the storage directly for the customer base to cope with swing and flex. The third and final project for this assignment is the acquiring of transport capacity in a pipeline in the Netherlands (called Zebra) that links the Botlek area with the existing trading hub[2] in Zeebrugge The fact that this pipeline links both the customer base and the storage to the trading hub in Zeebrugge makes this project very suitable for this assignment In summary, the three projects are:

- Building a customer portfolio in the Netherlands (Botlek Project);
- Storage acquisition from a new gas storage project in the P15-P18 concession, offshore of the Netherlands;
- Acquiring pipeline capacity in a Dutch transmission system

Although the first project has started already it will be treated as if not started since similar evaluations will be taken place for other countries in Europe
All three case study projects have been evaluated with the standard "BP-methodology". It is clear from the decisions BP Gas & Power management have taken that none of these projects are viable The reason the first project has gone ahead anyway is strategic - to make sure that BP Gas & Power gains the required market share in the Netherlands In the global BP structure, it is only allowed to take on a project for strategic reasons if there is a high expectation that the income in the future will make it worthwhile doing so.

BP Gas and Power needs projects like these in their approach to become one of the bigger energy marketing companies in continental Europe. They also believe that there is value created outside the traditional evaluation methodology This means that they need a methodology to calculate the value that these projects really generate.

It is important to understand the fundamentals of the current "BP-methodology" in order to see where additional value could be created and how this value might be calculated. In this assignment, the current "BP-methodology" which is based on a traditional value chain approach will be discussed In Chapter 4, the individual projects are analysed using this traditional approach

[1] *Flexibility (Flex) is defined as the difference between the off-take within hour and the next hour. Since BP Gas and Power has to buy a constant gas supply over the 24-hours of the day, BP Gas and Power needs to manage the differences between this supply and the off-take of the customer. Swing is defined as the difference between the off-take of a day compared to the next day.*

[2] *A trading hub is a location where trading (physical and virtual) is taking place. Often it is a location where more than one supply source comes to and where more than one market is attached. It is comparable to a stock exchange.*

From the current "BP-methodology" BP Gas & Power then wants to go to a new "BP-web value methodology". In the new approach it is important to see that the connections between the various elements of the traditional value chain are now combined into a web. This new approach might assist BP Gas and Power in their approach to enter the European energy market BP Gas & Power believes in this approach for several reasons

- Liberalisation; this puts pressure on companies to create value in all possible ways;
- Technology changes and the importance of knowledge; this facilitates additional ways of value creation beyond the traditional value chain method.

In other words, the first reason is the market they are operating in is liberalising, de-regulation is taking place and a lot of changes are approaching the market. The second reason is the constant technology change that is happening around BP Gas & Power Knowledge is becoming increasingly important and information is becoming a key driver for income.

It is very important that the projects within the web are linked closely Synchronising of the projects in time, place, scope and usage will be very important. If all four synchronisation elements are present it is believed that web value will be added.

In order for BP Gas & Power to make the concept of web added value something that they can use in their approach of the market they will need to make sure that:

- They have access to the web components (projects);
- They have access to the knowledge and systems needed to do the projects;
- They have the technology infrastructure to collect, share, interpret and act on information;
- They have the organizational infrastructure (talent & processes) needs to create value from the given information

If they have all of this they will be able to calculate the web added value, however that is still no guarantee that they will be able to generate the web added value in reality

In the research for this assignment it has become clear that BP Gas and Power strongly believes that potential for web value is something that will help them in building a sustainable position in mainland Europe. This web brings BP Gas and Power more information regarding the energy market they are present in. It also creates optionality that BP Gas and Power then can utilise in the best way to create additional value for the individual projects. Last but certainly not least it creates information that trading can use to optimise their positions In summary the main drivers in the "BP-web value methodology" are:

- Optimisation;
- Optionality;
- Information

In Chapter 6 the projects used in this assignment were analysed again now using the web added value method. In the analysis the projects were combined in pairs in order to see the effects they had on each other Since the "Botlek" project is a core project for BP Gas & Power this was taken as the central project The "Botlek" project was first combined with the storage project and then with the pipeline project In both cases, the outcome of the combined projects improved but wasn't sufficient to make the projects attractive for BP Gas and Power Finally all three projects were combined. The outcome of that was sufficient for BP Gas & Power to make the combination of projects attractive, but a risk analysis still needs to be performed before final judgement can be taken.
Looking at the amount of work and the difficulty of these analyses it must be said that using more than three projects might be too complex.

The conclusion of this must be that there is web value between projects in the assumed areas In this assignment this web value has been calculated specifically for the case study projects and although the projects represent the kind of projects BP Gas and Power is looking at, this doesn't mean that the method used can be copied easily. The main points to keep in mind when using the approach on other combinations of projects will be:

- Projects must have natural links;
- The number of projects may not be too much (maximum 3 to 4).

Further study is recommended. In the aims of this assignment paper it was already stated that this should be the framework or the start document for further work and this has proved to be the case. The framework

has been set. BP Gas and Power will be able to use these examples but they will need to do more of these analyses to make sure that the senior management will accept the valuation method unconditionally.
In the next phase of study, four important areas need to be covered.

- The first area that was not in the scope of this assignment is the valuation methodology for calculation option value;
- The second area that the study needs to cover is information value;
- Third and final point that needs to be worked on is the practical check;
- Risk analysis of the combined projects.

Markowitz in his theory mentions the risk return relationship, which he believes can be improved by holding a portfolio of assets (i.e., supplies, contracts, hard assets or customers) with different, uncorrelated or poorly correlated risks (i.e., diversification) He also points to the fact that if the projects are not aligned it might be that the income of the projects improve but the incorporated risk in the total web might increase dramatically. This is also a factor that needs to be investigated in order make sure that the webs that BP Gas & Power wants to create do not significantly increase the risk attached with the projects

1. Scope of the Assignment

Within the framework of a study at the University of Eindhoven (faculty Technology Management (TEMA), section Technology and Policy) it is necessary to finalise the study with a thesis. In the TEMA study the importance of technical science and social science are combined. I am working for BP Gas & Power and they offered me this assignment, which links technical projects with economical analysis
BP Gas & Power is looking for a tool that assists them in analysing and valuing projects that are closely linked together. This tool should be able to demonstrate that there is more value between two combined projects than the sum of the individual projects. Therefore this thesis will be looking at the value creation and linkages between projects.
Looking at the value of and linkages between projects requires not only economic skills but also technical knowledge about these projects to understand how they are linked. Besides that it is important to be able to valuate technical in- and outputs and links. A TEMA engineer combines those skills

1.1 Introduction

Within this chapter a general impression of the background of the project will be given by firstly explaining in short how BP performs economic analyses and secondly giving an overview of the market forming the environment in which projects will operate. In the following part of this assignment paper the problem definition that is used as a guide within this assignment is described. From this problem definition, a few clear objectives have been identified which divide the problem definition into sections that are clear and can be answered individually. This chapter introduces the rest of this paper.
The end result of this research assignment will be a first step in the development of a "CBA web+" methodology for analysing projects

1.2 Projects and Analysis

Projects are interventions executed by organisations in order to reach their goals. In commercial firms, organising work in the form of projects is becoming more and more common, because it is a great tool to promote efficiency. Common to all projects is that they require investment of resources, in the expectation that the investment will give rise to certain benefits over time. Since every organisation has limited resources, every organisation that undertakes projects is faced with a basic economic problem: *Which is the best way to invest our scarce resources?* Usually there are different, competing projects in which the limited resources of an organisation can be invested. Therefore, *investment choices* have to be made [1].

Cost-benefit analysis (abbreviated: CBA) is a technique that has been designed to help organisations select those projects that will probably contribute most to their objectives, bearing in mind their resource limitations. In a CBA all costs and benefits associated with the project are identified. Then all costs and benefits are valuated. In the CBA all costs and benefits will occur over time and will be registered as cash inflow or outflow, at the time they will occur

NPV and IRR are frequently used criteria to determine the feasibility of a project. BP uses both criteria to appraise their projects. Both criteria require a so-called discounting technique to reference all cash back to the value it has today[3]

CBA is always done for each individual project. All costs and benefits, which a project gives rise to, are taken into account. However, any influence (costs or benefits) that this project could have on the feasibility of other projects, which might be expected to be executed together with that project, will not be taken into account in the CBA for that particular project. Likewise possible influences, which these other projects may have on the project in question, will not be taken into account when assessing the feasibility of this project by means of CBA. Currently BP Gas & Power has been evaluating some projects that have strong links with each other. BP Gas & Power wants these project because they are very important in their business strategy. With the current evaluation methodology these project don't generate sufficient income for BP. If the influence that one project has on the other would be taken into account the income might be sufficient. This assignment will focus on this assumed deficiency by introducing a methodology, which incorporates extra

[3] *The NPV is the sum of the discounted annual net cash inflows (= all inflows minus all outflows) during the lifetime of the project. The IRR is the rate of discount, which results when the NPV is set to zero. In other words comparable to the rate you get when putting your money in a bank account (see paragraph 4.1)*

value that arises from implementing a cluster or "web" of (technically) related projects in a CBA for an individual project This extra value is referred to as web added value. It is visualised in figure1.

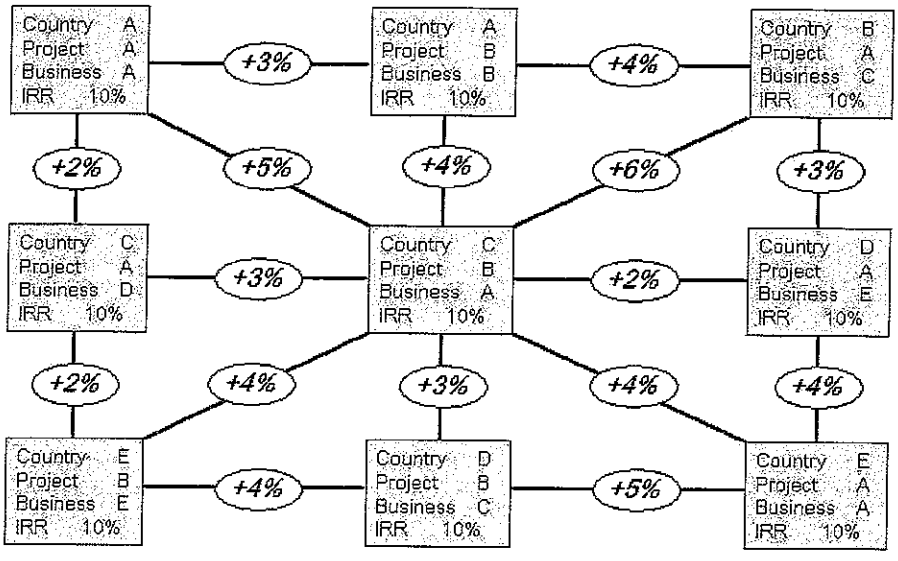


Figure 1: Web added value structure

1.3 Background

In this paragraph the background to the assignment for BP Gas & Power will explained In the background the reason and importance of web value will be explained.
EU directives (Gas directive no. 98/30/EC Electricity directive no 96/92/EC) for energy markets are forcing European energy markets to change The current monopolies need to be liberalised and third parties will take part in the energy markets all over Europe. This process, from a monopoly into a fully liberalised market, has already been completed in the United Kingdom (abbreviated: UK). It has taken the UK about 16 years to complete the process, from the first Gas act 1985 until now.
Due to the changing energy markets new players are now able to enter The incumbent monopolies are in danger of losing their dominance in these markets Because the UK is already a fully open market, a lot of European and American companies have entered this market.
BP as a global energy producer has got a position in energy supply in many places around the globe, but its position in the end-user market for gas & power in continental Europe is very small Countries like the Netherlands, Belgium, France and Germany are not yet fully on the Gas & Power map of BP (while it is one of the largest energy companies in the UK) In the long-term strategy BP has stated that it aims to have a significant marketing position in Gas & Power by 2004, and therefore they have started to enter the European energy markets.
As a traditional oil company BP is used to perform projects (e.g. drilling wells, producing oil, refining oil, producing chemicals, etc.) that generate high-income levels (IRR of about 15-20%) In the new business stream that BP has entered, Gas & Power, they want to see the same project performance Looking at individual projects in opening and competitive markets (with strong incumbents), this will be difficult to establish.
BP Gas & Power has conducted CBA's for a number of projects in Europe. The CBA assessments of most of these projects show internal rates of return (IRR) that are too low for BP (compared to the standard BP is used to). However, there is a suspicion among BP Gas and Power staff that the standard CBA technique, as currently used by BP, leads to IRR's that underestimate the full returns that these projects are likely to generate As stated in paragraph 1.1, additional value could be generated outside the domain of the individual project, and will be caused by external effects (also called: spillovers) from and to other projects, which are executed together with that project [2]

Governments want gas and power markets to be liberalised. Therefore legislation will be put in place that assist de-regulation. In the new liberalised world only strategic assets (e g the transmission grids or storage facilities) will be controlled by regulation [3]

Investing in projects that will be regulated (and are only allowed regulated returns, which are compared to BP standard returns of 15-20%, low) is not something BP is likely to do. However BP Gas and Power needs projects like this to gain leverage within the new markets. These projects will give BP Gas & Power market presence and provide BP Gas & Power with the same opportunities as current market players who do own assets like this Therefore given the fact that BP Gas and Power needs to execute projects to gain a position in the liberalising market, they need to prove that more income is likely to be generated from a project than the income that is shown by the currently used valuation methods.

To acquire the market share BP Gas and Power wants to have by 2004 they need several such projects to go ahead. These projects can all be seen as part of a web of projects because they are technically linked. The additional value that will be created through implementation of a set of projects in this web will be referred to as web added value. Web added value may be present within a cluster of related projects, which are to be implemented together. In other words the total value could be more than the sum of the individual values and BP Gas & Power needs a methodology to show this to the management of BP, because BP Gas & Power needs these projects (with low NPV and IRR's) to go ahead

1.4 The assignment

1.4.1 The Problem Definition

In the previous paragraphs it has become clear that BP Gas & Power assume there are linkages between the projects that they are looking to progress which are generating additional income to these projects and therefore the following problem definition has been defined for this assignment:

How can BP Gas & Power calculate the true expected returns on investment (or revenues) for BP, created by projects that are part of a web?

Within the Gas & Power stream of BP it is broadly assumed that linking projects in a web will create additional value. Current valuation methods don't incorporate this value Several people within the Gas & Power stream have been looking at webs and web added value but a method of finding and evaluating this has not yet been generated In other words BP Gas and Power want to convert the process of qualitative analysis of web added value into a quantitative analysis

1.4 2 The Objective(s)

This assignment tries to determine where the assumed web added value is generated and which elements can be identified that generate this value in order to capture it in a CBA. Key questions in this assignment that need to be answered are:

- *Value is added through the product and service value chains But beyond these relatively straightforward sources of value, which other distinct sources of value does a web of projects provide? Specifically, what sources of value are provided by the interconnectedness of the projects in a web?*
- *Is web added value likely to be generated by implementing a cluster of related Gas and Power projects, which are simultaneously being assessed?*
- *Assumed yes, where do the web values between these Gas and Power projects come from?*
- *And how can they be taken into account when analysing the financial feasibility of these projects by means of CBA?*

Within this assignment we define a web as:

"A web is a cluster of projects that, when brought together and interlinked, create incremental value above the sum of the standalone values of the individual projects, beyond the impact of economies of scale[4] and scope[5]"

[4] *When a company operates in a too small a scale in an individual product it is possible to enjoy significant economies of scale by using the component in different products This effect is called the economies of scope [18]*

[5] *Economies of scale and scope are already used in project appraisals and are not a specific value created by webs*

1.5 Research methodology

The problem definition provides no clear idea where the web added value comes from. Since the aim of the assignment is to come up with a framework for a methodology, the use of a descriptive research method for this assignment is a logical choice since BP Gas & Power already uses the idea of web value. BP Gas & Power has already started to use their idea regarding web added value in projects and these could be analysed (as case studies) using this research approach. Therefore the research approach used in this assignment is pragmatic and involves case studies. Literature (e.g. Sawney & Parikh [4]) indicates that web (or as Sawney & Parikh say, network) value comes from "forces within the interconnections between the participating elements". Their approach is to reshape the structures in the organisation to optimise the value creation. Taking example projects within BP and analysing them in two ways, traditional and modern, (including web added value) should give indications how to shape the use of web added value.

The information used in this assignment comes from primary sources within BP Gas and Power (analysis, interviews with experienced people, internal workgroups, financial reviews) and is supported when necessary by literature review.

1.6 Stages within this assignment

In the previous paragraph we have seen that the research methodology is descriptive and that this means that in this paper case studies will be used. Therefore the set-up of this paper needs to follow this methodology. The first stage in this approach is to analyse the case study project according to the current BP methodology, the second stage will be to determine where web value might be located and how it influences the projects. The third and final stage is re-calculating the case study projects with the changes due to web value.

As described in paragraph 1.3 the cause of the assignment lies within liberalisation. Therefore the liberalisation process will be explored in chapter 2. The case study projects that will be used in this assignment are all projects from BP Gas & Power in Northern Europe. To understand the position the energy market in Europe is in some background to the market will be given in chapter 2. To understand the stages the case study methodology will follow, it is important to understand the position BP Gas & Power has within the BP organisation. Their position will be explained in chapter 3. Also in chapter 3 all relevant information regarding the used case study projects will be described which is necessary to understand the analysis of the projects.
With all this necessary information, the first stage in the research approach can be taken, the BP analysis of the case study projects. In chapter 4 the analysis will be presented including the conclusions for BP Gas & Power. BP Gas & Power believes that web value is created when linked projects are executed. The origin and the valuation of these web values will be described in chapter 5. Next and final stage in the research is the analysis of the case study projects in the new "web value" methodology. Therefore in chapter 6 the projects will be analysed again but the difference due to web added value be will taken into account.
The conclusion of this assignment, the comparison between current system and the web value system, will be presented in chapter 7 and finally in chapter 8 all recommendations that should help BP Gas & Power to develop the web value methodology further in order to succeed in their aim of becoming a significant large player in the European energy market.

