CATÓLICA - LISBON SCHOOL OF BUSINESS & ECONOMICS
UNIVERSIDADE CATÓLICA PORTUGUESA

EQUITY VALUATION

GALP ENERGIA S.G.P.S.

PORTUGAL'S LEADING OIL AND GAS COMPANY

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Dissertation submitted in partial fulfillment of requirements for the degree of MSc in Business Administration, at the Universidade Católica Portuguesa, 31th of January 2012.

Abstract

Equity Valuation - Galp Energia S.G.P.S.
Cátia Maria Sousa Ferreira

Nowadays, companies are involved in a fiercely competitive environment and are more complex than they ever were. As a consequence, the need to more accurately access the value of an asset or an opportunity is essential, when the overall goal is to grow and to prosper. Furthermore, the recurrent instability in the financial markets has been unveiling irregular company's stock variations, which are no longer reliable indicators of firm´s performance evolution and ability to create future value.

In this context, corporate valuation emerges as a leading-edge instrument for managers and investors that want to assess the real underlying value of their companies in order to make wiser business and investment decisions.

Considering this, the main goal of the present dissertation is to value Galp Energia S.G.P.S, Portugal's leading oil and gas company, which is currently quoted in the Lisbon Stock Exchange Market and integrates the PSI-20 Index.

After a review of the fundamental academic literature existing, the company's three main businesses segments as well as the debt tax shield were valued separately and the overall valuation was accomplished, considering the sum of the different parts. Subsequently, a sensitivity analysis was made and the methodology and results were compared with the ones used by two Investment Banks – Millennium IB and Caixa IB – in their recent equity researchs.

The main conclusion is that each share of Galp Energia S.G.P.S. is currently being traded in the stock market at a discount to its intrinsic value. The future developments of its E&P projects – mainly in Brazil – and the evolution of macro variables such as the oil price, the international benchmarks for refining margins and the EUR/USD exchange rate will define the company's future valuation updates.

Abstrato

Avaliação da empresa - Galp Energia S.G.P.S.
Cátia Maria Sousa Ferreira

Nos dias que correm, as empresas estão envolvidas num ambiente intensamente competitivo e são mais complexas do que alguma vez o foram. Como consequência, a necessidade de perceber o valor de um activo ou de uma oportunidade é essencial, quando o objectivo fundamental é crescer e prosperar.
Para além disso, a recorrente instabilidade nos mercados financeiros tem denunciado variações irregulares no preço das acções das empresas e por isso os sinais do mercado accionista deixaram de ser indicadores confiáveis da evolução da performance da empresa e da sua habilidade de criar valor.
Neste contexto, a avaliação de empresas emerge como um importante instrumento para gestores e investidores que pretendam saber de forma mais precisa o valor real das empresas como forma de conseguir tomar melhores decisões ao nivel das operações correntes e de futuros investimentos.
Tendo isto em conta, o objectivo principal da presente dissertação é o de avaliar a Galp Energia S.G.P.S., a empresa portuguesa líder no sector do petróleo e do gás, que está cotada na Bolsa de Valores de Lisboa e que integra o Index PSI-20.
Após uma revisão da literatura académica essencial, os três segmentos da empresa, assim como o valor dos benefícios fiscais resultantes do envididamento, foram avaliados separadamente e só depois a avaliação da empresa foi feita, considerando a soma das partes. Subsequentemente uma análise de sensibilidade foi feita e a metodologia e os resultados foram comparados com aqueles utilizados por dois bancos de Investimento – Millennium BI e Caixa BI – nos seus recentes estudos da empresa.
Conclui-se que presentemente, cada acção da Galp Energia S.G.P.S. encontra-se subavaliada no mercado accionista. O desenvolvimento futuro dos seus projectos de E&P de petróleo e gás – maioritariamente no Brasil – e a evolução das variáveis macroeconómicas como o preço do petróleo, os benchamarks internacionais para as margens de refinação e a taxa de câmbio EUR/USD, definirão a evolução do valor futuro da empresa.

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Preface

Foremost I would like to express my sincere gratitude to Professor José Carlos Tudela Martins. As an academic teacher, it was him who instigated my passion for the field of corporate valuation when I first arrived at UCP as a master student. As the dissertation advisor, he was always a strong facilitator and presented me with a regular guidance and expertise thoughout all the technical and general doubts.
A profound gratitude also goes to Professor Rui Pina Pereira, that despite not personally knowing me, exceeded all my expectations and spontaneously agreed to supervise a part of my work, helping me to overcome some detailed issues either by email or by telephone.
Furthemore I would also like to thank: Drº Filipe Rosa from BES Investment Bank for his assistance in spite of his busy schedule; Drª Maria Ascensão and all the team from Galp Energia Investor Relations Department for all the information regarding the company and the industry's modus operandi; BPI – Asset Management team, namely Drº Paulo Candeias which during my master internship offered me the flexibility and means needed to develop this dissertation with a superior quality; Drº Carlos Jesus from Caixa Geral de Depósitos and Drª Vanda Mesquita form Millenium BCP for our productive discussions and all their support, knowledge and enthusiasm in providing me the foundations needed to better understand this multifaceted company.

I am also thankful to all my family and friends that through all the process were encouraging and comprehensive, namely: Anneline Gouveia, Cátia Castanha, Susana Sousa, Taniuska Abreu, Teresa Gonçalves, Sofia Teixeira and Victor Barros. A particular reference to Elizabetth Sequeira – a noteworthy friend that accompanied me throughout my master journey providing me the strenght to go on and with whom I had the privilege to share many of my thoughts and feelings, laughs and tears.
A particular acknowledgment to Fátima, Vasco, Cristina, Hugo and Margarida Pestana that were several times my home away from home and that with support and encouragement allowed me to better accomplish this objective.

A special thanks to my parents for their constant support, patience and care and to whom I dedicate this project and all my successes in life. My love for them is beyond description and I will never be able to thank them enough.
To Paulo, an incredible person who supports me through all the moments in life and without whom I will not be who I am. Everyday I am grateful for his presence in my life.

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1. Introduction

1.1 Dissertation's purpose

In this dissertation, Galp Energia S.G.P.S. (herein referred to as Galp Energia or Galp) is a valuation object and the main goal is to launch a valuation model for it in order to reach an accurate value for each of its outstanding shares. The valuation reference date is December 2011.

Additionally, it's also an objective to compare my approach, assumptions and outcome with the ones applied by two Investment Banks.

1.2 Motivation

The main incentive behind the choice of the company is the fact that Galp Energia S.G.P.S. is one of the few portuguese companies with most significant growth opportunities.

Moreover it's the only oil and gas operator in Portugal and a strong player in the Iberian market[1] representing a great source of value for the overall Portuguese economy and its competitiveness - the company exports[2] are an important contribution to the Gross National Product and to the equilibrium of Portugal's Trade Balance.

As a further motive, Galp is a leading multi-energy business and a challenging valuation object due to its personnel features and high correlation with the oil price.

1.3 Thesis Structure

The dissertation is organized in the following manner:

In section 2, a generalized literature review is presented, distinguishing the main valuation approaches and features. A special topic on the valuation of natural resources is offered.

In section 3, a succinct description of the company characteristics, corporate structure, business segments, past performance and strategy in place is clarified. Furthermore, the industry, its players and trends are briefly analyzed.

In section 4, the company's macro environment is analized and a focus on the oil & gas outlook can also be observed.

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[1] According to the company sources, Galp's market share for the refining products is 50% in Portugal and 8% in Spain. In what concerns the natural gas and electricity, the main market is Portugal with a 70% market share. Nevertheless, it's also the second-largest gas operator in the Iberian Peninsula with a 15% market share.

[2] Through its subsidiary - Petrogal, it's the major Portuguese exporter since 2009. According to Caldeira (2010), in the first trimester of 2010 Galp's exports represented around 8,6% of the total Portuguese exports. In the first trimester of 2011, its exports increased 14% and by June, it was still the largest Portuguese exporter (Baptista 2011).

Section 5 presents the line of thought behind my SoP valuation approach, the main conclusions, the projected financial position and a sensitivity analysis.

It's also possible to find an attempt to value Galp through relative valuation and the inconsistencies of the approach for this specific company.

In section 6, a contrast between the my valuation methodology and the ones used by Caixa and Millennium investment banks is done.

In Section 7, I present my main conclusions.

Sections 8 and 9 report respectively, the appendixes and the bibliography.

2. Literature Review

2.1 Introduction

Following the turbulent business, social, economic and political atmosphere in the last years, corporate valuation has acquired momentum and became "the financial analytical skill that general managers want to learn and master more than any other" (Luehrman 1997a, p.132). Koller, Goedhart & Wessels (2005) refer that it strengthens modern executives with the chance to make informed decisions about: the alternative business strategies, the corporate portfolio strategy and the effective capital structure to hold in order to sustain the company's strategy and to minimize the risk of financial distress. In this way, it allows them to envision the direction the business is heading, to comprehend if the undertaken strategy is working, and even to access potential market inefficiencies.

2.2 The Valuation Process: general approaches

In current days there are more than a few developed theories and models that, in the view of fundamental analysts[3], can be referenced and applied within a valuation process.

There is an extensive amount of literature and Young et al. (1999, p.1) state that "we are fast approaching the point of valuation overload".

Nevertheless, Young et al. (1999, p.4) state that under specific assumptions, "most popular valuation approaches are different ways of expressing the same underlying model" and hence are "mathematically equivalent". The basic principles are similar amongst the models (Damodaran 2002) and for Modigliani & Miller (1961), different combinations of variables just provide additional insights into the valuation process. Therefore, the choice of which model to use is just a matter of taste and convenience and should depend on the nature of the company and on the valuation purpose.

Furthermore, in a valuation process each analyst interprets the reality and the information available in a specific way and perceives the future with a particular shape, necessarily making assumptions about doubtful events. As a non objective science, Damodaran (2002, p.7), allerts that "it is unrealistic to expect […] absolute certainty in valuation, since cash flows and discount rates are estimated with error", particularly in young companies or the ones inserted in tumultuous sectors.

To reduce the number of mistakes that the uncertainty of forecasts and market conditions introduces in the valuation process, the appraiser needs more than simply rely on the

[3] These analysts compute the called intrinsic (or fundamental) value as it's also the purpose of the present dissertation. By this technique, the company's underlying value and potential for future growth is determined using the firm's financials and related data (activities, competition, growth prospects and macro variables) in order to reach to a stock value (Quirin, Berry & O'Bryan 2000). This contrasts with the technical analysis where securities are evaluated by analyzing the statistics generated by market activity, such as past prices and volume, to identify patterns that can suggest future price movements (McAllen 2011).

straightforward application of the models equations. Young, Sullivan, Nokhasteh and Holt (1999) declare that the data reliability is more important than the valuation model chosen. Determining corporate value is part art and part science (Siciliano & Jones 1991) and as a consequence, the company future projects, the competitive and macroeconomic environment and its value drivers should to be carefully scrutinized.

According to Luehrman (1997a) the models should always be a function of three fundamental factors – cash, timing and risk. The most popular models in corporate valuation can be analyzed under four broad and distinct approaches[4] (Damodaran 2005): discounted cash-flow valuation, liquidation and accounting valuation (asset based valuation), relative valuation and contingent claim valuation.

In this dissertation all four approaches are briefly explained. However the discussion will be mostly narrowed around the models that were considered as more suitable to value Galp Energia – the DCF and the Contingent Claim Valuation.

2.2.1.1 Discounted Cash Flow (DCF) valuation

According to Damodaran (2002), the discounted cash-flow valuation is seen as the foundation on which all other valuation approaches are built and the model with the best theoretical credentials (Damodaran 2005).

In the 1970s, it emerged as the best practice for valuing corporate assets (Luehrman 1997a), and currently, Koller et al. (2005, p.4) observe that "more and more investors, analysts, and investment bankers are turning to […] sophisticated discounted cash flow (DCF) models as the touchstone of corporate valuation". A view that is also supported by Damodaran (2005) and Fernández (2007c).

Its foundation lies on the notion of "present value" (PV) which states that the value of any asset is simply the present value of its expected future cash flows, discounted back at the rate that reflects the riskiness of those cash flows (Damodaran 2002).

It accesses the company as a financial asset (Fernández 2007c) and Damodaran (2005) highlights the following general equation, that serves as basis for the DCF models:

$$V = \frac{CF_1}{1+k} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \cdots + \frac{CF_n + TV_n}{(1+k)^n} \qquad TV_n = \frac{CF_n(1+g)}{(k-g)} \tag{1}$$

where:

V = Value of the company

CF $_i$ = Cash flows generated by the company in period i

[4] A compact overview of the valuation approaches can be seen in Appendix 1.

k = Discount rate for the cash flow's risk

Tv_n =Terminal value of the company in the year n

g = Expected growth rate of cash flows after the explicit period

The company value is computed by adding two separated components: the specific forecasts over a limited number of years and the terminal value.

Despite the DCF general formula, Damodaran (2002) observes that there are literally thousands of discounted cash flow models variants in existence. According to Oded & Michel (2007) and Fernandez (2007b), the basic differences among them lie in the cash flows taken as the starting point for the valuation and in the discount rates that are under each. Nevertheless, if there is no mismatch between the cash flows and discount rates used, consistent estimates of value should be yield (Damodaran 2002).

The Terminal Value

The terminal value, often called continuing value, i.e., the value after the growth period, measures the long-run value and can be difficult to estimate with any degree of accuracy. Nonetheless it deserves a special attention since it represents the lion's share of market value (Young et al. 1999).

According to Damodaran (2002), there are three alternate routes to compute the terminal value: i) assume that the cash flows of the firm will grow at a constant rate forever and therefore use a perpetual growth model (as demonstrated in equation (1)), ii) assume the liquidation of the firm's assets after some years and estimate what others would pay for the total assets at that point of time, or iii) rely on relative valuation, applying a multiple to earnings, revenues or book value.

Fernández (2007c) also points out that although the flows are assumed to be perpetual, it's possible to ignore some of them after a certain period, attending to the asset under valuation. This happens because on one hand, the present value decreases progressively with longer time horizons and on the other hand, the competitive advantage of many businesses tends to disappear after a few years. In this perspective, as the explicit period considered augments, there is less measurement error and the explanatory power of the results increase (Torrez, Al-Jafari & Juma'h 2006).

2.2.1.1.1 DCF valuation: Equity Value versus Firm Value

The diverse DCF variants can also be differentiated by the way they bring forward the value. Folowing this reasoning, they can disclose the equity value - when only the equity stake of

the business is valued - or the firm or enterprise value - when the entire business, with both assets-in-place and growth assets are under valuation.

Nonetheless, it's always possible to get from the firm value to the equity value. Whether it is approached directly (by discounting cash flows to equity at the cost of equity) or indirectly (by valuing the firm and then netting out the market value of all non-equity claims), the equity value should be the same (Damodaran 2005).

2.2.1.1.1.1 Equity Valuation Models

In the equity valuation models, the result obtained is the firm value to the equity holders[5] (Young et al. 1999).

The value is generally obtained by discounting expected cash flows to equity at the rate of return required by the equity investors of the firm (Damodaran 2002).

These cash flows are the ones that remain available in the company after covering fixed asset investments, working capital requirements and financial charges and after repaying the corresponding part of the debt's principal, as explained by Fernández (2007c).

In this context, Damodaran (2005) brings to the spotlight two variants of the DCF valuation where the cash flows to equity holders are viewed differently - the Dividend Discount Model (DDM) and the Free Cash Flow to Equity Model (FCFE).

2.2.1.1.1.1.1 The Dividend Discount Model (DDM)

In the words of Damodaran (2005), the dividend discount model represent the oldest[6] theoretical variant in practice of the neo-classical DCF models. The dividends are assumed as the only regular flow received by the equity holders (Müller & Teló 2003). As a consequence, the current worth of a share is seen as the "discounted value of the stream of dividends to be paid on the share in perpetuity" (Modigliani & Miller 1961, p. 419), i.e., the liquid present value of the expected dividends (Damodaran 2005 and Müller & Teló 2003).

According to Damodaran (2005), it's possible to infer that, within DDM:

$$\boldsymbol{Value\ per\ share\ of\ stock} = \sum_{\boldsymbol{t=1}}^{\boldsymbol{t=\infty}} \frac{\boldsymbol{E(DPS_t)}}{\boldsymbol{(1+k_e)^t}} \qquad (2)$$

where:

$E(DPS_t)$ = Expected dividends per share in period t

k_e = Cost of equity

[5] According to Damodaran (2005), equity and debt holders are different primary due to the nature of their cash flow claims - lenders get priority to claim the cash flows and equity investors get only the residual amount available.

[6] The book "The Theory of Investment Value" written by Jonh Burr Williams in 1983, was the first to explicitly connect the present value concept with dividends (Damodaran 2005).

The cost of equity (k_e) is determined by its riskiness and can be measured by different models such as the market beta in the CAPM[7] (Damodaran 2005).

To compute the expected dividends ($E(DPS_t)$), assumptions about future growth rates in earnings and payout ratios have to be made (Damodaran 2005).

Nonetheless, Müller & Teló (2003) note that the payout ratio and the growth rate in earnings are correlated. They clarify that if the company has a high payout ratio, it will have a lower growth in the stock value since it's distributing part of the profit that in other way, would be retained and reinvested in the business.

In this context, the different assumptions about the expected future growth of companies, shed light to the development of tailored versions of the DDM such as the Gordon growth model or the multi-stage DDM.

The Gordon Growth Model

For firms that are in a 'steady state' with dividends growing at a constant rate that can be sustained forever, the Gordon growth model[8] is applied (Damodaran 2002). Within this variant, the value of a stock can be computed as follows:

$$\boldsymbol{Value\ of\ the\ stock} = \frac{\boldsymbol{DPS_1}}{(\boldsymbol{k_e} - \boldsymbol{g})}$$

where:

DPS_1 = Expected dividends in period 1

k_e = Cost of equity

g = Expected growth rate in perpetuity (3)

In this version of the DDM model, there are two main constraints in what concerns to the growth rate of dividends: it cannot be greater than the overall growth rate of the economy (since any firm cannot grow forever at a rate higher than the growth rate of the economy in which it operates) and it should be similar to the expected growth in the other measures of performance, such as earnings (Damodaran 2005).

The Multi-Stage DDM

For firms that are non stable-growth companies, some extensions of the model were also developed over time mainly in response to the need of more flexibility when valuing firms that are expected to grow differently in distinct stages of time and consequently have divergent payout ratios across the time.

When compared to the Gordon growth model, these models fit better into the reality (Damodaran 2005), since in practice, given the volatility of earnings in most companies, the assumption of a constant growth rate in dividends is inadequate (Damodaran 2002).

[7] The Capital Asset Pricing Model (CAPM) was postulated in the 1960's by Jonh Lintner and William Sharpe and even resulted in a Nobel Prize for Sharpe in 1990. This model is better explained in the page 13.

[8] According to Damodaran (2005), the model was developed by David Durand and Myron Gordon, but it was the last one who popularized it, thus giving his name to the model.

Some examples are: i) the two–stage DDM that assumes two distinct phases with two different growing rhythms and, ii) the H model, presented by Fuller & Chi-Cheng (1984) that assumes that the growth rate in the initial phase is not constant and drops in linear increments each year, converging later to a stable growth rate (Damodaran 2005).

Despite the large range of critics along the years, the DDM approach still has its proponents since: i) fewer assumptions are needed to get to the forecasted dividends when compared with the forecasted FCF, what eases the process and, ii) managers can set their dividends at sustainable levels even with volatile earnings (Damodaran 2005).
On the list of cons, and as the same author explains: it undervalues companies with meaningful cash balances and it overvalues firms that pay more dividends that their available cash flows, since it doesn't consider the potential future problems on external funding to meet the deficits in perpetuity. In addition, Damodaran (2002) adverts that it does not accounts for other ways of returning cash to stockholders (such as stock buybacks) and it neglects the value of 'unutilized assets' or other valuable assets such as the value of brand names.
Damodaran (2005) even asserts that the fact that increasingly less practitioners use the dividend discount model in valuation is testimony to the belief that there are better ways of doing DCF valuation.

2.2.1.1.1.1.1 The Free Cash Flow to Equity (FCFE) Model

The free cash flow to equity valuation (FCFE) it's a simple departure on the DDM, with just one significant change: the FCFE replaces the value of dividends in the models, as observed by Damodaran (2002). Instead of discounting the actual dividends paid by the firm, as in the DDM, it discounts the cash that could have been paid out in dividends - potential dividends (Damodaran 2005).
The value to shareholders are estimated in the following manner (Fernandez 2005):

$$\boldsymbol{Equity\ Value} = \frac{\boldsymbol{FCFE_1}}{\boldsymbol{1+ke}} + \frac{\boldsymbol{FCFE_2}}{\boldsymbol{(1+ke)^2}} + \frac{\boldsymbol{FCFE_3}}{\boldsymbol{(1+ke)^3}} + \cdots + \frac{\boldsymbol{FCFE_n + TV_n}}{\boldsymbol{(1+k)^n}} \quad \boldsymbol{TVn} = \frac{\boldsymbol{FCFE_n(1+g)}}{\boldsymbol{(ke-g)}} \tag{4}$$

where:
FCFE $_i$ = Free Cash flow to equity generated by the company in period i
k = Discount rate for the cash flow's risk, i.e., the cost of equity
TV $_n$ = Terminal value
g = Expected growth rate of cash flows after the explicit period

The FCFE are measured by the cash flows left over after meeting all financial obligations (such as debt payments) and after covering all reinvestment needs such as capital expenditures and working capital, i.e.:
FCFE = Net Income + Depreciation - Capital Expenditures - Change in Non-cash Working Capital - (New Debt Issued - Debt Repayments).

(5)

When comparing DDM and FCFE valuation, Damodaran (2005) affirms that the former should be adopted just if we are facing a company reluctant to changes in corporate control, since in this case, the dividend policy of the firm is unlikely to be adjusted. If a firm can be easily taken or there is some probability for the management to change, FCFE models should be the valuation tool in use, since they are able to capture a higher value.
As happens in the DDM, there are similar variations of the FCFE models developed around different assumptions for future growth and reinvestment needs (Damodaran 2005).

2.2.1.1.1.2 Firm Valuation Models

The firm valuation models aim to value the firm as a whole, i.e., not only the equity stake but also the funds provided by third parties, such as the financial debt (Damodaran 2002). As a consequence, in comparison to the equity value, the major difference lies in the fact that it incorporates the tax benefits of debt and the expected additional risk associated with this source of financing - in the form of higher costs of equity and debt and superior debt ratios (Damodaran 2005).
The same author suggests the following models to compute the firm value: a) the Free Cash Flow to the Firm or the Cost of Capital approach; b) the Adjusted Present Value; c) the Capital Cash Flow approach; or the d) Economic Value Added.

2.2.1.1.1.2.1 The Free Cash Flow to the Firm (FCFF) Model

In the words of Damodaran (2005), the origins of this model lie on one of corporate finance's most cited papers by Modigliani & Miller (1958). It states that the firm value is obtained discounting the cumulated cash flows to all claim holders - also called the free cash flow to the firm (FCFF) - by the weighted average cost of capital (WACC).
In this line of thought, the cash flows considered are the ones available after taxes and reinvestment needs, but prior to any equity and non-equity claims.

The general version of the FCFF or the cost of capital approach can be presented as follows (Damodaran 2005):

$$\boldsymbol{EV} = \frac{\boldsymbol{FCFF_1}}{\boldsymbol{1 + WACC}} + \frac{\boldsymbol{FCFF_2}}{\boldsymbol{(1 + WACC)^2}} + \frac{\boldsymbol{FCFF_3}}{\boldsymbol{(1 + WACC)^3}} + \cdots + \frac{\boldsymbol{FCFF_n + TV_n}}{\boldsymbol{(1 + WACC)^n}} \quad \boldsymbol{TV_n} = \frac{\boldsymbol{FCFF_n(1 + g)}}{\boldsymbol{(WACC - g)}}$$

(6)

where:

EV = Entreprise value

FCFF $_i$ = Free cash flow to the firm generated by the company in period i

WACC = Weighted average cost of capital

Tv $_n$ = Terminal value of the company in the year n

g = Expected growth rate of cash flows after the explicit period

To compute the FCFF and despite the diverse definitions, the subsequent formula illustrates a simple way to compute it (Damodaran 2005):

FCFF = EBIT(1- tax rate) + Depreciation & Amortization – Capital expenditures – Δ Working Capital

(7)

To come across with the FCFF, we begin with the earnings before interest and taxes (EBIT), deduct the corporate taxes (to achieve the after-tax operating income), add the depreciation & amortization since it's not real cash and subtract the capital expenditures and working capital needs.

The free cash flows are computed as if the firm had no debt and consequently no tax benefits due to interest payments (Damodaran 2005). According to Damodaran (2002), this happens on purpose once the concurrent use of the after-tax cost of debt in the cost of capital already considers the tax deduction for interest payments.

This fact reflects one of the prevailing strengths of the model - any changes in the company's financing mix is built into the valuation adjusting the discount rate rather than the cash flows (Damodaran 2005). As a result, the model is most suitable for firms that have very high leverage or are in the process of changing their leverage (Damodaran 2002).

Nonetheless and similarly to what happens to the other DCF models previously described in this dissertation, there are several variations of the FCFF models – for example: a stable growth, a two-stage and a three-stage models - largely as a consequence of the future growth assumptions and on how long they are expected to be maintained (Damodaran 2005).

The same author also emphasizes that this model only values the operating assets of the firm and as a consequence, if the company has any assets whose earnings were not

accounted in the operating income – such as cash and marketable securities, the operating income from minority holdings and idle and unutilized assets - they have not been valued yet. Furthermore, to arrive at the equity value, all non-equity claims that have to be subtracted out to include not only all debt, but in addition all capitalized leases as well as unfunded pension plans and health care obligations.

2.2.1.1.1.2.1.1 The WACC

When valuing a company as a whole, the weighted average cost of capital – WACC – is by far, the average figure used as the cost of capital (Maruca 1996). It must reflect the cost associated with raising the capital - equity or debt or both – in the proportion to which they finance the company's asset base (Fernández 2007c).

It's the risk adjusted discount rate (Damodaran 2005) to use as input to the model or - as Modigliani & Miller (1963) refer - the minimum return that the company must offer to the investors to be just worth undertaking the project.