2. Liberalisation in Europe and the implication for BP

2.1 Introduction

Because BP Gas & Power wants to become one of the largest energy suppliers in Europe, regulatory affairs are very important. The context for this assignment can be found in the European natural gas market and its liberalisation. To understand the basis of the issues discussed in this assignment, an introduction to the European natural gas industry and the development of liberalisation will be presented
In the overview that this chapter will give the reader will be explained about the physical (paragraph 2.2.1), commercial (paragraph 2.2.2) and trading markets (paragraph 2 2.3) for gas in Europe. It also will explain the current position of liberalisation in the European countries (paragraph 2.2.4) and the EU directives (paragraph 2 2.5). And finally to understand the implications for BP Gas & Power in this market it is important to understand the importance of liberalisation for BP (paragraph 2.3.1) Since BP is a major global company they are in the position to influence processes like liberalisation by presenting their views (paragraph 2.3.2, 2.3.3 and 2 3.4). The most relevant constraints for BP Gas & Power are described in paragraph 2 3 5

2.2 The European Natural Gas Market and Liberalisation

2 2 1 The Physical Market:
As a major company BP is represented in the total value chain in the energy industry To be able to understand the position BP Gas & Power has in the energy market, and to understand the position the case study projects are in it is import to understand the layout of the physical market.
The physical market can be divided into upstream, midstream and downstream processes (as shown in Figure 2). Upstream processes include production, imports and processing of natural gas. It is clear from figure 2 that trading and storage are connected to all three parts of the physical market.
The European Union (EU) has significant indigenous natural gas production but will become increasingly dependent on imports, primarily from Russia, Algeria and Norway as shown in figure 3 because the natural reserves are diminishing. In figure 3 it is clear that from 2005 onward Europe needs to make sure that access to additional imports is secured There are ample supplies of natural gas outside the EU to meet demand in the foreseeable future.
Midstream and downstream activities include natural gas transit, transmission, storage, distribution, and supply. Natural gas may be transported by pipeline or in very low temperature tanks as liquefied natural gas (LNG)

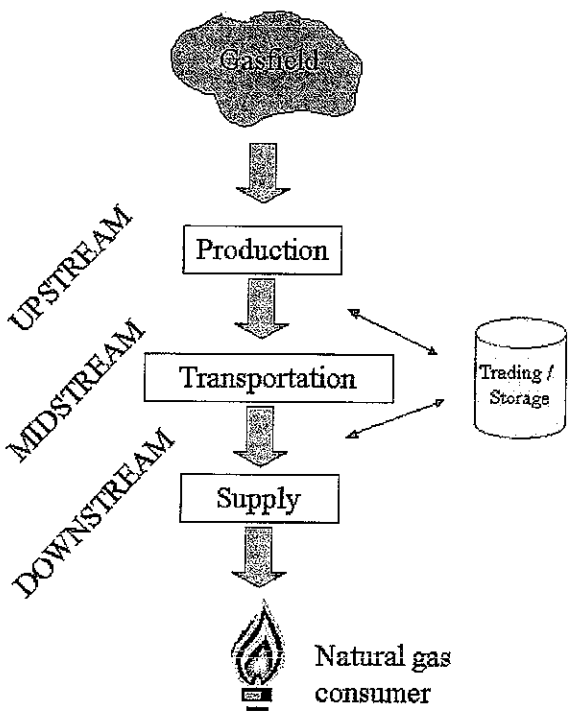
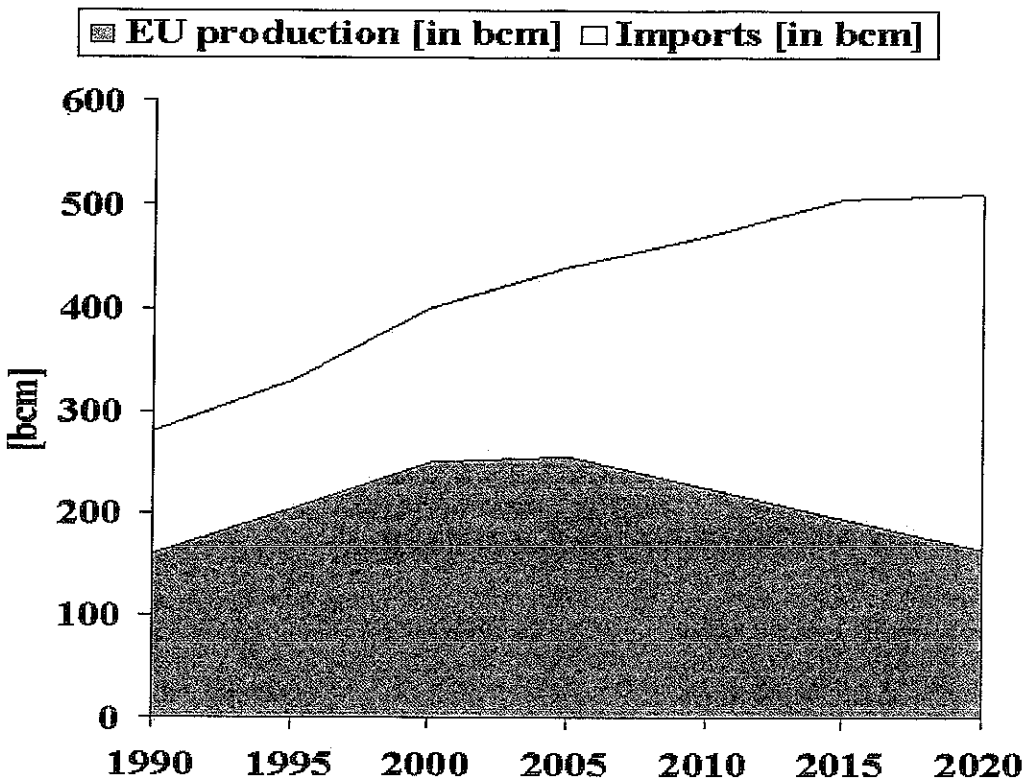


Figure 2: Physical market activities by sector



Source: EU, Energy Outlook to 2020

Figure 3: Europe increasingly dependent on imports

Across Europe many pipelines are present to transport imported and indigenous natural gas from and to the various member states There have been significant increases in capacity of pipelines and LNG facilities exporting natural gas to Western Europe in recent years. And it is clear from the demand curves shown in figure 3 that even more pipelines and LNG facilities are needed in the future.
There are 77 million natural gas consumers in the EU, of which 74 million are domestic users The future growth will be in natural gas as a fuel for power generation
In the physical market BP is present in upstream (BP Upstream) and in mid- and downstream (BP Gas & Power)

2.2.2 The commercial market
To understand the differences in value between projects it is necessary to know some things about the commercial markets BP (BP Upstream and BP Gas & Power) is in
Within the supply chain upstream, midstream and downstream activities are generally developed in different ways Upstream (BP Upstream) requires large investments (e.g. drilling wells and building platforms) and requires licences to be able to start drilling. Because of the large investments and the fact that licenses are not often given to a single party, more than one company develops upstream projects. In other words several companies share the concession license and the investments This structure makes decision-making regarding issues around the production difficult.
Within mid and downstream (BP Gas & Power) there are a variety of different models of natural gas supply markets in the EU ranging from integrated national monopolies to markets with many players and full gas-to-gas competition The midstream and downstream natural gas markets were generally developed with some form of supply monopoly, which was justified by the large investments required to build natural gas transportation and supply infrastructure, as well as the strategic nature of energy supply.
However, more recent market philosophy argues that monopolies are inefficient and lead to higher energy prices Industrial users have been one of the groups pressing for greater competition in natural gas supply, although this has met with mixed responses from national governments, partly due their strong links with state-owned natural gas companies
Within midstream and downstream, the players in the EU natural gas market include producers, transporters, suppliers, marketers, traders and consumers Various models of natural gas utility ownership exist in the EU including nationalisation and privatisation, different forms of public ownership, vertical and horizontal integration, and company shareholdings

In general BP Upstream will require projects to compete against and or cooperate with other upstream companies and BP Gas & Power will be competing against the incumbents

2.2.3 Natural gas trading markets

Within BP trading is taking a very important position. Trading is the tool that BP uses to optimise the value chain It is important for the assignment that some details regarding the trading markets for natural gas are known because this will play an important role in the case study projects

Traditionally, natural gas supplies have been based on long-term[6] negotiated contracts, with features such as take-or-pay[7] and oil price indexation[8]. In competitive markets short-term[9] natural gas trading normally develops. Short term trading typically starts with physical markets for supply/demand matching, but develops into liquid physical and financial markets providing a wide range of supply and risk management services. The emergence of short-term markets in the EU has started with several related markets at the British National Balancing Point ((B)NBP) in 1996, and at Zeebrugge (Zeebrugge HUB) in 1998. A form of short-term trading has also emerged in Eastern Europe with sales of excess natural gas by Gazprom There are a number of locations in Europe where natural gas trading hubs may emerge in the future, including Baumgarten, Bunde/Oude Staten Zijl, Emden, Rehden and Lacq. Key in the development of trading hubs is access to physical flexibility[10] tools such as storage and line pack These accomplish the transformation from physical to financial markets Typical flexibility tools are parking/loaning, title tracking, capacity trading, backup, balancing services and wheeling

2.2.4 Principles of liberalisation

In order to understand this paper it is important to clarify the principles of liberalisation. Competition, liberalisation and deregulation are terms often used to describe the same process, but actually refer to different activities. The negotiation and implementation of the Gas Directive is part of a larger argument regarding liberalisation of the energy market. Arguments for liberalisation focus on the effect of competition on prices and efficiency Both supporters and opponents of liberalisation use security of supply arguments Competition is also argued to lead to efficient use of, and investment in, natural gas infrastructure.

Factors encouraging the development of effective competition include the presence of new market entrants, customer pressure, natural gas and electricity convergence, natural gas trading, e-commerce, access to natural gas and transportation capacity, effective regulation, interoperability of infrastructure, and harmonisation of operational and commercial regimes.

All these elements of liberalisation need to be present in order for BP Gas & Power to become one of the leading energy marketing companies

2.2.5 The EU Gas Directive [5]

The centre of the liberalisation process is put in the EU directive The EU directive is the start and the guidance of the liberalisation process The case study projects are chosen because of the status the implementation of the directive is in.

The EU Gas Directive aims to further develop the single internal energy market. Energy had traditionally been excluded from the single market until the late 1980s From 1990, the European Commission began a long campaign to introduce legislation liberalising the natural gas and electricity markets The directive was finally adopted in 1998 and member states were required to transpose its terms of the directive into national law by August 2000

Key terms of the directive include market opening, third party access (TPA), rights to construct infrastructure, unbundling requirements for monopoly companies, and guidelines for regulation, derogations in certain conditions, harmonisation requirements and guidelines for further development of liberalisation Member states were required to open a minimum of 20% of national natural gas supply markets to competition by 2000 This will increase to 33% in 2008. Third Party access may be on the basis of negotiated contracts or regulated tariffs, but must be non-discriminatory Derogations from market opening and TPA are permitted for emergent markets and markets dependent on one main supplier In table 1, an overview is given of the liberalisation status of the European countries.

[6] *Long-term normally means longer than 1 month, but in this case it even means longer than 15 years*

[7] *Take-or-pay means that a certain part of the contract will have to be paid even if not used.*

[8] *Pricing structure that links the natural gas price with oil.*

[9] *Short-term means short than or equal to one or two month*

[10] *Flexibility is the difference between the hourly off-take by the customers and the total amount of input by the supplier*

Table 1: Summary of European countries

Country	Gas production [bcm]	Gas consumption [bcm]	Implemented Directive	Degree of market opening	Form of TPA
UK	99.6	91.6	May 1998	100%	Regulated
Germany	17.8	80.1	Dec 2000	100%	Negotiated
Italy	18.4	67.9	May 2000	96%	Regulated
Netherlands	70.1	40.4	Jun 2000	45%	Hybride
France	1.8	37.7	Not yet	20%	Hybride
Spain	0.6	15.0	Oct 1998	67%	Regulated
Belgium	-	14.8	Apr 2000	47%	Negotiated
Austria	1.7	8.1	Jul 2000	49%	Regulated
Denmark	7.8	5.0	May 2000	30%	Hybride
Finland	-	3.7	May 2000	90%	Regulated
Ireland	1.2	3.3	Jan 2000	75%	Regulated
Portugal	-	2.0	Not yet	Emerging market	Emerging market
Greece	-	1.5	Jan 2000	Emerging market	Emerging market
Sweden	-	0.8	Jun 2000	47%	Regulated
Luxembourg	-	0.8	Dec 2000	51%	Regulated

Source: Liberalising Gas Markets 2001, Petroleum Economist

As we can see in table 1 only a few countries are fully opened (UK and Germany) The Netherlands is open for 45% and has a hybride[11] regulation system Currently the Netherlands has a lot of new entrants in the 45% open market.

2.3 BP and the liberalisation process

As BP wants to take the opportunity to start supplying energy and energy related services to end-users within Europe it is important that regulations support these kinds of activities
To make sure that BP Gas & Power is aware of what regulators and other influential organisations are planning, they keep in close contact with a lot of the relevant organisations This chapter will give an overview of the liberalisation process in Europe and specifically point out some details of the Dutch situations since the projects that will be used are situated in the Netherlands.
The information in this chapter will give an understanding of the market where the example case study projects, used in chapter 3, are being processed in It should also provide them with the basics of why BP Gas & Power has a problem with the current CBA methods within BP

2.3.1 Importance of liberalisation to BP

Since BP Gas & Power want to supply energy and energy related service to end-users in Europe they will need to be able to buy energy somewhere in the market and take it to the customer site Being able to do this means using pipelines, cables or other ways of transporting the energy It also means using storage, conversion[12], blending[13] and or other facilities to handle these supplies. Building these facilities would not make a lot of sense since in most cases connections are already built. Therefore BP Gas & Power will need to use these existing facilities Within the liberalisation process government (EU and/or local) will need to define rules that make it possible for 3rd parties to use the existing facilities in order to enter the market.

2.3.2 Achieving effective competition

BP has as a global company an obligation to inform governments and regulators about issues that concern the market BP is active in Therefore BP Gas & Power is informing the EU and regulators in the European countries BP Gas & Power is active in (or wants to become) about issues regarding the liberalisation

[11] *Hybride is a combination of regulated and negotiated. This means that a regulator regulates part of the process and part of the process can still be negotiated between the operator of the system and its customers.*
[12] *Conversion: changing the gas quality from gas into a different quality to make it compliant with the system it is flowing into. The components of the gas that are too low to meet the specifications will be added*
[13] *Blending: is similar to conversion but the change in quality will now be arranged by mixing different gas qualities. The proportions of each gas will determine the end result*

process. BP believes that effective liberalisation is needed to create more choice for customers and competition in the end-use market To be effective in developing a long-term efficient market, regulations need to account for theoretical, contractual, investment and practical realities and the special problems associated with new entry. Progress in liberalisation will depend on tackling issues in all these areas. BP believes that consultation processes that are being held in several countries are an important means of acquiring the knowledge and experience by the regulators. These consultations constitute effective action in securing competition. Beyond that, it is essential to ensure that attention is given to the project management of the liberalisation process.
Changes need to be generated in opening transportation grids for access of third parties But not only access is important. Also the costs of access need to be equal to all parties including the incumbent. Access to information is also crucial for everybody in the market; in an open market, information needs to be transparent and free to access by everybody. Equal possibilities need to be available to everybody i.e. access to flexibility, quality conversion and other necessary tools to play within the rules of the prevailing system The costs for accessing these services should also be equal to all players including the incumbents With such large changes and implications for all companies involved, resources especially IT and knowledge and experience within new entrants, are often constraining factors to the development of competition.
BP believes that in order to maintain pace without compromising the aim of delivering choice to customers, simplicity of regulations and low barriers to entry are often the desired emphasis in the early phase of liberalisation Further, effective project management of the liberalisation process is vital to its overall success.
In summary this means that achieving effective competitions needs actions. BP has chosen the most important issues and will try to have these implemented correctly in all the European countries The next paragraph will describe these issues

2.3.3 Most effective action
In the previous paragraph BP's ideas regarding achieving effective competition are presented The actions BP Gas & Power is taking to optimise the way liberalisation is progressing are focussed onto specific actions. These actions are mentioned in this paragraph.
BP believes that three features would, from its experience, best address the key issues that prevent competition developing in the natural gas market at present, and these are as follows:

- *Sale of transmission rights by entry capacity and exit capacity* would facilitate trading of wholesale gas, by focussing trading at a point (within the transmission system), thereby increasing liquidity This system, by means of charging methodology at entry and exit, lends itself easily to account for backhaul benefits and congestion charging.
- *Daily balancing regime*: would significantly lower current barrier to entry Currently the physical and financial burden of the hourly balancing regimes (where applicable) makes entry into the natural gas market uneconomic. In concert with a daily balancing regime, there should be a flexibility and cash-out mechanism that charges shippers for imbalances they incur, but the cash-out charges should be based on the net balancing requirements on the system occasioned by all shippers Individual shipper charges should be pro-rated to the proportion of the imbalance of each individual shipper.
- *Gas quality conversion service*: would extend genuine competition, other factors allowing, to those customers on the low-calorific system, whose choice is currently limited due to the lack of availability of low-calorific gas to new entrant shippers This service would involve a swap facility, whereby credits for energy entered into the system in one form of gas would be useable in the other system, for a charge This charge would represent the pro-rated portion of total costs of the transporters in providing the service.
- *Release Gas*: The local incumbent owns a lot of contracts (mainly long-term) that helped him in the past to cover the total demand of the country In a liberalised world where competitors take over the supply to part of the market, these long-term contracts become difficult for the local incumbent. The take or pay[14] obligations in these contracts will force the incumbent to sell the gas. BP Gas and Power wants to push the regulator into opening some of these long-term contracts BP Gas and Power thinks that the incumbent otherwise starts dumping gas into the market in order not to lose the customers.

The conclusion is that although BP is a producing company, they believe that it is important for the whole industry that liberalisation is present The main issues that need to be arranged are, easy access to the distribution grid, equal access for everybody to flexibility mechanisms, equal access to conversion methods and last but not least access to gas supplies.

[14] *Take or pay means that part of the gas has to be taken by the customer If the customer doesn't take that gas during the required period he still has to pay the price for it. This is a well know penalty regime in energy contracts*

2.3.4 Constraints for BP Gas & Power due to the speed of liberalisation
From the information this chapter gives we can see that liberalisation has only started to work in Europe. In most of the European countries it has only started because market parties (incumbents) are just starting to do something although the law in their country is not yet in place (e.g. France). In other countries the law is not pushing the local incumbents enough to force market opening to be efficient (e g Germany where the Law only forces market parties to act as they see appropriate, the German Law only pushes for negotiated access).
BP believes that markets are not opening with the speed they should in order to comply with the regulations set by the EU. The effectiveness of opening is very low and BP believes that opening up the EU will take almost as long as it took the United Kingdom (10-16 years) if nothing is changed in the process. BP keeps pushing the regulators in order to move faster and more efficiently. It is believed within BP that their goals will need to be adjusted if the European regulators are not speeding up the implementation of liberalisation.
Since BP Gas & Power wants to enter into the gas and power markets of Europe and become one of the largest energy suppliers they will need to prepare for a difficult task. For the next few years uncertainty will be driving the process and the customer pressure will be low compared to the constraints BP will have (i.e capacity constraints, supply constraints) entering the various systems i.e. BP will face higher costs for entering and services needed in the systems and will need to build an organisation with knowledge and systems to be able to compete (as mentioned in paragraph 2 3 2)
Projects that BP Gas & Power wants to start in order to enter these markets will, due to the high costs of entering, have low to negative incomes (when viewed in isolation). And this is the reason why BP Gas & Power wants to be able to understand web added value
Within the Netherlands BP Gas & Power has set-up a project called "Botlek". This project aims to generate a customer portfolio within the Netherlands. This customer portfolio is in the Botlek area and consists of large to very large industrial users

2.4 Conclusions

In this chapter it has become clear that the market BP Gas & Power is in has only started to open up for new entrants to come in. This means that BP Gas & Power will have difficulties for a quite some time before everything is as it should
BP Gas & Power will need to be very entrepreneurial in its way of entering this market because barriers are placed everywhere. The way BP Gas & Power wants to overcome these barriers are by firstly pushing for the speed in the liberalisation process and by acquiring key projects in order to position themselves better.

3. The projects used in this assignment

3.1 Introduction

As described in chapter 1, in this assignment BP projects will be used to analyse the effects of web added value on the outcomes of project appraisals. The research approach used in this assignment was descriptive and uses real cases for the analysis To be able to use a suitable set of projects for this research approach, BP Gas & Power has chosen a set of key projects in their approach to become a significant player in the gas and power market of Europe. These projects are important to BP Gas & Power since they assist BP Gas & Power in overcoming some of the constraints they occur in the market. In this paragraph the chosen projects will be described Although the "Botlek" project is already running in 2002 we will act as if this is still under investigation. It is important to BP Gas & Power because similar sets of projects will be needed in other areas

This chapter starts with the organisational structure of BP It describes the position of BP Gas & Power within the total picture and it explains the links between a few business units, which is needed to understand the projects. After that the projects used in this assignment are introduced. It is a customer portfolio acquisition project, a storage acquisition project and a pipeline acquisition project. The CBA's of these individual projects will be calculated in chapter 4.

3.2 Organisational Structure of BP

To be able to understand the organisational issues in and around BP Gas & Power it is necessary to know a little bit about the BP structure. BP Gas & Power is one of the four streams within BP (Upstream-Downstream-Chemical-Gas & Power). BP's structure is based on these four streams, which are subdivided into Business Sub Sectors (BSS). BSS's are combinations of Business Units (separate businesses accountable for their P&L) that somehow belong together. The reason why Business Units are placed in a certain BSS can be different but the main reason is synergies (i e. costs saving due to combining resources and equipment).

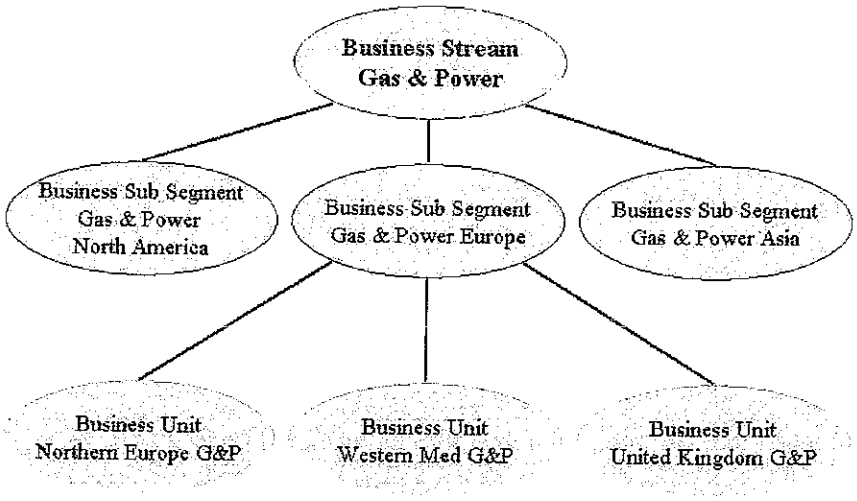


Figure 4: Business stream structure

The business unit BP Gas & Power Europe has three companies attached, the United Kingdom, Western Med (Italy, Spain and Portugal) and Northern Europe (France, Belgium, Germany, Austria and The Netherlands). In the United Kingdom BP Gas & Power is an established player of significant size since they are present in Upstream, Midstream and Downstream. The business units in Western Med and Northern Europe want to become as significant. This project will be done with the Northern Europe business.

BP Gas & Power Northern Europe has started to enter the gas and power market of Europe. The projects that will be investigated are part of the starting web of BP Gas & Power in Northern Europe (as from now referred to as BP Gas & Power).
The starting area for BP Gas & Power is the Netherlands and that will be the data source for this assignment. The reason for starting in this area is that systems and legislation are available to service customers. In other areas of Europe energy consumers are not allowed (or able) to choose a new supplier, and / or suppliers don't have access to sufficient assets (transmission grid, flexibility) to be able to service energy to customers

3.3 The case study projects

As described in the objectives in chapter 1 this assignment wants to demonstrate that value is created outside the traditional project-by-project approach. But it should also identify how value is added so that future projects can be chosen for the right reasons (base value + added value generate sufficient income).
As we have seen in the previous chapter the starting location where BP Gas & Power wants to build their presence is the Netherlands. In the Netherlands they have been investigating several projects without success yet. For this assignment it is important to use relevant projects that presume to have web added value. Since it is assumed that web added value comes from linkages between the projects three linked projects are selected. The projects are linked economically and technically, which makes them suitable projects for this assignment.
If BP Gas & Power wants to become a major energy supplier in the Netherlands they have three big problems.

- They need to supply gas to customers;
- They need to cover a full supply, which implicates covering for swing and flexibility[15];
- They need to transport gas from the market to the customers

The first project is acquiring a customer base in the Netherlands. In the aim of BP Gas & Power it is stated that they want to become one of the biggest energy suppliers in mainland Europe and supply gas to customers in the Netherlands is a start. The second project is acquiring capacity in an offshore storage project in the Netherlands. This project is economically and technically linked to the customer base since BP Gas & Power will be able to use the services from the storage directly for the customer base to cope with swing and flex. Third and final project for this assignment is the acquiring of transport capacity in a pipeline in the Netherlands (called Zebra) that links the Botlek area with the existing trading hub[16] in Zeebrugge. The fact that this pipeline links both the customer base and the storage to the trading hub in Zeebrugge makes this project very suitable for this assignment. In other words the three projects are:

- Building a customer portfolio in the Netherlands;
- Storage acquisition from a new gas storage project in the P15-P18 concession, offshore of the Netherlands;
- Acquiring pipeline capacity in a Dutch transmission system.

In the next paragraphs the projects will be described in more detail. This should make it possible to understand the analysis of chapter 4.

3.4 Case study project 1: Customer portfolio in the "Botlek" area

3.4.1 Introduction

In the BP Gas & Power business plans for the next few years, BP Gas & Power put forward target sales volumes of natural gas in Europe. To be able to sell these volumes, BP needs to be competitive in the end-user market. BP has access to gas supply sources from the UK, where it is a major gas production and sales company, and where the market is already liberalised. Through trading BP Gas & Power also has access to other markets like Zeebrugge or Oude Staten Zijl / Bunde.
Since both the UK gas market and the gas markets around the Netherlands are priced higher than the standard price for gas (set by the local incumbent), it is seriously difficult to deliver planned target volumes for 2002 (since customers will choose incumbent) and therefore to establish BP Gas & Power as a major player in the Northern European natural gas markets.

[15] *Flexibility is defined as the difference between the off-take within hour and the next hour. Since BP Gas and Power has to buy a constant gas supply over the 24-hours of the day, BP Gas and Power needs to manage the differences between this supply and the off-take of the customer. Swing is defined as the difference between the off-take of a day compared to the next day.*

[16] *A trading hub is a location where trading (physical and virtual) is taking place. Often it is a location where more than one supply source comes to and where more than one market is attached. It is comparable to a stock exchange.*

3.4.2 The Project

BP Gas & Power has to compete with other market parties but especially with the local incumbents[17] The local incumbents in northern Europe, including Gasunie in the Netherlands, are fighting to defend their profitable markets against potential new competitors and although regulation is leading to market opening, it is unlikely that we will see effective gas-to-gas competition before 2003 / 2005 Incumbents are continuing to offer their customers a fully bundled gas and commodity service while offering new entrants highly priced and disadvantageous access to their networks. This effectively prevents BP Gas & Power from building the customer portfolio essential to establish a position as a major gas supplier and Energy Services marketer. To be able to enter a market like this BP Gas & Power has started a project called the "Botlek" area project. The aim of this project is to get a customer portfolio in the Botlek area in the Netherlands Since BP Gas & Power has to sell energy in competition with others and these others are offering discounts to the customers BP Gas & Power also needs to sell with a discount to the market price This sale generates a loss since BP Gas & Power has to buy at market price and sell below market price

Figure 5: The customer base in the Botlek

With this project BP Gas & Power has started to realise its goal to become a major Energy Services company within Europe. Focussing on a specific area has given a better and clearer target to the company and that will create possibilities.

Why start in this area

The "Botlek" area represents one of the largest industrial concentrations of natural gas consumers in Northern Europe with many major international organisations having production facilities in this area By establishing a network of customers in the "Botlek" area, it is intended to use this customer portfolio as leverage to effect more sales in other areas By pooling the transportation agreements for several customers BP Gas & Power can overcome some of the disadvantages inherent in the current transportation system and the associated arrangements with the incumbents (i.e combine usage of offered service to reduce total costs, see paragraph 4.4 1). The additional advantage of being able to trade around the position these contracts create, will offset the initial cost of winning the contracts against the incumbent's pricing advantage.

Organisational and project set-up

As explained in paragraph 3 1 BP Gas & Power has a business sub segment structure In the BP Gas & Power sub segment Northern Europe the aim is to become one of the biggest energy supply businesses in Northern Europe. The supply necessary to support these sales will come from other business units within BP. The business unit that is responsible for supplying BP Gas & Power with the requested amounts of energy is within the Business Sub Segment BP IST (Integrated Supply and Trading). Within BP IST (Integrated Supply and Trading) the business unit responsible for Europe is called the European Gas & Power, Finance and Chemicals

Within the project BP Gas & Power and BP IST agreed a sales and purchase for the Botlek area. This implicated that BP IST is short[18] and needs to go into the market to cover this short position and BP Gas & Power is long[19] so they need to go and find customers to supply the gas to i.e. this is a "push" factor that forces BP Gas & Power into implementing their goal.

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[17] Incumbents are companies that are already active in the area In others words the current (often monopoly) players in the market.

[18] Being short means, having sold something, which you haven't got In other words if nothing happens in the mean time IST will be in problems They need to buy enough to cover the amounts they sold.

[19] Being long means, having bought something, which you don't need In other words NEGP needs to find customers to sell the amount of gas they bought

3.4.3 The links to other projects in this assignment

As mentioned in paragraph 3.3 the three projects are linked. Within the customer portfolio in the Netherlands, flexibility gas supply (or swing)[20] still has to be bought from the local incumbent since BP Gas & Power hasn't got access to different ways of supplying this to customers

Flexibility can be provided in a variety of ways using storage, interruptible supplies or the use of line-pack in a transport portfolio. Currently in the Netherlands it is difficult to use the line-pack[21] options in the transportation agreements since the tolerances given in the system are very tight. The best way to solve BP Gas & Power's position regarding flexibility is through the use of storage.

Another way of supplying flexibility to the customers can be a direct connection to a liquid and firm tradable HUB[22] Currently the only connection to the Zeebrugge Hub can be made via the Gasunie network. This has some constraints, which make it unattractive for traders to use it. The Zebra pipeline currently is too short to connect to the area but could be extended to be competitive with Gasunie

3.5 Case study project 2: Offshore Storage Project (Abbreviated: OSP)

3.5.1 Introduction

BP Upstream is producing gas in the Netherlands from an offshore production platform. BP Upstream is the operator of the fields called P15-P18 offshore of the Botlek area. BP is not the only concession holder in that area but BP is the biggest one and BP Upstream is the Operator Two of the fields are depleting and the asset holders (including BP Upstream) want to extend the life of the fields by converting them into gas storage This would save them the de-commissioning costs and would generate more income from the investment. BP Gas & Power has been informed about this project as well as 17 other energy companies in the market.

3.5.2 The project

This project encompasses the use of a (partly) depleted offshore gas field for the storage of natural gas and it involves two BU's of BP These business units are from two different streams, Upstream and Gas & Power.

The first one is the Business Unit that handles all upstream activities in the Netherlands (BP Nederland Energie BV). BP Upstream activities are e.g.

- The production of gas;
- Development of production activities;
- Operating production facilities for a group of concession holders;
- Operating storage facilities for a group of concession holders

Since the production of gas in the natural gas fields in the concession area P15-P18 is diminishing BP Upstream is looking to extend the operating time of the field. This is important to BP Upstream since BP Upstream activities in the Netherlands need to be justified and the decommissioning costs can be put backward in time

The other business unit that is involved in this project is the Northern Europe Gas & Power Business Unit (as described in paragraph 3.2 Northern Europe Gas & Power Business Unit is a business unit within BP Gas & Power).

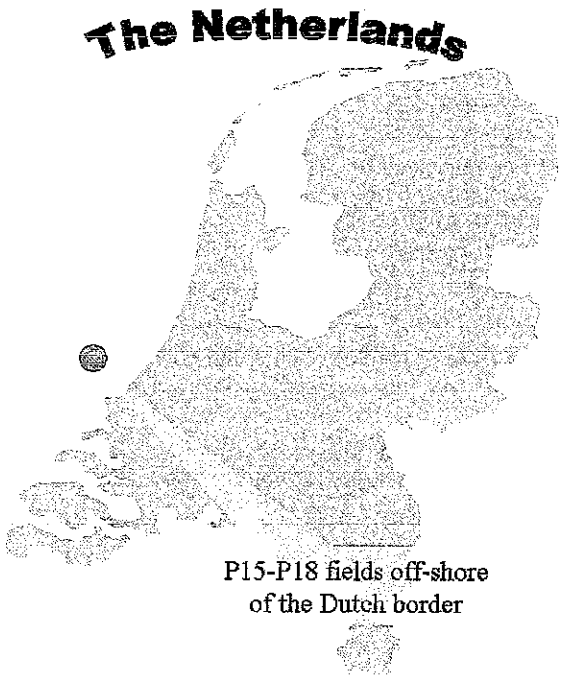

Figure 6: The Offshore Storage Project

[20] *Flexibility is defined as the difference in the off-take between one hour and the next hour Since BP Gas and Power has to buy a constant gas supply over the 24-hours of the day, BP Gas and Power needs to manage the differences between this supply and the off-take by the customer Swing is defined as the difference in the off-take of a day compared to the next day.*

[21] *Line pack is the amount of gas that is put in the pipeline to create sufficient pressure to flow gas through it. By putting a little bit more or less in the pipeline the gas will still flow This flexibility is referred to when line pack flexibility is mentioned*

[22] *A Hub is a location where pipelines connect and standard agreements are in place for counter parties to do trades on*

To get the project working for BP Upstream, the project will need companies buying the capacity to underpin the investments necessary to change the production facilities into storage facilities BP Gas & Power is one of the 17 interested customers for this storage
As described in paragraph 3.4.3, Storage is a way of handling flexibility in the gas market. And BP Gas & Power will need storage in their portfolio of supplies in the Netherlands

The European Gas Market
As stated in chapter 2, gas demand continues to grow steadily in Europe. Year by year the ratio of imported gas to gas produced within the borders of mainland Europe grows. Year by year the average distance travelled, the number of borders crossed and the number of third parties involved grows It is very costly and inefficient to provide flexibility to customers over a long distance. The distance between supply and customer demand can be very big since gas comes from Norway, via pipelines in the North Sea, from the Former Soviet Union and from Algeria through pipelines on the continent. It is far more efficient to provide flexibility as close to the point of consumption as possible This also provides an important measure of security of supply to consumers
Flexibility that is needed by the market consists of 3 major types First to manage the daily (or hourly) balance between supply and demand, required by the network operator, short-term[23] flexibility is needed. Secondly, medium-term[24] flexibility enables you to use arbitrage options in the short-term and/or medium-term market (called spot-market) Long-term[25] flexibility is used for seasonal variations in demand (also called swing). There are strategic and financial advantages for flexibility sources physically located close to the point of consumption. The current production field P15-P18 is close to the Rotterdam (Botlek) market Because BP Upstream is the operator of the fields the other concession holders have asked BP Upstream to look for a few customers to underpin the investment needed to convert the production fields into storage fields. One of the parties in the market that is interested is BP Gas & Power; they are considering being one of these customers.

The possibilities of the Offshore Storage Project for BP Gas & Power
Being in control of part of a storage facilities give opportunities to the capacity holder For BP Gas & Power this means that they might be offering flexibility to other players in the market (via the secondary market). This will generate additional income for BP Gas & Power It also provides additional information about the market and that gives BP IST opportunities to generate additional income.

3.5.3 The links to other projects in this assignment·
Storage is one of the possibilities of supplying flexibility to the end user market (see paragraph 3.4.3) BP Gas & Power needs flexibility to be able to offer full supply[26] to the customers they acquired or will acquire in the future. Being in the position to use this storage, BP Gas & Power has the ability to sell flexibility services to end-users and or wholesalers, this gives BP Gas & Power a privileged position in the market and will allow it to compete more equal footing with some of the incumbents. Market information will come automatically to the organisation that holds the capacity to this flexibility
If BP Gas & Power wants to use this storage even more in their advantage they would need to link this storage to one or more trading markets One way to link this storage to the Zeebrugge market is via the Zebra line. Therefore the Zebra line is also an interesting project to BP Gas & Power.

[23] *Short-term means shorter than 1 day*
[24] *Medium-term means from 1 day to 1or 2 month*
[25] *Long-term means longer than 1 or 2 month*
[26] *Full supply means supplying all the gas a customer uses. In practice customers can split their consumption into parts and ask more than one supplier to supply them*

3.6 Case study project 3: Transportation capacity within the Netherlands

3.6.1 Introduction

Pipeline capacity in the Netherlands is normally something that is offered by the grid owners, which are Gasunie for the high-pressure grid and several regional grid owners for the regional grids (see appendix 1) In the Gas Act it is stated that these companies need to offer third party access to their grids The tariffs for this transport capacity are regulated but are currently still high The Gas Act has listed several tasks to the grid owners Obviously they need to transport gas in their grid, but they are also responsible for resolving constraints in their network.

3 6 2 The Project

As mentioned in paragraph 3.3 BP Gas & Power needs to buy supply in the market. One of the most open markets in Europe is the NBP in the United Kingdom This market is connected to the Zeebrugge market via the interconnector (a pipeline between the UK and Belgium). Capacity from Zeebrugge to the Netherlands is sufficient to cover supplies to the Netherlands but the Gasunie grid is constraint. This effectively means that it is sometimes not possible to bring gas from the Zeebrugge market to the customers in the Netherlands.

In 1998 Essent and Delta (two regional distribution companies in the South of the Netherlands) built a pipeline of their own that connects Zeebrugge with the province of Zeeland (in the South West of the Netherlands) Extending this pipeline would be a way of securing additional transport capacity into the Botlek area.

Since this pipeline belongs to Essent and Delta BP Gas & Power will need to buy a share from this pipeline from one of them Delta is the most likely one since Delta doesn't use their part fully and they can use the cash for other business in their area

If BP Gas & Power has become part owner of the current pipeline they will need to extent the pipeline in order to make it connect to the Botlek area and the storage The project therefore will consist of three parts. First part is to buy in[27], in the current pipeline (owned by Essent and Delta), which only runs as far as Moerdijk Second part will be investing in the extension to the "Botlek" area. Third and final part would be investing in a connection to the landing point on shore of the P15/18 offshore storage project The 2nd and 3rd part make this project very interesting for BP Gas & Power since they are targeting that area

Figure 7: The Zebra Pipeline

3 6.3 The links to other projects in this assignment

In the second phase this pipeline will be connected to the Botlek area and BP Gas & Power will have a second possible route into this area. This will create additional value since this project can be linked to the storage facilities. Connecting the storage with the Zeebrugge market will not only generate options for BP Gas & Power in the Netherlands but it also brings a lot of optionality to BP Gas & Power in Zeebrugge, where BP IST (Integrated Supply and Trading) can offer new services to the hub.

This project also creates additional possibilities and those can create additional value. I.e. having the possibility to switch supply between various sources and trade the capacity to others gives a whole lot of new services BP Gas & Power can be offered into the market. The information BP Gas & Power gains from being in this market so closely also gives opportunities.

[27] *Buy a share of the existing pipeline to make sure that extended pipeline capacity can be used from the beginning without having to ask somebody else to ship the gas for you*

3.7 The web created by the case study projects

The projects described in the previous paragraphs are the web used in this assignment The combination of these projects fits very well from a business perspective as well as a technical perspective BP Gas and Power will need all three projects in order to optimise their offers to the customers in the Netherlands. And they need the customers in order to create the optionality that BP IST (Integrated Supply and Trading) will be able to optimise.
Technically these projects combine very well since they have got complementary parts with lots of synergies. As we can see in Figure 8 these projects combine very well and make it possible for BP Gas & Power to build their presence in the Netherlands

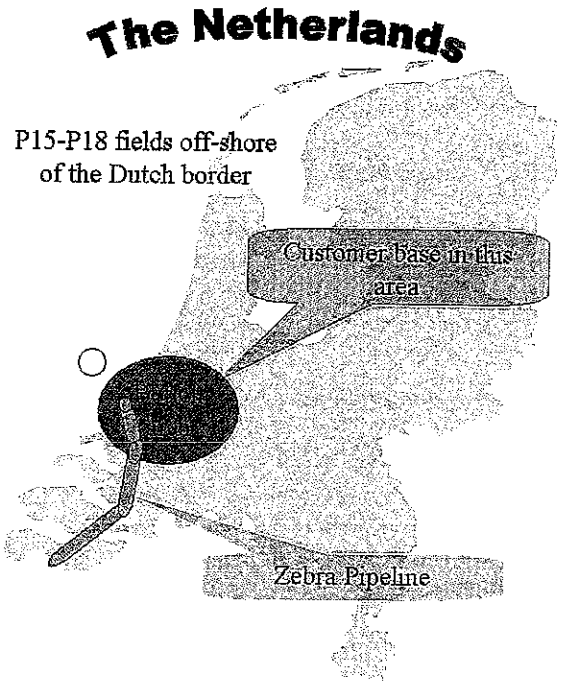

Figure 8: All three projects in overview

3.8 Assignment objectives

In the previous paragraphs the example case study projects used for this assignment have been described. The assignment will use these to develop a framework for web value evaluation and the way it is created It will then look forward to capture lessons learned as well as "company wide" economic effects
It is very important to define what is web value and what isn't, this will be done in chapter 5
In the next chapter the base case (BP standard) analysis will be shown for the projects in this chapter. These analyses will be used as the reference against which the analysis in chapter 6, the same project analysis including the web values described in chapter 5 can be valued.

4. Economic Analysis of the projects

In the first part of this chapter background to standard CBA methodologies will be provided and the "BP" way of analysing projects will be described This is necessary to understand the details in the second part of this chapter in which the projects mentioned in chapter 3 will be evaluated. The aim of this chapter is to provide background information as well as to set the basis for the comparison between current "BP"-methodology and the "web value"-methodology, which will be given in chapter 6.