The general formula is the following (Booth 2007):

$$\boldsymbol{WACC_t = \frac{E_{t-1}}{E_{t-1} + D_{t-1}} * Re_t + \frac{D_{t-1}}{E_{t-1} + D_{t-1}} * Rd_t\,(1 - Tc)} \quad (8)$$

where:

Re_t = Cost of equity in period t

Rd_t = Cost of debt in period t

E_{t-1} = Market value of the firm's equity

D_{t-1} = Market value of the firm's debt

$E_{t-1}/(E_{t-1}+D_{t-1})$ = percentage that is financed by equity

$D_{t-1}/(E_{t-1}+D_{t-1})$ = percentage that is financed by debt

V = E + D = Firm value

Notwithstanding, there is room for disagreement among several authors about the practice of using WACC. Luehrman (1997b) establishes that the WACC is not good at handling financial side effects automatically since it just addresses the tax effects on raising debt. Damodaran (2005) by its turn, assures that the effects of leverage are reflected in WACC by two manners: i) the tax benefits are incorporated in the after-tax cost of debt and ii) the bankruptcy costs are mirrored in both the levered beta and in the pre-tax cost of debt. Another point of view is that the WACC sponsors simplification in the companies' values

(Torrez et al. 2006) since, in practice, is not adjusted over the years and remains constant over a long period of time.

For this reason, Koller et al. (2005) and Luehrman (1997b) refer that WACC-based models work best when a company maintains or is expected to preserve a relatively stable debt-to-value ratio. In the case of a volatile capital structure, APV[9] is recommended as the most accurate valuation model.

2.2.1.1.1.2.1.2 The Cost of Equity

Although it's a subject of controversy, there are basically there are two main approaches to find the cost of equity, as exposed by Fernández (2007c), Mullins (1982) and Cooper & Davydenko (2007): i) the dividend growth model and ii) the capital asset pricing model - CAPM.

2.2.1.1.1.2.1.2.1 The Dividend Growth Model

Using the dividend growth approach which results from the Gordon growth model in the DDM – as seen in equation (3) - the cost of equity can be computed as follows (Mullins 1982):

$$\boldsymbol{Ke} = \left(\frac{\boldsymbol{Div_1}}{\boldsymbol{P_o}}\right) + \boldsymbol{g}$$

where:

P_0 = Current stock price

Div_1 = Dividend next period

g = Dividend growth rate

Ke = Cost of equity

(9)

In this case, is necessary to calculate the market's current estimates of g, what can be a significant source of error (Mullins 1982). Furthermore, the assumption of a constant and perpetual growth rate in dividends inferior to the cost of equity makes the model inadequate for companies with unstable dividend patterns or which are rapidly growing.

For this reason, despite of also having limitations, the CAPM can yield more realistic estimates (Torrez et. al 2006) of the company's cost of equity and it's the preferred method among corporate analysts (Maruca 1996).

[9] The valuation model called Adjusted Present Value is explained in page 15.

2.2.1.1.1.2.1.2.2 The Capital Asset Pricing Model (CAPM)

The CAPM, developed by Sharpe (1964) and Lintner (1965), marked the birth of asset pricing theory and is nowadays one of the most widely used models in finance (Mukherji 2011).

The same author clarifies that within this model, a firm's return on equity (K_e) is a linear function of its market risk:

$$\boldsymbol{Ke = R_f + \beta\,(R_m - R_f)} \quad (10)$$

where:

Rf = rate of return for risk-free investments

ß= equity beta, denoting market risk

Rm = expected market return

(Rm – Rf) = market risk premium or equity premium

K_e = Cost of equity

The expected return on equity is the sum of the risk-free rate (R_f)[10] plus a risk premium[11]. The risk premium equals the Beta multiplied by the market risk premium which is the expected return on the market minus the risk-free rate.

Furthermore, the model only works correctly if we assume that investors are well diversified and consequently only exposed to the systematic risk[12] of the investment, which is measured by the company's beta.

The Risk-Free Rate

According to Koller et al. (2005), the risk-free rate is defined as the return on a portfolio that has no covariance with the market and it should be chosen to match the term of cash flows (Maruca 1996).

Due to the high liquidity, in the context of valuation, the yield to maturity on long term treasury bonds is used as a reference (Maruca 1996). The German and French government bonds[13] are the guide to get the risk-free rate in Euros (Damoradan 2008) due to their higher liquidity and lower credit risk when compared to bonds of other European countries (Koller et al. 2005). Also, the usage of year-specific risk-free rates is usually needless since these rates do not deviate radically over years (Damoradan 2008).

The Beta coefficient

It's described as the security's volatility relative to the market's volatility (Mullins 1982). Maruca (1996) refers that it's usually drawn from published sources, once the internal

[10] The variable that sustains the CAPM reasoning (Mullins 1982) measuring the return on a riskless investment.
[11] The extra expected return that investors demand as compensation for taking on that extra risk, i.e., for investing in this portfolio relative to the risk-free asset (Damodaran 2002). Higher-risk securities are priced to yield higher expected returns than lower-risk securities (Mullins 1982).
[12] The risk related to the movement of the stock market and therefore unavoidable (Mullins 1982).
[13] The lowest of the German and French 10-year government bond rates should be used (Damoradan 2008).

estimations of betas produce little improvement over the model. However, since it reflects the industry risk, the beta may need some refinements to adjust for the companies' differences related to financial leverage and others factors (Mullins 1982).

The Market Risk Premium or Equity Premium

The calculation of the market risk premium remains an unresolved issued for many analysts. A few models were developed to foresee it but none has gained universal acceptance since all bear some weaknesses.

Koller et al. (2005) suggest that it's possible to estimate the future market returns using: i) the extrapolation of historical excess returns, introduced by Ibbotson & Sinquefield (1976) ii) advanced regression techniques against observable financial ratios, such as the dividend-to-price ratio (also defended by Lewellen (2004)) or iii) using the Gordon and Shapiro's suggestion of a DDM, projecting future corporate dividends and then calculating the internal rate of return that sets the current market capitalization equal to the present value of future expected dividends.

Nonetheless, it can also be reasonably obtained by surveying financial professionals or academics that make available their expectations for the different market's risk premiums (Soenen & Johnson 2008).

According to Damodaran (2002), the equity risk premium is the sum of a base premium for mature equity markets and the country risk premium. Nonetheless, the specific country risk premium should only be considered if the risk of investing on it, is non-diversifiable and has a low correlation to other markets. Maruca (1996) and Koller et al. (2005) affirm that based on historical averages and forward looking estimates, the appropriate base market risk premium lies between 4,5 and 5,5%.

2.2.1.1.1.2.1.3 The Cost of Debt (Rd)

According to Cooper & Davydenko (2007), the true cost of debt has to account for any expected default loss and therefore it must lie somewhere between the promised yield and the risk-free rate. However, this subject causes a lot of head scratching and despite of the several theories, most methods are hard to implement or lead to significant errors because they fail to capture firm-specific and current market information.

Nonetheless, Damodaran (1996) states that the cost of the debt measures the cost to the firm of borrowing funds to finance its projects and it depends mainly on three factors: the riskless rate, the default risk and the tax advantage associated with debt.

As a consequence, to encounter the cost of debt before taxes, a default spread (depending upon the company's credit risk) should be added to the risk-free rate (Damoradan 2008).
Additionally, Koller et al. (2005) assert that is also possible to estimate the cost of debt only using the yield-to-maturity of the company's outstanding long term bonds.
Despite the calculation alternatives, the fact is that, for most companies, the cost of debt (before tax) is usually lower than the cost of equity.

2.2.1.1.1.2.2 The Adjusted Present Value (APV) Model

According to Damodaran (2002), the adjusted present value (APV) method unbundles the firm's value, computing first the value from its operations and then adding the effects of the value of debt and other non-equity claims.
Consequently it adds managerially relevant information to the company (Luehrman 1997b) exposing individually all the components of value and being easily adaptable to changing capital structures[14].
The firm value results from the sum of three major procedures, through APV. In the first step we value the firm as if it had no leverage. Within the second step, it is considered the value added (or taken away) by a given level of debt, computing the present value of the interest tax savings. And in the third step, the probability of the firm to go bankrupt and the expected costs of financial distress are appraised.
Because of this, it's possible to state that:

Firm Value = Present value of business with 100% equity financing (**Vu** = Value of the firm unlevered) **+** Present value of expected interest tax shields (**PVTS**) **–** Present Value of expected bankruptcy costs (**PVEBC**)

(11)

The following formula summarizes step one:

$$\boldsymbol{Vu} = \frac{\boldsymbol{FCFF_1}}{\boldsymbol{1+k_u}} + \frac{\boldsymbol{FCFF_2}}{\boldsymbol{(1+k_u)^2}} + \frac{\boldsymbol{FCFF_3}}{\boldsymbol{(1+k_u)^3}} + \cdots + \frac{\boldsymbol{FCFF_n + TV_n}}{\boldsymbol{(1+k_u)^n}} \qquad \boldsymbol{TV_n} = \frac{\boldsymbol{FCFF_n(1+g)}}{\boldsymbol{(k_u - g)}}$$

(12)

where:
V_u = Value of the firm unlevered
FCFF = after-tax operating cash flow to the firm

[14] In accordance with Damodaran (2005) and Cooper & Nyborg (2007), the financing side is not captured in the discount rate as most DCF approaches.

K_u = unlevered cost of equity or required return on assets[15]

g = expected growth rate

TV_n = Terminal value

The step two is accomplished through the following equation:

$$PV_{TS} = \sum_{t=1}^{t=\infty} \frac{Tax\ rate_t * Interest\ rate_t * Debt_t}{(1+r)^t} \quad (13)$$

where:

PV_{TS} = Present value of the expected tax savings due to payment of interest

r = rate that reflects the riskiness of these cash flows

and the last step, although uneasy to estimate and recurrently neglected in practice, according to Damodaran (2005) and Luehrman (1997b) is calculated in the following manner:

$$PV_{EBC} = Probability\ of\ bankruptcy * PV\ of\ bankruptcy\ costs = \pi a * PV_{BC} \quad (14)$$

where:

PV_{EBC} = Present value of the expected bankruptcy costs

2.2.1.1.1.2.2.1 TheTax Shield Dilemma

A worth mentioning subject of debate among a number of academics lies on the correct discount rate to use when computing the present value of the interests tax shield (PV_{TS}) (Fernandez 2007a).

Although Modigliani & Miller (1963) propose to discount the tax savings at a risk free rate (Rf), Fernandez (2004) demonstrates that this view provides inconsistent results for growing companies.

One alternative is to refer Myers (1974), Taggart (1991), Luehrman (1997a), Cooper & Nyborg (2006) and others which consent that the value of the interest tax savings should be discounted back at the cost of debt (K_d), based on the premise that tax shields are as uncertain as principal and interest payments. Nonetheless, this cost of debt does not inevitably has to be the interest rate at which the company has contracted its debt and it may

[15] According to Fernández (2007), in a leveraged company, the required return on assets is smaller than the required return to equity because financial risk anchored by the existence of debt implies a higher equity risk premium to shareholders.

be the debt's market cost, as observed by Fernández (2007c). Furthemore it will only work for expected debt fixed levels (Fernandez 2007a).

Harris & Pringle (1985), Ruback (2002), Kaplan & Ruback (1995), Brealey & Myers (2000) and Tham & Vélez-Pareja (2001), by their turn, propose that the tax to discount the interests tax shield should be the required return to unlevered equity (K_u) since the leverage and the tax shields accomplish with it are positively correlated to the firm's operating cash flows and therefore deserve the same discount rate. Ruback (2002) also supports this point of view stating that it is more reasonable to assume that interest tax savings share the same risk as the operating assets, with fluctuating capital structures, rather than rely on the conventional APV's assumption that the interest tax savings are discounted back at the cost of debt supposing a constant the debt ratio.

Regardless of these previous divergent points of views, there is another alternative to discount the value of the tax shields, depending on the debt strategy of the firm. Therefore: i) if a firm intends to keep a constant D/E ratio, an analyst should discount the interest tax shields with K_d for the first year and K_u in later years as recommended by Miles & Ezzell (1980), Lewellen and Emery (1986) and Fernandez (2005); ii) if the amount of debt is the fixed factor, the interest tax shields should be discounted with R_d, in the words of Inselbag & Kaufold (1997) and Ruback (2002).

Taggart (1991) by its turn explores another path and suggests using Miles & Ezzell (1980) point of view if the target debt ratio of the company is adjusted once a year and Harris & Pringle (1985) theory if the company adjusts to that ratio continuously.

Reflecting this lack of consensus, the finance literature does not clarifies which discount rate is theoretically correct (Fernandez 2007a).

2.2.1.1.1.2.3 The Capital Cash Flow (CCF) Model

The capital cash flow (CCF) valuation or the compressed APV approach was presented by Kaplan & Ruback (1995) and within this view, the firm value is computed using the capital cash flows discounted back at the expected asset return (Ruback 2002).

The cash flows considered are the after-tax cash flows available to all capital providers - both debt and equity investors (Kaplan & Ruback 1995). Therefore they include the debt tax shields, assuming a similar systematic risk between the interest tax shield and the operating free cash flow (Cooper & Nyborg 2007). Furthermore, and because the interest tax shields are included in the CCF, the appropriate discount rate is before taxes and corresponds to the WACC.

The general principle is the following:

$$EV = \frac{CFF_1}{1 + WACC_{BT}} + \frac{CFF_2}{(1 + WACC_{BT})^2} + \frac{CFF_3}{(1 + WACC_{BT})^3} + \cdots + \frac{CFF_n + TV_n}{(1 + WACC_{BT})^n} \quad TV_n = \frac{CFF_n(1 + g)}{(WACC_{BT} - g)}$$

(15)

where,

$$WACC_{BT} = \frac{E_{t-1}}{E_{t-1} + D_{t-1}} * Re_t + \frac{D_{t-1}}{E_{t-1} + D_{t-1}} * Rd_t$$

(16)

and,

$$\mathbf{CCF} = \mathbf{FCFF} + \mathbf{Interest\ tax\ shields}$$

(17)

In the words of Ruback (2002), this model is more useful than others, when we are dealing with highly leveraged transactions, restructurings, project transactions and other instances where the capital structure changes over time.

When compared with the APV conventional model, the major difference is that the CCF method discounts the tax shields at $WACC_{BT}$ rather than at the cost of debt (R_d) (typically a lower rate) as in the APV. As a result the value through APV will be higher because they implicitly assume the debt level to be a fixed amount and consequently the tax shields are treated as less risky when compared to the firm assets.

2.2.1.1.1.2.4 Excess Returns Models - the case of Economic Value Added (EVA)

The excess return models are seen as another variant of the DCF approach and consider that any investment only adds value to a business if it's able to generate excess returns, i.e., the returns on equity (or capital) have to exceed the cost of equity (or capital) as explained by Damodaran (2005).

One of its variants that has acquired momentum, is the Economic Value Added (EVA) that measures the surplus value created by an investment or a portfolio of investments (Damodaran 2005).

The mathematical reasoning behind it, is that:

EVA = (Return on capital invested – Cost of capital) x (Capital invested)

= After-tax operating income – (Cost of capital) x (Capital invested)

(18)

In this way, the NPV of a project measured using the EVA is "the present value of the economic value added by that project over its life" (Damodaran 2005, p.732) and it's calculated in the following way:

$$NPV = \sum_{t=1}^{t=n} \frac{EVA_t}{(1+k_c)^t}$$

where:
EVA $_t$ = Economic value added by the project
K $_c$ = Cost of capital
n = Life length of the project

(19)

Whe the purpose is corporate valuation, Damodaran (2002) states that, the firm value can be seen as the sum of the capital invested currently in the firm and the present value of the excess returns that the firm expects to make in the future, i.e.:

$$\boldsymbol{Firm\ Value = Value\ of\ the\ assets\ in\ place + Value\ of\ expected\ future\ growth}$$

(20)

Or more explicitly:

$$\boldsymbol{Firm\ Value = Capital\ invested_{Assets\ in\ place} + NPV_{Assets\ in\ place} + \sum_{t=1}^{t=\infty} NPV_{Future\ projects,t}}$$

(21)

Furthermore, due to the connection between EVA and NPV it's possible to value a firm just substituting the NPV by the EVA in the previous formula (Damodaran 2005), as evidenced next:

$$\boldsymbol{Firm\ Value = Capital\ invested_{Assets\ in\ place} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,Assets\ in\ place}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,Future\ projects}}{(1+k_c)^t}}$$

(22)

As a consequence, the firm value can be written as the sum of three components - the capital invested in assets in place, the economic value added by these assets and the expected economic value that will be added by future investments (Damodaran 2005).

The same author also explains that the other variants of EVA – such as Economic Profit or Cash flow return on investment (CFROI) models – differ essentially on how excess returns are computed.

Still, most analysts face serious obstacles to get reasonable estimates for the variables that serve as inputs to the model, and for that reason the approach is not widely used.

2.2.1.2 Liquidation and Accounting Valuation

Also known as the balance sheet-based techniques or assets based valuation, this approach neglects the fact that a firm is an on-going-entity and focuses primarily on valuing the firm's assets in place.

In this way, is usually not recommended for companies with meaningful growth opportunities (Damodaran 2005) because most of their value comes from their growth assets[16] and is not reflected in the current account statements. Using balance sheet-based techniques would disclose over conservative estimatives of value (Fernández 2007c).

Nevertheless, Bhojraj & Lee (2002) observe that it's commonly used approach when valuing real estate and distressed firms.

Some examples to approach value through these techniques are: the book value, the adjusted book value, the residual income and the liquidation value, as referred by Damodaran (2005) and Fernández (2007c). Since they were not considered as valuation methods for the purpose of this dissertation, I will not further develop this topic.

2.2.1.3 Relative Valuation

Also known as the multiples approach, relative valuation is an income statement-based method, where the value of any asset is priced based upon how similar assets are priced in the market (Damodaran 2005). It implicitly assumes that the other firms in the industry are comparable to the firm being valued and that the market, on average, prices them correctly (Damodaran 2002).

According to Lie & Lie (2002), it demands calculating particular multiples for a set of comparable companies (peer group) and then finding the implied value of the company of interest, based on the benchmark multiples. This value is estimated by multiplying the multiple by the relevant financial figure of the company under valuation.

It's usually used as a supplement to DCF in a second stage of valuation (Lie & Lie 2002) where it can be helpful to test plausibility and accuracy of the cash flows forecasts, to explain differences among the companies' performance and to generate additional insights into value creating factors (Koller et al. 2005). Furthermore it's also a valid method to use when computing the terminal value or even when valuing minority interests, according to Koller et al. (2005).

[16] The investments that the business is expected to make in the future (Damodaran 2005).

Nevertheless, in the words of Fernández (2001), it's a highly questionable method, guardian of a broad dispersion since it's too affected by one-time events, rarely accounts for future events and handles the companies' risk differences based on rules-of-thumb.

There is an infinite number of multiples (Koller et al. 2005) but Fernández (2001) categorizes them into three major groups: i) multiples based on the equity value – such as PER, Price/Sales, Price/Book Value, Price/Output; ii) multiples based on the company's value – such as EV/EBITDA, EV/Sales, EV/FCF and iii) growth-referenced multiples – such as PER to EPS Growth, EV/EBITDA Growth, along with others.

Although there is no consensus as to which multiple performs best (Lie & Lie 2002), Fernández (2001) identifies PER and EV/EBITDA among the most popular ones. On the other side, Koller et al. (2005) refer that EV multiples can be preferable since they minimize the effects of the capital structure and non-operating items, unlike PER for example. Nonetheless, Fernández (2001) argues that the multiples selection should be made considering the company and the industry unique characteristics.

The peer group

Despite the apparent simplicity, the selection of the comparable firms can be a source of manipulation, threatening the model's credibility (Bhojraj & Lee 2002).

Besides excluding the "abnormal" firms, Koller et al. (2005) defend that the selection of pure play proxies firms should be made, adjusting for differences across assets and considering similar prospects for the expected growth rates, returns on invested capital, capital structures and also the SIC[17] codes or the GICS[18] system.

Recognizing the difficulty in practice to measure all these aspects in the potential peer group, Damodaran (2005) observes that most analysts consider comparables firms as the ones in the same business or businesses, i.e., based on the industry classification, and then adjust their sample according to other factors such as size.

2.2.1.4 Contingent Claim Valuation

The contingent claim valuation is the only valuation approach that accounts for the value of managerial flexibility (Koller et al. 2005), i.e., the value obtained from the possibility that managers have to postpone decisions and to do the best when the time comes, based on market evolution (Luehrman 1997a).

[17] The Standard Industrial Classification (SIC) code list which contains a system that classifies and clusters economic activities into specific industries, in order to facilitate comparison. It corresponds to the Portuguese CAE – Classificação das Actividades Económicas Portuguesas.

[18] Global Industry Classifications Standard system, recently developed by S&P and Morgan Stanley.

In the words of Damodaran (1996), it's designed to price assets (financial or real)[19] with "option-like" characteristics that permit arbitrage, in distinct possible states of the world. The prices obtained are the payoffs which are contingent on the occurrence of specific events.

Since almost all corporate liabilities can be viewed as combinations of options (Black & Scholes 1973), it's seen as a promising approach in the context of valuation (Luehrman 1997a).

Notwithstanding, Koller et al. (2005) emphasize that it's more suitable when valuing companies with a single product, companies in a commodity-based industry[20] – that deal, for example with investments in oil and gas fields, refining facilities, chemical plants and power generators -, companies in (or near) distress or even in high-technology firms, since the most valuable things these firms generally own are golden business opportunities.

In financial terms, these opportunities are similar to options (Luehrman 1997a), and to value them there are basically two techniques (Koller et al. 2005): the Black-Scholes Option Pricing Model (BSOPM) and the Decision Tree Analysis (DTA), focused on the binominal model.

Despite the fact that the BSOPM is theoretically superior to DTA (Koller et al. 2005), none can replace conventional DCF since valuing an option still requires knowing the value of the underlying assets, typically not simply observable. Consequently, Luehrman (1997a) defends that this approach should be used as a supplement for the valuation methodology already in use.

For the purpose of this dissertation only the BSOPM will be here clarified. A brief explanation of the Binominal model is in Appendix 2.

2.2.1.4.1The background reasoning

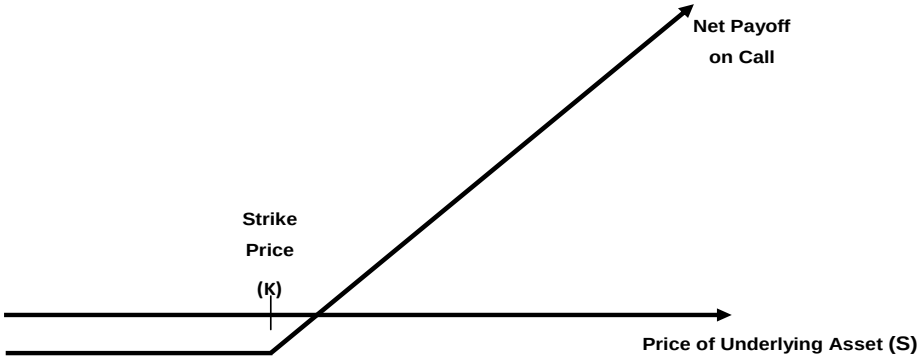
In the words of Luehrman (1997a), an option[21] is a contract which provides the holder with the right – but not the obligation – to buy (call option) or sell (put option) an underlying asset (**S**) at a specific price (strike or exercise price - **X**) on or before some future date (expiration or maturity date). For that right, the buyer pays a call price.

[19] The financial options are based on assets which are traded, such as warrants. Contrary, the so called real options, are based on untraded assets, i.e., on real assets, such as commodities, real estate or investment projects - such as investments in oil reserves (Damodaran 2002).

[20] An industry where companies trade commodities which are basic goods, such as grains, gold, iron, oil and natural gas that are usually used as inputs in the production of other goods or services or are desired as investments in their own right (Damodaran 2009). The basic idea is that there is little differentiation between the commodity coming from one producer and the same commodity from another producer. Recently, the definition has even expanded to include financial products such as foreign currencies and indexes.

[21] That is termed American if the right to buy or sell can be exercised at any time up to maturity date and European, if this right can only be exercised at maturity (Black & Scholes 1973).

Figure 1: A call option payoff diagram

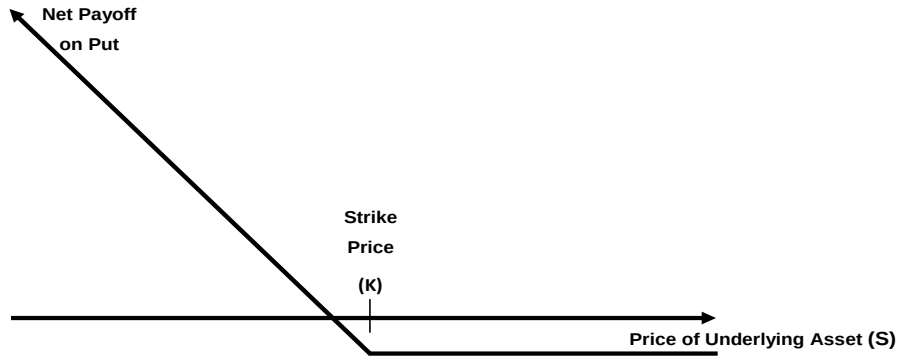


Source: Damodaran (1996)

If it's a call option, at expiration, the buyer only exercises its right if the underlying asset (**S**) > striking price (**K**). In this case, the net payoff = S – K - call price. Otherwise the call option is almost sure to expire without being exercised so its value will be zero (Black & Scholes 1973).

If it's a put option, at expiration, the buyer only exercises its right if the underlying asset (**S**) < striking price (**K**) and in this case, the net payoff = S – K - put price (Figure 2).

Figure 2: A put option payoff diagram



Source: Damodaran (1996)

According to Hull (2008), in practice the value of an option is determined iteratively as a function of six major variables, that are the inputs to the model:

Table 1: The 6 factors affecting the price of a stock option

S	The current stock price
K	The strike price
T	The time to expiration
Δ	The stock price volatility (or **σ**)
R	The risk-free interest rate
D	The dividends expected during the life of the option

Source: Hull (2008, p. 201)

2.2.1.4.2 The Black Scholes Theory for Option Pricing

According to Damodaran (1996), the BSOPM, developed by Black & Scholes (1973) and Merton (1973) is one limiting case of the binomial model with the difference is that it does not requires so many inputs as the last one.

It works based on the assumption that the stock price fluctuates in random Brownian movements[22] (Dickens and Lohrenz 1996) and that the price behavior of the underlying security follows a lognormal distribution[23] of returns (Damodaran 1996).

While the Black-Scholes option pricing model presupposes that the stock pays no dividends payments and the option can not be exercise until maturity – European type (Dickens and Lohrenz 1996) - it can be modified to allow for both (Damodaran 2002).

Damodaran (1996) states that the value of a call in the BSOPM can be written as follows:

$$\boldsymbol{Value\ of\ the\ call} = \boldsymbol{SN(d_1) - Ke^{-rt}N(d_2)} \tag{23}$$

where,

$$\boldsymbol{d_1} = \frac{\boldsymbol{ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)t}}{\boldsymbol{\sigma\sqrt{t}}} \quad \text{and} \quad \boldsymbol{d_2 = d_1 - \sigma\sqrt{t}} \tag{24}$$

The valuation process is made within 4 main steps:

In the first step, the inputs to the Black Scholes model are used to estimate d_1 and d_2.

In this context and to estimate the price's volatility, three main alternatives exist: rely on the historical volatility, use the forward-looking implied volatility or compute it through other complex dynamic models. Brous, Ince & Popova (2010) and Corrado & Miller (2006)

[22] The asset rate of returns is continuously compounded following a geometric Brownian motion model or Wiener process (Hull 2008) where a particle subject to a large number of small molecular shocks is analyzed.

[23] A variable is lognormal distributed if its logarithm (or log) is normally distributed. Stating that the asset prices are lognormal is equivalent to say that its returns are normally distributed (Anon 2010).

advocate that the past volatility is often an unreliable predictor of future volatility and that the option implied forecast of return volatility outperforms the other methods.

In the second step, the cumulative normal distribution functions - $N(d_1)$ and $N(d_2)$ - are estimated.

The third assignment is to estimate the present value of the exercise price as follows:

$$\boldsymbol{PV\ of\ exercise\ price = K\ e^{-rt}} \tag{25}$$

And the last task is to finally value of the call as showed in equation (23).

After finding out the call value, the value of a put can be easily isolated through the arbitrage relationship - the Put-Call Parity (Damodaran 1996).

Within this:

$$\boldsymbol{C - P = S - Ke^{rt}} \tag{26}$$

Where C is the value of the call and P is the value of the put, with the same life and exercise price.

2.3 Valuing Natural Resources

Natural resource companies – such as oil and mining companies – generate their cash flows from their existing under development reserves and from the undeveloped reserves that they own and can develop at a time of their choice, presumably when the price of the resource is high (Damodaran 2002).

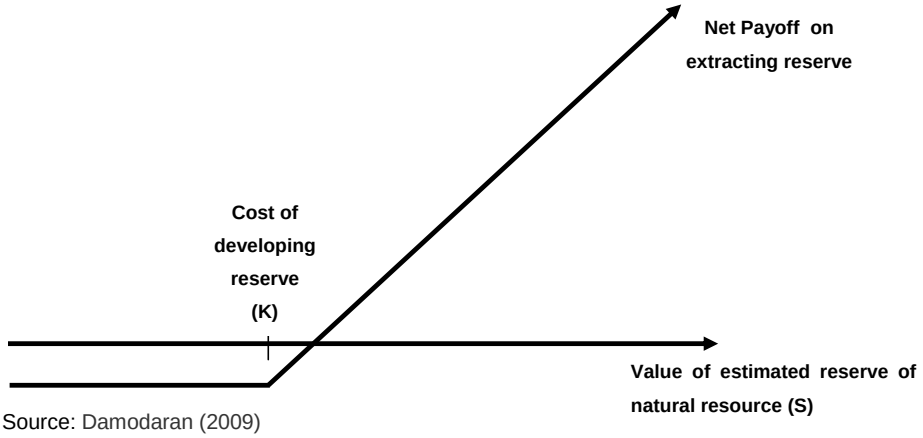
The resources' value is, in theory, a function of the quantity of the resource and its current price (Damodaran 2009). But as the quantity is typically known, their value ends up being almost entirely a function of the movements of the commodity price.

As a consequence, very uncertain earnings and cash flows are expected. When commodity prices are on the upswing, all companies that produce that commodity benefit, whereas during a downturn, the opposite happens (Damodaran 2009).

Furthermore, since managers get to observe the commodity price before they make decisions, as the reserve value rises and falls, the owner of the reserve will compare the value to the cost of developing[24] the reserve and will only develop it if the value exceeds the development cost, what can be compared to valuing a call option (Damodaran 2009).

The potential payoff is as illustrated below:

Figure 3: Payoff from developing natural resource reserves



Source: Damodaran (2009)

According to Dickens & Lohrenz (1996), Paddock et al. (1988) and Damodaran (2009), evaluating of oil and gas assets should then entail an option pricing theory using real options. When compared to a conventional DCF valuation, Damodaran (2009) acknowledges that the contingent claim valuation adds a premium[25] to the former value, to reflect the optionality. In addition, it makes an efficent use of market data mittigating the need to use (among others)

[24] Any holder of petroleum leases must pass through three stages before he can obtain hydrocarbons below the ground: exploration, development, and extraction (Paddock et al. 1988, p. 483). These stages will be better explained in Appendix 3.
[25] Which is positively correlated to the volatility of commodity prices (Damodaran 2009).

expected future commodity prices or estimated risk-adjusted discount rates[26] (Paddock et al. 1988). Consequently, is less subject to error.

Damodaran (2009) affirms that the analyst should value the undeveloped reserves as options and value reserves already under development with conventional DCF models.
As regards the value of undeveloped petroleum leases, one can: i) value each individual undeveloped reserve as an option (and then cumulate the value of the options to get the firm value) or, ii) value the sum of all undeveloped reserves as an option.
Although the first alternative is normally preferred, a guide to calculate the model's standard inputs for each alternative, is suggested by Damodaran (2009):

Table 2: Valuing natural resources – OPM major inputs

INPUTS	H1 – valuing each individual reserves	H2 – valuing all undeveloped reserves
Value of underlying asset **(S)**	Estimated value of the natural resource in reserve - usually estimated as quantity of resource multiplied by the current price	Value of all the cumulated company's undeveloped reserves, based upon the price of the resource today and the average variable cost of extracting these reserves today.
Strike Price **(K)**	Cost of developing reserve - assumed to be known and fixed	Aggregate cost to the company to develop all of its undeveloped reserves immediately.
Life of the option **(t)**	Defined as: i) finite period of time the company has the rights to the reserve; or ii) number of years of production it would take to exhaust the estimated reserve.	Weighted average of the lives across undeveloped reserves, with weights based upon reserve quantities.
Variance in the value of underlying asset	Variance in the price of natural resource	Variance in price of the underlying commodity.
Dividend yield (cost of delay)	Annual cash flow as a % of the value of the underlying asset. Once the reserve becomes viable, it's what the firm is losing by not developing the reserve.	Aggregate annual cash flows that will be generated if reserves are developed, as a % of the value of the reserves.

Source: Damodaran (2009)

[26] Within DCF valuations, analysts regularly resort to simple rules of thumb such as "use 20 percent for the exploration phase and 10 percent thereafter" (Paddock et al. 1988, p. 483), for the discount rate.

In order to calculate S, and once the resources cannot be extracted instantaneously, an adjustment should be made, discounting back the current value of the undeveloped reserve (S) at the dividend yield, which is what you loose while we wait to start the extraction (Damodaran 2009).

Within the literature, other authors such as Brennan & Schwartz (1985); Dickens & Lohrenz (1996); Osmundsen, Asche, Misund & Mohn (2006); Paddock et al. (1988) and Quirin, Berry & O'Bryan (2000) suggest alternative approaches to embrace the value of these commodity companies. However, their proposed methods explicitly require an amount of information that the companies usually do not disclose. For that reason and due to the dissertation length limitation, they were not here exposed.

3. Galp Energia S.G.P.S. – the company and the Oil & Gas industry

3.1 The company in a few words

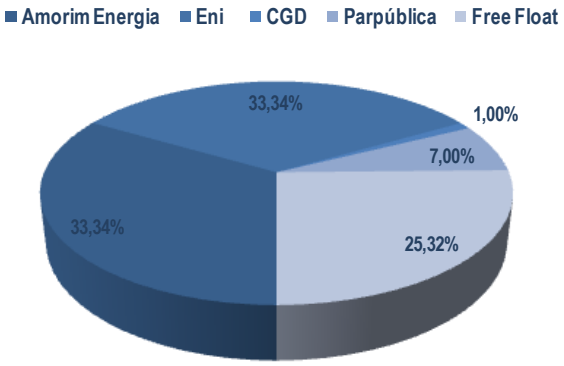
3.1.1. The history

The history of Galp Energia dates back to the 18th century and is closely related to Portugal's industrial development. Nonetheless the company as we know it was only established in the 22nd of April 1999 under the name - Petróleos e Gás de Portugal, SGPS, S.A. and resulted from the merger, acquisition and integration of several companies such as Petrogal - Portugal's sole refiner and the main distributor of oil products - and Gás de Portugal – the country's main natural gas importer in charge of its transport and distribution domestically. It was the vehicle for restructuring the Portuguese oil and natural gas sectors.

Along the years, it developed and expanded its businesses and currently the group integrates many subsidiaries[27] companies in Portugal, Spain and other worldwide[28] locations. The company also became the single integrated Portuguese multi-energy operator, performing in a broad spectrum of the energy chain, from exploration and production of crude oil and natural gas to the supply of energy products and services to the end consumers.

3.1.2 The shareholder structure

Figure 4: Shareholder structure as of 31 December 2010



Source: Company website

Amorim Energia and ENI are the two main shareholders of Galp, each one with 33,34% of the company's equity value. The Portuguese state directly – through Parpublica - and

[27] The company's current subsidiaries can be seen in the company's 2010 annual report and accounts (pp. 129-133), publicly available in their website.
[28] For the company worldwide presence, promptly check Appendix 4.

indirectly - through Caixa Geral de Depósitos (CGD) - controls a total stake of 8% and the remaining capital is traded freely in the Euronext covered by investidors from 26 different countries.

Until the end of 2010, the structure was quite stable since there was a shareholder agreement[29] in place underlining that until the end of that year, none of the parts could sell its stake (lock-in-period) and consequently no significant changes would happen to the structure. After 1 January 2011, the parties became liberated to sell their shareholding what did not happened so far.

3.1.3 The business segments

The company's activities can be summarized in three core business segments:
Exploration and Production - **E&P**
Refining & Marketing - **R&M**
Power & Gas - **P&G**

Since it became listed in 23rd October 2006, Galp evolved from being essentially a domestic competitor with downstream activities[30] in both gas and refining markets to having one of the most exciting upstream portfolios in the industry.

In Table 3, a summary of the company's current activities is presented.

[29] Which regulated several issues regarding the transference of Galp's shares.
[30] For a simple illustration of the Petroleum value chain, see Appendix 3.

Table 3: The company's three major business segments – a review

Exploration & Production **E&P**	Refining & Marketing **R&M**	Gas & Power **G&P**
Objective: The exploration, development and production of oil and natural gas.	***Objective:*** To process oil and gas into refined products to be mainly marketed in the Iberian Peninsula.	***Objective:*** The sourcing, distribution and sale of natural gas and the production of electrical and thermal power through cogeneration plants. It's a complement to the other segments.
Current characterists: 43 projects in the portfolio in several countries (area close to 10,000 km2); Actual estimated total resource base[31]: 5,8 billion boe[32]; Actual source of production: fields in Angola (with 17,8 thousand boe/d[33] in 2010) and in Brazil (with 1,6 thousand boe/d in 2010 in Lula field – Santos Basin).	***Current characteristics:*** The only two refineries in Portugal; Total refining capacity of 310 thousands boe/d (20% of the Iberian Peninsula's refining capacity); Refineries conversion project in development until 2012 – additional 20 thousands boe/d; 1,436 service stations in Portugal and Spain.	***Current characteristics:*** 1.3 million natural gas customers in Portugal and in Spain -a priority high growth market; The second largest operator in the natural gas market; Supply contracts of 6 billion m3 per year of natural gas from Algeria and Nigeria; Installed capacity of 160 MW in multiple cogeneration plants; A developing portfolio of new cogeneration projects, gas-driven combined-cycle generation and wind power.
Goal: To achieve a production of 150 thousand barrels of oil a day; 200 thousand boe/d in 2020 and 300 thousand boe/d in the early 2020's.	***Goal:*** Better alignment of the production profile with the market demand in order to strengthen the enlarged network.	***Goal:*** To develop an integrated portfolio of natural gas, electrical and thermal power generation projects, maintaining a balanced mix.

Data source: Company's website and Galp's 2010 annual report and accounts

[31] According to the last independent review performed by DeGolyer and MacNaughton. The total estimated resource base contemplates: Proved and Probable reserves (2P); Contingent Resources (3C) and Prospective Resources. For further clarification see Appendix 5.
[32] Boe = barrels of oil equivalent
[33] Boe/d = barrels of oil equivalent per day

3.1.4 The overall strategy

According to the last Strategy update[34], the company's plan is to develop its potential as an integrated multi-energy operator. On one hand the aim is to capture value in the Refining & Marketing and Gas & Power business segments (downstream business) by vertical integration and, on the other hand, the purpose is to turn the company into an important upstream operator taking advantage of the portfolio of valuable E&P assets that the company owns, mainly in Angola and Brazil's pre-salt Santos Basin.

Until the end of 2011, the main focus will be on the R&M segment with the refinaries upgrade. From 2012, a more efficient downstream business will be in place and will serve as the funding source for the upstream development, which will absorb the biggest pie of the company investments and will be the main source of value for the future from that year on.

In the medium and long term, the increasing production achieved will strengthen Galp's position as an integrated oil & gas operator, promoting an increment in cash flows and turnning Brazil into the key focus of the company long term strategy.

Appendix 6 exhibits a more detailed overview of the strategy splitted along the business areas and in Appendix 7, a summary of the company's historical performance can be found.

3.2 The oil & gas industry

The petroleum is amongst the world's primary sources of energy production. It assures the industrial maintenance and development and is used as an inimitable input in nearly every type of production that is made worldwide. As a consequence it's in the world's best interest to manage the industry sustanability and antecipate future challenges.

The industry's characteristics, recent performance and major threats are explored in Appendix 8, given the relatively lower importance of the themes. Nevertheless, the company's main competitors are showed next.

3.2.1 Major competitors

As an integrated oil and gas operator, Galp is the monopolistic portuguese player. However, it's often pressured by other integrated oil & gas companies in the international panorama which directly or indirectly confine Galp's conditions to access the oil, natural reserves and raw materials for the refineries and which, consequently affects its operating profitability and the pace of the development of future projects.

[34] Announced in 14th March 2011 in the company's Capital Markets Day 2011.

If we consider only integrated oil & gas, the competitive frame in the western Europe is essentially composed by the following companies:

Table 4: Competitors – Integrated oil & gas companies – Western Europe

Integrated oil & gas companies	BG Group	BP Group	Cepsa	ENI	Exxon Mobil	OMV Group	Repsol	Royal Dutch / Shell Group	Statoil	Total
Country of origin	UK	UK	Spain	Italy	France	Austria	Spain	UK	Norway	France

Source: Own analysis based on Bloomberg information [accessed 7 June 2010]

Petrobras is also included in the group when the aim is to access the global integrated competitors.

On the other side, the spectrum can even be more ample if we also consider companies with activities that are solely related to the downtream activities of the value chain. In this case, Galp also competes for sales with the following companies:

Table 5: Competitors – Downstream businesses

Downstream oil & gas companies	ERG	Hellenic Petroleum	Neste Oil	Saras
Country of origin	Italy	Greece	Finland	Italy

Source: Own analysis based on Bloomberg information [accessed 7 June 2010]

Furthermore in Portugal, and in accordance to the ERSE[35], companies such as REN or Iberdrola compete with Galp Energia with regards to the activity of eletricity commercialization. In what concerns to the storage and distribution of natural gas, REN is again a strong player.

[35] Entidade Reguladora dos Serviços Energéticos – The Energy Services Regulatory Authority responsible for regulating the electricity and natural gas sectors in Portugal.

4. Macroeconomic environment

According to IMF (2011a), the world is currently facing an intense deceleration and its recovery is at risk. The main reasons behind it are: on one hand, the Euro sovereign crisis caused by the elevated public debts, banking sector problems and a slow growth in the euro area and, on the other hand, the economic slowdown in the United States (due to the credit downgrade), the impact of the tragic March 2011 earthquake and tsunami in Japan (which led to a broad-based decline in global manufacturing and exports growth across Asia), as well as the unstable situation in the Middle East and North Africa (MENA) region - Egipt, Tunisia, Libya, Iran and Bahrein - and the related impact in oil prices.

In this context, the investor's risk aversion and the employments rate increased as well as the world's financial instability, lowering the propension to consumption and turning the global activity severely unbalanced.

The experts previsions have been revised downwards and the world real GDP growth is expected to be around 4% in 2011 and 2012 (IMF 2011). In Europe, the growth is expected to be lower i.e., 2,3% in 2011 and 1,8% in 2012 (IMF 2011). Nevertheless, since countries such as Germany and Sweden were barely affected by the turmoil, and others such as Ireland, Portugal, Greece and Italy were strongly influenced by it, their GDP growth rates will be quite differents. Furthermore, recently and due to the high pressures and abrupt cutbacks in external financing, Ireland, Greece, Portugal and recently Italy were obliged to ask for external financial assistance and are now embarked on an adjustment program supported by the EU and the IMF.

In this context, the portuguese real GDP growth is forecasted to be -2,16 % in 2011 and –1,84% in 2012 and just after 2013 is forecasted to be out of recession.

Table 6: GDP growth estimates for Portugal

Year	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
GDP growth Portugal	**-0,008%**	**-2,507%**	**1,331%**	**-2,159%**	**-1,844%**	**1,190%**	**2,453%**	**2,220%**	**2%**

Data source: IMF projections [Accessed on 21 December 2011]

For Spain, the projections antecipate a better outlook until 2014, when compared to the ones for Portugal as evidenced in the following table.

Table 7: GDP growth estimates for Spain

Year	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
GDP growth Spain	**0,864%**	**- 3,722%**	**-0,147%**	**0,775%**	**1,123%**	**1,769%**	**1,863%**	**1,945%**	**1,845%**

Data source: IMF projections [Accessed on 21 December 2011]

According to IMF (2011), the US and China will reemerge relatively quickly from the latest downturn; the Eurozone and possibly India will move at a slow pace and the economies of the former Soviet Union and Latin America (except Brazil) may not progress so quickly.

In the major advanced economies such as the United States, euro area, and Japan, the growth is forecasted to rise modestly, from about 0,75% in the first half of 2011 to about 1,5% in 2012, and even higher if the country is predicted to have close ties with emerging Asia.

In emerging and developing economies, the overall economic climate may encourage a higher financial regulation with policymakers seeking to increase protectionism, reducing the allowed capital flows, augmenting the exchange rates, deteriorating terms of tradings and exports volume, promoting a reduction in foreign demand. This is expected to cut the growth in these economies from about 7% in the first half of 2011 to about 6 % in 2012 (IMF 2011a).

Furthermore, as a consequence of the recent adverse supply shocks promoted by the political instability in the MENA countries, a rapidly fluctuating crude oil market is now on the spotlight, the oil prices have been reaching historical maximums and there is no expectation that they will be more moderate in the near future since the Iran's petroleum sector is being hit with Western sanctions and the European Union is considering a possible embargo on Iranian oil imports suspecting the development of atomic weapons. If the situation deteriorates, the oil price[36] will even exceed those currently predicted by futures markets and its volatility will influence the GDP growth (OPEC 2010).

This instability in the oil prices is also reflected in the countries' inflation levels. Most analysts expect the high commodity prices to be temporary and therefore the world's inflation[37] is forecasted to be 2,5% in 2011 and 1,5% in 2012 in more advanced economies and, 7,5% in 2011 and 6% in 2012 in developing countries (IMF 2011a). In Portugal, 2011 is expected to be the year with the higher inflation rate as seen in Figure 5.

Figure 5: Inflation rate (%) estimates – Portugal

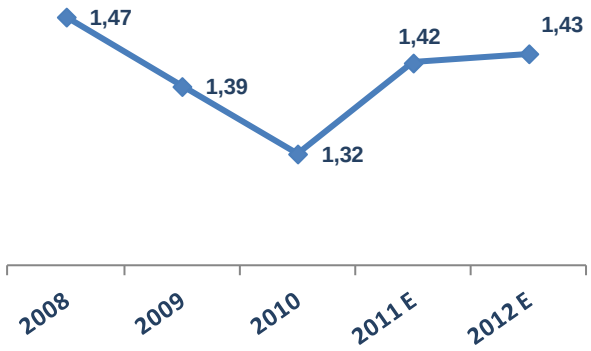
Data source: IMF [Accessed on 21 December 2011]

[36] Dated Brent is seen as a reference and the best gauge for the direction of oil prices for petroleum production from Europe, Africa and the Middle East. It's sources in North America and it prices a two thirds great part of the world's internationally traded crude oil supplies. Is an international benchmark for crude oil and Galp's realization sales price is based on a discount to Brent. Appendix 9 presents a graph with the Brent oil past performance.

[37] See for a more illustrative graph.

Furthermore under such a global scenario, the uncertain growth performance in most industries will be evidenced. For multinational firms, as it is the case of oil & gas companies, the exchange rates can also be an important driver for results. The following graph presents the expected exchange rates USD/ Euro until 2012.

Figure 6: Exchange rate EUR/USD estimates



Source: Bloomberg and BdP (2011) [Accessed on 21 December 2011]

As a complement to the macroeconomic overview, in Appendix 11, a detailed outlook for the oil and gas sector is provided.

5. Valuation of Galp Energia S.G.P.S.

5.1 The valuation methodology – "the break-up value[38]"

Galp Energia is a multi-business company, in which each business segment is distinct in terms of features and value drivers. To avoid some potential misconceptions, my valuation approach was made through 4 main steps:

1st step: I valued each business segment – E&P, R&M and G&P – separately and as if they were exclusively financed by equity and then those valuation outputs were added up.

2nd step: The preceding result was adjusted to report the value of the non-operating assets and the company's financing benefits - since the group also relies on external financing sources, such as banks - and by this manner, I've reached the Enterprise Value (EV).

3rd step: To achieve the Equity Value, all non equity claims such as the value of debt and minority interests were subtracted from the EV.

4th step: The equity value was divided by the number of shares outstanding and the value per share was encountered.

Figure 7: Own valuation methodology

	Valuation Approach
+ Value of Operating Assets	
E&P	**DCF + Black Scholes OPM**
R&M	**DCF**
G&P	**DCF + RoRAB**
PV Tax Shields	**DCF**
+ Value of Non-Operating Assets	
Cash and equivalents	**Book Value**
Associates and jointly controled entities	**Equity Method**
= Enterprise Value (EV)	
- Value of Non Equity Claims	
Debt	**Market Value**
Minority Interests	**Book Value**
= Equity Value	
÷ Number of shares	
= Price target	

A more detailed valuation could have been accomplished, considering either the: company's different geographic markets, the individual valuation of the group's subsidiaries and associates or the supplementary undeveloped resources in the company's portfolio, but the lack of information available, would require me to do entirely groundless and unrealistic

[38] When the company valuation is made as the sum of the value of different businesses (Fernández 2007c).

assumptions, that would possibly further deviate the obtained value from the reality. In this context, the firm's value was accessed in consolidated terms and solely accounting for the different segments.

5.2 The valuation in practice

5.2.1 General Assumptions

5.2.1.1 Macroeconomic Variables

Despite my attention on the global economic atmosphere and its upcoming future, I keept a special focus on the Portuguese and Spanish macroeconomic progress, since these countries are the main markets where the company operates in and they represent the largest source of the Galp's profits.

A special attention goes to the E&P activities which are often more dependent on the world economic context and on the oil price evolution, rather than on the financial situation of the countries where the natural resources are located in.

As a result, I considered the following macroeconomic outlook, having the IMF as the primary data source:

Table 8: Assumptions – GDP growth (%) and inflation rates (%)

	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
World GDP Growth (%) - constant/real prices	2,79	-0,66	5,11	3,96	4,00	4,47	4,69	4,80	4,86
European Union GDP growth (%) - constant/real prices	0,67	-4,21	1,79	1,69	1,39	1,91	2,08	2,11	2,13
Portugal GDP growth (%) - constant/real prices	-0,01	-2,51	1,33	-2,16	-1,84	1,19	2,45	2,22	2,00
Spain GDP growth (%) - constant/real prices	0,86	-3,72	-0,15	0,78	1,12	1,77	1,86	1,95	1,85
Inflation rate - Portugal (%)	2,65	-0,90	1,39	3,44	2,11	1,46	1,53	1,55	1,63
Inflation rate - Spain (%)	4,13	-0,24	2,04	2,87	1,46	1,48	1,56	1,73	1,78
Inflation rate - Brazil (%)	5,67	4,90	5,04	6,59	5,15	4,15	4,50	4,53	4,53

Data Source: IMF [Accessed on 21 December 2011]

As I considered an explicit period of 37 years – 2011 to 2048 -, from 2017 on I assumed that the variables would remain in line with 2016 levels.

Inserted in the oil & gas industry, the company negotiates the crude oil barrels in US dollars while the petroleum products derivatives are priced and sold according to local currencies - the Euro, in Galp's case. For that reason, I had to account for the EUR/USD exchange rate evolution, mainly when accessing the value for the E&P segment.

I considered that the exchange rate will be 1,42 in 2011 and 1,43 in 2012, according to Banco de Portugal estimates. From 2013 on, I assumed that it would be a value similar to 2012.

Furthermore and as Galp is a commodity company producing and using crude oil and natural gas as an inputs in its business, the firm's earnings and value are highly correlated to the price fluctuation of these commodities, which are given externally. Table 9 presents my assumptions.

Table 9: Assumptions – Brent oil price ($/bbl) and Henry Hub natural gas price ($/Million Btu)

	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Dated Brent ($/bbl)	96,7	63,1	79,8	112,0	108,0	112,0	112,0	112,0	112,0
Henry Hub Spot ($/Million of Btu)	4,48	4,50	4,56	4,57	4,66	4,74	4,76	4,81	4,87

Data Source: BdP (2011) for the Dated Brent and Nebraska State Energy Office (NO) for the Henry Hub[39] prices [Accessed on 21 December 2011].