4.1 Standard Economic Evaluation Methodologies

In literature it is mentioned that cost-benefit analyses (CBA) of projects are used to assist companies in choosing projects that are most profitable to them [1]. It gives them an insight into the possible income that a project might generate This tool gives managers the possibility to compare projects and make a decision about which project to put their limited resources in

CBA has been developed by well-known international organisations, namely the World Bank in Washington D.C. [16] and the United Nations Industrial Development Organisation (UNIDO) in Vienna Both methods are in principle the same [15]
In the CBA technique the concept of *cash flow* is used Cash flow is income or expenditure in a project Accounting with cash flows is mentioned in literature as "cash flow accounting".
When we know how cash flows will proceed within a project we can now proceed to conduct a CBA
There are three different criteria [1] to assess project profitability:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Benefit Cost Ratio (BCR)

All are making use of the so-called *discounting* technique Discounting means that all cash flows are treated as if they where done today Money in the future (i e in one year or more) is worth less to investors since they have a preference to receive money now because the value of money in the future is less due to lost interest and the possible inflation This is called *'time preference'* Discounting is a technique that make is possible to compare income and expenditure in the future with income and expenditure now Discounting income and expenditure in the future into a income and expenditure now is done by he following method:

$$X_0 = \frac{X_p}{(1+i)^p}$$

***i**=interest rate (is the prevailing market rate of interest)*
***p**=year that the income or expenditure occurs (starting year project is 0, next year is 1, etc.)*

Where X_p is the value of the income or expenditure at the time it occurs (year p) and X_0 is the value of the income or expenditure at the year the project has started (year 0)
In the next 4 paragraphs the four ways of assessing project profitability as mentioned are described

4.1.1 Method 1: The Net Present Value (NPV)

A definition for NPV is: *NPV = the sum of all the discounted annual net cash inflows during the lifetime of the project*
The selected discount rate ***i*** reflects the likely return on alternative financial investment opportunities, the opportunity rate of interest When conducting a financial CBA of a project, ***i*** is set equal to the prevailing market rate of interest, because the usual alternative opportunity for the investor to investing an amount Z in a project would be, to put the same amount Z in the bank at the going rate of interest
Let X_p represent the net result of all cash flows associated with a project in year p Then the formula for the NPV is:

$$NPV = \frac{X_0}{(1+i)^0} + \frac{X_1}{(1+i)^1} + \frac{X_2}{(1+i)^2} + \frac{X_3}{(1+i)^3} + \frac{X_4}{(1+i)^4} + \ldots\ldots + \frac{X_n}{(1+i)^n}$$

With the value of the NPV a decision can be made about the project. The decision rule to accept or reject a project is:

- NPV > 0 => the project will give rise to more return than when put at the bank against market interest rate (i.e , its net project earnings are estimated to be higher than putting the money in the bank at ***i*** percent of interest for the duration of the project). If the result of

this project were more then all the other projects that a company could do, this one would be selected

- NPV = 0 => the project is estimated to give exactly the same result putting the money at the bank against market interest, so there is no economical reason to approve the project.
- NPV < 0 => the project is estimated to result in less than putting the money at the bank against market interest. It should therefore not be approved

4.1.2 Method 2: The Internal Rate of Return

A definition for IRR is: *IRR = the rate of discount in the NPV formula, which results when the NPV is set to zero.*

The ***i*** in the NPV formula as mention in paragraph 4.1.1. has been replaced in the formula below by the variable ***IRR.*** The formula for IRR is to be determined by setting the NPV equal to zero (0). The formula for IRR is as follows:

$$NPV = \frac{X_0}{(1+IRR)^0} + \frac{X_1}{(1+IRR)^1} + \frac{X_2}{(1+IRR)^2} + \frac{X_3}{(1+IRR)^3} + \frac{X_4}{(1+IRR)^4} + \ldots\ldots + \frac{X_n}{(1+IRR)^n} = 0$$

With the value for the IRR of a project it is also possible to make a decision regarding the project. In the decision rule the value for IRR that is found through this formula will be compared to ***i***, the prevailing market rate of interest.

The decision rule accept or reject a project is:

- IRR > ***i*** the project is expected to be more profitable than putting the money in the bank and therefore it could be approved
- IRR = ***i*** the project is estimated to return the same as putting the money at a bank. Therefore there is no reason to go ahead with it
- IRR < ***i*** the project is estimated to return less than putting the money in the bank. Therefore it should not be approved

4.1.3 Method 3: Benefit Cost Ratio (BCR)

A definition for the benefit cost ration (BCR) is: *The BCR is the ratio of the sum of all discounted cash inflows, Bt, and the sum of all discounted cash outflows, Ct. The discount rate is the opportunity rate of interest also used in the NPV formula, **i**. Whereas the NPV is the (discounted) difference between all cash inflows and outflows, the BCR is the ratio of the (discounted) inflows and outflows.*

In a formula that looks like:

$$CBR = \frac{\frac{B_0}{(1+i)^0} + \frac{B_1}{(1+i)^1} + \frac{B_2}{(1+i)^2} + \ldots\ldots + \frac{B_n}{(1+i)^n}}{\frac{C_0}{(1+i)^0} + \frac{C_1}{(1+i)^1} + \frac{C_2}{(1+i)^2} + \ldots\ldots + \frac{C_n}{(1+i)^n}}$$

CBR can just as NPV and IRR give rise to a decision about a project. The decision should be based on the following:

- BCR >1 the sum of the discounted cash inflows is greater than the sum of the discounted cash outflows, so the project could be approved.
- BCR = 1 the sum of the discounted cash inflows is equal to the sum of the discounted cash outflows, so there is not reason to approve the project.
- BCR < 1 the sum of the discounted cash inflows is smaller than the sum of the discounted cash outflows, so the project should not be undertaken.

4.1.4 Conclusions on general approach

The NPV, IRR and BCR are equivalent (one can use either one, or the other) when one is analysing the expected profitability of *just one* project. A real profitable project could have an NPV > 0, an IRR > i, and a BCR > 1. Since the BCR is based on the same principle as the NPV it is in practice less used. In practice the IRR and the NPV are used most frequently.

It is useful to use the NPV and the IRR in combination, because they provide different complementary insights about project profitability. The IRR tells us directly if a project is likely to be better than the prevailing costs of capital (the interest rate a bank would ask for borrowing the money). E.g. if the IRR is 100% and the prevailing interest rate is 9% the project is highly profitable. If the IRR is much closer to the prevailing interest rate the project might not to be approved (although the IRR is positive). The NPV doesn't have this kind of information. The NPV tells directly what amount of money the project will generate over and above putting the money at the bank. If both are used together they will be more accurate in predicting how

profitable the project is and what the result of this project might be. Both kinds of information are necessary to make a proper decision about a project. There is one remark that needs to be made In comparing projects the IRR and NPV might not give the same result and in that case the NPV should be used to make the decision since it tells how much income the project will generate.

4.2 Current BP methodologies of project appraisal and value recognition

4 2.1 Introduction

In the previous paragraph the general way of calculating CBA has been described including the cash-flow methodology. Within BP the purpose of economic evaluation is to aid optimisation, and ensure that only the best projects are implemented. There is a slight distinction here between BP's approach and the more traditional "Business School" approaches as described above. The traditional "Business School" approach states that the project with a positive NPV should be selected, but BP will only select projects that are best in class, i.e most profitable.

With this starting point in mind it is possible to understand why the key objective of the processes is to provide a level playing field on which the various competing bids for capital expenditure within the company can be assessed

A single methodology is consistently applied across BP. This gives confidence to the Executive Line that any conclusions that they draw from the numbers are the result of real differences between projects and not simply the result of methodological inconsistencies. Put bluntly, decision makers wish to select the best projects, not just those that benefit from having their numbers calculated in the most favourable manner.

A description of the differences between and the choices within the method described in paragraph 4.1 and the CBA method used within BP is given in the following paragraphs

4.2.2 Economic evaluation Methodologies

BP's decision processes are based on the Discounted Cash Flow model (DCF). As such, this follows Business School orthodoxy. There are, however, many elements of DCF where individual practitioners (i e. companies like BP) have to make a choice in how to apply the method In the rest of this paragraph BP's choices in the most important areas will be described

Discount Nominal Cash Flows

BP applies a nominal cost of capital to nominal cash flows This nominal approach, also termed "money of the day " (MOD), means the actual sums of money that are expected to be spent in the future are accounted for This is different from a real cash flow approach in the fact that the inflation is not accounted for. The decision by BP to adopt a nominal approach to discounting is designed to send a signal to the organisation about the pressures on costs that BP expects to face A real cash flow approach to discounting might be interpreted by some as giving a signal that BP will be able to raise prices in line with inflation The nominal approach is designed to signal that if there is to be a default assumption for the pricing of products, this should be constant nominal.

The Cost of Capital

All business opportunities should be assessed at the same benchmark cost of capital. This cost of capital for BP has been set at 9% nominal post tax.

Risk

Within the standard CBA approach the element of risk can be used separately and/or it can be compensated for in the calculated discount rate Since BP's business will take place in different circumstances with different risks attached, BP applies the method of using a separate risk factor The reason for BP not to incorporate it in the discount rate is that satisfactory means to calculate the actual discount rate for each project are not available.

The question of risk and return is complex and in order to aid decision makers BP has developed a number of risk archetypes (Appendix 1). These risk archetypes suggest typical characteristics of low and high-risk projects. The idea is that sensitivities be calculated that illustrate the impact on NPV of a change in the cost of capital that reflects the risk characteristics of the project. It should be stressed that the sensitivity is there to provide additional context for any investment decision and not to replace the standard base case numbers.

The alternative case

In the general approach alternative cases are taken into account. The "with" or "without" project scenarios are evaluated. There can often be uncertainty as regards to exactly what the without project world will be The normal rule should be that this reflects a stay in business case but with capital investment held to a minimum "stay legal" case. The assumptions implicit in the without project case should be described to decision makers.

4 2.3 The Economic Indicators

In this paragraph a description is given of the main areas of interest to BP Gas & Power when valuing projects. As described in paragraph 4.1 there are four indicators for the financial performance of a project Within BP these are also recommended. Important are the IRR and NPV. IRR and NPV at cost of capital are recommended as the primary indicators. Discounted payback gives a useful indication of the time before a project is expected to have at least earned its cost of capital

Another measure is needed to indicate the efficiency with which the project converts investment funds into NPV This measure will be called the Capital Efficiency (CE). If the CE is low it means that the project is generating high cash outflows, which is not favourable even when the IRR is sufficient high enough.

The definitions of these four indicators as used by BP are:

- **NPV.**
  This is the Net Present Value of the projected after tax incremental cash flows resulting from the project. A positive NPV is a necessary but not sufficient condition for proceeding with any project.
- **IRR.**
  This is the Internal Rate of Return of the project, sometimes also referred to as the rate of return or the DCF return. It is the discount rate that if applied to the base case cash flows expressed in discounted cash flows will result in a zero NPV
- **Capital Efficiency (CE).**
  This is defined as the ratio of NPV to the present value of initial cash outflows, expressed as a percentage The project's annual cash flows are inspected and only those early years where there is a net cash outflow are included.
- **Discounted Payback.**
  This is the number of years lapsed before the cumulative present value of future cash flows first becomes zero. Note that to avoid potential confusion between project years and calendar years it is recommend that discounted payback should be stated in calendar years and not in project years or in years after the project comes on stream

4.2.4 Sources of Value

Simply looking at the NPV and IRR of a project is a way of analysing as described in paragraph 4 1 5 BP however believes that there is more to be taken into account than just the numbers. The numbers in the NPV and IRR calculation need to be earned and are a consequence of leveraging specific sources of competitive advantage The sources of value technique has been developed within BP in order to provide a link between the numerical analysis that calculates an NPV and BP's wider strategic management perspectives. This principle is also used in standard sensitivity analysis The technique is an extension from the standard NPV approach because the sensitivity of the numbers that add up to the NPV will be taken into account The technique allows BP to differentiate themselves from their competitors by choosing the right sources of value to BP. In other words it allows the decision makers to choose projects that best fit the goal and vision BP has.

The technique starts by asking the question, "where does the NPV come from?". The answers to this question and the subsequent analysis and insights that will be generated provide three specific benefits:

- They allow margin and other assumptions to be calibrated in order to check that they are reasonable.
- They give insights as to where the value comes from and hence help to direct capital investment towards areas where BP can maximise value from a restricted capital budget.
- They catalyse a highly relevant debate about what really makes a particular project tick and focus discussion onto the key issues

It is particularly important to select the appropriate sources of value for any project by reference to why this project is different for other opportunities available to BP's competitors. BP could also analyse the various lines in a spreadsheet and call this a sources of value analysis This approach, which BP calls components of value in order to distinguish it from sources of value, will not usually provide many strategic insights

In the project evaluations in the remainder of this chapter the sources of value to the projects will be mentioned.

4.3 Conclusions on BP method of CBA

In the previous paragraph the choices BP has made within the standard approach of project evaluation have been explained. The BP methodology doesn't differ from the standard method described by the World Bank in Washington D.C. and the United Nations Industrial Development Organisation (UNIDO) in Vienna but it has taken some standard assumptions that have to be used in all evaluations Within a major oil company it is important for management to be able to compare analysis of different kind of projects and to be able to choose that projects that suits the BP best. The choices made are there to assist in that approach. The choices as described are being put in a regime that has to be applied in all evaluations.
Because BP has a strictly regulated regime of calculating economic evaluations of projects it is not allowed until now to use web value that other projects have within projects
Within the next part of this Paragraph the analysis of the projects from chapter 3 will be done according the described current BP methodology.

4.4 The case study projects

Within BP there is a general way of presenting projects for approval from ExCo (= executive committee) [7]. The Proforma Finance Memorandum (appendix 2) describes the elements that need to go into a project proposal This memorandum should be short and clear with all necessary financial elements to make a decision Keeping it simple is another way of making sure that it isn't the project with the best proposal that gets awarded, but the project that is best
The CBA within BP Gas & Power contains according to the Proforma Finance Memorandum the following items:

- Description of Proposal
- The Sources of Value
- The Economic Indicators
- Accuracy of costs estimate
- Risks
- Strategic Rationale and additional reasons for this project to go ahead
- Other Alternatives considered
- Assurance process
- Conclusions and recommendations

In the next paragraphs the 3 projects mentioned in chapter 3 are analysed The analysis is done in a short version of the standard layout as mentioned above.

4.4 1 Case study project 1: Acquiring customer portfolio in the Netherlands

This project is a starting tool for the Northern European Gas & Power Business Unit to enter the gas market in their target area. Their target area is northern Europe (mainly France, Belgium, Germany, Austria and the Netherlands) but since the liberalisation process in the Netherlands is the fastest of all they want to start in the Netherlands

The Project

As described in chapter 3 4 the aim of this project is to start a gas marketing business in the Netherlands Entering a market as a new party is difficult because a lot of the rules regarding entering assume that you have a group of customers instead of just a single customer Prices for services including transportation are very unfavourable for just a single customer If BP Gas & Power could act as if they had a group of customers they would be able to overcome this first hurdle The second hurdle is the gas price In the Netherlands, Gasunie defines a public gas price for their customers This gas price forms the benchmark against which new players have to compete. Since this gas price is indexed to fuel oil it differs from quarter to quarter (the price index is quarterly). BP Gas & Power has to buy their gas from the gas market (either in the UK, Zeebrugge (Belgium) or Bunde (Germany)) The gas market is based on gas-to-gas competition and this has little to no correlation with fuel oil Periods of the year the gas market can be more expensive than the indexed Gasunie price but other periods it can be cheaper

Description of Proposal

BP Gas & Power wants to acquire a group of customers in the Netherlands by offering them a discount to the Gasunie price Buying gas from the gas market, this means that BP Gas & Power will make a profit if market is lower than their sales price and BP Gas & Power will make a loss when market is above their sales price The marketing team is 95% sure they can sell gas at a discount of 5% to the Gasunie price. The volume BP Gas & Power needs to sell in 2001 is 1 bcm (billion cubic meter) If BP Gas & Power has to take

a loss on the sales of gas they want to recover that loss by selling other services to the customers as well BP Gas & Power is convinced that they will be able to negotiate additional deals with these customers when they have a contract with them for gas deliveries. The first step to start this project BP Gas & Power has to buy the 1 bcm of gas from BP IST (Integrated Supply & Trading). The second step will be that BP Gas & Power will try to sell that gas to customers and BP IST (Integrated Supply & Trading) will have to purchase the gas from the market. This means that BP IST (Integrated Supply and Trading) has to go short[28], BP Gas and Power has to go long[29]: In other words both will take a position[30] The transportation and services[31] costs for a customer (who is supplied by Gasunie) are lower then the costs BP Gas & Power needs to make to offer the same contract. Since BP Gas & Power will need to transport the gas to the customer in the profile that the customer needs it they will need to arrange for transportation and services. The costs of these services are more expensive for BP Gas & Power than they are for Gasunie and the customer will not be willing to pay more than the costs of Gasunie In other words additional to the profit or loss on the gas commodity, BP Gas & Power will make a loss on transportation and services. For strategic reasons BP Gas & Power wants to acquire this portfolio of customers and BP Gas & Power wants approval for this project although the NPV of the project might be negative.

The Sources of Value

The first part of the economics is the purchase of gas from the trading department at a loss compared to the estimated sales price (Gasunie price minus 5%). BP Gas & Power bought this gas from the trading group within BP (called IST=Integrated Supply and Trading) with 0.227 €ct discount compared to Gasunie (although market at that stage was above Gasunie price). BP Gas & Power wants to sell the gas for a price of 5% discount to Gasunie. Gasunie for 2002 is 12 €ct. The discount of 5% is 0.6 €ct BP Gas & Power will loss 0 6 – 0.227 €ct = 0 373 €ct. For 1 bcm this makes a loss of **3.73 million €/y**[32].

Total costs of transportation to BP Gas & Power for these sales are estimated at 18.35 million € Total costs customers would pay to Gasunie for transportation and services are 16 85 million € Because competitors are discounting transportation and services to customers BP Gas & Power will need to do the same in order to make the sales. There for the income on transportation and services to BP Gas & Power will be 15 85 million € The loss on transportation and services is therefore equal to **2.5 million €/y**

Because the price is now indexed to fuel oil BP Gas & Power has the opportunity to optimise the arbitrage between the traded market and the indexed gas BP Gas & Power believes that it should be possible to switch 300 mm nm3 with a margin of .5 €ct during the year prior to start up With a high likelihood this can generate an income of **1.5 million €/y**.

Due to the large number of customers and the scale of this volume in the market (5% of the eligible market) BP Gas & Power expects to generate small but lucrative deals with other customers **1.5 million €/y** is the expected income for that. Volume is approximately 150 mm nm3 and the margin should be 1 €ct.

Within transportation it is possible to negotiate additional services, which can make it cheaper This is only possible when the amount of gas to be shipped is sufficiently large (*no definition for sufficient possible!*). BP Gas & Power hopes to be able to negotiate a better deal with Gasunie and reduce the costs by approximately 7%, which equals **1.33 million €/y**

In table an overview is given for the total project.

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[28] *Being short means, having sold something, which you haven't got In other words if nothing happens in the mean time IST will be in problems. They need to buy enough to cover the amounts they sold Traders like being short in a market where they believe sufficient gas can be bought*

[29] *Being long means, having bought something, which you haven't sold yet. In other words if nothing happens in the mean time BP Gas and Power will be in problems. They need to sell enough to cover the amounts they bought Selling is the core business for BP Gas and Power*

[30] *Taking a position means e.g. buying something that you don't need or selling something that you don't have. In other words you still need to look for a need for the product you bought or in case you sold something that you don't have you need to buy it somewhere else first*

[31] *Service like quality conversion, pressure, balancing and flexibility*

[32] *The background calculations of these values are done with an extensive data analysis. Since the data that is just for these analyses is confidential the calculations are not mentioned in the assignment paper*

Table 2: Botlek project economics

Costs	Commodity	117.70	Million EUR
	Transportation & Services	18.35	Million EUR
Income	Commodity	114.00	Million EUR
	Transportation & Services	16.85	Million EUR
	Trading oil index	1.50	Million EUR
	Additional sales	1.50	Million EUR
	Transportation optimisation	1.33	Million EUR
Total P&L		-1.90	Million EUR

The Economic Indicators

In this project BP Gas & Power will be making a lot of costs for buying gas and the services around the gas necessary to supply the gas to the customers The total expenditures are higher than the income and therefore the NPV[33] of this project is negative The total negative NPV will be 1 9 million € Since this project is for one year and the income and payments are all in the same year, there is no IRR to be calculated It is cash in and out in the same year and the end result is negative

Pay back and Capital Efficiency are also not relevant for this project since there is no pay back and the capital efficiency is undefined since there is no investment to be made upfront.