5.2.1.2 Capital Expenditures (CAPEX)

The investment policy is expected to enhance the portfolio of tangible - land and natural resources, machinery and transport equipment and reusable containers, for example - and intangible - as R&D Costs and services concession arrangements - fixed assets.

From 2011 until 2015, the investment estimatives were made in line with the plan disclosed by the company.

In 2011, Galp plans to spend 1400 million dollars of which 630 million in the R&M segment – with the completion of the upgrade's project. From 2012 on, the bulk of capital expenditures will be redirected to the E&P segment, to the development of projects in the pre-salt Santos Basin. From 2012 to 2015, I assumed a total spending of 3500 million euros of which 70% where to the upstream activities.

After 2016 and due to the fact that there is slight information about the costs that these kind of activities require, I assumed that:

For the E&P Segment – the investments will be varying across the years. Assumptions were made considering the previous years' values released by the company but also the fields characteristics, the number of FPSO's predicted to be installed, the forecasted inflation rate and expected timeframe for production.

For the R&M and G&P Segments – the annual investments will increase from the 2015 level based on the estimated annual inflation rate and will work as a maintenance CAPEX.

In addition and following the past years' results, a residual investment - reported in the caption Others - is estimated to be made every year to account for the intra-group's operations. In 2011, the value followed the release of the company's 9 months results. From 2012 on, the projection was based on the historical trend adjusted for the inflation estimated.

[39] Henry Hub is the pricing point for natural gas futures contracts traded on the New York Mercantile Exchange (NYMEX). The prices are denominated in $/mmbtu (millions of British thermal units) and are generally seen as the primary price set for the North American natural gas market (http://www.energymarketprice.com/SitePage.asp?Command=Glossary).

In the following table, the CAPEX projections are summarized until 2016.

Appendix 12 provides the forecast for the remaining years.

Table 10: Assumptions – Capital expenditures (Million €), 2009 – 2016 E

(Million €)	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Total Investments	***1560***	***730***	***1233***	***1400***	***850***	***850***	***850***	***950***	***1854***
Exploration & Production (E&P)	196	193	341	700	595	595	595	665	1564
Refining & Marketing (R&M)	1245	456	820	630	150	150	150	150	153
Gas & Power (G&P)	116	77	87	70	102	102	102	132	134
Others	2	3	5	4	3	3	3	3	3

Data source: Company's historical data and analyst estimates

5.2.1.3 Depreciation and Amortization (D&A) schedule

In the company's last annual report, I was able to identify the key components of its fixed assets, the respective updated values and their depreciation phases. As a result, for the existent fixed assets I was able to forecast with a reduced uncertainty, their D&A future schedule.

In what concerns to the new investments projected to be made from 2011 on, I had to make some assumptions since the expected breakdown between tangible and intangible assests was not disclosed by the company.

In this context and after trailling the historical trend, the projections were made considering an 89% investment in tangible assets and an 11% investment in intangible assets. As for the amortization rate, 5% was considered for the amortizable intangible assets and 4% for the tangible assets, i.e, 20 and 25 years of estimated usefull life.

Table 11: Assumptions – Depreciation and amortization schedule, 2009 to 2016 E

(Million €)	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Gross tangible fixed assets*	6.654	7.171	7.649	8.900	9.660	10.420	11.179	12.029	13.685
Depreciation of existing assets	228	231	275	296	295	295	279	52	42
Depreciation of new assets	-	-	-	55	88	122	155	192	265
Total Depreciation	228	231	275	351	384	417	434	244	307
Total Accumulated Depreciation		-	4.060	4.411	4.795	5.211	5.645	5.890	6.197
Gross intangible fixed assets*	645	783	1.933	2.081	2.172	2.262	2.352	2.453	2.650
Amortization of existing assets	25	35	59	60	60	60	60	60	60
Amortization of new assets	-	-	-	8	13	17	22	27	38
Total Amortization	25	35	59	68	72	77	82	87	97
Total Accumulated Amortization		-	625	692	764	841	923	1.010	1.107
D&A	**253**	**266**	**334**	**418**	**456**	**494**	**516**	**331**	**405**

** The amount also includes the value of non depreciable assets*

Data source: Company's historical data and analyst estimates

For additional yearly forecasts for D&A, consult Appendix 13.

5.2.1.4 Working Capital (WC) and Working Capital Needs (WCN)

For valuation purposes, I used as a reference, the operating working capital which reflects the strictly operating current assets and liabilities, i.e., the accounts receivable, the inventories and the acounts payable. Additionally and based on historical facts, I accounted for a mininum cash level[40], to more accurately reproduce the company's operational efficiency and short-term financial health. In the subsequent table, the results of the company's activity ratios achieved in the last years, are exhibited.

Table 12: The Operational efficiency ratios

		2005	2006	2007	2008	2009	2010	Historical Average
Ratios								
Accounts receivable / Sales & Services	(%)	8,1%	7,9%	8,6%	6,5%	6,5%	7,7%	**7,5%**
Average Collection Period	(days)	29,4	28,7	31,3	23,9	23,7	28,1	**28**
Inventories / COGS	(%)	12,4%	9,7%	12,1%	7,5%	11,2%	12,3%	**10,9%**
Inventory Turnover Ratio	(days)	45,2	35,5	44,1	27,3	41,0	44,9	**40**
Accounts payable / COGS	(%)	7,3%	6,3%	8,6%	6,9%	10,2%	11,7%	**8,5%**
Average Payment Period	(days)	26,6	23,1	31,3	25,2	37,4	42,6	**31**
Cash / Sales & Services	(%)	1,4%	1,7%	0,9%	0,8%	2,0%	1,3%	**1,4%**
Cash / Sales & Services	(days)	5,2	6,4	3,1	3,1	7,4	4,9	**5**
Minimum cash / Sales & Services	(%)	1,2%	0,7%	0,7%	0,7%	1,0%	0,9%	**0,9%**
Minimum cash	(days)	4,2	2,7	2,5	2,7	3,8	3,3	**3**
Excess cash / Sales & Services	(%)	0,3%	1,0%	0,2%	0,1%	1,0%	0,4%	**0,5%**
Excess cash	(days)	0,9	3,7	0,6	0,4	3,6	1,6	**2**
Cash Conversion Cycle	(days)	**48,0**	**41,2**	**44,1**	**26,0**	**27,2**	**30,4**	**36**

Data source: Company's historical data and analyst estimates

After 2011, the indicated activity ratios and the cash conversion cycle are assumed to remain equal to the historical average as the company didn't revealed further informations.

Based on these, I also anticipated the company's Operating Working Capital as well as its variation and considered the results evidenced in Table 13, as inputs to the DCF valuation methodology. For the subsequent years, the WC was similarly computed.

Table 13: WC and WCN – Past results and future outlook

(Million €)	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Sales & Services (S&S)	15062	11.960	13.998	14.786	15.420	16.112	17.074	18.472	18.964
Cost of Goods Sold (CGS)	14.406	10.944	12.778	13.495	13.712	14.327	15.182	16.426	16.863
Minimum cash	110	125	125	129	135	141	149	162	166
Accounts receivable	988	778	1.082	1.115	1.163	1.215	1.287	1.393	1.430
Inventories	1.076	1.229	1.570	1.466	1.490	1.557	1.649	1.785	1.832
Accounts payable	993	1.122	1.490	1.147	1.165	1.218	1.290	1.396	1.433
Total Operating Working Capital	**1.181**	**1.011**	**1.288**	**1.564**	**1.622**	**1.695**	**1.796**	**1.943**	**1.995**
Δ WC = WCN	**(373)**	**(170)**	**277**	**276**	**58**	**73**	**101**	**147**	**52**

Data source: Company's historical data and analyst estimates

[40] The least amount of available cash that a company decides to maintain on a regular basis to avoid or cover up cash shortfalls resulting from a potential mismatch between cash inflows and outflows during an accounting period. In this case I considered to be the sum of cash, demand deposits and other negotiable securities included in the caption cash and equivalents. The remaining value is accounted as Excess Cash.

Since the valuation was made accessing each business segment individually, the working capital segmentation had to be made and without any kind of indicative elements I decided on doing it according to the sales volume.

Table 14: Working capital needs – segmentation, 2009 – 2016 E

	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Sales & Services RCA by segment (%)									
Exploration & Production (E&P)	1%	1%	2%	3%	4%	5%	7%	11%	12%
Refining & Marketing (R&M)	88%	89%	89%	85%	83%	82%	81%	77%	78%
Gas & Power (G&P)	13%	12%	13%	12%	12%	12%	11%	10%	10%
Others	1%	1%	1%	1%	1%	1%	1%	1%	1%
WCN by segment (Million €)									
Exploration & Production (E&P)	(5)	(2)	4	8	2	4	7	17	6
Refining & Marketing (R&M)	(327)	(151)	245	234	49	60	82	114	40
Gas & Power (G&P)	(48)	(20)	36	32	7	9	11	15	5
Others	(3)	(2)	3	2	0	1	1	1	0
Total WCN (Million €)	**(373)**	**(170)**	**277**	**277**	**58**	**73**	**101**	**147**	**52**

Data source: Company's historical data and analyst estimates

As the sales from the R&M activities are higher than the bulk from the other segments, the WC for the segment's maintenance is also expected to be higher and a major positive variation is denoted. For more information on the WCN segmentation, consult Appendix 14.

When comparing with the activity ratios that serve as a reference for the global sector, and neglecting the inventories proportions, Galp appears to have below the average results, as can be seen in Appendix 15.

5.2.1.5 The Capital Structure

At the end of September 2011, the leverage analysis expressed mainly by the debt ratio and net-debt to equity ratios indicated that the businesses had too much risk.

To manage this situation, the company announced that, in the first quarter of 2012 it will sell a 30% stake of its subsidiary – Petrogal Brasil, Lda to Sinopec, a chinese company and one of the largest energy groups worldwide, to raise around 3,77 billion €. Furthermore Sinopec will make a shareholder loan to Petrogal of nearly 306 million €.

According to the same source, these new funding options will allow the group to achieve a net debt-to-equity inferior of 50% and net debt-to-EBITDA inferior to 2,5x.

In this context, I forecasted the debt levels taking into account the previous information and also the company needs to meet the operational projections in the explicit period, as see in Table 15. In Appendix 16, I account for the remaining years.

Table 15: Financial situation, 2009 – 2016 E

(Million €)	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E
Short term debt	687	424	616	1.035	570	335	0	0	0
Long term debt	1.304	1.747	2.412	3.268	2.305	1.656	903	822	722
Total Debt	1.991	2.171	3.028	4.303	2.875	1.991	903	822	722
Cash and equivalents	127	244	188	203	510	800	697	677	427
Net Debt	1.864	1.927	2.840	4.100	2.365	1.192	206	144	295
Total equity	2.219	2.389	2.711	2.559	4.182	5.577	6.858	7.480	8.767
Debt ratio (%)	66%	68%	70%	74%	61%	51%	42%	41%	38%
Net Debt-to-Equity (%)	**84%**	**81%**	**105%**	**160%**	**57%**	**21%**	**3%**	**2%**	**3%**
Net Debt-to-EBITDA	**4,2x**	**2,3x**	**2,7x**	**4,5x**	**1,7x**	**0,8x**	**0,1x**	**0,1x**	**0,2x**

Data source: Company's historical data and analyst estimates

With regards to the debt ratio, I foresee an incremental decrease after 2012 due to the alternative cash coming from Petrogal's raise in capital. For the same reason and assuming that the cash obtained will be received in parcels until 2016, the net debt-to-equity and net debt-to-EBITDA ratios will decrease mainly after 2012 converging to the anticipated intervals previously described. Until the end of the explicit period, the debt ratio is expected to be always inferior to 50%.

5.2.1.6 The Cost of Equity

Each segment was valued considering an individual risk performance in a debt free environment. As a consequence, the cost of capital, i.e., the discount rate used to come across the segments' values was the cost of equity, computed throught the CAPM. The table below outines the assumptions and final results.

Table 16: Assumptions for the cost of equity

	Risk free	Market risk premium	Beta levered	Beta unlevered	Terminal g	**Ru (annual)**
E&P - Angola	1,85%	9,88%	1,32	0,97	no meaning	**11,5%**
E&P - Brazil	1,85%	7,63%	1,32	0,99	no meaning	**9,4%**
R&M	1,85%	7,11%	1,3	0,96	1,0%	**8,6%**
G&P	1,85%	9,01%	0,62	0,46	1,2%	**8,3%**

Data Source: Bloomberg (2011)

The risk free rate

Although it should be chosen to match the term of cash flows, I used the yield-to-maturity of a Germany's 10-year government bond as the risk free rate, since 10 years is the average length of most investments in stocks.

The market risk premium

To obtain a reasonable estimate of the market risk premium, I had to the account for the diversity of countries were Galp operates in, especially in the dowstream activities.

For this purpose I calculated a specific equity premium by segment which was a result of the weighted average market risk premiums of all the countries where the segment's sales were made.

For the R&M segment, the market risk premiums of Iberian Peninsula, Africa, US, Mexico, UK, Netherlands, Greece and others were considered.

For the G&P business, I followed the same reasoning but just considered the Portuguese and Spanish expected differential returns of the markets over the treasury bonds.

For the E&P activities: in Angola, a country risk premium of 9,88% was considered, while in Brazil a risk of 7,63% was more accurate.

The market premiums used were made available by Damodaran (2011a), although I am aware that due to the current economic climate, they may not be a good enough approximation of the reality.

The beta coefficient

In what concerns to the segments beta, the following approach was made:

E&P segment: I resorted on Damodaran industry data base and composed a peer group[41] based on the companies' market capitalization, capital structures, projected growth and ROIC's which allowed me to identify a group of companies that were relatively comparable to Galp. Based on this, I used the average levered beta of these companies and adjusted it for the company's capital structure and the countries corporate tax rates, to reach a value for the segment's unlevered beta.

R&M segment: As the company until just recently was mainly focused on this kind of activities, I considered that Bloomberg's beta estimative, based on past performance was realistic to account for the R&M business sensitivity to the market performance.

G&P segment: I identified and analyzed a peer group[42] based on capital strutures, and ROIC's and considered their average beta as a good indicator for this segment after the adjustement for Galp's capital structure.

To deleverage the beta and assuming that the Beta of the debt is zero, I used the following formula:

$$\beta_U = \frac{\beta_L + (1 - t_C)\frac{D}{E} \cdot \beta_D}{1 + (1 - t_C)\frac{D}{E}} \qquad (27)$$

[41] More details about its composition are made in section 5.3.
[42] Utilizing the Damodaran's industry data base.

where:

Bu = Beta unlevered

BL = Beta levered

Tc= Corporate Tax

D/E = Debt/ Equity

The terminal growth rate

For the E&P segment, the number of reserves and resources available to be developed and extracted are in a limited number. Therefore no growth rate at perpetuity was considered.

Concerning the R&M business, I considered that the major investment plans were already accomplished. Moreover, the refining capacity is limited and the utilization rate can only increase slightly. A 1% growth rate was estimated to be reasonable to account for this doubtful growth at perpetuity since it's the growth rate expected to be in place in the last years of the explicit period.

The G&P segment serves as a complement to the refining and marketing activities and the company didn't reveal any plans to future substancial investment. Nevertheless I considered a 1,2% growth rate since the Galp's CEO announced that it was the expected growth rate for the industy sector after 2012.

5.2.1.7 The Cost of Debt

Following the methodology ascribed to Damoradan (2008), the before tax cost of debt of 5,85% was reached considering the following assumptions:

- Risk free rate: 1,85% as similarly used when computing the cost of equity.
- Default spread: 4%. On one hand, the historical trend highlighted an average spread of 1,5% while, on the other hand and based on the synthetic rating calculation, the associated spread was 1,1%. However, in the last year and due to the economic recession the banks' risk perception has changed considerably and these values were not reflecting the reality. For this reason, and due to the lack of more information, I relied on the average spread achieved by EDP[43] when, in January 2011, issued bonds.

5.2.2 Valuation – E&P business

Despite of the large portfolio of assets that the company owns for exploration and development, as already described in Figure 14 (Appendix 6), currently, the real production

[43] A Portuguese company in the energetic sector that, in January 2011 announced that it would issue 750 million € in bonds maturing in January 2016, with an associated 5,875% interest rate.

of oil and natural gas to Galp Energia has its origin in Kuito, BBLT and CPT in Block 14 (Angola) where the company has a 9% participation share and in the Lula field in Block BM-S-11 (located in Santos Basin – Brazil), where a 10% stake is entitled to Galp.

To access the value of the segment, I considered, besides the previous ones, the other E&P assets that are or have already been under the exploration phase and consequently are ready to be developed and productive.

According to the disclosed information, the next in line to be under development are:

- Cernambi, Iara and Jupiter in Block BM-S-11; Bem-te-vi in BM-S-8 and Caramba in BM-S-21 – located in Brazil.
- Negage, Malange and Menongue in Block 14; Lianzi in Block 14K-A-IMI; Block 32 and Block 33 – placed in Angola.

Furthermore recently, the company announced the discovery of a new hydrocarbon province in Mozambique - Mamba South-1, in Area 4 - with at least 15 Tcf[44] of recoverable natural gas. However, as residual information was released to the market, it was not considered for this valuation purpose.

Pre-exploration reserves were also not valued as no informations concerning the reserves in place, the development costs and the required investments were availabe.

Valuation techniques:

Each Brazilian field was valued separately using the DCF methodology in order to get a suitable value per barrel. Since the company divulged the number of barrels that each field is expected to have, the total value of the reserve was encountered.

The Angolan area was valued similarly but it was analyzed as a whole and not discriminated by field, as the company did not provide detailed information.

Additionally and following Damodaran (2009), I've accessed the yet undeveloped fields using the Option Pricing Theory to pull out the extra value that comes from the options - such as to accelerate or postpone the development and extraction stage[45] according to the economic perspectives at the time - that the field operator[46] might have, since it's a natural resource.

For this matter, I had to account for the projects' main sources of uncertainty at this stage - the recovery rate and the development and extraction costs - which are highly correlated to the oil and gas prices volatility. In this case, and based on the information of future contracts, an implied volatility of 25,45% in oil prices and 16% in gas prices was assumed.

[44] Trillion of cubic feet. According to the company website in 6 January 2012, 5610 cubic feet is equivalent to 1 Boe.

[45] I treated development and extraction as one single phase due to the shortage of data available. Furthermore the abandonment option was not considered since these costs are hard to predict and very uncertain.

[46] Galp is not the operator in any of those fields and consequently its influence regarding these managerial decisions its quite residual. Nevertheless the economic value of each field was accessed to account just for the part that is assigned to Galp.

The summarized final results are displayed in the next table and the detailed DCF's per field are exhibited in Appendix 17.

Table 17: E&P valuation summary

E&P VALUATION SUMMARY	Consortium DCF Methodology			Galp Energia's share										
				DCF Methodology					Option pricing Theory				DCF + OPT	
	# 2P reserves (billion boe)	NPV ($/bbl)	EV ($ Million)	Galp´s stake (%)	Net to Galp (M boe)	EV ($ Million)	EV (€ Million)	€/share	Option value (€ Million)	Option Value (€/share)	Additional Value* (€ Million)	Additional Value* (€/share)	Total Value (€ Million)	Total Value (€/share)
Santos Basin's Assets														
Lula / Cernambi	8,3	**6,6**	54.462	10%	829	5.437	3.829	4,62	4.531	5,46	702	0,85	4.531	5,46
Iara	3,5	**4,8**	16.911	10%	350	1.691	1.191	1,44	2.005	2,42	814	0,98	2.005	2,42
Jupiter	6,5	**1,5**	10.001	20%	1.300	2.000	1.409	1,70	2.462	2,97	1.054	1,27	2.462	2,97
Bem-te-vi	1,0	**3,6**	3.596	14%	140	503	355	0,43	729	0,88	375	0,45	729	0,88
Caramba	1,0	**2,5**	2.462	20%	200	492	347	0,42	925	1,12	578	0,70	925	1,12
Subtotal	20,3	-	87.432		2.819	10.125	7.130	8,60	10.653	12,85	3.523	4,25	10.653	12,85
Other exploration Brazil	n.a.	**3,8**	n.a.	n.a.	267	1.015	715	0,86	n.a.	n.a.	n.a.	n.a.	715,06	0,86
Sum of Brazil	**5,6**	**3,8**	**n.a.**	**n.a.**	**3.086**	**11.140**	**7.845**	**9,46**	**10.653**	**12,85**	**3.523**	**4,25**	**11.368**	**13,71**
Sum of Angola	**-**	**7,9**	**-**	**-**	**255**	**2.014**	**1.418**	**1,71**	**1.695**	**2,04**	**277**	**0,33**	**1.695**	**2,04**
Subtotal					3.341	13.154	9.263	11,17	12.348	14,89	3.800	4,58	13.063	15,75
Prospective Resources	**n.a.**	**1,0**	**-**	**-**	**2.550**	**2.550**	**1.796**	**2,17**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**1.796**	**2,17**
				TOTAL	**5.891**	**15.704**	**11.059**	**13,34**	**12.348**	**14,89**	**1.580**	**1,90**	**14.859**	**17,92**

**OPT vs DCF Valuation*

Data source: Analyst estimates

The valuation assumptions for the Black and Scholes OPM, are also presented next:

Table 18: Black Scholes valuation output – E&P segment

Offshore oil projects	Stage	Stake (%)	# Reserves (M boe) net to Galp	Current Price ($)	OPEX ($/bbl)	Development lag (years)	Dividend yield / Cost of delay (%)	S (M €)	Option life	Rf	Variance in oil price (%)	PV of Development costs (M €)	Option Value (M €)
Brazil													
Lula & Cernambi (BM-S-11)	Develop. & Extraction	10%	828,7	113,43	9,6	0	5%	46.890	35	2,9%	6%	27.612	**4.531**
Iara (BM-S-11)	Development	10%	350	113,43	9,6	1,75	5%	18.306	35	2,9%	6%	9144,4	**2.005**
Jupiter (BM-S-24)	Development	20%	1300	113,43	9,6	4,5	5%	30.008	31	2,9%	4%	19216,8	**2.462**
Bem-te-vi (BM-S-8)	Development	14%	140	113,43	9,6	1,5	5%	6.914	24	2,9%	6%	4.463	**729**
Caramba (BM-S-21)	Development	20%	200	113,43	9,6	6,5	5%	9.300	22	2,9%	6%	7533,7	**925**
Angola													
Block 14	Extraction												
Blcok 32	Development	n.a.	255	113,43	5,485	5	5%	15.039	36	0,029	6%	4481,05	**1.695**
Block 14-k-A-MI	Development												
												Total	**12.348**

Data source: Analyst estimates

Segment's assumptions:

Since no more data was available I considered that the others reserves in Brazil would have a value per barrel equal to the average valuation of the other fields. The prospective resources would have a minimum value of 1$/barrel.

The projections of the segment's annual sales per field were based on the mix of oil and gas production profile considered, and the oil and gas realization prices[47]. The production profile, by its turn, was a result of the analysis of the production report in the last 3 years as a complement to the industry historical prodution profiles in major oil fields.

For the Brazilian fields the main costs considered were: an OPEX of 9,6 $ per barrel, according to the figures released by Petrobras; a 10% Royalties tax and a Special Participation Tax (SPT) that is owned by the leaseholder to the State and that oscillates according to the production volume in each year.

For the Angolan fields, the scenario is a bit different. Instead of taxes, the company has to transfer part of its total production – called Working Interest Production (WIP) - to the State and it's only able to sell the remaining, which is called the Net entitlement Production (NET). Historically the NET has been around 67% of the WIP and I maintained that ratio for the future to forecast the field' s production which will be sold. Furthermore an OPEX of 5,5 $ per barrel was considered.

The D&A of the segment were allocated to each field in proportion of the CAPEX invested in it.

In what concerns to corporate taxation, a tax rate of 34% and 28% were the assumptions for the Brazilian upstream assets and for the Angolan ones, respectively.

The segment value is nearly 14,9 billion €. It worths 66% of EV, or in other words, 17,92€ per share. The segment's EV is 79,9 times its 2010 EBITDA.

The value drivers:

The value of the segment is highly correlated to the cost of capital and the amount of reserves owned by the company. Any future discoveries on the amount of resources and reserves that are available to the company will positively update the actual E&P valuation and might also push the value per barrel of each field up.

Nonetheless, the business it's even more sensitive to changes in the Brent oil Price ($/bbl) and in the EUR/USD exchange rate.

5.2.3 Valuation – R&M business

Valuation technique:

A DCF was the valuation methodology chosen and the segment was valued as a whole.

[47] In Brazil, a 9% discount on oil price was considered (Source: Petrobras) while in Angola, 3% was the assumed price cut (Source: IEA)

Segment assumptions and results:

Table 19: R&M – Key assumptions

R&M Assumptions	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E and the following years
Average Benchmark Refining	2,00	0,91	1,18	(0,47)	1,00	1,62	1,62	1,62	1,62
Galp's Refining margin ($/bbl)	4,40	1,5	2,60	0,92	6,52	7,14	7,14	7,14	7,14
Galp refining capacity (kbbl/d)	310	310	310	310	330	330	330	330	330
Capacity utilization (%)	79%	69%	75%	70%	78%	85%	90%	90%	75%
Cash costs ($/bbl)	2,2	2,1	2,1	3,3	2,1	2,1	2,1	2,1	2,1

Data source: Company's historical data and analyst estimates

In the last years, the international benchmark refining margins have been decreasing and as a result, the company's refining margin has also been very low. Faced with the current economic climate, I assumed that for 2011, the refining margin would follow the trend of the results in the first three quarters of that year and that in 2012, it would rise to an average of 1$ per barrel. Galp also released an information that from 2011 to 2015, an average benchmark margin of 1,62 $/bbl would be expected which I only assumed to happen from 2013 on, to be more conservative.

In what concerns to the company's refining margin, a boost of 3,5 dollars per barrel is expected after the end of the refinaries' upgrade project. Furthermore and considering an average spread of 2,02 $/bbl and a cost of 2,1 $/bbl, Galp will be able to solidify the segments' gains.

Additionally, the capacity utilization will increase until 2013 and then will decrease coming to a period where it will stabilize to a standard 75%, in line to what is hoped to happen in the industry. As a consequence, the processd crude and, as a result, the sales, are expected to augment in the first years of the projection and then will become quite constant.

The processed crude is a product of the refining capacity and its actual utilization. The amount of sales is then a function of the processed crude and the company's refining margin.

In what respects the Marketing division, the increase in sales is positively correlated to the Iberian inflation rate and its costs are expected to be 97% of the sales, as the past years results have showed. As a result, the Marketing EBITDA as well as its weight on the segment's result will lean on increasing year after year.

Table 20: R&M – Operating highlights

OPERATING HIGHLIGHTS	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Processed crude (k bbl/d)	245	213	232	218	257	281	314	297	248	248	248	248	248	248	248	248
Processed crude (k bbl)	89.808	77.624	84.700	79.442	93.951	102.383	114.428	108.405	90.338	90.338	90.338	90.338	90.338	90.338	90.338	90.338
Refining EBITDA (M €)	134	(33)	32	(99)	290	361	403	382	318	318	318	318	318	318	318	318
Marketing EBITDA (M €)	406	326	362	370	375	386	401	416	431	497	595	712	853	1.021	1.221	1.360

Data source: Company's historical data and analyst estimates

Table 21: R&M – DCF valuation results

R&M - DCF	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
R&M EBIT RCA (M€)	86	400	475	534	634	571	598	636	701	774	914	1.136	1.293
Taxes paid (M€)	24	113	134	151	179	161	169	180	198	219	258	321	365
R&M EBIT RCA (1-T)	61	287	341	383	455	409	429	456	503	555	656	815	928
D&A (M€)	185	265	272	269	164	179	217	278	330	398	425	404	386
CAPEX (M €)	630	150	150	150	150	153	163	177	193	326	355	386	406
WCN (M€	276	49	60	82	114	40	57	68	53	100	82	82	40
FCFF (€)	(659)	354	403	421	355	395	427	489	587	527	644	751	868
Discount factor	1,00	0,92	0,85	0,78	0,72	0,66	0,47	0,31	0,21	0,14	0,09	0,06	0,05
Discounted FCFF	(659)	326	341	328	255	261	202	153	122	72	58	45	40
Terminal Value (TV)	9.706												
Present Value TV	452												
NPV - R&M (M €)	**4.736**												

Data source: Analyst estimates

The segment value is nearly 4,7 billion euros and its terminal value just accouts for 9,5% of it. It worths 21% of EV, or in other words, 5,71€ per share.

The value drivers:

The key drivers that underpin this value are the company's Refining Margin, the volume of processed crude and the segment's discount rate.

5.2.4 Valuation – G&P business

Valuation technique:

This segment core current activities were also approach as a whole and through a DCF methodology.

Segment's assumptions and results:

Table 22: G&P – Operating highlights

OPERATING HIGHLIGHTS	2008	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Installed capacity (MW)	160	160	160	162	244	244	244	244	244	244	244	244	244	244	244	244
Total sales of the segment (M m3)	5.681	4.744	5.034	5.875	5.925	5.925	5.925	5.925	5.925	5.925	5.925	5.925	5.925	5.925	5.925	5.925
EBITDA RCA (M€)	n.a.	216	262	264	264	269	270	237	244	269	308	347	391	413	408	401
EBIT RCA (M€)	216	113	184	179	179	179	179	179	179	179	179	179	179	179	179	179

Data source: Company's historical data and analyst estimates

The segment's sales of natural gas and electricity are expected to increase, mainly due to the higher production capacity that will be in-place from 2012 on, with a new cogeneration plant in Matosinhos.

Due to the limited amount of information available, mainly in what concerns to unitary sales prices, I calculated the historical margins of the EBIT over the volume sold and presumed that it would remain equal for the years to come.

I also assumed that the storage and distribution assets add a constant yearly EBITDA contribution of 1,548 million euros to the segment as no more significant investments will be made.

Table 23: G&P – NG regulated asset base (RAB)

Galp's NG regulated assets	*RAB* (M€)*	*Rate of return (%)*	*Annual EBITDA (M€)*
Storage	18,0	8% **	1,44
Distribution	1,2	9% ***	0,11
Total	19,2		1,55

**Regulated Asset Base*

*** Fixed on a quarter basis*

**** Until 2013. But I assumed it will remain the same*

Data source: Company's historical data and analyst estimate of EBITDA

As no further investments are expected to be made, not much information was available to value other potential investments that the company has been showing interest to develop such as a wing power project, the construction of the 12MW Vale Grande wind farm and the Sines combined-cycle plant. Nevertheless, if they become viable and implemented, an additional capacity of 1012 MW will potential increase the eletricity production, the segments sales and the G&P segment's value.

Table 24: G&P – DCF valuation results

DCF - G&P	2011	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030	2035 E	2040 E	2045 E	2048 E
EBIT RCA	184	179	179	179	179	179	179	179	179	179	179	179	179
EBIT RCA (1-T)	132	129	129	129	129	129	129	129	129	129	129	129	129
D&A	80	85	89	91	58	65	89	128,6	167	211	234	229	222
CAPEX	70	102	102	102	132	134	144	156	170	218	237	257	271
WMN (M €)	32	7	9	11	15	5	6	6,5	4	7	5	4	2
FCFF	110	104	107	106	39	54	68	94,6	122	116	122	96	78
Discount factor	1,00	0,94	0,89	0,84	0,79	0,75	0,59	0,44	0,33	0,25	0,19	0,14	0,12
Discounted FCFF	110	98	95	89	31	40	40	41,9	40	29	23	13	9
Terminal Value (TV)	2.045												
Present Value TV	238												
NPV - G&P (M €)	1.659												

Data source: Analyst estimates

Currently, the segment's value is still relatively residual, representing 7% of the total EV , i.e., 2€ per share. The segment's EV is just 6,3 times above its 2010 EBITDA.

The value drivers:

The value of these activities are very sensitive to a change in the volume of sales of natural gas and electricity, the growth assumed in perpetuity and the discount rate of the segment. Furthermore when the company update its investment plan and account for the wind projects and the CGCP, a boost in the G&P value will happen.

5.2.5 Valuation – Debt Tax shield

Taking into account the company's projected capital structure, clarified in section 5.2.1.5, the debt ratio is expected to be variable.

As a consequence, I considered that the company's forecasted tax savings should be discounted at the weighted average unlevered cost of equity of company's business segments, in which the weightning factor was the CAPEX from 2011 to 2015.

As the amount of debt is highly correlated to the firm's investments and its capacity to generate operational cash flows, it should entail an equivalent risk.

In Table 25, the main outcome is presented.

Table 25: Debt tax shield – valuation results

	Present Value of Tax Shields (Million €)
Bonds	30,1
Commercial paper	20,1
Bank loans	286,6
Loans from shareholders	21,7
New issued debt	177,1
Total	**535,7**

Data source: Analyst estimates

5.2.6 Valuation – Sum-of-parts (SoP)

After a SoP approach, the valuation of Galp Energia S.G.P.S. was complete and the folowing output was accomplished:

Table 26: Galp Energia S.G.P.S. – SoP Valuation

GALP ENERGIA - SoP Valuation	EV (Million €)	EV/EBITDA	Weight on EV (%)	Value per share (€)	Comments:
Value of Operating Assets	**21.790**				
Lula /Cernambi	3.829		17%	€4,62	829 million boe @ 6,6 $/boe
Iara	1.191		5%	€1,44	350 milion boe @ 4,8 $/boe
Jupiter	1.409		6%	€1,70	1300 million boe @ 1,5 $/boe
Bem-te-vi	355		2%	€0,43	140 million boe @ 3,6 $/boe
Caramba	347		2%	€0,42	200 million boe @ 2,5 $/boe
Other exploration Brazil	715		3%	€0,86	267 million boe@ 3,8 $/boe
Sum of Brazil	7.845		35%	€9,46	
Sum of Angola	1.418		6%	€1,71	255 million boe @ 7,9 $/boe
Prospective Resources	1.796		8%	€2,17	2550 million boe@ 1,0 $/boe
Additional value from Options	3.800		17%	€4,58	
E&P	**14.859**	79,9x	66%	€17,92	
R&M	**4.736**	12,0x	21%	€5,71	
G&P	**1.659**	6,3x	7%	€2,00	
PV Tax Shields	**536**		2%	€0,65	
Value of Non-Operating Assets	**578**		**3%**	**€0,70**	
Cash and equivalents	244		1%		
Associates and jointly controled entities	334		1%		
Enterprise Value	**22.368**		**100%**	**€26,97**	
Value of Non Equity Claims	**10.129**		**45%**	**€12,22**	
Debt (Sept 2011)	5.980		27%	€7,21	
Minority Interests (after sale of 30% of Petrogal)	4.149		19%	€5,00	
Equity Value	**12.239**				
Number of shares (m)	829				
Price target (€)	**14,76**				
Current share price - 06th January 2012	12,71				
Deviation (%)	16,1%				

Data source: Analyst estimates

The value per share that I reached in my SoP valuation in my base case was 14,76 € per share. Considering a -10% to + 20% interval range, the value might fluctuate between the 13,28 and 17,71€ per share. This value represented a 16,1% premium to the market value of Galp on the 06th of January 2012. As the price target is above the current market price, my recommendation is to **BUY.**

In Appendix 18, a brief overview of the company's share performance in the last years can be seen.

The E&P business segment is the center source of value for Galp, followed by the R&M business activity. The G&P segment entails a relatively low proportion of value to the company.

5.2.7 Sensitivity Analysis

As previously I have identified the main value drivers for each segment, a sensitivity analysis is provided in this section.

Focusing on potential changes in my base case E&P assumptions, it's possible to verify that: If the volume of resources that the company holds for exploration increases, the value of the segment will also increase, as the expected share price (Table 27).

Table 27: Sensitivity analysis – change in the volume of Contingent and Prospective resources

Δ Brazil Contingent Resources (Million boe)	+ 100	+ 500	+ 1000
New price per share (€)	15,08 €	16,53 €	17,98 €

Δ Prospective Resources (Million boe)	+ 100	+ 500	+ 1000
New price per share (€)	14,84 €	15,18 €	15,61 €

The EV has an even higher relationship with the Brent oil price and the EUR/USD exchange rate.

As the oil price raises, the company value will increase, implicity boosting the value of each stock. In the prices drops, the value will also diminish.

Table 28: Sensitivity analysis – change in the Brent oil price

				-3 $/bbl	Base Case	+1 $/bbl			
Expected Brent Oil Price ($/bbl)	80	90	100	110,4	113,4	114,4	120	150	200
New price per share (€)	8,35 €	10,22 €	12,13 €	14,16 €	**14,75 €**	14,95 €	16,06 €	22,23 €	32,86 €

In what concerns to the exchange rate, an negative correlation exists. A dollar devaluation causes a higher inflation and decreases the oil supply, the drilling activities, the oil demand and the purchasing power in the producing countries. As a result if the exchange rate goes up, the E&P will value less, decreasing the value per share. The inverse will occur as the exchange rate decreases.

Table 29: Sensitivity analysis – change in the EUR/USD exchange rate

Δ EUR/USD exchange rate	-0,3	-0,2	-0,1	+0,1	+0,2	+0,3
New price per share (€)	23,76 €	20,11 €	17,16 €	12,78 €	11,10 €	9,67 €

Furthermore as in the international markets occurs a simultaneous fluctuation in these two items, the follow values per share can be obtain:

Table 30: Sensitivity analysis – change in the EUR/USD exchange rate

Brent Oil Price ($ per barrel)	EUR/USD exchange rate						
	0,9728	1,0728	1,1728	1,2728	1,3728	1,4728	1,5728
60	9,15 €	7,39 €	5,97 €	4,84 €	3,91 €	3,13 €	2,47 €
70	11,70 €	9,61 €	7,92 €	6,55 €	5,43 €	4,50 €	3,70 €
80	14,37 €	11,91 €	9,96 €	8,35 €	7,03 €	5,93 €	5,00 €
90	17,12 €	14,29 €	12,05 €	10,22 €	8,69 €	7,42 €	6,35 €
100	19,92 €	16,75 €	14,20 €	12,13 €	10,41 €	8,96 €	7,74 €
110	22,77 €	19,24 €	16,40 €	14,08 €	12,17 €	10,55 €	9,17 €
120	25,66 €	21,78 €	18,64 €	16,06 €	13,95 €	12,17 €	10,64 €
130	28,57 €	24,34 €	20,92 €	18,10 €	15,76 €	13,81 €	12,14 €
140	31,52 €	26,93 €	23,21 €	20,16 €	17,60 €	15,47 €	13,66 €
150	34,49 €	29,54 €	25,54 €	22,23 €	19,48 €	17,15 €	15,19 €
160	37,49 €	32,17 €	27,87 €	24,33 €	21,37 €	18,86 €	16,74 €
170	40,49 €	34,82 €	30,23 €	26,44 €	23,28 €	20,59 €	18,30 €
180	43,52 €	37,49 €	32,60 €	28,57 €	25,20 €	22,34 €	19,90 €
190	46,56 €	40,17 €	34,98 €	30,71 €	27,13 €	24,10 €	21,50 €
200	49,62 €	42,86 €	37,38 €	32,86 €	29,07 €	25,86 €	23,12 €

As for the drivers of the R&M activities, the refining margin and the volume of proccessed crude are the center of attention for this sensitivity analysis. The next tables illustrates the effects on the company's value per share, if the international benchmark refining margin[48] and volume output of crude processed - measured by the capacity utilization of the refinary - change.

Table 31: Sensitivity analysis – change in the benchmark refining margin

Benchmark refining margin ($/bbl)	-1	-0,5	1	1,5	2
New price per share (€)	14,37 €	14,44 €	14,67 €	14,74 €	14,82 €

Table 32: Sensitivity analysis – change in refinaries' capacity utilization

Δ Capacity utilization (%)	-0,1	-0,05	0,05	0,1
New price per share (€)	14,35 €	14,56 €	14,96 €	15,17 €

As can be seen, the value of the company increases as the benchmark refining margin and crude processed output increases.

In what concerns the G&P business, and assuming a constant capacity installed, the value is driven by the volume of sales sold. For that purpose, the next table presents a sum of indicatives values per share, as the volume of natural gas and electricity sales is adjusted.

[48] In this dissertation it was accounted as 30% of the Rotterdam Hydroskimming + aromatic + basic oils margin ($/bbl) + 70% of the Rotterdam cracking margin($/bbl). This information is based on company sources and the refineries' announced profile.

Table 33: Sensitivity analysis – change in volume of gas and power sales

Δ Sales of natural gas (Million m3)	-200	-100	100	200	300
New price per share (€)	14,69 €	14,72 €	14,79 €	14,83 €	14,86 €

Δ Electricity sales to the network (Million m3)	-50	-25	50	100	200
New price per share (€)	14,74 €	14,75 €	14,78 €	14,79 €	14,83 €

Also and considering the intense link that any valuation results have with the discount rate used by the analyst, it's important to reflect these changes as they are negatively correlated to the value of the segments and consequently the value per share. The table below shows the results obtained when I modify the cost of capital used in my base case.

Table 34: Sensitivity analysis – change in the cost of capital

	New price per share (€)		
	-1%	Base Case	1%
E&P - Ru Brazil (%)	**14,95 €**	9,4%	**14,60 €**
E&P - Ru Angola (%)	**14,79 €**	11,5%	**14,73 €**
R&M - Ru (%)	**15,87 €**	8,6%	**13,92 €**
G&P - Ru (%)	**15,22 €**	6,0%	**14,44 €**

5.3 Relative Valuation – an alternative approach

As a complement to the previous valuation methodology, I decided to use the multiples approach as an attempt to better understand the company, its role amongst the industry players and the reasonableness of the break-up valuation.

In this context, and with the support of Damodaran database[49], I assembled a group of integrated oil & gas companies, that could potentially be comparables to Galp according to factors such as the size, forecasted growth rates, ROIC and capital structures.

I fist had in mind to resctrict the group to the ones located in the Western Europe, due to the higher probability of resemblance in terms of modus operandi. Nevertheless, it was quite an unproductive job since none of them was truly similar to Galp Energia.

For that reason, in a second phase, I searched for integrated petroleum companies that despite their location, could be more pure proxies to Galp and used them as the peer group.

The next table compares the two groups just above described, with Galp.

Table 35: Peer group – Integrated oil & gas companies

	Market Capitalization (M USD)	Market D/E	ROIC	Beta	Growth next 2Y	Growth next 5Y
*Companies in Western Europe**						
BG	72.718	17,6%	22,3%	1,2	15,7%	14,9%
Total	115.676	38,2%	33,4%	1,29	10,3%	10,3%
ENI	75.346	53,3%	22,1%	1,38	9,4%	10,3%
* the less dissimilar when compared to Galp						
Peer group considered						
Continental Resources Inc	12.318	7,5%	10,6%	1,65	n.a.	n.a.
Hess Corp.	19.113	29,2%	10,8%	1,25	n.a.	5,5%
Repsol-YPF ADR	19.029	51,6%	14,7%	1,2	n.a.	35,3%
Murphy Oil Corp.	10.891	8,6%	10,2%	1,2	n.a.	5,50%
Galp Energia	**16.885**	**39,7%**	**13,6%**	**1,3**	**11,0%**	**25,2%**

Data source: Damodaran database

As it's possible to verify, Galp has a much lower market capitalization and ROIC, a distict capital structure and higher growth perspectives when compared to most of the potential comparable firms from Western Europe and from this point of view, it's entirely a distinct company.

When compared to the peer group, it's less atypical and so the multiples reasoning can be applied. The next table gathers the multiples from: Galp, the peer group and the industry average. Since companies such as Galp and the peer group emerge to be quite different from the bigger companies in the sector, I also present their multiples.

[49] "Individual company information" (January 2012), available at http://pages.stern.nyu.edu/~adamodar/

Table 36: The multiples comparison – Galp, peer group and industry average

	EV/EBIT	EV/EBITDA	Trailing PER	Forward PER
Western Europe				
BG	12,2x	10,5x	18,9x	15,8x
Total	4,1x	3,6x	7,2x	7,3x
ENI	5,0x	3,4x	9,2x	7,0x
Average	***7,7x***	***5,7x***	***10,3x***	***10,2x***
Peer group considered				
Continental Resources Inc	*38,3x*	*22,5x*	*24,8x*	*26,7x*
Hess Corp.	*6,7x*	*4,0x*	*9,8x*	*9,0x*
Repsol-YPF ADR	6,9x	4,4x	7,9x	n.a.
Murphy Oil Corp.	7,4x	4,1x	10,0x	9,4x
Average	**14,8x**	**8,8x**	**13,1x**	**15,0x**
Industry average				
Oil & Gas - E&P	6,1x	4,0x	-	-
Oil & Gas - R&M	6,2x	4,8x	-	-
Oil & Gas Storage and Transportation	12,4x	8,6x	-	-
Average	***8,3x***	***5,8x***	**-**	**-**
Galp Energia S.G.P.S.	**18,1x**	**13,3x**	**19,3x**	**24,7x**

Data source: Damodaran

The major conclusion is that even when compared to the average multiples of identical companies, Galp trades at higher multiples. Although they are all integrated petroleum companies, their mix of businesses and specific characteristics are not similar among them and so the company's multiples, should be adjusted to account for those differences.

Due to the recent sharp increases in the oil price, the companies mostly involved in the exploration and drilling activities evidence higher EV's and consequently higher implied multiples. This is the case of Galp, which was until recently mostly a dowstream player and has just emerged to be a promising player in the upstream activities, due to its exciting portfolio of E&P assets. As a result, the Galp's implied multiples incorporate assets that do not yet produce operating income and the potential value from the E&P segment increased as well as the overall company EV.

Furthermore, it's not accurate to compare them with the companies that worth less, either because they have a potential lower value from E&P assets, or because there are more focused on other activities of the value chain.

Nevertheless the valuation results using the multiples approach, more specifically EV/EBITDA and PER[50], are presented next:

[50] As recommended by Fernández (2001).

Table 37: Relative valuation output

	EV/EBITDA = 8,8X		PER = 15X	
	2010	*2011 E*	*2010*	*2011 E*
EV (M€)	9.266	7.984	6.615	3.166
Equity Value (M€)	6.426	3.884	9.455	7.267
Share Price (€)	7,75 €	4,68 €	7,98 €	3,82 €

I can say that the previous valuation outputs indicate the minimum value that Galp would worth if it was similar to the peer group companies considered.

The difference between the firms is again undeniable when, in Table 38, the implicit multiples obtained through my valuation approach are presented.

Table 38: Implied multiples resulting from my valuation approach

		EV/EBITDA	PER
Galp Energia implied multiple (own valuation)	2010	24,7x	26,9x
	2011 E	51,3x	

5.4 Financial Outlook – complementary remarks

The financial estimatives for Galp Energia's P&L, Cash Flow Statement and Balance Sheet are summarized in Appendix 20.

Nevertheless, I would like to add the following comments:

In terms of sales, and despite the fact that the ones from the E&P operations will increase substancially from 2011 on, the bulk is still expected to come from the refining and marketing activities. In Appendix 22, a table with the projected company sales by segment is offered.

The amount of costs in the income statement was calculated by segment and considering their historical percentage over sales.

The company is expected to increase its EBITDA margin, ROS and ROE on a yearly basis mainly after 2011. The ROE is even expected to be higher than the required return to investors for at least a decade after 2012.

Despite of the great amount of investments expected to be made, the firm will give back a higher return on capital invested (when compared to the past results) and is likely to be financially healthy with, a D/E ratio below 50% as exposed in section 5.2.1.5. and a solvency ratio below 30% (Appendix 21).

Until the 2013, the company predicts to pay a 0,20€ dividend per share what corresponded to a dividend payout ratio of 38% in 2010. For the following years, I assumed a higher dividend payout ratio - Galp will distribute 50% of the net income at replacement cost until 2034 (in line with the dividend policy that was in place until 2009) and 80% of it after 2035.

Furthermore the half yearly interim dividends payment will occur and will be equal to 50% of the previous annual dividend.

The agreement made with Sinopec to sell 30% of Petrogal, is expected to be finalized in the first months of 2012. For the dissertation purpose, I assumed that the cash balance will increase as well as the minority interests amount. As the operation is still on the run to be made, not much details were available and I was not able to consider a profit or loss that the transaction might entail, by comparing the selling price to the book value.

Besides the macroeconomic, political, technological, fiscal and regulatory risks, the company has highly influent operational risks, such as: lower than expected commercially recoverable reserves, higher lifting and R&D costs, superior royalties or special participations taxes imposed to leaseholders by local governments.

6. Valuation Comparison – Caixa IB and Millennium IB

In this section, I present the main findings that were achieved when I put side by side my valuation methodology and the ones used in recent equity researchs from Caixa BI and Millennium IB[51].

While Milllennium IB valued Galp at 18,15€ per share, Caixa IB settled the value of each stock to 18,7€. In comparison, my approach yielded the most conservative value, reaching a lower equity value and value per share (14,76€).

The main cause was the adjustment that I've made to the EV considering a higher level of minority interests[52] as a result of the Petrogal's selling operation and which was not equally accounted by these analysts. Additionally, I considered a relatively higher level of debt and I did not account for a debt reduction since my assumption was that the cash-in obtained with this operation would be the financial support to Galp's future investments.

On the other side, while Millennium BCP did not account for any of these changes, the analyst from Caixa IB assumed that the monetization of these Brazilian assets would be used to reduce the current amount of debt outstanding.

Table 39: Valuation output – own valuation, Caixa BI and Millennium IB

			Own Valuation	Millennium IB - 1 September 2011	Caixa IB - 28 November 2011
Valuation Method	SoP	E&P	DCF + Black Scholes OPM	DCF	DCF
		R&M	DCF	DCF	DCF
		G&P	DCF + RoRAB	DCF + RoRAB + various	DCF + Multiples
EV (Million €)	E&P	Lula & Cernambi	4.531	4615	4535
		Iara	2.005	1628	773
		Jupiter	2.462	1932	883
		Bem-te-vi	729	not considered individually	167
		Caramba	925	not considered individually	239
		Other Expl. - Brazil	715	2051	363
		Total in Brazil	*11.368*	*10226*	*6960*
		Angola	1.695	1255	1259
		Mozambique	not considered in valuation	not considered in valuation	614
		Prosp. Resources	1.796	Included in Other Expl. - Brazil	not considered in valuation
		Total E&P	***14.859***	**12391**	***8.833***
	R&M		**4.736**	**3807**	**3.891**
	G&P		**1.659**	**2253**	**2.997**
	Total EV		**22.368**	**19.026**	**15.721**
	Equity Value (Million €)		**12.239**	**15.059**	**15.529**
	Value per share (€) YE 2011		**14,76 €**	**18,15 €**	**18,70 €**
	EV adjustments		- Sept 2011 net debt (market value) - Value of the Goup's minority interests after Petrogal deal	- 2011 net debt (book value) + net debt attributable to minorities - Dividends 2012E -Value of minority interests	- 2012E net debt + consolidated net debt reduction + Value of the Associates (valued@PER) - Value of minority interests

Among all, the predominant valuation method was the DCF. Nevertheless the other analysts also used the multiples approach to value essentially the G&P business segment.

[51] Although my purpose was to also examine a report from a foreign investment bank - BofA Merrill Lynch, that was not possible since insufficient information was disclosed by the analyst.

[52] For this purpose, a sensitivity analysis on the value of minority interests is made in Appendix 19.

In what concerns to the cost of capital, different assumptions for the discount rate were made, as can be seen in the next table.