Conclusions and recommendations

The conclusion by BP Gas & Power management regarding this project was nevertheless positive Both BP Gas & Power and BP IST believed that taking this project forward from a strategic perspective made sense Both believed that other units within BP would be able to benefit from this project, for example the trading and total energy management functions

It was hard to prove that other units within BP would make a profit due to these projects from BP Gas & Power. Therefore this conclusion on this project was that BP Gas & Power would drive this assignment. Although people within BP believed that other projects (or units) could benefit from this project, there was no reason found yet to calculate this so called web value. If it would be possible to simply calculate the web value, people in the consultation group would only need to check the values calculated qualitatively instead of discussing the details of all the relevant projects

Other projects will be analysed in the next paragraphs, which conform to the same BP principle as this paragraph.

4 4.2 Case study project 2· Storage acquisition within P15-P18 concession

As in paragraph 4.4.1, this paragraph holds all elements of the standard format for CBA used within BP. The previous project is a starting tool for the Northern European Gas & Power Business Unit to enter the gas market in their target area. This second project should assist BP Gas & Power in starting to offer transportation services themselves, these are currently still bought from the incumbents (at high prices).

The Project

As described in chapter 3.5 the aim of this project is to hold capacity in a storage facility that is operated and partly owned by BP Upstream. BP Upstream wants together with other concession holders in P15-P18 block to convert an existing production field into storage. The field is running empty and its characteristics are well known now. Converting depleted production fields into·storage is a well-known method of creating storage facilities. BP Upstream has asked market parties to indicate if they would be interested in becoming a customer of this new storage A lot of market parties where enthusiastic about it but they needed more information on what the storage will be able to do for them. BP Upstream has provided them with the available information and they have asked potential customers to come back with a firm and binding offer. BP Gas & Power is one of the customers that have been asked by BP Upstream BP Gas & Power will need storage in their portfolio to be able to handle all operational requirements of supplying customers within the Netherlands without buying expensive services from the incumbents

For BP Upstream it is now a matter of determining whether or not sufficient parties will book part of the storage capacity to make the investment have a return that is appropriate for upstream projects within BP.

[33] *The NPV is equal to the P&L since the duration of the project is only one year*

Description of Proposal

BP Gas & Power wants to acquire a proportion of the storage unit but BP Upstream needs somebody (one or maximum 3 parties) to talk on the full capacity in order to underpin the project from a upstream perspective and to get the other concession holders satisfied. It is preferable to BP Upstream that one party take the commitment for the full capacity for the full 15 years. This party then can sell the capacity into the market.

In the plan for BP Gas & Power in the next 3 years volume targets are set within the Netherlands. This will only give indications for the need for storage for a short period since this storage facility will only become available as from 2003

In the Netherlands other storage facilities will be available soon and BP Gas & Power will therefore have alternatives. Looking at volume targets for 2004 BP Gas & Power will need to book 135 mm nm3 of working gas and 2.700.000 nm3/d of withdrawal capacity This is approximately 35% of the P15-P18-storage facility Within the P15-P18-storage it is necessary to supply the cushion gas need to use the facility. In the economics calculated 1 5 bcm of cushion[34] is used as the amount needed for the complete facility

BP Gas & Power wants approval to invest in a long-term contract (15 years) with the P15-P18-storage in order to cover for their need of storage

The Sources of Value

Three Business Units within BP could be involved in the project. The first Business Unit is BP Upstream They would be investing the installation together with the other concession holders The return on their investment would need to be 15 %. This will need to be generated by the companies buying the primary capacity within the storage. Due to this it is very important that 100% of the capacity is sold

The second business unit involved might be called "BP Storage", a new business specially created for this This unit will book the storage capacity in the facility If regulation is applicable to the storage capacity owners it is necessary to create an additional company because this company will be regulated The income to this company will then be reduced to selling firm storage services only The income will be regulated and therefore not sufficient to meet BP standards BP will not need to create an additional company if regulation doesn't apply BP Gas & Power will then be the owner of the primary capacity. BP Gas & Power will then need to generate income through selling services The primary services for this company are mentioned next First the base value will be explained and then the additional income values will be explained

The 3rd business unit involved is BP Gas and Power BP Gas and Power will purchase their need for storage from the previously mentioned new business unit BP Storage. The base value of a storage unit for BP Gas & Power is the seasonal swing in the customer portfolio Seasonal swing is the difference between the off take pattern of the customers in summer and in winter. Customers tend to take more gas in the winter period since part of the gas is used for heating[35] If BP Gas & Power wants to buy gas from the market in the summer (when prices are lower than in winter) and sell the gas to the customers in winter they will need seasonal storage[36] to store the gas in the summer This seasonal usage of the storage will be the base value for BP Gas & Power. Estimated income per year is 200 mm nm3 at a tariff difference of 0 4 €ct is **0.8 million €/y**. Additional to this base value BP Gas and Power will be able to create additional value, which will be described in the next part of this paragraph

Some customers in a portfolio will also vary a lot between weekends and weekdays consumptions. Being able to buy flat from the market makes gas cheaper. Therefore BP Gas & Power will be able to offer this weekend / weekday service to customers BP Gas & Power can gain additional income due to this service of 200 mm nm3 at a tariff difference of 0.4 €ct is **0.8 million €/y**

In the currently developing liberalised markets in Europe the grid owners need to make sure that they can secure their network In order to do that they will need to make sure that the pressure in the network doesn't get to low or too high Since the transporters don't own any gas they have to ask their shippers to

[34] Cushion gas is gas that is in the storage to keep the pressure at a minimum level Without cushion gas, the storage is not capable of producing the gas at a high enough speed The speed of production needs to be higher then the minimum withdrawal rate

[35] *The gas can be used in production processes (to produce steam or melt iron) or it can be used for heating the buildings If a large part of the consumption is for heating the buildings, the off-take will be lower in summer than in winter*

[36] *Storage that offers a service of injection in summer and withdrawal in winter is called seasonal storage*

stay in a balanced situation[37] Shippers will occur additional costs to stay in balance BP Gas & Power could offer them this balancing service. The value of this balancing service to BP Gas and Power is 0 2 €ct/m3 This will generate an income of **4.0 million €/y**.

Additional to the three above-mentioned base values enhanced values can be subtracted from owning storage capacity Since the storage capacity is sold in bundles[38] it might well be that BP Gas & Power has overbooked injection-, withdrawal- or storage capacity. BP Gas & Power can trade this capacity back into the market (this is called the "secondary market"). Since other parties might be acting in the same way it is possible to trade around the position and optimise the amounts of capacity fitting the need of BP Gas & Power. All of these capacities are traded firm or interruptible These trading of capacity activities on the secondary market are expected to generate income of **1.0 million €/y**.

Special offers can be made for producers and or power generators Producers often need short term storage to store over production or supply underproduction to their customers. Generators often need additional supply. These two kinds of customer's request are special and can be sold separately when owning storage Income generated for BP Gas & Power due to this service will be **0.5 million €/y**

Other special service that can be sold into the market are, gas sales related services i e services directly related to the commodity E g. customer "pre-purchases" a quantity of gas in the storage at a pre-defined price The customer than has the right to call for this gas within pre defined time periods.

The Economic Indicators

In this 15 year project BP will be earning an NPV of 18.46 million € on an investment of 187 million € The total IRR is slightly above the cost of capital (9%). The cash flows and the economic indicators are shown in attachment 4 and a summary is show below.

The cash flows summary:

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Storage	-2.6	-82.5	4 0	14.6	10.9	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	71.5

The economics:

NPV	18.46	Million €
IRR	12.38	%
CE	5.32	%
PBP	9	Year

Conclusions and recommendations

As it clearly is a difficult project to decide the management team BP Gas and Power has decided not to go ahead since the income they can generate is not significant and the IRR is not much higher than the cost of capital. The risk of regulation is very high and the likelihood of securing additional value is too low. This project needs a strategical reason to go ahead with the economic indicators as they are currently. Currently there is no such reason

4.4.3 Case study project 3· Acquiring pipeline capacity

As in paragraph 4.4 1 this paragraph holds all elements of the standard used format for CBA within BP The previous project is a starting tool for the Northern European Gas & Power Business Unit to enter the gas market in their target area. This project should assist BP Gas & Power in starting to offer services themselves that they currently still have to buy from the incumbents (for high prices).

The Project

As describe in chapter 3.6 the aim of this project is to acquire transportation capacity in a pipeline. The current pipeline runs from Zelzate[39] to Moerdijk[40] Total length of the current pipeline is approximately 70 km Connected to the pipeline are several large industrial companies in the area between Zelzate and

[37] Balancing means that the amount of gas put into the system in a certain period needs to equal to the amount taken out of the system in the same period.

[38] A bundled unit is a fixed combination of injection capacity, withdrawal capacity and storage capacity

[39] *Belgian-Dutch border*

[40] *A town in the south-west of the Netherlands*

Moerdijk plus part of the distribution grid of Delta[41]. Zebra B.V. owns this pipeline. Delta and Essent[42] are the two shareholders of Zebra BV[43].
The current pipeline has little to no benefit to BP Gas & Power since the area around the pipeline is small and there are no large customers. The pipeline will get interesting to BP Gas & Power when and if it is extended to the Botlek area. The extension would give BP Gas & Power an alternative route to transport gas from the Zeebrugge market to the Botlek area. Since the current route via Gasunie is constraint during peak periods is this of very high value to BP Gas & Power.
In order to gain access to this pipeline and to extend the pipeline; BP Gas & Power needs to buy a share of the Zebra Company

Description of Proposal

As a first step BP Gas & Power wants to negotiate a deal with one of the two current shareholders for a share in the Zebra Company. Delta is the most likely partner since they are not using their own capacity and Delta is looking for a strong international partner because they believe that this their position in the market[44]
This share in the pipeline will give BP Gas & Power capacity to ship gas from Zelzate to Moerdijk. It also gives BP Gas & Power access to a share of the line-pack[45] that is in the pipeline. Capacity and Line-Pack can be used to service customers in the area around the pipeline.
Since BP Gas & Power wants to target customers in the Botlek area they will need to extend this pipeline to Pernis. This connection will give the shareholders the opportunity to sell capacity into the secondary market since it becomes a second alternative to enter the Botlek area next to the Gasunie grid. All third parties currently using the Gasunie grid will be interested in booking capacity (If the price is right and the constraints are less). If the P15-P18-storage will be built BP Gas & Power wants to connect the pipeline to the storage in order to make trading at the Zeebrugge HUB more efficient. This last part of the pipeline (connecting it to the storage) will give BP Gas & Power an advantageous position compared to other players in the market.

The Sources of Value

The main source of value to BP Gas & Power comes from the capacity in the pipeline. BP Gas & Power gets access to a supply area where other pipelines (including the Gasunie grid) are constrained in capacity. This extended pipeline will give BP Gas & Power a source to access the Botlek area cheaper than via the Gasunie grid and without the constraints the Gasunie grid has. The Line-Pack in the pipeline can be used as flexibility tool, which gives BP Gas & Power the opportunity to sell a better service to their customers than without this line-pack.

A second source of value is the connection to the Zeebrugge market. The pipeline will give a direct link to the trading HUB, which should give BP IST (Integrated Supply and Trading) additional trading opportunities

The Economic Indicators

BP Gas & Power needs to buy a share in the existing pipeline that runs until Moerdijk and at the same time start the extension of the pipeline. Both investments will start in 2002. The final bit of the pipeline in the extension project will only be finished in 2003. Income will be generated from 2002 if BP Gas & Power will be able to acquire customers in the area who are still able to source gas for 2002. The likelihood is small and therefore no income is calculated for 2002.
In this project BP will be earning a NPV of 0.80 million €. The total IRR is slightly above the cost of capital (9%). The cash flows and the economic indicators are shown in attachment 4 and a summary is show below

[41] *DeltaNutsbedrijven N.V. is the regional grid owner in the south-west of the Netherlands*
[42] *Essent N.V. is one of the two major regional grid owners in the Netherlands. Essent owns the regional grid in the south east of the Netherlands (directly connected to Delta)*
[43] *Zebra BV is 1/3 Delta and 2/3 Essent*
[44] *Delta is a small regional company that has indicated to be interested.*
[45] *If gas needs to flow through a pipeline it is necessary that there is gas in the pipeline to keep it a minimum pressure. The amount of gas in a pipeline that is necessary to control gas flows is called Line-Pack.*

The cash flows summary:

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Transportation	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.50

The economics:

NPV	0.80	Million €
IRR	9.7	%
CE	2.84	%
PBP	8	Year

Conclusions and recommendations

The end conclusion of the management of BP Gas & Power was that it is not a viable project. The income generated isn't negative but far from sufficient to have BP Gas & Power invest money in it.

4.5 Conclusions on standard CBA's of case study projects

Because the pipeline project and the storage project are both 15 year projects the overview is given over a 15 year period. In order to do this the "Botlek" project has been repeated for 15 years This is possible since BP Gas & Power wants be marketing gas in the future as well and it is assumed that it will not getting easier than it is today.

The total overview of the economics of these projects is:

After Tax Cash Flows (in million €)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
Net Cashflow Storage	-2.57	-82.46	4.04	14.64	10.85	12.55	12.63	12.71	12.79	12.88	12.97	13.07	13.18	13.29	71.52
Net Cashflow Zebra	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.64

Botlek	
NPV @9% nominal	-15.32
IRR	N/a
Capital efficiency	N/a
Payback period	N/a
Storage	
NPV @9% nominal	18.46
IRR	12.38%
Capital efficiency	5.32%
Payback period	9 year
Zebra	
NPV @9% nominal	0.80
IRR	9.70%
Capital efficiency	2.84%
Payback period	8 year

All three case study projects have been evaluated with the standard "BP-methodology" It is clear from the decisions BP Gas & Power management have taken that none of these projects are viable. The reason for the customer base project to go ahead any way is only taken to make sure that BP Gas & Power has got market share in the Netherlands In the global BP structure it is only allowed to take on a project for strategic reasons if there is a high expectation that the income in the future will be worthwhile doing so BP Gas & Power has got the intension of become a major energy supplier in the Netherlands that can generate sufficient income in the total portfolio of projects they will be acquiring in the future

BP Gas & Power believes that the additional income needed to approve projects like these is within the web value they can create between each other

In the next chapter the approach BP Gas & Power wants to take in looking at more than one project is described Via literature I have tried to demonstrate that simultaneously other people outside BP Gas & Power also think that there is more value with webs of assets. In chapter 6 the projects from chapter 3 are again evaluated but then with the assumed web value from chapter 5.

5. Web value, what is it and how does it work

BP Gas and Power needs these projects like these in their approach to become one of the bigger energy marketing companies in continental Europe They also believe that there is value created outside the traditional evaluation methodology. This means that they need a methodology to calculate the value that these projects really generate. In this chapter I will first look at the background to the current "BP-methodology" which is based on the value chain approach From the current "BP-methodology" I will then examine a new "BP-web value methodology". The new view on web value will then be explained and it will be compared to the "BP-methodology" background. After this general theory around web value approach will be discussed. Finally, some theory from financial analysis will be given. From all this theory the "BP-web value methodology" will be extracted.

In chapter 6 the projects from chapter 3 will be re=examined taking into account the value created by the "BP-web value methodology" as described in this chapter.

5.1 Value Chain approach

In chapter 4 the "BP-methodology" has been explained. The basis of the "BP-methodology" is the value chain approach. The "BP-web value methodology" has a different theoretical basis. I will first discus the value chain approach, then present the new web value approach and finally, I will analyse the differences As global oil company BP has a long history of investing in upstream projects Many of these projects are long term, lasting 30 years or more. BP management is well used to investing in projects The main characteristics of upstream oil projects investments are:

- Capital intensive
- Long term
- High risk profiled (but covered with a lot of experience)
- High returns (IRR > 15-20%)

BP has always believed that it is very important for a company to be present in the complete value chain (in order to capture most / all of the value in a varying oil price environment). BP has therefore always been present in the downstream and chemicals markets as well. Looking at investing in the downstream market shows that the bigger the margins are in upstream (in a high oil price period) the lower they are in downstream and chemicals and vice versa. Thus BP margins overall are protected in some way from oil price fluctuations.
The latest area where BP has entered is Gas & Power. In recent years, BP's production portfolio has shifted from 8% gas as a proportion of overall production to 40%. Investing in downstream Gas & Power does not bring BP high returns in comparison to upstream projects But since BP believes that a lot of value is captured further down in the gas value chain, and since gas now represents a high proportion of BP's portfolio, they have decided that they want to be in the downstream gas market as well

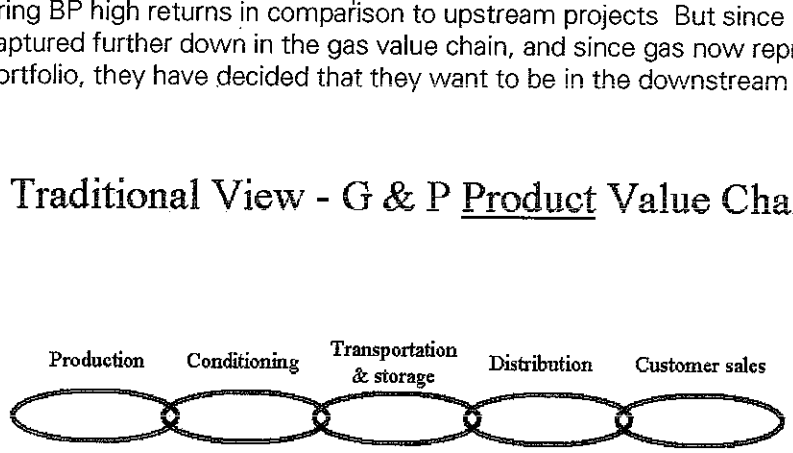

Figure 9: Traditional product value chain Gas & Power

5.1 1 Traditional value chain view
The traditional value chain can be split into two chains. The first chain is the "product value chain" In this chain production, conditioning, transportation, distribution and the sales of the product are centred Looking at the traditional product value chain for Gas & Power 5 parts can be distinguish (as shown in Figure 9)

In addition to the product value chain it is also necessary to look at the second value chain that is closely linked with the product value chain, which is the "service value chain". With BP Gas and Power a lot of the value is assumed to be part of the service value chain. The core expertise within BP Gas and Power lies within optimisation of energy supply, managing supply risk, managing price risk, separation of supplies and the back office and control around the deals In Figure 10 the service value chain is demonstrated.

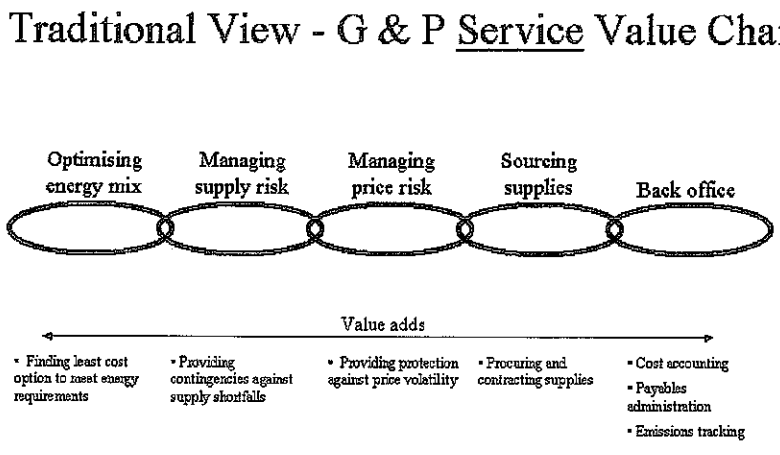

Figure 10: Traditional services value chain Gas & Power

Each part of the value chain is expected to add value It is believed within BP that each part separately can be analysed and should be able to guarantee sufficient income on its own "By analysing the stages of the value chain, managers have been able to redesign their internal and external processes to improve efficiency and effectiveness" [9]

5.2 Web value approach

BP's marketing and trading organisation for Gas and Power in Europe, is pursuing a business model that aspires to develop a "web" of assets (physical assets, contractual assets or customers) that can be leveraged to realise above average returns on BP's marketing and trading business. Given the fundamental importance of this model to developing gas marketing and trading business, BP sees an opportunity to develop a methodology that:

- Supports a common understanding of the web business model across the BP Gas & Power and allows BP Gas and Power to articulate the model in a consistent manner;
- Allows BP Gas & Power to understand very specifically the sources of value associated with the web and to estimate these component values, and;
- Identifies the critical success factors associated with the value web business model.