Table 40: Cost of capital – own valuation, Millennium IB and Caixa IB

		Own Valuation	Millennium IB - 1 September 2011	Caixa IB - 28 November 2011
Cost of capital	E&P	**Angola - Ru = 11,5%** (Rf=1,85%; Market Risk Premium=9,88%; Beta U=0,97) **Brazil - Ru=8%** (Rf=1,85%; Market Risk Premium=7,63%;	**Angola - Re = 13,8%** (Rf=3% ; Country Risk Premium = 4%; Market Risk Premium=5%; Beta = 1,2) **Brazil - Re=10,8%** (Rf=3% ; Countrty Risk Premium=1,5% ; Market Risk Premium=5%; Beta = 1,2)	**WACC=10%** (Rf=4,5% ; Market Premium=7%; Beta = 0,99; D/E=25%)
	R&M	**Ru=8,6%** (Rf=1,85%; Market Risk Premium=7,11%; Beta U=0,96)	**WACC = 14,97%** (Rf=3% ; Country Risk Premium = 7%; Market Premium=5%; Beta = 1,30; Re= 18,65%) + (D/E= 30%, Rd= 6,39%) **Terminal Value WACC = 8,24%** (Rf=3% ; Country Risk Premium = 0,5%; Market Premium=5%; Beta = 1,3; Re=10,17%) + (D/E= 30%; Rd=3,73%)	**Refining - WACC=7,4%** (Rf=4,5% ; Market Premium=4%; Beta = 1,2; D/E=67%) **Marketing - WACC=7,3%** (Rf=4,5% ; Market Premium=4%; Beta = 1 ; D/E=43%)
	G&P	**Ru=8,3%** (Rf=1,85%; Market Risk Premium=9,01%; Beta U=0,46)	**Gas distribution - WACC=8,37%** (Rf=3% ; Country Risk Premium = 7%; Market Premium=5%; Beta = 1,34; Re=19,13%) + (D/E=80%; Rd=5,68%) **Gas Supply - WACC = 14,92%** (Rf=3% ; Country Risk Premium = 7%; Market Premium=5%; Beta = 1,3; Re=18,65%) + (D/E=30%; Rd=6,21%) **T. Value Gas Supply - WACC = 8,13%** (Rf=3% ; Country Risk Premium = 0,5%; Market Premium=5%; Beta = 1,3; Re= 10,17%) +(D/E=30%; Rd=3,37%) **Power - WACC = 10,72%** (Rf=3% ; Country Risk Premium = 7%; Market Premium=5%; Beta = 0,88; Re== 13,61%) + (D/E=40%;Rd=6,39%)	**NG Supply - WACC=7,4%** (Rf=4,5% ; Market Premium=4%; Beta = 0,9; D/E=25%) **NG Infrastructure - WACC=5,4%** (Rf=4,5% ; Market Premium=4%; Beta = 0,7 ; D/E=100%)
Cost of debt (Rd)		**5,88%**	**R&M - Rd = 6,39%** **T.Value R&M - Rd =3,73%** **Gas Distribution - Rd = 5,68%** **Gas Supply - Rd = 6,21%** **T. Value Gas Supply - Rd = 3,37%** **Power - Rd = 6,39%**	**NG Infraestructure: 5%** **Others: 6,5%;**

The main discrepancy lies in the fact that Millennium IB and Caixa IB, have allocated the total amount of debt to each segment and subsegments valuing them at different WACC's and considering different risk profiles, while I valued debt separately and the segments in a debt-free context. Their betas are generally superior as they account for the risk of leverage and a special attention also goes to their higher assumptions of the risk-free rate.
Furthermore, Millennium IB offers the most exhaustive study and thoroughly accounts for individual discount rates considering segments and subsegments.

In this context, I will now highlight the main drivers that guided the overall valuation outputs in each business segment. I will just focus on the next five years to compare the results, since they carry the bulk of the most important assumptions.

For the E&P sector:

- The analysts did not account for the options value in these kind of activities.
- For the projections, Millennium IB assumed a constant oil price of 100$ per barrel, a gas price of 7,65$ per million of btu and an exchange rate of 1,40. Caixa IB relied on lower levels, i.e., a price per barrel of 85$, a gas price of 4,2$ per million of btu and an exchange rate of 1,34. My projections can be seen on Table 9.

In this context, each field was valued individually and distinct NPV's ($ per barrel) per field, were accomplished:

Table 41: E&P – NVP ($ per barrel): own valuation, Millennium IB and Caixa IB.

	Own Valuation		Millennium IB - 1 September 2011		Caixa IB - 28 November 2011	
	NPV /bbl ($)	*Net Reserves (Million boe)*	*NPV /bbl ($)*	*Net Reserves (Million boe)*	*NPV /bbl ($)*	*Net Reserves (Million boe)*
Lula & Cernambi	6,6	829	6,5	1000		1186
Iara	4,8	350	5,7	400	3,5	420
Jupiter	1,5	1300	2,7	1000	1,7	1000
Bem-te-vi	3,6	140	not considered individually	-	3,3	98
Caramba	2,5	200	not considered individually	-	3,3	140
Other exploration Brazil	3,8	267	4,6	1809	3,7	188
Angola	7,9	255	7,5	206	-	241
Prospective Resources	1	2550	1	1800	not considered in valuation	-
				*Data from previous reports		

- In what concerns to the CAPEX and production profile, Caixa IB did not disclosed the information of its assumptions. As a result I will just compare my projections to the ones from Millennium IB.

Table 42: E&P – Production profile, EBITDA and CAPEX – own valuation and Millennium IB

	Own Valuation					Millennium IB - 1 September 2011				
	2011 E	**2012 E**	**2013 E**	**2014 E**	**2015 E**	**2011 E**	**2012 E**	**2013 E**	**2014 E**	**2015 E**
Production (million boe)	8,0	10,6	14,0	20,5	35,5	7,3	8,0	9,5	14,2	25,9
Total Production (kboe/d)	22	29	38	56	97	20	22	26	39	71
E&P EBITDA (Million €)	271	250	337	461	644	278	358	409	577	1004
CAPEX (Million €)	700	595	595	595	665	550	551	727	1020	1184

For the R&M activities:

There is not much relevant differences in what concerns to the assumptions for the company refining margin since all analysts position it in a similar interval range. When compare to Millennium, I assumed a lower cash cost per barrel. Adding to the comparatively regular assumptions for the processed crude, I ended up with higher level for the segment's projected EBITDA. In what concerns to the segment's investments, Millennium assumed a similar CAPEX effort, when compared with my own valuation. For CAIXA IB, this last data was not available.

Table 43: R&M assumptions – own valuation, Millennium IB and CAIXA IB

	Own Valuation					Millennium IB - 1 September 2011					Caixa IB - 28 November 2011				
	2011 E	*2012 E*	*2013 E*	*2014 E*	*2015 E*	2011 E	2012 E	2013 E	2014 E	2015 E	2011 E	2012 E	2013 E	2014 E	2015 E
Refining Margin ($/bbl)	0,92	6,52	7,14	7,14	7,14	0,9	4	6	6	6,5	1,2	5,8	6,0	6,0	6,0
Cash Cost ($ per barrel)	3,30	2,10	2,10	2,10	2,10	2,2	2,31	2,43	2,55	2,67	n.a.	n.a.	n.a.	n.a.	n.a.
Processed crude (k bbl)	79.442	93.951	102.383	114.428	108.405	79.200	96.200	101.800	101.800	101.800	n.a.	n.a.	n.a.	n.a.	n.a.
R&M EBITDA (Million €)	271	665	747	804	798	266	472	623	622	656	270	600	633	800	700
CAPEX (Million €)	630	150	150	150	150	672	150	150	150	150	n.a.	n.a.	n.a.	n.a.	n.a.

For the G&P segment:

It's the segment with the less value, according to all the three analysts, and it revenues and EBITDA are expected to be maintained in relatively low levels.

Millennium IB valued the natural gas related activities with DCF and RoRAB as I did in my own valuation, while Caixa IB valued it only with DCF's.

In what concerns with the electricity business, Caixa IB used the multiples approach, I valued it with DCF and Millennium IB valued in with multiples and DCF's.

Besides the G&P assets considered in my own valuation, Millennium also valued the wind and cogeneration assets through relative valuation and projected a negative NPV to the CCGT.

The main output in seen in Table 44. I assumed that there will be heavier investments in the segment, when compared the other analysts. My revenues and EBITDA forecast are also slightly inferior.

Table 44: G&P – Revenues, EBITDA and CAPEX – own valuation, Millennium IB and CAIXA IB

	Own Valuation					Millennium IB - 1 September 2011					Caixa IB - 28 November 2011				
	2011 E	*2012 E*	*2013 E*	*2014 E*	*2015 E*	2011 E	2012 E	2013 E	2014 E	2015 E	2011 E	2012 E	2013 E	2014 E	2015 E
Revenues (Million €)	2008	1961	1961	1961	1961	1761	1900	2031	2164	2298	n.a.	n.a.	n.a.	n.a.	n.a.
G&P EBITDA (Million €)	264	264	269	270	237	251	271	289	308	327	270	217	217	300	300
CAPEX (Million €)	70	102	102	102	132	57	58	60	61	62	140	140	8,4	97	99

To sum up, I would like to say that despite the fact that each analyst have pursued different paths to account to the company's value, the divergence between the final results has to do mainly with the different assumptions made by each one especially in what concerns the key value drivers. Otherwise the final value would be analogous.

7. Conclusion

Valuing companies is a complex subject where is not possible to establish a unique path or methodology to execute it. Furthermore, each valuation output is simply a result of the analyst set of judgments on the company future expected development.

In this dissertation, the value of Galp Energia S.G.P.S. was accessed through the Sum-of-the-parts (SoP) methodology using mainly two valuation approaches - the Discounted Cash flow method and the Black and Scholes model to value options.

Moreover, the results were cross-checked with the average industry implied multiples to better understand the SoP results. The conclusion was that for Galp, fundamental DCF valuation is a much more powerful tool when compared to relative valuation. Due to the Galp's characteristics and current market conditions, the company trades to a premium to the sector.

The company's current value driver is the E&P business with a promising exploration portfolio held in Angola and in Brazil (Santos Basin). Nevertheless, this segment is also the biggest source of uncertainty for the firm, since it's highly sensitive to changes in the macroeconomic variables such as the Brent oil price and the euro/dollar exchange rate.

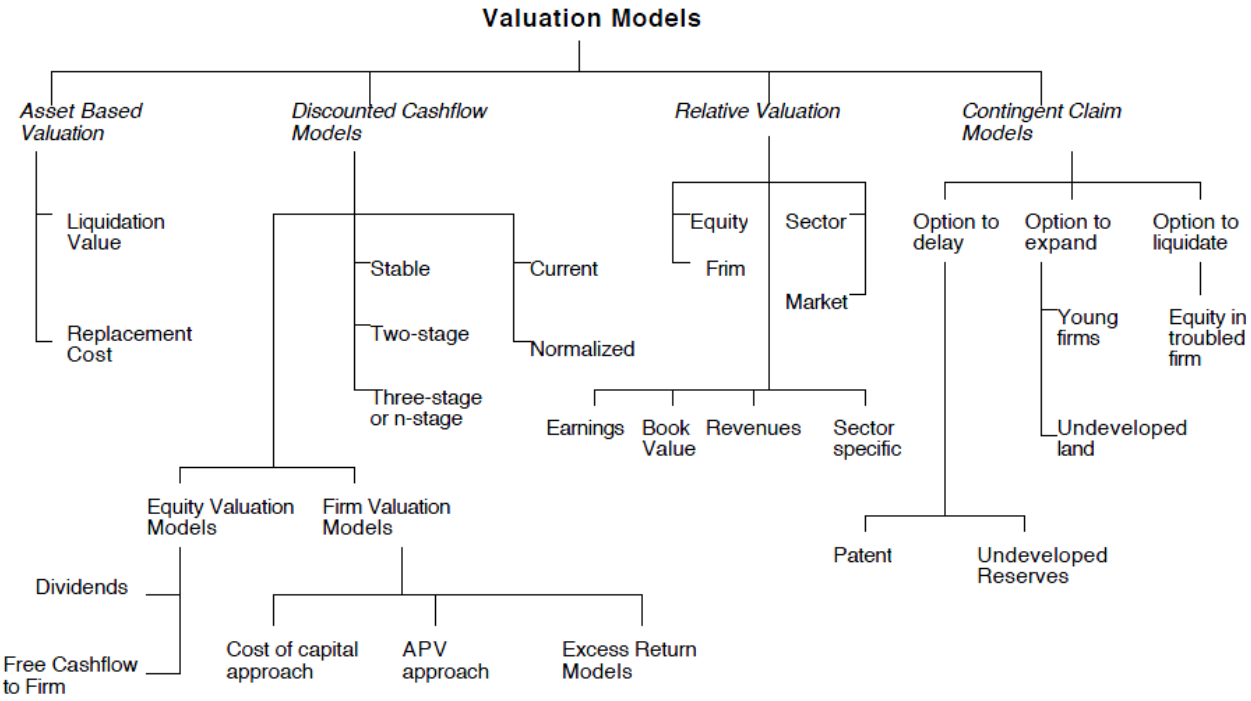
The dowstream activities are projected to become a complement to the E&P activities, contrary to what have been happing so far. A special focus goes to the R&M business that is expected to become a cash cow and an important funding source to the upstream developments.

The main issue to be followed in the near future is the partnership deal with Sinopec to sell 30% of the company's subsidiary, Petrogal Brazil. This operation will, on one hand, wipe out the company's short term funding issues allowing it to grow in a more sustained way and, on the other hand, diminish the company's value attributable to the equityholders.

8. Appendices

Appendix 1: A compact overview – main valuation approaches

Figure 8: The general valuation approaches



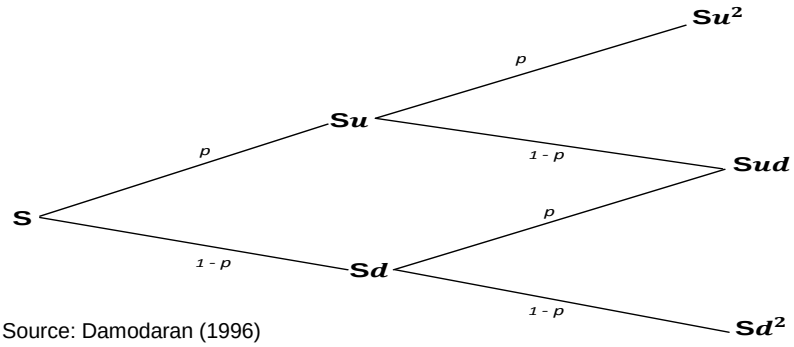
Source: Damodaran (2002)

Appendix 2: Decision three analysis (DTA) – the Binomial tree model

The binomial option pricing model assumes that the stock price follows a random walk, i.e., in each step, it has a certain probability of moving up by a certain percentage amount (p) and a certain probability of moving down by a certain percentage amount (1-p) (Hull 2008).

It's a discrete time model and the following tree illustrates precisely all the possible future stock valuations and the associated probabilities.

Figure 9: The asset price possible paths in the Binomial tree model



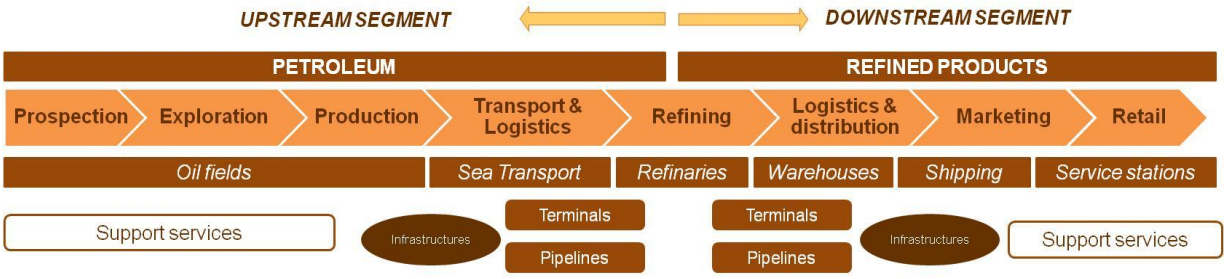
Source: Damodaran (1996)

In practice, we have to create a replicating portfolio using a combination of risk free borrowing/lending and the underlying asset to create the same cash flows as the option being valued (Damodaran 2002).

The value of the option should equal to the value of the replicating portfolio. If the option value deviates from the value of the replicating portfolio, investors can create an arbitrage position.

Appendix 3 – The Petroleum related activities

Figure 10: The petroleum value chain



Source: Adapted and translated from Mateus (2010, p.77)

According to Wolf & Tordo (2009), the oil and gas industry involves a range of different activities and processes inherently linked with each other (conceptually, contractually and/or physically) which contribute to the transformation of petroleum resources into valuable products for industrial and private customers.

These activities can be categorized into upstream, downstream or midstream operations.

The petroleum value chain starts with the identification of suitable areas to conduct exploration for oil and/or gas. After that, there are three stages before hydrocarbons can be obtained above the ground: exploration, development and extraction (Paddock et al. 1988) – what are generally called Exploration and Production (E&P) or upstream activities.

The exploration stage involves seismic and drilling activity to obtain information on the quantities of hydrocarbon reserves present in that tract, as well as the costs of bringing them out. Only if the exploration results are favorable, the firm may then proceed to the development stage, which involves putting the equipment in place to extract the oil, such as: constructing platforms and drilling production wells. These development expenditures convert undeveloped reserves into developed reserves and prepare for the extraction phase where barrels of oil and gas equivalent are produced.

In a next phase, the barrels are transported through infrastructures such pipelines, access to roads, rails and ports and storaged to be refined into usable products such as gasoline and diesel. Then they are distributed onwards to wholesale, retail or direct industrial clients –

through what is known as Refining and Marketing (R&M) or downstream activities (Wolf & Tordo 2009).

The same authors note that the transport and storage operations have a massive weight within the value chain linking production, processing facilities and the final customer. For that reason, they refer that these activities could be distinguished as the midstream part of the value chain, in spite of being usually included in the downstream point of view. For this dissertation purpose, the downstream operations include these midstream activities.

A final remark goes to the fact that the upstream activities entail higher investments that can be offset with the possibility of achieving higher profits while in the downstream activities the risk is relatively low and there is a possibility of moderate earnings despite the colateral losses from the fluctuant benchmark refining margins in international markets.

Appendix 4: The company's activities around the globe

Geographically speaking, Galp Energia has a strong presence in almost all the world:

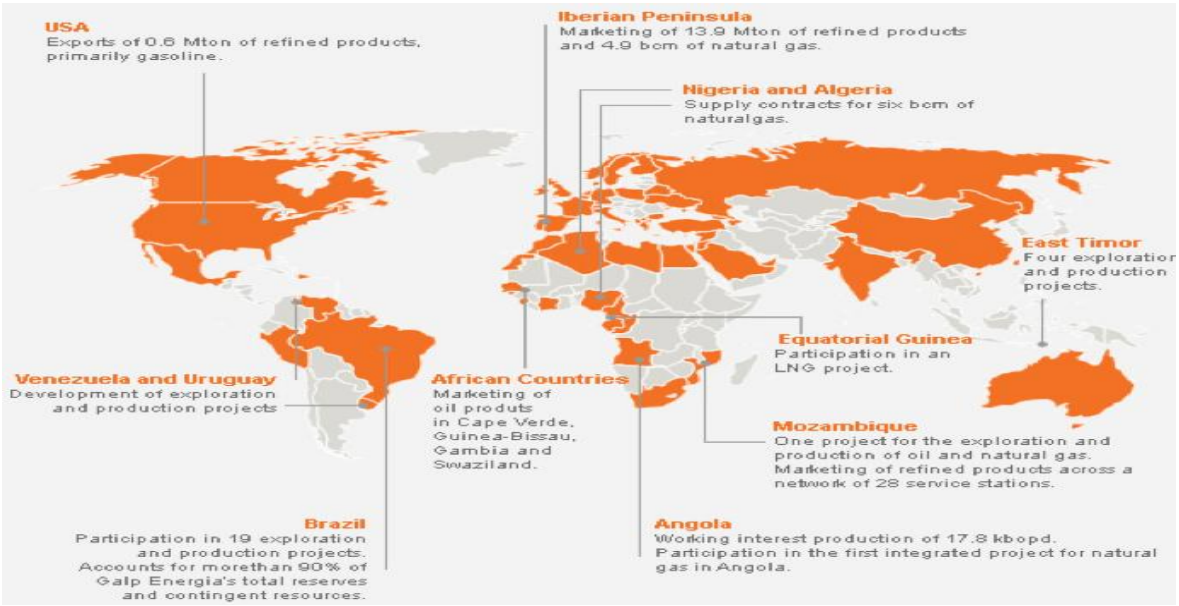
The E&P activities are placed predominantly in Brazil, Angola, Mozambique Venezuela and Uruguay.

The R&M operations are located mostly in Portugal and Spain, although some clients are placed in Africa and North America.

The G&P segment is mainly associated with Nigeria and Angelia, in the North of Africa, since these are the main suppliers of natural gas. In the beginning of 2009, a LNG project in Equatorial Guinea started being designed.

The following figure illustrates what has been said.

Figure 11: Galp Energia – presence worldwide



Source: Company website

Appendix 5: Galp's base of resources & the petroleum classification system

The current resource base

According to the company, the intense exploration work that has been developed in the recent years, particularly in the Brazilian Santos basin, led to an considerable enlargement of Galp's base of resources and reserves.

Presently the company publicizes that nearly 2,4 billion of barrels of oil and natural gas can be encountered in its porfolio. Furthermore, if we also account for the prospective resources, the 2P reserves in Angola and the 3P reserves in Brazil, the total resource base is estimeted to be around 5,88 billion boe, which considering a production level of 200 thousand boe per day is equivalent to around 80 years of production. In Figure 12, it's possible to see the evolution of the company's resource base along the years.

Figure 12: Galp Energia – Reserves and resources

	Unit	2006	2007	2008	2009	2010	Ch. 2009/10
Reserves 2P NE	Mboe	50	31	28	35	397	n.m.
Reserves 3P NE	Mboe	50	31	28	35	574	n.m.
Contingent resources WI	Mboe	68	742	2,113	3,065	2,356	(23%)
Prospective resources WI	Mboe	-	-	1,972	1,640	2,550	55%

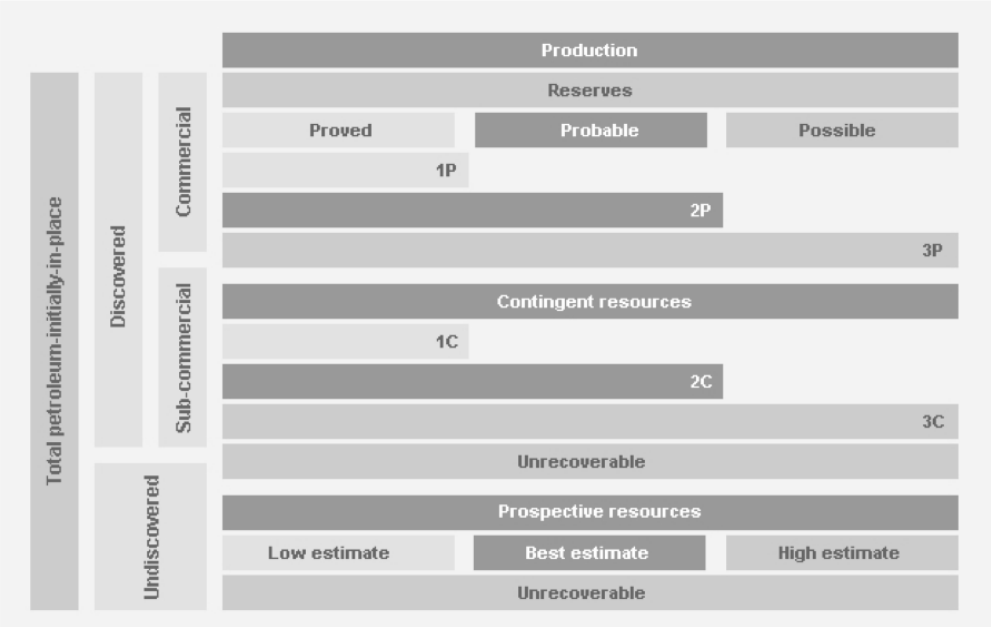
Source: Company website

The petroleum classification system

According to the definitions approved by the Society of Petroleum Engineers (SPE) and by the World Petroleum Council (WPC), the total petroleum (which includes crude oil, condensates, natural gas and related substances) dispersed around the globe can be classified as Reserves - Proved (1P), Probable (2P) and Possible (3P) - or as potentially recoverable hydrocarbon volumes beyond Reserves, which are known as Resources – Prospective or Contingent.

In theory, each quantity of petroleum starts as being a Prospective Resources. Dependent of the company disclosures along the time, these Prospective Resources are likely then, to be classified in Contingent Resources and later in Probable and Proved Reserves.

Figure 13: Petroleum classification system



Source: Company website

To better understand Figure 13 and according to the SPE, the WPC and the company website:

Prospective resources are quantities of petroleum that have, on a certain date, been estimated as potentially recoverable from undiscovered accumulations by application of future development projects. The estimation of the resources quantities of a prospect is subject to both technical and commercial uncertainties.

Contingent resources consign quantities of petroleum that have, on a certain date, been estimated as potentially recoverable from known reservoirs but that are not commercially recoverable yet. The maturity stage of the project (the discovery needs further appraisals to support for the development plan), technical issues (new technology needs to be developed and tested) or issues related with the market (the sales contracts are not yet in place or the infrastructure needs to be built in order to take the product to the clients) appear as reasons for this classification.

When the previous phases have been overcome and there is already a development plan in place, the discovered petroleum is renamed to fit in one of the following three categories:

Proved, Probable and Possible reserves (3P) are a category of unproved reserves and correspond to the addition of proved, probable and possible reserves.

These reserves are based on geological or engineering data similar to those used in the calculation of proved reserves but entail technical, contractual, economic or regulatory uncertainties and therefore are not classified as proven. The possible reserves have lower probability of being recovered than the 2P reserves. If probabilistic methods are used, there should be at least a 10% probability that the quantities actually recovered will equal or exceed the 3P estimate.

Proved and Probable reserves (2P) are also a category of unproved reserves and correspond to the sum of proved and probable reserves. These reserves are based on geological or engineering data similar to those used in the calculation of proved reserves but also entail technical, contractual, economic or regulatory uncertainties and therefore are disqualified from becoming categorized as proved. When compared with the 1P reserves, these have a lower probability of being recovered, but higher if compared with the 3P reserves. The probabilistic methods are used, there should be at least a 50% probability that the quantities actually recovered will equal or exceed the 2P estimate.

Proved reserves (1P) are those quantities of petroleum which, by analysis of geological and engineering data can, with reasonable certainty and under current economic conditions (include relevant petroleum prices and associated costs), operational methods and government regulations, be estimated to be commercially recoverable, from a certain data onwards from known reservoirs. If probabilistic methods are used, there should be a minimum 90% probability that actual recovered quantities will equal or exceed the estimatives.

Appendix 6: Galp Energia – characteristics and strategy by segment

E&P

The company aspires to develop its current resources in order to increase future oil and gas production. The present goal is to reach to a production of 200 thousands boe/d in 2020 and 300 thousands boe/d in the early 2020's.

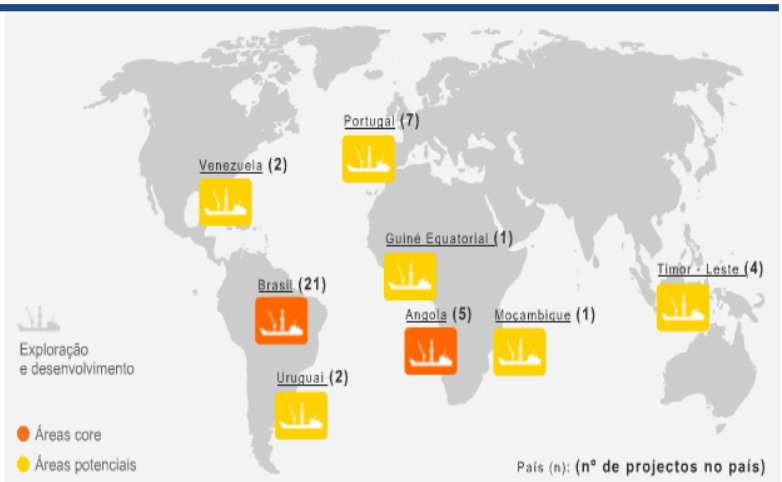
To achieve this production, Galp is focused on its major E&P assets, located in Angola and in Brazil's pre-salt Santos basin where the scale of reserves and the recent discoveries have positioned it among the restricted group of operators with highly successful exploration programmes. For the company, the participations in the Brazilian exploration fields represent more than 90% of the total reserves and contingent resources, from where the company can extract petroleum and natural gas. Furthermore, after 2012 the focus of the company's capital investments will move from the R&M segment to the development of these projects.

Despite the large assets portfolio as seen in Figure 14, the projects which are the current source production of oil and natural gas to Galp are located in Angola's Block 14 and at the Lula field, in the Block BM-S-11, in Brazil, whose production started in October 2010.

In the future, Galp's activities, will be focused on the development and the appraisal of other estimated resources in the pre-salt of the Santos basin such as blocks BM-S-8, BM-S-11, BM-S-21 and BM-S-24. The Lula field, included in the Block BM-S-11 has already undergone through an EWT and 8,3 billion recoverable barrels of oil and natural gas were indicated to exist.

Figure 14: E&P – Galp's current portfolio of assets

- **Venezuela**: 2 projects waiting for a decision to proceed.
- **Brasil**: 21 projects in 6 Basins - 3 offshore + 3 onshore (partnership with Petrobras)
- **Uruguai**: 2 projects in 1 Basin offshore
- **Portugal**: 7 projects in 2 Basins
- **Equatorial Guinea**: 1 LGN project
- **Angola**: 4 blocks offshore and 1 LGN project
- **Mozambique**: 1 block offshore
- **East Timor**: 4 blocks offshore



Data source: Galp Energia website [Accessed 18 December 2011]

R&M

The segment integrates two separated but correlated set of activities: the refining process and the distribution of the refined products to the market.

The company imports the crude oil from numerous suppliers in circa 16 countries[53] and refine it to obtain a broad range of products, such as gasoline, diesel and middle distillates.

Galp Energia owns the only two refinaries in Portugal which presently have a joint capacity of 310,000 barrels of oil per day, equivalent to 20% of the Iberian Peninsula's total refining capacity. After the conversion project scheduled to be completed in the months of 2012, the distillation capacity will raise by 20,000 barrels of oil per day. Additionally it will promote a reduction in imports, an adjustment in the production profile (to meet the needs of the Iberian market, where diesel is currently in short supply) and an upgrade in the heavy crude oil[54] processing (expected to top 70% of total crude processed), since it's available on the market at lower prices what allows a reduction in the raw material costs. As a consequence, the refinaries' upgrade will augment the refining margins and maximize the cash flows.

In Figures 15 and 16, the production profile and the types of crude oil that were processed in 2010 are presented.

[53] Mainly located in the West Africa (representing 32% in 2010), Mediterranean Basin, West Africa and the Persian Gulf.
[54] Classification according with the American Petroleum Institute that uses it to compare the relative density of petroleum liquids, i.e., how heavy or light a petroleum liquid is, when compared to water.

Figure 16: Profile production in 2010

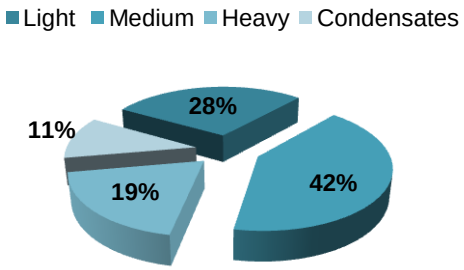
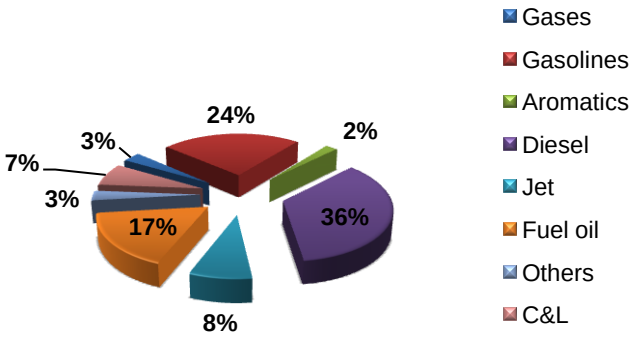


Figure 15: Types of crude oil processed in 2010



Data source: Company website

Once the crude oil is processed, the refined products are marketed mainly in Portugal and Spain – 80% under Galp's brand. The company commands a 14% market share in the Iberian market, where Spain accounts for 44% of sales and the wholesale segment accounts for the biggest proportion of volumes sold. Nonetheless a few sales are made to Africa and some production is exported to European and North American countries. Galp's position in the Iberian Peninsula was consolidated by the acquisition of Agip's and Exxon Mobil's operations, in 2008.

G&P

This segment clusters Galp Energia's procurement, distribution and marketing of natural gas as well as its electrical and thermal power generation activities.

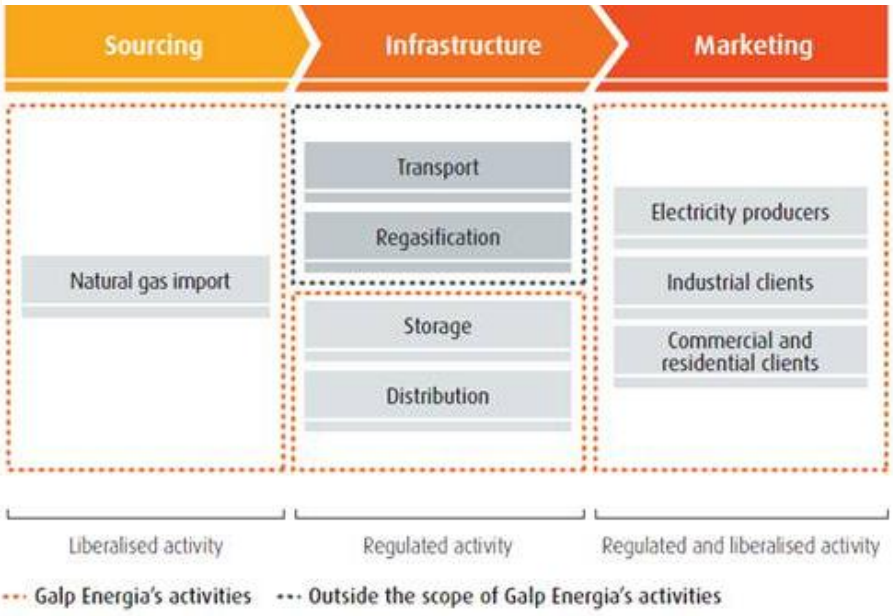
Natural Gas

The company purchases natural gas in Nigeria and Argelia and then, storages, distributes and sells it in the Iberian Peninsula where it currently holds a 15% market share[55], partly due to the growing importance of the Spanish market recently consolidated with the acquisition, in 2010, of the Madrileña Suministro de Gas SUR and Madrileña Suministro de Gas. The company expects to be less dependend on these sources, throught the future development of its projects in Angola and in Brazil Santos Basin.

In Portugal, the natural gas sector comprises a set of regulated and unregulated activities, ranging from unregulated procurement and mixed (regulated and unregulated) marketing to fully regulated infrastructure. Galp Energia is actively present in all stages except in the regasification and high-pressure transportation of liquefied natural gas as seen in Figure 17.

[55] Is holds around 1300 thousands clients in Iberian Peninsula.

Figure 17: The natural gas sector in Portugal



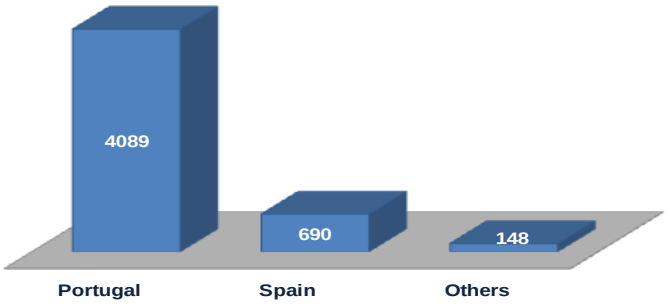
Source: Galp's 2010 annual report

In what concerns to distribution – a regulated activity - in Portugal, the natural gas is distributed by six companies and five of them are Galp Energia subsidiaries operating through the so-called 'autonomous distribution units'.

Regarding the underground storage of natural gas – also a regulated activity - the company was awarded with a 40-year period up to 2046. Its regulatory asset base (RAB) is currently valued at €18 million and the rate of return has been set by ERSE[56] to be 9% (until June 2013). Furthermore, a combined storage capacity of close to 118 million cubic metres, is scheduled to come into operation in 2016 and 2019 augmenting the company relevant weight on the strategic quantity needed for the country and allowing it to exploit some trading opportunities.

In Figures 18 and 19 we can find the breakdown by country and by sector respectively, of the volumes of natural gas sold in 2010.

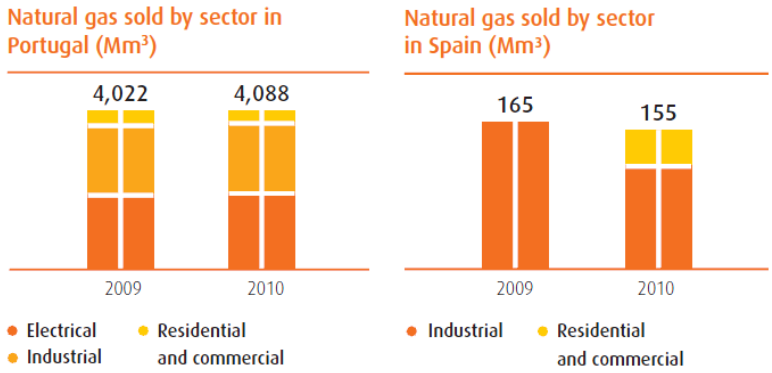
Figure 18: Volumes of natural gas sold, by country in 2010 (Mm3)



Data source: Galp's 2010 annual report and accounts

[56] "Entidade Reguladora de Serviços Energéticos" is the Portuguese Energy services Regulatory Authority responsible for regulating the electricity and natural gas sectors.

Figure 19: Natural gas sold by sector in Portugal and in Spain (Mm3)



Source: Galp's 2010 annual report and accounts

Power

It's currently working as a complement to the natural gas set of activities, to allow a dual offering predominantly to the domestic customers. Nevertheless, the company aims to develop a competitive energy generation portfolio with cogeneration plants, wind power and a joint offering of electricity and natural gas, optimizing the margins in this business segment. Galp already comprises a cogeneration plant, in Sines, with an installed capacity of 160MW. Moreover: i) another cogeneration plant in Matosinhos[57] with a total production capacity of 80MW is under construction; ii) the company partly owns three cogeneration plants - Carriço, Powercer and Energin - with a joint capacity of 80MW; iii) the construction of an alternative power generation system - a combined-cycle gas turbine (CCGT) plant in Sines – is being analysed until the end of 2011; iv) a wind power project, which has a 200MW installed capacity is expected to be in place by 2013; v) Galp anticipates the construction of the 12MW Vale Grande wind farm to be initiated in the fourth quarter of 2010 and completed in 2011.

Appendix 7: Galp Energia – historical financial performance

From 2005 to 2010, the group's sales & services grew significantly. The only exception in 2009 where there was nearly a 21% reduction in the sales and services RCA[58] in all segments, mainly due to the intensive decline in the oil prices and in the refining margins, a smaller volume of natural gas sales and a controversial economic context.

[57] Expected to come into operations by the end of 2011, it will result in a total increase in consumption of 500 million cubic meters of natural gas each year, integrating further the natural gas and power businesses.
[58] Replacement Cost Adjusted - although not accepted by the IFRS, it adjusts the results in order to smooth the inventory effect and exclude non-recurrent events. Within the IFRS accounting method, the cost of goods sold is valued at weighted average cost (WAC) what can lead to a volatility in results due to the fact that commodities and good prices fluctuate intensively – also called the inventory effect. By RCA method, the costs of goods is valued at replacement cost, i.e., the average cost of raw materials in the month when the sales were realized and unrelated to the inventories held at the start or the end of the period.

In 2010, the company was able to partially recover and sales & services increased by 17%. The higher bulk came from the R&M segment following the historical trend but the contribution of the G&P and E&P segments to this result grew to 13,1% and 1,5% respectively, when compared to the previous year.

Just in the first 9 months of 2011, the amount of sales was 12.429 million euros what corresponded to 88% of the 2010 result. Additionally it's possible to foresee that the E&P business area is increasing its share in sales, what comes in line with the company strategy analyzed previously.

Table 45: Historical analysis – Sales & Services

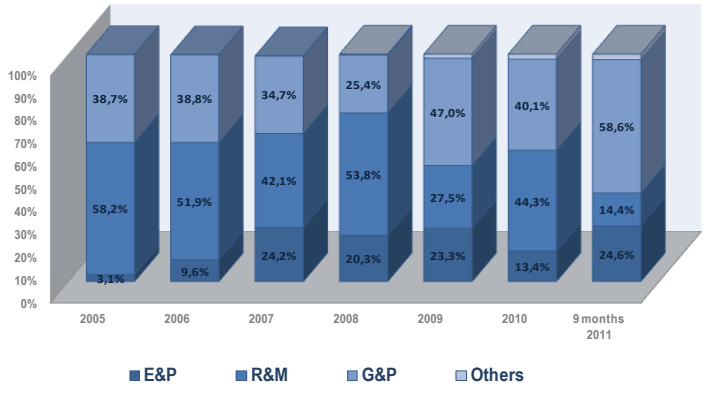
	2005	2006	Δ 06 (%)	2007	Δ 07 (%)	2008	Δ 08 (%)	2009	Δ 09 (%)	2010	Δ 10 (%)	9 months 2011
Sales & Services (*IFRS*) - *Million €*	**11.137**	**12.193**	*9,6%*	**12.560**	*3,0%*	**15.086**	*20,1%*	**12.008**	*-20,4%*	**14.064**	*17,1%*	**12.429**
Sales & Services (RCA) - *Million €*	**11.137**	**12.193**	*9,5%*	**12.560**	*3,0%*	**15.062**	*19,9%*	**11.960**	*-20,6%*	**13.998**	*17,0%*	**12.429**
Contribution by segment (%)												
E&P	0,6%	1,2%		1,9%		1,3%		1,4%		1,5%		1,9%
R&M	90,1%	88,9%		88,5%		87,6%		88,8%		88,5%		87,9%
G&P	10,1%	11,4%		11,6%		12,9%		11,9%		13,1%		12,9%
Others	0,9%	0,8%		0,8%		0,8%		0,9%		0,9%		0,7%

Source: Company's annual reports

Focusing largely on the last year and on the primary data of this year's first three quarters, it's possible to affim that, according to Table 46, Galp has been improving its operating performance, by presenting, in 2010, a 27% increase in the EBITDA (RCA) and a 58% augment in the EBIT (RCA).

Figure 20 illustrates each segment contribution to the EBIT result and it's possible to conclude that the R&M activities have been an important segment to the company's sustainability. Nevertheless, if we compare 2010 and the 2011 primary results, we can antecipate on one hand, a decrease in the contribution of the R&M segment, and on the other hand, an increase in the input from the E&P and G&P segments.

Figure 20: Historical segment contribution to EBIT (RCA) %



Data source: Company's annual reports

Table 46: Historical analysis – EBIT, EBITDA and Net Profit

	2005	2006	Δ 06 (%)	2007	Δ 07 (%)	2008	Δ 08 (%)	2009	Δ 09 (%)	2010	Δ 10 (%)	9 months 2011
EBITDA *(IFRS)* - *Million €*	1.192	1.260	4,1%	1.213	2,3%	449	-63,0%	830	82,4%	1.053	26,9%	903
EBIT *(IFRS)* - *Million €*	863	968	10,0%	936	4,4%	167	-82,1%	459	174,2%	639	39,2%	579
EBIT *(RCA)* - *Million €*	581	686	18,1%	620	-9,6%	693	11,8%	287	-58,6%	454	58,2%	285
Net Profit *(IFRS)* - *Million €*	701	755	7,7%	720	2,9%	117	-83,8%	347	196,9%	441	27,1%	384
Net Profit (RCA) - *Million €*	425	468	10,1%	418	-10,6%	478	14,2%	213	-55,3%	306	43,7%	172
EBITDA margin (%)	10,7%	10,3%	-	9,7%	-	3,0%	-	6,9%	-	7,5%	-	7,3%
ROS (%)	6,3%	6,2%	-	5,7%	-	0,8%	-	2,9%	-	3,1%	-	3,1%
Earnings per share (€)	0,84	0,91	-	0,87	-	0,14	-	0,42	-	0,53	-	0,46
Dividend Payout Ratio (%)	n.a.	144,7%	-	52,5%	-	225,1%	-	55,0%	-	37,6%	-	-

Data source: Company's annual reports

The financial information also reveals that, despite the noteworthy decrease in 2009, the company's annual profit has always been positive and taking into account the adjusted results, it raised by 44% in 2010. In the premature results of 2011, the adjusted net profit was close to 56% of the 2010 full year results.

Until 2009, the earnings per share have decreased along the years but in 2010, they raised by 26% to a value of 0,53 euros per share. Yet, the dividend payout ratio has been always superior to 50%, with the exception of 2010.

In the last four years, the EBITDA margin has been below 10%, when compared to 2005 and 2006 what indicates a less operating profitability, i.e., higher operating costs. Nevertheless, in 2010 it increased 0,6% reaching a value of 7,5%. This also promoted the lower ratio of return on sales (ROS) which indicates that a relatively low amount of sales is actually being transformed in net profit.

In what concerns to the capital expenditures, with the exception of 2009, the amount applied has been increasing year by year. In 2010 it expanded 68,9%, with the higher share being invested in the R&M segment. Nevertheless, the investment rate in E&P also increased while the one in G&P activities decreased as can be see in Table 47.

Table 47: Historical analysis – CAPEX

	2005	2006	Δ 06 (%)	2007	Δ 07 (%)	2008	Δ 08 (%)	2009	Δ 09 (%)	2010	Δ 10 (%)	9 months 2011
CAPEX - *Million €*	315	349	10,8%	466	33,5%	1560	234,8%	730	-53,2%	1.233	68,9%	808
Contribution by segment (%)												
E&P	26,0%	30,4%		41,4%		12,6%		26,4%		27,7%		25,7%
R&M	45,1%	37,5%		36,1%		79,8%		62,5%		66,5%		69,3%
G&P	27,9%	32,1%		22,1%		7,4%		10,5%		7,1%		4,5%
Others	1,0%	0,3%		0,2%		0,1%		0,4%		0,4%		0,4%

Data source: Company's annual reports

In addition, Table 48 evidences that in the last two years, as in so far this year, around 70% of the company assets are being finance by debt and the other 30% are being sponsored by equity.

The net debt to equity ratio increased on a yearly basis, reaching 105% in 2010, and indicated a high risk due to a soaring net debt. In September 2011 this ratio was 114%.

Table 48: Historical analysis – Financial structure

	2005	2006	2007	2008	2009	2010	1Q 2011	2Q 2011	3Q 2011
Debt Ratio	59,8%	61,1%	58,2%	66,5%	68,2%	70,4%	71%	71%	70%
Net debt to equity	50,0%	43,5%	31%	84%	81%	105%	107%	112%	114%

Data source: Company's annual reports

Appendix 8: Oil and Gas industry – Main characteristics, historical facts and challenges

Core characteristics and historical facts:

The petroleum industry is characterized by high entrance costs and consequently, the number of important competitors is significantly narrower when compared to other industries. Furthemore, Wolf & Tordo (2009) observe that the players are usually organized to benefit from vertical and horizontal integration.

With regards to the horizontal concentration, the goal is to benefit from economies of scale in order to: easily access better funding, diversify investment and development risk, and to serve as long-term insurance to partners such as host governments.

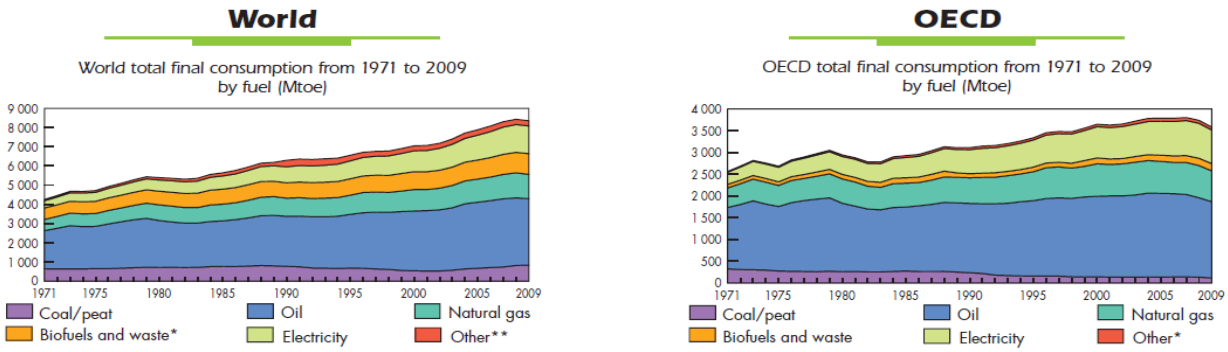
Within the vertical integration, some of the gains are: to secure sources of supply, to facilitate logistical operations, to create entry barriers, to circumvent taxes, to eliminate profit margins of intermediaries or to practice price discrimination.

It's a very complex industry, highly capital intensive, has long lead times and it's inherently risky (Stevens 2005).

Nevertheless it thrives since the energy demand continues to increase even in the less propitious economic cycles, due to the fact that economies expand, the global population grows and living conditions across the world improve (OPEC 2010).

According to Figure 21, the crude oil has been the most consumed type of energy until now and consequently, the more sought. In 2010, the global energy consumption strongly recovered, growing at an above-average rate 5.6% which was the highest rate since 1973, with a big contribution of non OECD countries (BP 2011a).

Figure 21: Historical world and OECD consumption, by fuel



Source: IEA (2011)

The biggest pie of the world oil reserves are concentrated in a relatively low amount of countries and companies, as seen in Figures 22 and 23Figure 22. Nonetheless the oil consumption has been global, with a focus in America and Europe as evidenced in Figure 24. The transportation sector has been that one that absorbes most of the oil demand.

Figure 22: Crude oil – producers, exporters and importers

Producers	Mt	% of world total
Russian Federation	502	12.6
Saudi Arabia	471	11.9
United States	336	8.5
Islamic Rep. of Iran	227	5.7
People's Rep. of China	200	5.0
Canada	159	4.0
Venezuela	149	3.8
Mexico	144	3.6
Nigeria	130	3.3
United Arab Emirates	129	3.2
Rest of the world	1 526	38.4
World	**3 973**	**100.0**

2010 data

Net exporters	Mt
Saudi Arabia	313
Russian Federation	247
Islamic Rep. of Iran	124
Nigeria	114
United Arab Emirates	100
Iraq	94
Angola	89
Norway	87
Venezuela	85
Kuwait	68
Others	574
Total	**1 895**

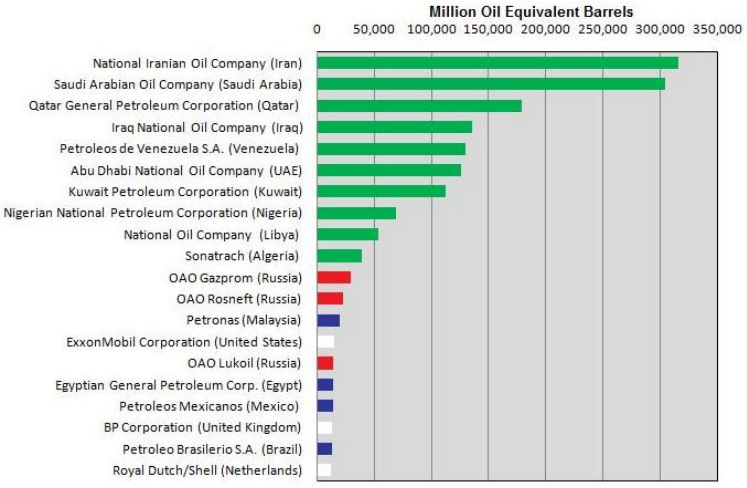
2009 data

Net importers	Mt
United States	510
People's Rep. of China	199
Japan	179
India	159
Korea	115
Germany	98
Italy	80
France	72
Netherlands	57
Spain	56
Others	477
Total	**2 002**

2009 data

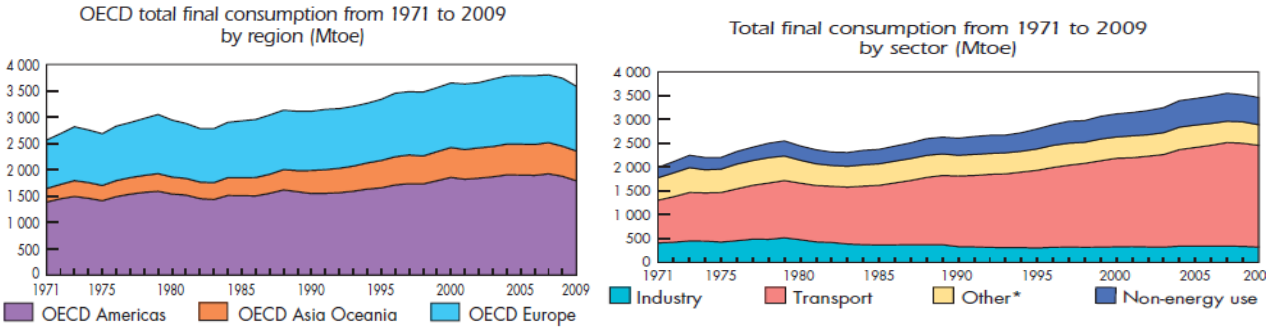
Source: IEA (2011)

Figure 23: World's largest oil and gas companies in 2010



Source: PetroStrategies (2011)

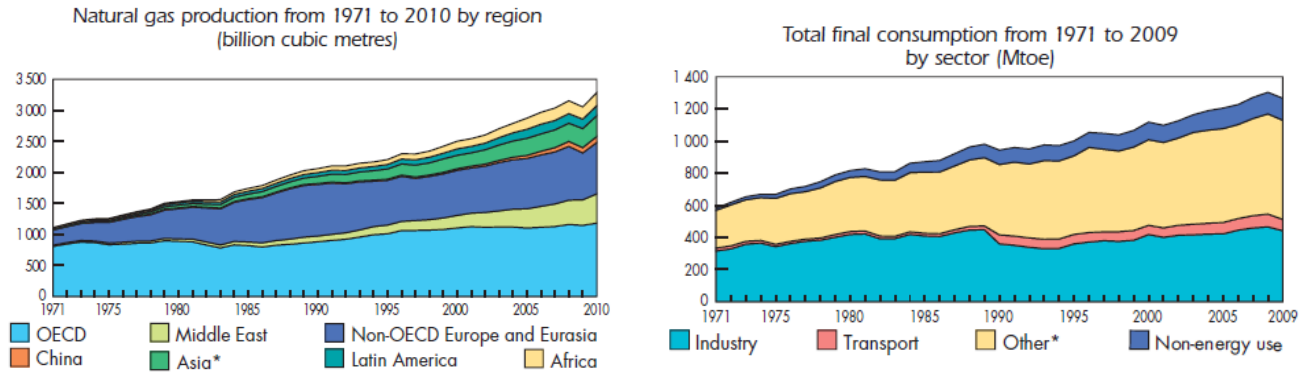
Figure 24: Historical oil consumption by region and sector



Source: IEA (2011)

In what concerns to natural gas, most of it came from the OECD and non-OECD in Europe and Asia. Its core aplications were in the industry and other sectors not related to transportation as demosntrated in Figure 25.