5.2.1 The new web value view [13]
In the traditional value chain approach it is not possible to capture value generated from within a web. Therefore it is necessary to adopt a new view, the web value view In chapter 1 a simplified approach to web value is demonstrated in Figure 1 This approach can also be visualised in a style similar to the traditional value chains, but as a spider web (demonstrated in Figure 11), rather than a traditional chain The two value chains will be combined into one figure. The influence that the chain elements have on each-other is the basis for the web added value The spider web shows all assets interlinked in one circle rather than in separate value chains, as demonstrated in figure 11;

The external and internal relationships this centre circle has with the outside world are represented as well The internal ones are the expertise, relationships, contracts and systems that BP Gas and Power has The external ones are the links between the suppliers and the customers In the traditional value chain the supplier and customer were linked directly through conditioning to transportation and then via distribution to the customer. The difference in this new model is that the link between the chains has disappeared, they are now all in one web and each element can optimally use its connections to the supply and customer elements. Value can be added via different combinations of expertise and distribution.

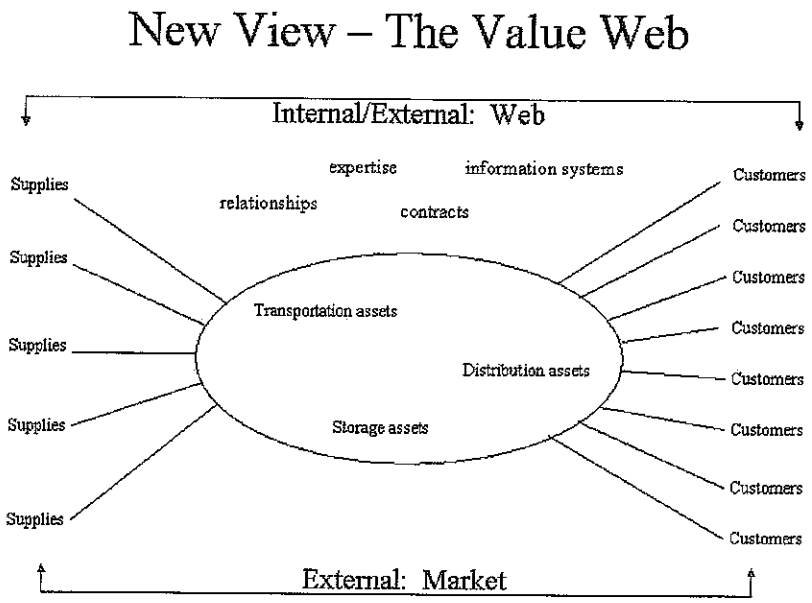

Figure 11: The new view on values, external and internal aspects

In the next paragraph the differences between the value chain approach and the web approach will be highlighted.

5 2 2 Value chains versus web value

As seen in Figure 9 the product value chain is about adding value to a product as it progresses its source to the final customer In Figure 10 it is shown that the value service chain is about doing something (providing a service) for the customer more efficiently and effectively than they can do it themselves. The new view of web value is about using both value chains together to optimise the amount value created. In the traditional view it was very difficult to optimise around the different elements of the value chain, in the new view it is simpler because every can be linked together in the centre circle. Very important in the new view are:

- Improving efficiency of both the product and service value chains elements This is also using the economy of scope and scale, but also by leveraging flexibility inherent in the web;
- Improve the scope of services possible within the various projects This differentiation of product and service becomes clearer in the new view and is assumed to generate more income The new income will mainly be coming from the optionality that is within the combination of the various elements.
- Because of the different way external relationships will behave to the various elements it is possible to improve income on these elements as well. Access to market information will provide proprietary trading advantages, which will then lead to improved trading margins
- The improved external relationships will also realize conversion opportunities between market segments (e.g., gas to power, gas to gas between regional markets) Since these conversion opportunities are products that customers as well as competitors are looking for in the market it will be possible to take advantage of these opportunities
- Last but not least the risk can be managed more effectively when the overview into the various elements is clearer This will give the opportunity to provide risk management services to the market which in effect can be covered within the web without increasing the risk to BP Gas & Power.

As show in this paragraph the advantages of the new web added value approach can be found in mainly in, efficiency, optimisation and information

5.2.3 General theory regarding web added value

The reason for this assignment was based in the belief from BP Gas & Power that there is more value created by projects than just the straightforward value calculated with the current evaluation methodology

Therefore BP Gas & Power wanted to search for a new methodology of evaluating projects to replace the current "BP-methodology" From the previous paragraphs it has become clear that BP Gas & Power believes that the new structure is caused by the way projects are linked The new "BP-methodology" could therefore be called the "BP-web value methodology". This new approach might assist BP Gas and Power in their approach to enter the European energy market BP Gas & Power believes in this approach because of the following reasons.

- Liberalisation; this puts pressure on companies to create value in all possible ways.
- Technology changes and the importance of knowledge; this facilitates additional ways of value creation beyond the traditional value chain method.

In other words the first reason is the market they are operating in is liberalising, de-regulation is taking place and a lot of changes are approaching the market. The second reason is the constant technology change that is happening around BP Gas & Power. Knowledge is becoming increasingly important and information is becoming a key driver for income Very important in both reasons is that the projects that are used within the web will be linked closely. Synchronising the projects in time, place and usage will be very important. If all three synchronisation elements are present it is believed that web value will be added

The business environment in which BP Gas and Power is active around the world is moving quickly De-regulation is a key driver for the changes and strategy is no longer a matter of positioning a fixed set of activities along the old value chain model. As Norman and Ramírez said· "successful companies increasingly do not just add value but reinvent it [10] In other words it is not just a matter of adding value along the value chain but also looking for value between the elements of the business in order to pick up all available options that can create addition value. BP Gas and Power sees web value in combining projects and pick-up value that is created by options between projects

The traditional value chain approach is based on the vertical integration of the various projects along the value chains BP Gas and Power believes that the traditional vertical integration is re-shuffled into virtual integration due to liberalisation and de-regulation The energy markets (gas and power) in Europe are forced to change due to de-regulation and liberalisation. Links between projects are created but the order and manner in which this is done are different from the traditional way This approach is supported by Micheal Weiner's approach to the electricity markets in the US [8] In his view there are three forces driving the change, the first is regulatory and political, the second is market and the third is technology. He claims that regulatory and political activities are forcing markets to change

Market changes are putting pressure on newcomers like BP Gas and Power to optimise their service in the best possible manner in order to optimise income and reduce expenditure within their projects The push that the market currently has is big since it is combined with the political driver for de-regulation. As mentioned previously Michel Werner believes that these kind of market forces will push a company to use all the value created in between projects to cash flows in projects [8] The technology push is big within BP Gas and Power as well Internet based trading, or sales are introduced and the pressure on prices (due to transparency) is increasing as well. Technology is also a driver for BP Gas and Power to optimise their offer, since technology provides better systems that can assist BP Gas and Power analysts in optimising their markets Important to notice is that this change is not unique to BP Gas and Power but it is a general force in the market. Technology is no longer considered a side product but has become significantly import for the business BP Gas & Power is in. Andrews and Hahn support this view since they state that: "Technology is no longer considered a side product to the value chain but is considered to be a major strategic weapon that can quickly produce competitive advantages and leverage" [12].

BP Gas & Power believes also that a new source of value is being created – knowledge (within people and systems). A web is effectively an array of sensors collecting information, which can be intelligently leveraged to create value. BP Gas and Power has a lot of knowledge about the markets they act in and has proved to that it can extract value out of this knowledge. Creating additional sensors into the BP Gas and Power organisation that can provide them with real-time and accurate information would be generating income to BP Gas and Power Sawney and Parikh support this view by stating that knowledge is the key in the web that will create the added value [4]

Due to the constantly changing market situation BP Gas & Power needs to align their projects as good as possible to optimise the income and to minimise expenditure. This optimising will only give rise to better cash flows if the projects are synchronised in time and space. Andrews and Hahn [12] support this view because they say that in this period of change from value chain to web value the synchronisation of activities is very important. They state that: "A synchronised web could become a powerful economic engine that produces great wealth for its members" [12] This supports exactly the view from BP Gas and Power since they believe that projects will only be able to generate the maximum income when placed in the surrounding of various other projects that are being executed. In the same period the organisation structure behind the web of projects also needs to be in place to allow for synchronisation of the various activities, which fall under them to allow BP Gas and Power to capture the maximum value.

If BP Gas & Power want to make web added value to something that they can use in their approach of the market they will need to make sure that:

- They have access to the web components (projects);
- They have access to the knowledge and systems needed to do the projects;
- They have the technology infrastructure to collect, share, interpret and act on information;
- They have the organizational infrastructure (talent & processes) needs to create value from the given information

If they have all of this is they will be able to calculate the web added value, however that is still no guarantee that they will be able to generate the web added value in reality

In the next paragraph key elements from financial theory surrounding the web concept will be reviewed The previous points together with the financial theory should support the ideas of BP Gas and Power regarding the web value.

5.2.4 Financial theory regarding web added value

In addition to the straightforward methods of calculating the value in the value chain, there are theories that support the calculation of what is defined as "something additional" [13] What exactly is this added value that is being created by a web? BP Gas and Power is looking for the answer to this question, and support is found in scientific literature

In the standard literature it is stated that value is added through the product and service value chains. Next to these relatively straightforward sources of value, BP Gas and Power believes that there are other / different sources of value that will be added via a web of assets. BP Gas and Power has searched for support to this theory and found this support in scientific and popular literature. The following areas of financial theory are explored to address this question:

1. Markowitz portfolio theory [13]
2. Options theory [14]
3. Efficient capital markets theory [13]

In the Markowitz portfolio theory it is said that the risk return relationship can be improved by holding a portfolio of assets (i.e., supplies, contracts, hard assets, customers) with different, uncorrelated or poorly correlated risks (i e , diversification). In other words a web (portfolio of assets) will improve the total return and will lower the implied risks The reason for this improvement is the fact that holding such a portfolio diversifies away the unique risk of the individual assets and optimises the use of the individual projects, which improves their returns. Therefore holding a portfolio of assets is generating additional value according to this theory. This supports the view BP Gas and Power has regarding webs.

In the options theory, options are defined as "a right, but not an obligation, to take a future action". Option theory says options have value when there is uncertainty and time before action is required. The notion of 'real options' is an extension of financial option theory to real (non-financial) assets

In a web, options are embedded. In the energy market BP Gas and Power is in, changes occur on a regular basis, due to (de)-regulation, customer experience and technology changes. Combining assets in this changing environment will create supply optimisations as well as the expansion of customer offers The basis this web creates can be used for further enhancement when the environment changes again This optionality loop that is created can be described as web value.

The value of individual assets can higher to BP Gas and Power than somebody else due to this creation of optionality Effective management of these options should allow BP Gas and Power to do things better (efficiency and effectiveness) and to do things BP Gas and Power would not otherwise be able to do

In the efficient capital market theory, it is stated that market prices reflect all available information, but:

- Information is not instantaneously or perfectly shared across a market;
- There is a huge amount of information flowing through the market some of which is noise and some of which relevant;
- Where barriers or discontinuities exist between markets (e g , regional gas markets, gas vs power market) price differences may exist.

Building a web of assets also builds a web of knowledgeable people who can access, decipher and act on information ahead of the market. Having access to the web of assets also provides more options for acting on market information

Access to a web of transportation and conversion assets provides potential supply linkages between quasi-independent markets (e.g., The Interconnector[46] links UK and Continental Europe or gas to power) opening possible arbitrage and trading opportunities.

In all three financial theories the same message comes through, optionality is the key driver for the creation of a web. This optionality will generate the additional value in a web. Two other main elements are mentioned in financial theory, optimisation of the assets involved and the information created by the portfolio of assets.

5 2 5 A compilation of value sources

Within the current approach taken by BP Gas and Power it is recognised that web value is defined into specific sources of value. These specific sources of value are the building blocks, which create optionality that BP Gas and Power will be able to use. BP Gas & Power has been making a compilation of the recognised sources of value, which is represented in table 3. In this table the various sources of value are presented in 3 main blocks. The three major parts are supply optimisation, creation of optionality and information (which creates trading opportunities) The values as presented in table 3 are the sources of value that create value when a web is build Concluding from the previous paragraphs and the content of table 3 the following can be concluded:

- Optimisation; Optimise the use of the projects in order to maximise the income generated. It is important that the income of the web is the driver for the optimisations and not the individual projects any more.
- Optionality; Optionality created by one project can generate income to others Using this will created additional income to BP Gas & Power
- Information; Information that will come from controlling the web will give trading the opportunity to be using their position in the market more effectively. Trading will therefore be in a position to generate more income

are the key drivers in the "BP-web value methodology"

In table 3 these 3 main blocks are described and some specific sources are identified. In this table it becomes clear that there are a lot of possible value to BP Gas & Power when using the web added value method

In the table in the first column the kind of source value is described. The sources of value are categorised in the main elements as described in this paragraph, i e. optimisation, optionality and information. In the second column a description is given in which way BP Gas & Power wants to create this value And finally in the third column the requirements for the creation of this source of value are given.

[46] *Interconnector UK Ltd is a company that build a pipeline between Bacton (UK) and Zeebrugge (B). This pipeline is the first pipeline that connects mainland Europe with the United Kingdom. Since opening of the pipeline (in 1998) the two gas markets are connected Trading around positions in Zeebrugge and in Bacton has grown into a liquid market with a churning factor of around 6. (Churning is the amount of physical gas compared to the amount of traded gas)*

Table 3: Specific sources of value

Source	*Description*	*Requirements*
Optimisation		
Supply flexibility	Access to multiple sources of supply allow fulfilment from least cost source	Access to multiple supply sources with differing costs to market
Transportation flexibility	Access to multiple transportation routes to allow fulfilment using least cost path	Access to multiple transportation routes with differing transportation costs
Placement flexibility By demand aggregation	Access to multiple customers for placing supplies Aggregation of demand should raise base demand level and reduce relative variability of demand.	Access to multiple customers with un- or poorly correlated demand
Balancing flexibility	Access to multiple supply sources, transportation routes, storage depots and customers supports lower cost balancing	Access to assets (supply, logistical, customer) that allow flexible, cost effective balancing
Conversion capability	Allows conversion of gas to electricity when there is a positive spark spread	Access to gas-fired power generation and a positive spark spread greater than the tolling rate and delivery cost
Acquisition synergies	Elimination of redundancies resulting from acquisitions	BP able to manage the acquired company more efficiently than incumbent
Optionality		
Customer offers:		
Risk management	Charge for risk management services and potentially a return on the associated trading activity	Customer demand, risk management expertise, positions around which to manage the risk
Energy management	Charge for energy management services and lock product sales (gas, electricity, oil)	Customer demand, customer service expertise, market presence
Other	Other services such as those bundled with a downstream offer	Customer demand, customer service expertise, market presence
Information		
Physical positions	Trade on our own positions, the	Timely access to
Paper positions	Positions of our customers and	Information on the
Derivative positions	More generally on the information we acquire through our web of product, asset and customers positions	Market, our positions, and the positions of our customers, expertise to interpret the information, trading skills and positions which allow us to profitably response to the information

Source: BP Gas & Power [13][17], 2001

5.3 Conclusions

In summary the main drivers in the "BP-web value methodology" are:

- Optimisation;
- Optionality;
- Information.

If BP Gas & Power wants to be able to optimise their projects by including web added value they need to make sure that the projects are linked in a way that it will create possibilities in one of the above mentioned areas. Looking for web added value in projects that BP Gas & Power wants to accomplish means analysing if the is value in one of these areas

In the next paragraph the drivers identified for web value will be tested on the projects that are mentioned in chapter 3 The analysis performed in chapter 4 will be used as the basis around which the web value will be added.

6. Economic Analysis of the projects including web value

In this chapter the assumed web value drivers from chapter 5 will be tested at the projects described in chapter 4. The project analysis from chapter 4 will be used as the base value The additional value that could be added via web value will be presented. The total expected value including the web value will be used as the "real" value the project can generate in the presented web Conclusions that BP Gas and Power would draw from these new financial numbers will be given as well since these projects are presented to the review groups as well as the traditional views calculated in chapter 4.

The base project will be the customer portfolio in the Netherlands. This project has been approved using the returns given in chapter 4 and it is the basis around which the storage and the pipeline would be placed to generate the start of a web. In the next paragraphs the customer portfolio project will be first combined with the P15-P18-storage project and secondly with the pipeline project. Finally all three will be combined to see what web value will be generated.

6.1 Customer portfolio plus the P15-P18-storage

In paragraph 3.4 the customer portfolio project has been explained and in paragraph 4 4 1 the economics have been demonstrated in the standard BP way In this project the value needs to be generated by the services that are offered to the customers. The price the customers are prepared to pay for these services are currently less then the costs the BP Gas and Power will make and therefore the net income is negative Similar to the customer portfolio project the P15-P18-storage project has been explained (paragraph 3 5) and the economics for the P15-P18-storage project are calculated in paragraph 4.4.2.
In this paragraph the web value created by accepting both projects will be calculated similar to the way it has been done in paragraph 4.4

6 1 1 Description of Proposal
In combining the customer portfolio project with the storage project it is necessary to realise that the P15-P18-storage project will not have any influence on the customer portfolio project as it currently is. The P15-P18-storage project will not be able to generate any service before end of 2003 In the assumptions made, it is assumed that the project will generate a service for 2002 in order to see what this project will do to similar customer portfolio projects in 2004 and onwards

6.1 2 The Sources of Value
The combination of these two projects will generate web value as explained in chapter 5. In chapter 5 the web value creators where,

- Optimisation
- Optionality (e.g for new services)
- Information (Trading possibilities)

The customer portfolio will generate web value in the following areas.
In the customer portfolio project the optimisation will come from the fact the currently BP Gas and Power needs to buy services from Gasunie to cover for flexibility and swing. This service is fixed and therefore BP Gas and Power has no possibility to use the flexibility services they purchased for the customer group elsewhere If they would have control over flexibility services from the P15-P18-storage they would be able to optimise the use of the service by using it for other customers (e.g. for a service fee). This web value should be saving BP Gas and Power approximately **1.5 million €/y**[47].

BP Gas and Power will be getting valuable information about the off-take patterns customers have in the area. They can use this in optimising their offers for supply. Since BP Gas and Power has this information BP Gas and Power will be able to offer a better service and a better price than other suppliers who don't have this information. This has a potential value for BP Gas and Power in the next supply period The value for this information is difficult to calculate but assuming that BP Gas and Power will be able to secure 3 more large industrial customers next period at a margin of 0.2 €ct higher than expected otherwise, this generates an income of **1 million €/y.**

[47] *The background calculations of these values are done with an extensive data analysis. Since the data that is just for these analyses is confidential the calculations are not mentioned in the assignment paper*

The combined project would create optionality to the customer portfolio project. BP Gas and Power would be in the position to sell different services then flexibility to other customers. One service that BP Gas and Power would be able to sell is back-up services. So in case a customer has a problem with its supplier, BP Gas and Power would provide back-up supply for a certain amount of time. This would generate additional income to the project. The web value this source of value can generate is approximately **0.75 million €/y.**

Since BP Gas and Power has purchased their supply for BP IST (Integrated Supply and Trading), BP IST (Integrated Supply and Trading) has to optimise the trading position of this supply. If BP IST (Integrated Supply and Trading) has the possibility to use the storage facility and gets the information of BP Gas and Power who else is using the storage and how, all this information would give BP IST (Integrated Supply and Trading) the possibility to trade more and better. This trading would be able to generate additional web value. It is difficult to estimate how much value but looking at the customers base volume and the storage opportunities this should be able to generate **0.5 million €/y**.

The P15-P18-storage project will generate web value in the following areas.
Optimisation in the P15-P18-storage project can only be generate by selling interruptible services to the market since the assumption is that the firm (primary) services have been sold 100%. BP Gas and Power will sell these interruptible services to their customer portfolio and other customers who are interested in a service like that. This will generate web value income to BP Gas and Power but it will also generate income to the storage project. The income to the storage project can be estimated by the amount of interruptible flexibility sold multiplied by a small fee. The estimated income would be **0.5 million €/y.**

6.1.3 The Economic Indicators

In this combination the economic indicators would change into:

The Economic Indicators
In the combined project of "Botlek" and the storage BP will be earning a NPV of 33.88 million € on an investment of 187 million €. The total IRR is slightly above the cost of capital (9%). The cash flows and the economic indicators are:

Paragraph 6.1.3

Without web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Storage	-2.57	-82.46	4.04	14.64	10.85	12.55	12.63	12.71	12.79	12.88	12.97	13.07	13.18	13.29	71.52
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
TOTAL CASH FLOW	**-4.47**	**-84.36**	**2.14**	**12.74**	**8.95**	**10.65**	**10.73**	**10.81**	**10.89**	**10.98**	**11.07**	**11.17**	**11.28**	**11.39**	**69.62**

NPV @9% nominal	3.14
IRR	9.58%
Capital efficiency	0.91%
Payback period	10 year

With web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Storage	-2.57	-82.46	4.04	14.64	10.85	12.55	12.63	12.71	12.79	12.88	12.97	13.07	13.18	13.29	71.52
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
Savings on services	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Information value	0.25	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Additional service offer to the market	0.25	0.25	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Optimisation trading	0.25	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Interruptable services	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
TOTAL CASH FLOW	**-2.22**	**-82.11**	**6.39**	**16.99**	**13.20**	**14.90**	**14.98**	**15.06**	**15.14**	**15.23**	**15.32**	**15.42**	**15.53**	**15.64**	**73.87**

NPV @9% nominal	33.88
IRR	15.42%
Capital efficiency	9.76%
Payback period	8 year

6.1.4 Conclusions and recommendations

The outcome of this first very small web already indicates the advantages of the "BP-web value methodology". The expected profitability of these projects would improve into a situation where BP Gas & Power would be able to invest in these projects. However the risk attached to the new project still needs to be evaluated before any final decision can be taken.
In the next paragraph the combination between the customer portfolio and the pipeline will be valuated
Finally in paragraph 6.3 the total web of all three projects will be valuated

6.2 Customer portfolio plus the pipeline

As mentioned in the previous paragraph the customer portfolio project has been explained in paragraph 3 4 and in paragraph 4.4.1 the economics have been demonstrated. In this project the value needs to be generated by the services that are offered to the customers. The price the customers are prepared to pay for these services are currently less then the costs the BP Gas and Power will make and therefore the net income is negative.

Similar to the customer portfolio project the pipeline project has been explained (paragraph 3.6) and the economics for the P15-P18-storage project are calculated in paragraph 4 4.3.

In this paragraph the web value created by accepting both projects will be calculated similar to the way it has been done in paragraph 4 4

6.2.1 Description of Proposal

If both projects are accepted and the projects will be able to influence each other there will be additional benefits for BP Gas and Power The benefits for BP Gas and Power will be in optimising transportation for the customer portfolio in the area of the Botlek. Optimising the flexibility services for the customer portfolio is also possible but that will not offer a big savings since the amount of flexibility offered by just the pipeline is limited. Connecting the customer portfolio with the Zebra pipeline to the trading hub of Zeebrugge does bring additional trading opportunities to BP IST (Integrated Supply and Trading).

6.2 2 The Sources of Value

The combination of these two projects will generate web value as explained in chapter 5. From the in chapter 5 mentioned web value creators the following will apply to the combinations of these two projects,

- Optimisation of transportation and services
- Optionality (e.g. for new services in the area around the pipeline)
- Trading possibilities (especially due to the connection to the trading hub in Zeebrugge)

In the customer portfolio project the optimisation will come from the fact the currently BP Gas and Power needs to buy transportation and services from Gasunie to cover for flexibility and swing in the Botlek area. The transportation costs for transporting in the Gasunie grid is higher than transporting in the Zebra pipeline since the Zebra pipeline has to cover a shorter distance, and the tariff is distance related This web value should be saving BP Gas and Power approximately **1.1 million €/y.**

BP Gas and Power will be getting the possibility to supply to customers in the area where the pipeline is running Currently BP Gas and Power has no possibility to supply to that area If BP Gas and Power will be supplying that area they can use their current supply portfolio to cover for the services required This will generate a savings to the sales in this are of around **0.75 million €/y.**

BP IST (Integrated Supply and Trading) will supply BP Gas and Power from the trading markets around the Netherlands The pipeline connection will give BP IST (Integrated Supply and Trading) a cheaper possibility to switch from Bunde to Zeebrugge then other players This will generate a web value of **0.5 million €/y**

6 2.3 The Economic Indicators

In this project combination BP will be earning a NPV of 1 94 million € The total IRR is slightly below the cost of capital (9%) The cash flows and the economic indicators are:

Paragraph 6.2.3

Without web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Zebra	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.64
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
TOTAL CASH FLOW	**-22.36**	**-5.17**	**2.63**	**3.48**	**3.41**	**1.70**	**0.90**	**0.85**	**0.80**	**0.75**	**0.70**	**0.60**	**0.56**	**0.51**	**0.74**

NPV @9% nominal	**- 14.51**
IRR	**-7.21%**
Capital efficiency	**-54.12%**
Payback period	**15 year**

With web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Zebra	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.64
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
Savings on services	0.10	0.55	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Additional customers	0.25	0.50	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Optimisation trading	0.25	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
TOTAL CASH FLOW	**-21.76**	**-3.87**	**4.98**	**5.83**	**5.76**	**4.05**	**3.25**	**3.20**	**3.15**	**3.10**	**3.05**	**2.95**	**2.91**	**2.86**	**3.09**

NPV @9% nominal	**1.94**
IRR	**10.53%**
Capital efficiency	**7.23%**
Payback period	**7 year**

6.2 4 Conclusions and recommendations

The conclusions so far are, NPV is positive but the IRR is not sufficient in the traditional BP philosophy. The combination of the customer portfolio project and the pipeline project is still not sufficient. To make these two projects more economical, it was recommended to connect the P15-P18-storage to the pipeline so that the trading hub in Zeebrugge could generate more optionality. Before a final decision than can be taken it is necessary to investigate the risks attached to this new combined project. Only if the risks are acceptable and the economics are positive enough, both projects could go ahead

6.3 All the projects in one web

If all three projects would be put in one web would this generate sufficient income to BP Gas and Power? This is one of the questions asked in paragraph 1.4.2. If the answer is yes (and it is), where does this value come from? In this paragraph using the information in chapter 5 and the outcome of the previous paragraphs can answer both questions

6.3.1 Description of Proposal

In this analysis all three projects will be in place. The aim of this project is to build the basis for BP Gas and Power to become one of the important energy players in the Netherlands. From the start in the Netherlands this approach might then be used to get the same position in other European countries (i.e. France, Germany and Belgium)

6.3.2 The Sources of Value

The combination of these projects will generate web value as explained in chapter 5. From the mentioned web value creators in chapter 5 the following will apply to the combinations of these projects,

- **Optimisation** of transportation and services to customer portfolio
- **Optimisation** of transportation to new customers in area around pipeline
- **Optionality** (e.g. for new services to customers, or wholesalers)
- **Information**: knowledge (i.e. information regarding customers and wholesalers)
- **Information**: Trading possibilities (due to the connection to the trading hub in Zeebrugge and the additional information)

Most of the previous mentioned sources of value between the P15-P18-storage project and the customer portfolio and the pipeline project and the customer portfolio would also appear when all three projects are operated together. Since in the previous paragraphs all possible double counting are eliminated they can be used for the new economics of the projects

Having both projects (storage and pipeline) together with the customer portfolio creates more web value than the web value from each separate combination. The reason for this is that the two projects will have web value between themselves as well.

The flexibility service as mentioned in paragraph 6.1.2 will be optimised even more when the storage is connected with the trading hub in Zeebrugge via the Zebra pipeline. Flexibility and swing will be services that BP Gas and Power no longer has to contract from Gasunie. BP Gas and Power will be able to offer these services to customers as well as other marketing companies. This combination also gives BP Gas and Power the opportunity to offer interruptible products, i e. interruptible storage, interruptible flexibility, interruptible transportation.
All this optimisation will be able to generate an additional income of **5.7 million €/y.**

As mention in paragraph 6.2 2 BP Gas and Power will be getting the opportunity to supply other customers in the area around the pipeline. Offering a commodity deal to these customers can generate additional income as mentioned but offering the commodity plus services can generate a higher income to BP Gas and Power. The income that can be generated will be approximately **1.8 million €/y**.

BP Gas and Power will gain a lot of information as pipeline and storage holder in the Netherlands This knowledge will help BP Gas and Power to structure their offers to the market. This restructuring of offers into the market can generate additional income to BP Gas and Power. Estimated will be an additional income of 0 2 €ct per cubic meter sold additional due to this information. The estimated amount to be sold due to this will be 1 bcm Additional to this extra amount of sales BP Gas and Power will be selling 3 bcm themselves. Also these sales can be optimised due to proper information The benefit due to this part of the information will be approximately 0 05 €ct The total revenue from this additional information will approximately **3.6 million €/y**

A possibility to sell different services (i e other that commodity and flexibility) is mentioned in paragraph 6.1.2. Due to the connection to the Zeebrugge hub this service can be sold more often and will therefore generate more income Estimated is an increase of 50% and the income generated will then be **1.8 million €/y**

Last but not least the trading possibilities will increase. BP IST (Integrated Supply and Trading) is the sole supplier for BP Gas and Power and they will be able to generate trading income due to the marketing short that BP Gas and Power creates. Since due to the combination of the projects BP Gas and Power will be able to sell more gas into the market the marketing short created is bigger The larger the position taken by BP Gas and Power the more trading value can be created around this position. Trading will get a lot of good market information due to the projects and this will together with the short position of BP Gas and Power generate an trading income to BP Gas and Power of **3.6 million €/y**

6.3.3 The Economic Indicators

In this project combination BP will be earning a NPV of 120.76 million € The total IRR is significantly higher then the cost of capital (9%) The cash flows and the economic indicators are:

The Economic Indicators

Paragraph 6.3.3

Without web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Zebra	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.64
Net Cashflow Storage	-2.57	-82.46	4.04	14.64	10.85	12.55	12.63	12.71	12.79	12.88	12.97	13.07	13.18	13.29	71.52
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
TOTAL CASH FLOW	**-24.93**	**-87.63**	**6.67**	**18.12**	**14.27**	**14.25**	**13.52**	**13.55**	**13.59**	**13.63**	**13.68**	**13.67**	**13.73**	**13.80**	**72.26**

NPV @9% nominal	**3.94**
IRR	**9.60%**
Capital efficiency	**1.05%**
Payback period	**10 year**

With web value	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Cashflow Zebra	-20.46	-3.27	4.53	5.38	5.31	3.60	2.80	2.75	2.70	2.65	2.60	2.50	2.46	2.41	2.64
Net Cashflow Storage	-2.57	-82.46	4.04	14.64	10.85	12.55	12.63	12.71	12.79	12.88	12.97	13.07	13.18	13.29	71.52
Net Cashflow Botlek	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90
Savings on services	2.50	3.50	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70
Additional customers	0.90	1.00	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Re-structuring of service to customer	1.80	2.00	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
Different service to trading market	0.90	1.00	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Optimisation trading	1.80	2.00	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
TOTAL CASH FLOW	**-17.03**	**-78.13**	**23.17**	**34.62**	**30.77**	**30.75**	**30.02**	**30.05**	**30.09**	**30.13**	**30.18**	**30.17**	**30.23**	**30.30**	**88.76**

NPV @9% nominal	**123.16**
IRR	**28.98%**
Capital efficiency	**32.90%**
Payback period	**5 year**

6.3 4 Conclusions and recommendations

The conclusion for all three projects is positive. Although the remark was made that it was necessary for all three of them to go ahead together. If one of them would not be possible the situation would be different. This remark explains the importance of the web value that will be created. But it is anyway necessary to make a risk analysis before final judgement can be made whether or not these projects should go ahead.

6.4 Conclusions web value in case study projects

In the previous paragraphs it has become clear that analysing the case study projects as combined projects does give rise to additional expected value This value in general comes from the three major sources recognised in chapter 5.

If all the three projects are combined and executed the return that this web will give is expected to be sufficient to cover BP requirements on IRR and NPV It is still necessary to analyse the risks attached to this project in order to make any final decisions on the project.

In the next chapter the conclusion of this assignment will be summarised and in the final chapter the recommendations for after this assignment will be formulated.

7. Conclusions and recommendations

7.1 Conclusions

Within this chapter the conclusion from this assignment paper will be described In paragraph 1.1 it was mentioned that the end result of this paper should be· "a first step in the development of a "CBA web+" methodology for analysing projects". The contribution of this paper in this area will be made clear in this chapter

In chapter 1 the problem definition and some clear objectives were formulated:

How can BP Gas & Power calculate the true expected returns on investment (or revenues) for BP, created by projects that are part of a web?

The problem definition is answered in this assignment using the case study projects as examples of projects in a web. In chapter 4, the economics of the individual projects are calculated and the straightforward product chain values are mentioned in these analysis

In chapter 5 it will be shown the areas BP assumed that would create web value where supported by popular and scientific literature. From the research it was found that the areas that contributed to web added value are·

- Optimisation possibilities;
- Optionality (i.e. new services and possibilities)
- Information regarding the market drivers (Trading possibilities)

In chapter 6 the projects used in this assignment were again analysed now using the web added value method and all possible web values were taken into account In the analysis of chapter 6 it is shown that the outcome of the "real" value of that is to be expected from the case study projects is higher than the sum of the individual values In the analysis it was necessary to combine the projects in pairs in order to see the effects they had on each other Since the "Botlek" projects is a core project for BP Gas & Power this was taken as the centre project. The "Botlek" project was first combined with the storage project and then with the pipeline project In both cases the outcome of the combined project improved but wasn't sufficient to make the projects attractive for BP Gas and Power. Finally all three project where combined The outcome of that was sufficient for to make the projects attractive BP Gas & Power. Still it is necessary to make an risk analysis to see if the risk attached to this combination of project doesn't decrease the value dramatically

Looking at the amount of work and the difficulty of these analyses it must be said that using more than three projects might be too complex

The conclusion of this must be that there is web value between projects in the assumed areas. In this assignment this web value has been calculated specifically for the case study projects and although the projects represent very well the kind of projects BP Gas and Power is looking at, this doesn't mean that the method used can be copied easily The main points to keep in mind when using the approach on other projects will be·

- Projects must have natural links;
- The number of projects may not be to much (maximum 3 to 4)

In these cases the approach of web added value as taken in this assignment can be copied

In the final chapter of this paper there will be some recommendations for further study to improve the way of calculating and to optimise the way of combining projects

7.2 Recommendations

As shown in the conclusions, further study is necessary In the aims of this assignment paper it was already stated that this should be the framework or the start document for further work and this has proved to be the case.. The framework has been set BP Gas and Power will be able to use these examples but they will need to do more of these analyses to make sure that the senior management will accept the valuation method unconditionally

In the next phase of study, three important areas need to be covered. The first area that was not in the scope of this assignment is the valuation methodology for calculation option value. This needs to be developed in order to standardise the way evaluating options. Standardisation is important to BP as explained in chapter 4.
The second area that the study needs to cover is information value. Information value has been used in the case study projects but that was only possible since there was sufficient knowledge in BP Gas and Power about the case study projects that it was possible to put a value on information. Very often the value of information is too intangible, or not enough is known about a project to assign a value to information generated through it. Information value is one of the main four drivers for web value and it would be important to have a good way analysing it. Third and final point that needs to be worked on is the practical check. What are the key components that realise (in practice) the web added value? In other words what are the necessary requirements in the organisation to be sure that the calculated web added value will be created? A method to review projects sanctioned using the web value approach should be put in place to enable BP Gas and Power to check if value assumed in the evaluation phase has been achieved in practice

In chapter 5, the Markowitz theory was mentioned. Markowitz talks about the risk return relationship, which he believes can be improved by holding a portfolio of assets (i.e., supplies, contracts, hard assets or customers) with different, uncorrelated or poorly correlated risks (i.e., diversification). He also points to the fact that if the projects are not aligned it might be that the income of the projects improve but the incorporated risk in the total web might increase dramatically. This is also a factor that needs to be investigated in order make sure that the webs that BP Gas & Power wants to create do not significantly increase the risk attached with the projects

8. Bibliography, abbreviations and appendixes

8.1 Bibliography

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8.2 Abbreviations

bcm	Billion Cubic Meter
BPNE	BP Nederland Energie BV
BSS	Business Sub Sector
CBA	Cost Benefit Analysis
DCF	Discounted Cash Flow
EU	European Union
EXCO	Executive committee
G&P	Gas & Power
GIAAPS	Group Investment Assurance & Approval Processes
IRR	Internal Rates of Return
Midstream + Downstream	Natural gas transit, transmission, storage, distribution, and supply
NEGP	Northern Europe Gas & Power
NPV	Net Present Value
TEM	Total Energy Management
UK	United Kingdom
Upstream	Natural gas production, imports and processing
USA	United States if America

8.3 Appendixes

1 Grid owners in the Netherlands
2. GIAAPS, risk archetypes
3 GIAAPS, The Proforma Finance Memorandum
4. Project evaluations

8.3 1 Grid owners in the Netherlands

	Grid operators Gas
1	RENDO Netbeheer BV
2	Netbeheerder Centraal Overijssel BV (CONET)
3	nv Continuon Netbeheer
3	Noord West Net NV
3	EWR Netbeheer BV
4	ENBU BV/REMU Infra NV
5	BV Netbeheer Haarlemmermeer (NetH)
6	ENECO NetBeheer BV
6	Netbeheer Midden-Holland BV
6	BV Netbeheer Zuid-Kennemerland
6	Edelnet Delfland BV
6	Netbeheer Nutsbedrijven Weert NV
7	Westland Energie Infrastructuur BV
8	ONS Netbeheer BV
9	DELTA Netwerkbedrijf Gas BV
10	Intergas Netbeheer BV
11	Obragas Net BV
12	GNET Eindhoven BV
13	Essent Netwerk Brabant BV
13	Essent Netwerk Friesland NW-ZO NV
13	Essent Netwerk Limburg BV
13	Essent Netwerk Noord NV
14	InfraMosane NV

8 3.2 GIAAPS, risk archetypes

Change in CoC	Typical Risk Characteristics
-2%	• Benefits come from highly certain fixed cost savings • Revenues are from long term contracts with fixed price or inflation link (but not linked to a market price such as the oil price) • High "optionality" to protect against downside e.g ability to phase capex in line with market growth • Contains "natural hedges" which substantially reduce risk OVERALL has no material exposure to undiversifiable or reputational risk
Nil	• A "typical" project in a familiar market • OECD country, no particular reputation risk • Normal exposure to risk - capex spent in advance of revenues, price and or volume uncertainty, fixed costs less responsive than sales revenues
+2%	• Moderate reputation risk or any of: • New country or business area • Inflexible partners significantly impact ability to respond • Significant potential for negative cash flows during the operating life of the project owing to high fixed costs or to the operator having a poor or unproven record of responding to the economic downside • Very strong market risk such as strong link of margins to general economic cycle and/or strong link of sales volume to market conditions.
+4%	• Considerable uncertainty about the legal framework that will govern the project (e.g. country is newly emerging from period of state control); or • Project suffers from two or three of the "+2%" risk characteristics
+5%	• Severe reputation risk or any of: • Little or no ability to respond to downside conditions coupled with significant chance that these come about • Suffers from four or more of the "+2%" risk characteristics
>5%	• Very high risk projects • Return potentially required on any equity investments in projects with financial leverage (Note that Finance would need to be consulted in order to assess the impact of leverage on the project's economics)

APPENDIX 1a PROFORMA FINANCE MEMORANDUM

(For examples of other suitable layouts see Appendix 1b)

Security Classification (where appropriate)
MEMO NO: (see Note i)

- NAME OF COMPANY INCURRING THE EXPENDITURE
- TYPE OF EXPENDITURE (see Section A.4)
  NAME OF PROJECT/PROPOSAL

	Currency	Ex Rate	US$
Total Amount (see Note ii and Section E)	X	N/$	X
BP y% share (see Sections E.1 & E.4)	X		X

- Brief description of what is proposed.
- Explanation of why it is a good idea. Give the economic justification - post-tax NPV, Profitability Index (PI) and discounted pay-back at the appropriate cost of capital, and the IRR (see Note iii and Appendix 1c) Identify the sources of value. Describe the fit with Business strategy. Indicate the degree of difficulty expected in executing the project and the key success factors. Set out milestones for monitoring the progress and performance of the project.
- Address Group concerns such as finance, tax and effects on the rest of BP (Note iv).
- Statement of the major technical, commercial and country/political risks. Where the risks are large, show the NPCe of the proposal.
- Show the sensitivities of the NPV, PI and IRR to the key assumptions.
- State the accuracy of the cost estimate, as endorsed by the Chief Engineer where appropriate (see Section D.6), in percentage terms +x% -y% (at the 70% confidence level). The amount plus upward tolerance determines the required level of review.
- Explain any significant unresolved issues and how they are to be resolved prior to release of funds
- Show the annual phasing of the expenditure (e.g. the current year, the following year and the balance).
- Memoranda for the acquisition, disposal or restructuring of companies which will be seen by the GCE or the Main Board must state what effect the change will have on Group post-tax net income. Also show the effect on Group funds flow if this is significantly different from the expenditure phasing

Closing Paragraph

Support is now sought to _____ at a cost of $ _____

Signatures

Sponsor	_____	Date _____
Business CEO Support	_____	Date _____
Chair of Business Board Support	_____	Date _____
BP Main Board Support (Chairman)	_____	Date _____
Approved (legal entity, see Section A.2)	_____	Date _____

NOTES TO APPENDIX 1a

(i) The memo may need a Capex Register number, as advised by the Business control function, and if it is a Board resolution, it will need a Board resolution number as provided by the Board Secretary

(ii) Support is usually given to a commitment in terms of the functional currency agreed for the unit sponsoring the case, (see Section E). Where this is not US$, a dollar equivalent must also be quoted to aid aggregation of data and to establish the review level required. Figures in the text of the Finance Memorandum may be in any appropriate currency but for proposals presented to Business Boards or higher, dollar equivalents should also be given.

Where projects involve a number of different currencies (e.g. international procurements), the exchange rates used to derive the project economics and the total amount for sanction should be noted in the Memorandum.

The exchange rates to be used are those applicable to each year of expenditure as advised through the Group's Planning Assumptions Document (PAD), unless the cash flows are immediate, in which case the appropriate current rate should be used, or the rates have been hedged, in which case the hedged rates should be used.

(iii) The economic calculations should be relative to a reference case, which should be clearly explained. The reference case is what would realistically happen if the proposal does not go ahead.

Explain which Group assumptions have been used, and any departures from such assumptions, also any other assumptions crucial to the basic economics. Explain the sources of value and competitive advantage and lay out the appraisal results in a tabular format (see Appendix 1c).

It is also often a good idea to briefly describe alternative options. This helps to show that the alternatives have been properly considered and gives decision makers some guidance as to the flexibility surrounding the project.

(iv) Where relevant, the commentary should cover all of the following points:

- Consultations and endorsements received (see Section D.6).
- Finance (see Section C 5 & Appendix 11).
- Tax (see Section C 5, Appendices 6 & 7).
- Local and/or UK legal constraints.
- Effect on other Businesses and "fit" with the rest of BP (see Sections D.6 & D.4).
- Government and public affairs considerations. Where country risk is significant, mention the extent to which BP is already exposed (see Section C 6).

APPENDIX 1b OTHER FINANCE MEMORANDUM LAYOUTS

• Simple Project

		Local Currency	$ at (ex. rate)
Modification of flare-stack at ..... refinery	Total cost	X	X
	BP y% share	X	X

• Joint Venture or Related Company Project with Phased Support

Development of the . . . oil field	Total expected cost	X	X
	BP y% share	X	X
	Existing pre-development support (y%)	X	X
	Phase 1 support now sought (y%)	X	X

Note - A further memorandum should be submitted when it is intended to commit to the next phase.

• Project with Capital and Lease Expenditure

New research facility at . .	Furniture and fittings	X	X
	15 year lease on building (Present Cost @ z% discount rate)	X	X

• Acquisition of Shares

		BP y% share		100%		
		Local Currency	$ @ ex rate		Local Currency	US$
Purchase of a y% interest in ..... Ltd	Existing Net Book Value of the company at (date)	X	X		X	X
	+ Uplift of book value	X	X			
	+ Goodwill	X	X			
	Maximum offer priceX	X				
	+ Costs	X	X			
	+ Debt acquired (net of cash)	X	X		X	X
	Amount to be supported	X	X			

• Disposal of Fixed Assets

			BP y% share Local Currency	US$ at (ex. rate)
Sale of BP's y% share in the .... terminal to .. Ltd	Net Book Value		X	X
	Estimated realisable value	- minimum	X	X
		- expected	X	X
	Holding value to BP		X	X
	Costs of disposal		X	X

Note - Disposal Memoranda should quote when, and in what form, the proceeds are expected.

APPENDIX 1c SPECIMEN ECONOMIC JUSTIFICATIONS

(Generally included within the Finance Memorandum)

Example 1: SEEFELD PROJECT (a hypothetical resource project)

BASE CASE Cost of capital: 8% real	NPV	IRR	SENSITIVITIES	NPV
ECONOMIC CURRENCY EVALUATION	£m	%		$m
Pipeline tariff/processing fee	11	-	No direct sale	(10)
Use of existing infrastructure	20	-		
Value added to reserves	120	-	$16/bbl oil price	(50)
Minor value effects	19		Technology risk	(20)
Foregone proceeds from selling the asset as it	(40)			
STAND ALONE PROJECT NPV (relative to default case, i.e. - sell the asset)	130	17		
Tax consolidation	10	-	Full UK tax rate	(12)
BASE CASE NPV AT 1.1.199X	140	18		
FUNCTIONAL CURRENCY EVALUATION	$m			$m
Base Case NPV using Group exchange rate assumptions and/or hedged rates	210	18	Current exchange rate throughout	20
			Long run equil'm rate throughout	(10)

Max. cash exposure (NPCe) see Section C 7	£300m
Profitability Index	0 47
Discounted payback	4 years
NPV of alternative option (deferred development)	£115m

Significant atypical risks: If there are significant atypical risks (country, technical, commercial, etc) discuss what they are, their potential NPV impact, the degree to which BP is already exposed to correlated risks and the plan for managing the risks.

The above example itemises the sources of value in the Seefeld project - a hypothetical North Sea gas development. The terms of the Seefeld sales contracts imply a Sterling rather than a dollar economic currency It will be seen that a number of factors contribute to the base case value:

- Transmission and processing revenues from partners adds £11m of NPV. The use of existing infrastructure gives a cost advantage with an NPV of £20m. The value added to the hydrocarbons by producing them is estimated to be £130m.
- The default case has been made clear If development is not approved, the realistic default case for this asset is to sell it The economics have been calculated relative to this reference. Finding the Seefeld field in the first place created a valuable asset worth £40m The project proposes to add a further £140m of value by developing the field. It is not correct to claim the full value of the developed resource, i.e. £180m, for this development proposal This would overstate the case for development.
- An alternative option has been considered, which is to postpone development. for one year. The NPV of £115m is lower because of the delay in realising the value, plus an effect which is expected to come from competition from rival developments.

Example 2: WAGNER PROJECT (a hypothetical marketing project)

BASE CASE Cost of capital: 8% real	NPV	IRR	SENSITIVITIES	NPV
ECONOMIC CURRENCY EVALUATION	DMm	%		DMm
Stand alone value of Wagner	(14)	-		
Retention of sales profits otherwise lost	12			
Margin increase (net of competitor retaliation)	8			
STAND ALONE PROJECT (relative to modified business without Wagner)	6	8		
Tax consolidation	2	-	Loss of tax consolidation	(2)
Expected WHT on remitted profits	(1)			
BASE CASE NPV at 1.1.199x	7	10		
FUNCTIONAL CURRENCY EVALUATION	$m			$m
Base Case NPV using Group exchange rate assumptions	5	10	Current exchange rate throughout	(1)
			Using a long run equil'm rate throughout	1

Max. cash exposure (NPCe)	DM14m
Profitability Index	0 57
Discounted payback	3 years
NPV of alternative (buy, then divest 50%)	DM10m

Significant atypical risks· There is a possibility of losing the ability to tax consolidate Wagner. It is too early to estimate the probability of this, but this will need to be watched.

The above example itemises the sources of value in the Wagner project - a hypothetical acquisition of an ailing European gasoline retailer following market deregulation The economic currency of the project is the Deutschemark. The functional currency is US$

The main aspect of the proposal is to defend current marketing volume and profits. If BP does not acquire the company, it would certainly be bought by a competitor who would supply it entirely with their own product. As BP has traditionally sold substantial quantities of product to the company, the result would be a considerable reduction in BP's sales volume and profits. If BP does not buy Wagner, the outcome would be a loss of business volume, but this would be mitigated by a reduction in costs due to downsizing

Among the factors contributing to value are·

- The retention of volumes which would otherwise have been lost;
- Some improvement in margins, following an initial period of unsettled prices due to competitor attempts to preserve market share It is anticipated that the main competitor will become a price follower;
- An ability to make use of tax losses in the acquired company

To some extent, value was lost through the exposure of Wagner to competitor takeover. It would have been better if the status quo had prevailed. This project aims to redress some of the expected loss. But care should be taken to factor in the possibility of similar adversities in future proposals, i.e. consider the possibility that capex will be needed to preserve market share, or comply with increasing HSE standards etc

8.3.4 Project evaluations

Botlek project:

Botlek project

Commodity

Customer load		1	bcm
Gasunie price		12	EURct
Discount sales price		5%	
Discount IST		0.227	EURct
Sales income		114.0	million EUR
Sales costs		117.7	million EUR
Margin	-	**3.73**	million EUR

Transport & Services

"Normal costs customers"		**16.85**	million EUR
Costs BP Gas & Power		**18.35**	million EUR
Total discount to "Normal" costs		**1.00**	million EUR
Margin	-	**2.50**	million EUR

Additional income expected

Trading the index

Volume		300	million m3
Difference		0.5	EURct
Income		**1.50**	million EUR

Additional sales

Volume		150	million m3
Positive margin		1	EURct
Income		**1.50**	million EUR

Transportation Savings

Costs reduction		7%	
Positive margin		1.33	million m3
Income		**1.33**	million EUR

P&L	-	**1.90**	million EUR

Storage project:

OSP Storage

Prices in Dutch Guilder

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
BP OSP																
Net Cash Flow After Tax	-5.7	-32.9	-25.7	3.8	7.5	11.1	11.1	11.0	11.0	10.9	10.9	10.9	10.8	10.8	10.8	
Cushion Gas																
Revenues																187.50
Operating Expenses	0.0	-375.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Depreciation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Profit before Tax	0.0	-375.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	187.5
Tax	0.0	138.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-69.4
Net Cash Flow After Tax	0.0	-236.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.1
BP Storage																
Costs																
Cushion Gas Charges	0.0	-236.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.1
Annual Fee for capacity	0.0	0.0	-19.5	-39.0	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	
Total Costs	0.0	-236.3	-19.5	-39.0	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	-58.4	118.1
Total Revenues	0.0	0.0	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	0.0
Net Revenue before Tax	0.0	-236.3	50.1	30.6	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	118.1
Tax	0.0	87.4	-18.5	-11.3	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-43.7
Net Revenue after Tax	0.0	-148.8	31.6	19.3	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	74.4
Marketing and ETI																
Costs																
For Firm Service	0.0	0.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	
Total Costs	0.0	0.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	
Revenues																
Seasonal Variations	0.0	0.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
Short Term Arbitrage Opportunities	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Paper Based Trading	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Interconnector Turn Around	0.0	0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Ability to offer Flexibility	0.0	0.0	5.5	5.8	6.1	6.4	6.7	7.0	7.4	7.7	8.1	8.5	9.0	9.4	9.9	
Optimising Gasunie Supply	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Sale of Balancing Services to Third Parties			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Total Revenues	0.0	0.0	11.8	12.1	12.4	12.7	13.0	13.4	13.7	14.1	14.5	14.9	15.3	15.7	16.2	
Net Revenue before Tax	0.0	0.0	4.9	5.2	5.4	5.7	6.1	6.4	6.8	7.1	7.5	7.9	8.3	8.8	9.3	
Tax	0.0	0.0	-1.8	-1.9	-2.0	-2.1	-2.2	-2.4	-2.5	-2.6	-2.8	-2.9	-3.1	-3.3	-3.4	
Net Revenue after Tax	0.0	0.0	3.1	3.2	3.4	3.6	3.8	4.0	4.3	4.5	4.7	5.0	5.3	5.5	5.8	

BP G&P in Europe

Swaps of Spare Capacity																
New Supply Contracts Russia and Norway	0.0	0.0	0.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	
Increase in Market Presence	0.0	0.0	0.0													
Increase in Volumes sold	0.0	0.0	0.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
Cross Selling of Other Products (e.g. Power)	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Gas at preferred Hub location	0.0	0.0	0.0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
Added Optionality	0.0	0.0	0.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
Market Information	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
	0.0	0.0														
Net Revenue before Tax	0.0	0.0	0.0	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	
Tax	0.0	0.0	0.0	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	-3.5	
Net Revenue after Tax	0.0	0.0	0.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	
TOTAL Net Revenues after Tax																
OSP (BP Share)	-5.66	-32.88	-25.74	3.80	7.53	11.09	11.05	11.02	10.98	10.95	10.91	10.87	10.83	10.79	10.75	
BP Storage (Capacity Company)	0.00	-148.84	31.57	19.29	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	74.42
Marketing and ETI	0.00	0.00	3.08	3.25	3.43	3.62	3.82	4.03	4.25	4.49	4.73	4.99	5.25	5.54	5.83	
BP G&P in Europe	0.00	0.00	0.00	5.93	5.93	5.93	5.93	5.93	5.93	5.93	5.93	5.93	5.93	5.93	5.93	
TOTAL POST TAX REVENUES	-5.66	-181.72	8.90	32.27	23.91	27.66	27.82	28.00	28.18	28.38	28.59	28.80	29.03	29.28	29.53	74.42
NPV in EUR	18.49															
Capital Efficiency	5.32%															
IRR	12.38%															

ZEBRA PIPELINE			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Assumptions																	
Discount rate	9%																
Throughput (bcmpa)	6		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
BP Utilisation of our share			30%	30%	60%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
BP share of throughput			0.3	0.3	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Transportation fee	EUR m3/hr		27.23	27.23	26.41	25.62	24.85	24.10	23.38	22.68	22.00	21.34	20.70	20.08	19.48	18.89	18.32
No of customers			1	5	10	20	35	50	52	53	55	56	58	60	61	63	65
Marketing Volume	in mil m3/ yr		50	250	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Utilised percentage of BP capacity			5%	25%	50%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Marketing Unit Gross Margin	EUR/m3		0.0023	0.0023	0.0023	0.0018	0.0018	0.0018	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
Operation hours			137500	137500	137500	137500	137500	137500	137500	137500	137500	137500	137500	137500	137500	137500	137500
Net Income Statement																	
Revenue	Tranportation income		1,118,910	1,118,910	2,170,686	2,807,420	2,723,197	2,641,502	2,562,257	2,485,389	2,410,827	2,338,502	2,268,347	2,200,297	2,134,288	2,070,259	2,008,152
	Marketing income		113,445	567,225	1,134,451	1,815,121	1,815,121	1,815,121	1,361,341	1,361,341	1,361,341	1,361,341	1,361,341	1,361,341	1,361,341	1,361,341	1,361,341
	Linepack		164,495	147,479	818,506	661,101	648,509	547,769	541,473	535,177	535,177	535,177	535,177	440,734	440,734	440,734	440,734
Total Revenues			1,396,851	1,833,614	4,123,642	5,283,642	5,186,827	5,004,392	4,465,070	4,381,907	4,307,345	4,235,020	4,164,865	4,002,372	3,936,363	3,872,334	3,810,226
Op costs	Operating cost for extension		-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756	-90,756
	Marketing costs		-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689	-22,689
	Trading cost		-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378	-45,378
Total Operating costs			158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823	-158,823
Depreciation	Based on depr. in 10 yrs		-2,282,930	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-2,923,895	-640,965				
RC Operating Profit			-1,044,903	-1,249,104	1,040,924	2,200,924	2,104,109	1,921,674	1,382,352	1,299,188	1,224,627	1,152,302	3,365,077	3,843,548	3,777,540	3,713,511	3,651,403
Corporate Tax			365,716	437,186	-364,323	-770,323	-736,438	-672,586	-483,823	-454,716	-428,619	-403,306	-1,177,777	-1,345,242	-1,322,139	-1,299,729	-1,277,991
Net Income			-679,187	-811,918	676,601	1,430,601	1,367,671	1,249,088	898,529	844,472	796,007	748,996	2,187,300	2,498,306	2,455,401	2,413,782	2,373,412
Cash flow Statement			-1,044,903	-1,249,104	1,040,924	2,200,924	2,104,109	1,921,674	1,382,352	1,299,188	1,224,627	1,152,302	3,365,077	3,843,548	3,777,540	3,713,511	3,651,403
add back depreciation			2,282,930	2,923,895	2,923,895	2,923,895	2,923,895	2,923,895	2,923,895	2,923,895	2,923,895	2,923,895	640,965	0	0	0	0
Working Capital	Commodity in pipe to Moerdijk		-30,630														67,500
	Commodity extension				-91,890												202,500
Total Working capital			-30,630	0	-91,890	0	0	0	0	0	0	0	0	0	0	0	270,000
Net cash from Operations			1,207,397	1,674,791	3,872,929	5,124,819	5,028,004	4,845,569	4,306,247	4,223,083	4,148,522	4,076,197	4,006,042	3,843,548	3,777,540	3,713,511	3,921,403
Tax	Operating income (Rev - Op costs)		1,238,027	1,674,791	3,964,819	5,124,819	5,028,004	4,845,569	4,306,247	4,223,083	4,148,522	4,076,197	4,006,042	3,843,548	3,777,540	3,713,511	3,651,403
	Tax depreciation		-4,565,861	-5,847,790	-5,847,790	-5,847,790	-5,847,790	-1,281,929	0	0	0	0	0	0	0	0	0
	Taxable income		-3,327,833	-4,172,999	-1,882,971	-722,971	-819,786	3,563,640	4,306,247	4,223,083	4,148,522	4,076,197	4,006,042	3,843,548	3,777,540	3,713,511	3,651,403
	Tax paid		1,164,742	1,460,550	659,040	253,040	286,925	-1,247,274	1,507,187	1,478,079	1,451,983	1,426,669	1,402,115	1,345,242	1,322,139	1,299,729	1,277,991
Net Cash Flow from ops After tax		12,315,716 13	2,372,139	3,135,341	4,531,968	5,377,859	5,314,929	3,598,295	2,799,061	2,745,004	2,696,539	2,649,528	2,603,927	2,498,306	2,455,401	2,413,782	2,643,412
Capex	Buy in existing Pipeline	-2,078,056	-4,991,582	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Extension to Moerdijk	-1,554,606	-3,734,233														
	Extension to Pernis	-5,871,454	-14,103,489														
	Extension to Botlek	-2,668,413		-6,409,646													
Total Capex			-22,829,305	-6,409,646	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cashflow		363,514	-20,457,166	-3,274,305	4,531,968	5,377,859	5,314,929	3,598,295	2,799,061	2,745,004	2,696,539	2,649,528	2,603,927	2,498,306	2,455,401	2,413,782	2,643,412
NPV @9% nominal	0.801		836,352	20,430,763	23,308,025	19,654,426	15,676,869	12,070,433	9,830,417	8,231,816	6,793,534	5,497,305	4,328,837	3,275,298	2,347,954	1,511,791	757,671
IRR	9.70%																
Capital efficiency	2.84%																