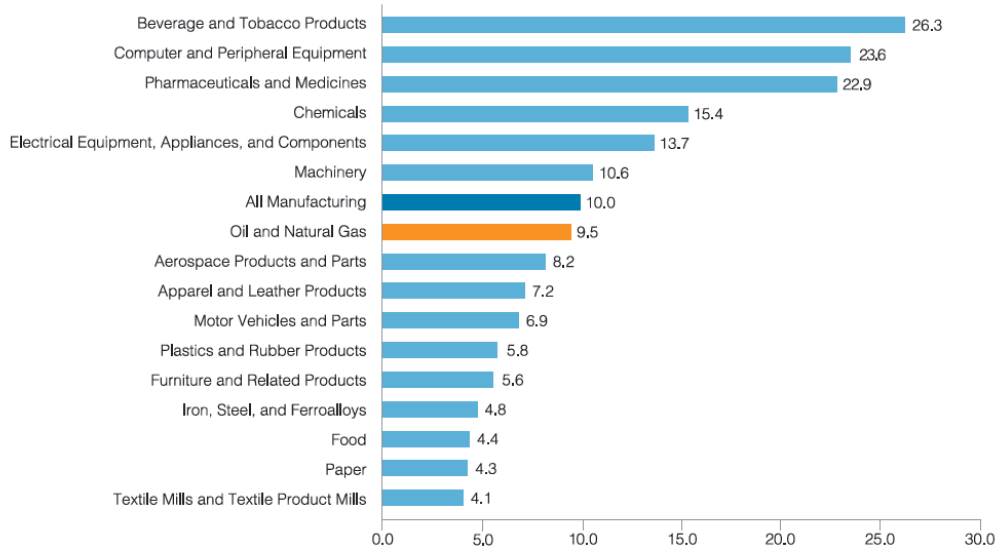
Figure 25: Historical natural gas consumption by region and by sector



Source: IEA (2011)

In terms of earnings, the latest published data by API (2011), explains that the oil and gas industry is characterized by relatively high earnings. In the second quarter of 2011, this industry earned in average, 9,5 cents per every dollar of sales achieved. This value has been increasing over the last quarters – in the period 2006 to 2010 it was just 6,7 cents - and in the last few months, the oil & gas industry was positioned among the top ten higher earnings industries as can be seen in Figure 26.

Figure 26: Earnings per dollar of sales – industry benchmark – 2Q 2011



Source: (API 2011)

Industry trends and challenges:

According to Al-Zayer (2007), these are some of the major threats to the sector:

There are geographic challenges such as the deep waters of the Gulf of Mexico, the frigid regions of Russia or the hot, dusty, undeveloped deserts of the Middle East that can affect the field's recovery rate and prodution accomplished.

Global geopolitical forces are creating highly volatile markets and unreasonable swings in the crude oil price.

The sector is currently characterized by a labor shortage, what is reflected in the increasing wages. In the words of IMF (2011), 50% of the industry's current skilled workforce will be retired within the next ten years and the recruitment and training activities of new engineers, geologists, technicians and managers activities have been relatively insufficient.

The firm's overall costs have been increasing year over year. The expenditures in the drilling activities largely contribute to this, in addition to the growing personnel costs.

The global competition brings out the importance of lowering these operating costs more than increasing oil production.

The companies must incessantly seek to develop innovative technologies, in order to enhance the field's exploration success rates, reduce the CO2 carbon emissions, minimize the time intervals needed, avoid the wasteful use of energetic resources and improve the fuel efficiency.

Shareholders are pressuring companies for a rapid return on their investments affecting the firm's reinvestment rithm and their margin to implement large size projects.

The concern with the environment poses relevant issues and pressures the future path of the companies' strategy. There are projects on the run that aim to: prevent oil spills and reduce gas flaring, minimize the global warming effect, develop carbon capture and storage (CCS) tecnhnologies, make use of fossil fuels more environmentally friendly or even promote the reduction of these fuels consumption. Moreover there is a growing presence of energy and climate change legislation that might raise refiners' costs, as well as further limit crude-derived products demand.

Uncertainties from the demand became an adverse reality since mixed signals are being sent to the market. If by one side there is an expectation that the supply will need to increase in order to cover the growth in the world economy, on the other side, many countries are actively engaged in moving away from fossil fuels.

Since these facts are directly reflected in the company's investment decisions, the same experts recommend that innovative schemes involving all stakeholders should be implemented. Furthermore, to reduce the amount of uncertainty that this produces, transparency, dialogue, partnership and a productive cooperation between players should be efficiently structured in order to minimize losses in times of high and low prices.

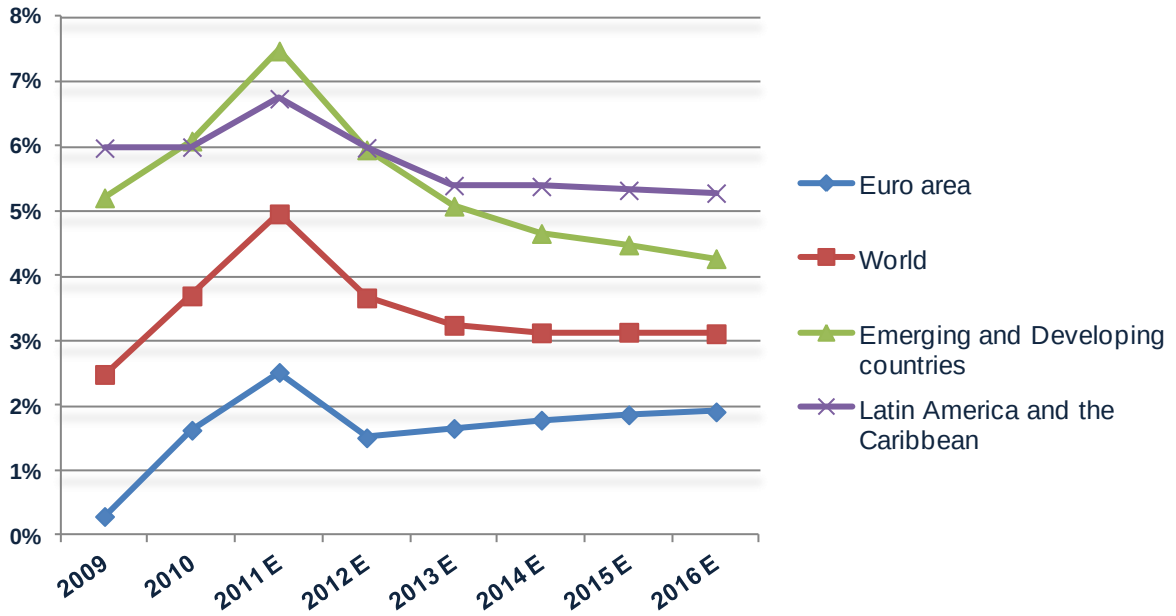
Appendix 9: Dated Brent – past performance

Figure 27: Dated Brent – monthly price evolution (October 2006 to June 2011)

Source: Bloomberg [Accessed on 10 June 2011]

Appendix 10: Inflation forecast by country groups

Figure 28: Inflation projections by country groups



Data source: IMF [Accessed on 21 December 2011]

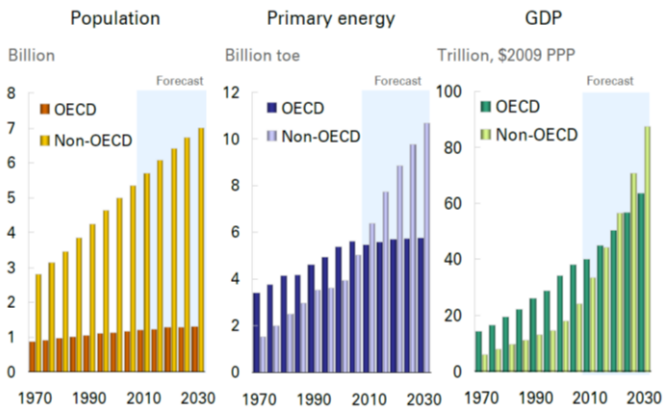
Appendix 11: Petroleum energy outlook

Although some regions of the world may be cutting back on their energy consumption, the oil and gas demand will still be largely stimulated as a result of the increase in living standards, industrialization and other socio economic factors.

According to OPEC (2010), by 2030, the world energy demand will have increased by more than 40% when compared to today's levels, and the developing countries or rapidly-growing non-OECD[59] economies will be responsible for the most part in this growth, as evidenced in Figures 29 and 30.

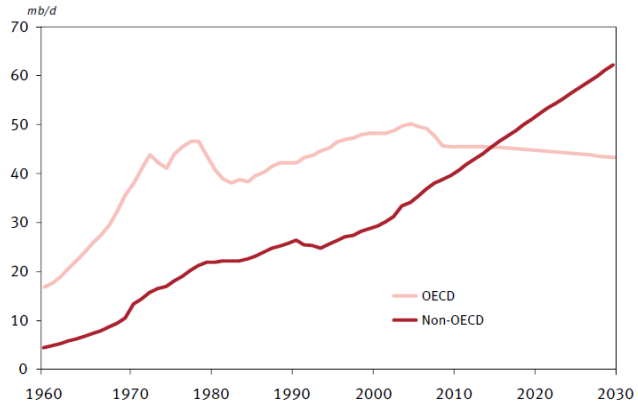
[59] Organization for Economic Co-operation and Development that integrates countries with highly developed economies and democratic governments.

Figure 30: Outlook: population, primary energy and GDP



Source: BP (2011)

Figure 29: OECD and non OECD oil demand



Source: OPEC (2010)

In what concerns to the global energy consumption, BP (2011) refers that the world primary energy consumption which grew 45% in the last 20 years, will grow by 39% over the next 20 years (1,7% per year), with a gentle deceleration beyond 2020.

By 2030, non-OECD energy consumption (in countries like China or Asia) will be 68% higher (yearly growth of 2,6%) and will account for 93% of the global energy growth. The OECD[60] economies foresee just a 6% growth, and from 2020 on, their energy consumption per capita will face a declining trend by over 4 million barrels per day[61].

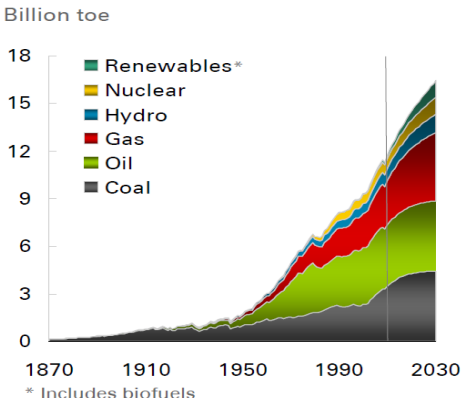
While in developing countries, the energy consumption growth will be driven by power generation and industrial activities, in the OECD members the decline will be highly corrected to the softening growth of consumption by the transportation sector.

Considering the supply side, in the short term, the growth is likely to come from non-OPEC countries, but OPEC will be responsible for an increasing share of global oil supplies in the long term (OPEC 2010).

Moreover, among the energy sources globally available – coal, crude oil, gas and wind for example - by 2030, fossil fuels are expected to still make up to 68% until 2030 (from 83% in 1990 to 2010) of the energy mix around the globe (BP 2011).

[60] Their demand has peaked in 2005 according to BP (2011).
[61] Which contrasts to what has been happening so far where the industrialized countries led in energy consumption.

Figure 31: World commercial energy utilization until 2030



Source: BP (2011)

Even so, BP (2011) refers that the fuel mix changes relatively slowly and that gas and non-fossil fuels will gain share at the expense of coal and oil. Furthermore, the fastest growing fuels will be renewables (including biofuels) which are expected to grow at 8.2% per year until 2030 and among the fossil fuels, gas will be the fastest growing energy source (2,1% annual growth).

In this context, the refining sector is also under pressure to pressure to supply lighter and cleaner products, i.e., mainly middle distillates such as diesel fuel. In the short-medium-long term the companies might have to deal with a contrasting demand evolution across regions and a severe overcapacity in the refineries. By 2015, the utilization capacity is expected to be, on average only 75% (OPEC 2010).

Appendix 12: CAPEX (Million €), 2017 E – 2049 E

Tables 49 and 50: Assumptions – Capital expenditures (Million €), 2017 E – 2048 E

(Million €)	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E	2025 E	2026 E	2027 E	2028 E	2029 E	2030 E	2031 E	2032 E
Total Investments	***1801***	***1722***	***2216***	***1900***	***1890***	***2021***	***2166***	***2121***	***2077***	***1913***	***1869***	***1845***	***1941***	***1897***	***2024***	***2032***
Exploration & Production (E&P)	1507	1423	1911	1590	1575	1700	1840	1790	1740	1570	1520	1490	1580	1530	1510	1510
Refining & Marketing (R&M)	155	158	160	163	166	169	172	174	177	180	183	187	190	193	305	310
Gas & Power (G&P)	137	139	141	144	146	148	151	154	156	159	161	164	167	170	203	207
Others	3	3	3	3	3	3	3	3	4	4	4	4	4	4	5	5

(Million €)	2033 E	2034 E	2035 E	2036 E	2037 E	2038 E	2039 E	2040 E	2041 E	2042 E	2043 E	2044 E	2045 E	2046 E	2047 E	2048 E
Total Investments	***1751***	***1820***	1829	1829	1718	1668	1677	1647	1207	1188	1148	1059	870	881	892	903
Exploration & Production (E&P)	1220	1280	1280	1270	1150	1090	1090	1050	600	570	520	420	220	220	220	220
Refining & Marketing (R&M)	316	321	326	332	337	343	349	355	361	367	373	380	386	393	399	406
Gas & Power (G&P)	210	214	218	221	225	229	233	237	241	245	249	253	257	262	266	271
Others	5	5	5	6	6	6	6	6	6	6	6	6	6	6	7	7

Appendix 13: D&A forecast (Million €), 2017 E – 2048 E

Tables 51 and 52: Assumptions – D&A schedule (Million €), 2017 E – 2048 E

(Million €)	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E	2025 E	2026 E	2027 E	2028 E	2029 E	2030 E	2031 E	2032 E
Gross tangible fixed assets*	15.295	16.835	18.815	20.514	22.203	24.009	25.945	27.841	29.698	31.408	33.078	34.726	36.461	38.156	39.965	41.781
Depreciation of existing assets	42	42	42	8	8	8	8	8	8	8	8	8	8	8	8	8
Depreciation of new assets	336	403	490	565	639	718	804	887	968	1.043	1.117	1.189	1.265	1.340	1.419	1.499
Total Depreciation	378	446	533	573	647	726	812	895	976	1.051	1.125	1.197	1.273	1.348	1.427	1.507
Total Accumulated Depreciation	6.575	7.021	7.553	8.126	8.774	9.500	10.312	11.206	12.183	13.234	14.359	15.556	16.829	18.177	19.604	21.111
Gross intangible fixed assets*	2.841	3.024	3.259	3.461	3.662	3.876	4.106	4.332	4.552	4.755	4.954	5.149	5.356	5.557	5.772	5.988
Amortization of existing assets	60	60	60	33	33	33	33	33	33	33	33	33	33	33	32	32
Amortization of new assets	48	57	70	80	91	102	114	126	138	149	159	169	180	191	194	201
Total Amortization	107	117	129	113	124	135	147	159	171	181	192	202	213	224	226	233
Total Accumulated Amortization	1.215	1.332	1.461	1.574	1.698	1.833	1.980	2.139	2.310	2.491	2.683	2.885	3.098	3.321	3.548	3.781
D&A	**485**	**563**	**662**	**686**	**771**	**862**	**959**	**1.054**	**1.147**	**1.233**	**1.317**	**1.399**	**1.486**	**1.571**	**1.654**	**1.740**

** The amount also includes the value of non depreciable assets*

(Million €)	2033 E	2034 E	2035 E	2036 E	2037 E	2038 E	2039 E	2040 E	2041 E	2042 E	2043 E	2044 E	2045 E	2046 E	2047 E	2048 E
Gross tangible fixed assets*	43.346	44.973	46.608	48.243	49.778	51.269	52.768	54.240	55.320	56.381	57.408	58.354	59.131	59.918	60.716	61.523
Depreciation of existing assets	8	8	8	8	8	8	8	8	8	8	8	8	8	0	0	0
Depreciation of new assets	1.568	1.639	1.711	1.728	1.762	1.794	1.826	1.854	1.828	1.804	1.782	1.736	1.696	1.656	1.612	1.562
Total Depreciation	1.576	1.647	1.719	1.736	1.770	1.802	1.834	1.862	1.836	1.812	1.790	1.744	1.704	1.656	1.612	1.562
Total Accumulated Depreciation	22.687	24.334	26.053	27.789	29.559	31.361	33.195	35.057	36.894	38.706	40.496	42.240	43.944	45.600	47.213	48.775
Gross intangible fixed assets*	6.173	6.367	6.561	6.755	6.938	7.115	7.293	7.468	7.596	7.722	7.844	7.956	8.049	8.142	8.237	8.333
Amortization of existing assets	32	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0
Amortization of new assets	206	211	216	216	216	215	212	211	207	203	197	191	184	178	173	168
Total Amortization	238	243	248	248	248	247	244	243	239	235	197	191	184	178	173	168
Total Accumulated Amortization	4.019	4.262	4.511	4.759	5.007	5.254	5.499	5.742	5.981	6.215	6.412	6.603	6.787	6.966	7.139	7.306
D&A	**1.814**	**1.891**	**1.967**	**1.984**	**2.018**	**2.049**	**2.079**	**2.105**	**2.076**	**2.047**	**1.987**	**1.935**	**1.888**	**1.835**	**1.785**	**1.730**

** The amount also includes the value of non depreciable assets*

Appendix 14: WCN by segment (Million €), 2017 E – 2048 E

Tables 53 and 54: Assumptions – WCN segmentation (Million €), 2017 E – 2048 E

	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E	2025 E	2026 E	2027 E	2028 E	2029 E	2030 E	2031 E	2032 E
Sales & Services RCA (Million €)	20.138	21.198	22.704	23.451	24.299	25.019	26.044	26.822	27.705	28.613	29.586	30.395	31.422	32.088	33.249	34.019
By segment (%)																
Exploration & Production (E&P)	14%	16%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	18%	18%	17%
Refining & Marketing (R&M)	76%	75%	72%	72%	72%	73%	73%	73%	73%	74%	74%	74%	74%	76%	76%	77%
Gas & Power (G&P)	10%	9%	9%	8%	8%	8%	7%	7%	7%	7%	7%	6%	6%	6%	6%	6%
Others	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
WCN by Segment (Million €)																
Exploration & Production (E&P)	17,3	17,4	29,6	14,7	17,0	14,3	21,0	15,8	17,9	18,4	19,8	16,1	20,5	12,6	22,2	14,1
Refining & Marketing (R&M)	93,7	83,2	114,4	57,0	64,6	55,3	78,7	59,9	68,1	70,2	75,4	63,1	80,5	53,0	92,3	62,0
Gas & Power (G&P)	11,8	10,1	13,5	6,5	7,1	5,9	7,8	5,7	6,5	6,5	6,7	5,4	6,7	4,2	7,1	4,6
Others	0,8	0,7	0,9	0,4	0,5	0,4	0,5	0,4	0,4	0,4	0,4	0,4	0,4	0,3	0,5	0,3
Total WCN (Million €)	**124**	**111**	**158**	**79**	**89**	**76**	**108**	**82**	**93**	**96**	**102**	**85**	**108**	**70**	**122**	**81**

	2033 E	2034 E	2035 E	2036 E	2037 E	2038 E	2039 E	2040 E	2041 E	2042 E	2043 E	2044 E	2045 E	2046 E	2047 E	2048 E
Sales & Services RCA (Million €)	34.694	36.509	37.743	39.090	39.826	40.575	41.497	42.449	42.765	43.977	44.796	45.704	46.579	47.779	48.105	48.504
By segment (%)																
Exploration & Production (E&P)	16%	18%	18%	18%	17%	15%	14%	14%	11%	11%	9%	8%	7%	6%	3%	1%
Refining & Marketing (R&M)	78%	77%	77%	77%	78%	79%	81%	82%	84%	85%	86%	87%	89%	90%	92%	95%
Gas & Power (G&P)	6%	5%	5%	5%	5%	5%	5%	5%	5%	4%	4%	4%	4%	4%	4%	4%
Others	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
WCN by Segment (Million €)																
Exploration & Production (E&P)	11,6	33,9	23,0	25,3	12,9	12,1	14,0	13,6	3,7	13,7	8,1	7,7	6,2	7,4	1,1	0,3
Refining & Marketing (R&M)	55,2	146,2	99,7	108,8	60,5	62,6	78,1	81,7	27,9	107,8	74,1	83,4	81,8	113,3	31,7	39,9
Gas & Power (G&P)	4,0	10,2	6,7	7,0	3,8	3,8	4,5	4,6	1,5	5,6	3,7	4,1	3,8	5,1	1,4	1,7
Others	0,3	0,7	0,4	0,5	0,3	0,3	0,3	0,3	0,1	0,4	0,2	0,3	0,3	0,3	0,1	0,1
Total WCN (Million €)	**71**	**191**	**130**	**142**	**77**	**79**	**97**	**100**	**33**	**128**	**86**	**95**	**92**	**126**	**34**	**42**

Appendix 15: Activity ratios – Industry average (%) versus Galp Energia

Table 55: Activity Ratios – Industry sector versus Galp Energia

		Ratios			
		Accounts receivable / Sales & Services (%)	Inventories / Sales & Services (%)	Accounts Payable / Sales & Services (%)	Cash / Sales & Services (%)
Industry Sector	Petroleum (Integrated)	12.65%	7.21%	14.88%	5.03%
	Petroleum (Producing)	10.36%	4.72%	10.13%	8.03%
	Oil & Gas distribution	13.37%	5.37%	12.94%	7.52%
	Galp Energia S.G.P.S.*	7,5%	9,8%	7,7%	1,4%

*Historical average

Data Source: Damodaran (2011), for the industry sector and own analysis for the company data.

All the company's ratios outputs are below the industry average. The sales by credit are within an inferior number, the stock over sales amount sustained is superior and the unpaid suppliers' bills over the amount of revenues is minor when compared to the industry what can mean better liquidity.

Nevertheless, what is more evident is the Galp's substancially inferior cash to sales ratio, what indicates a better effectiviness of its collection and credit policies meaning that the company requires less cash to deal with unexpected cash collection delays, when compared to the other companies in the industry.

Appendix 16: Debt Forecast (Million €), 2017 – 2048 E

Tables 56 and 57: Assumptions – financial situation (Million €), 2017 E – 2048 E

(Million €)	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E	2025 E	2026 E	2027 E	2028 E	2029 E	2030 E	2031 E	2032 E
Short term debt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long term debt	1.530	1.962	3.033	3.456	4.253	4.702	3.040	3.009	6.705	6.586	7.112	6.852	6.680	6.910	7.492	6.926
Total Debt	1.530	1.962	3.033	3.456	4.253	4.702	3.040	3.009	6.705	6.586	7.112	6.852	6.680	6.910	7.492	6.926
Cash and equivalents	276	290	311	322	333	343	358	368	380	392	406	417	432	440	457	466
Net Debt	1.253	1.671	2.722	3.134	3.920	4.359	2.683	2.641	6.325	6.194	6.706	6.436	6.249	6.470	7.036	6.460
Total equity	9.135	9.860	10.347	11.080	11.391	12.051	12.379	13.084	12.997	13.668	13.595	14.188	14.019	14.655	14.350	15.055
Debt ratio (%)	41%	41%	45%	45%	47%	47%	49%	49%	51%	50%	52%	51%	53%	51%	53%	52%
Net Debt-to-Equity (%)	**14%**	**17%**	**26%**	**28%**	**34%**	**36%**	**22%**	**20%**	**49%**	**45%**	**49%**	**45%**	**45%**	**44%**	**49%**	**43%**
Net Debt-to-EBITDA	**0,7x**	**0,8x**	**1,3x**	**1,4x**	**1,7x**	**1,8x**	**1,1x**	**1,0x**	**2,4x**	**2,2x**	**2,3x**	**2,2x**	**2,0x**	**2,1x**	**2,2x**	**1,9x**

(Million €)	2033 E	2034 E	2035 E	2036 E	2037 E	2038 E	2039 E	2040 E	2041 E	2042 E	2043 E	2044 E	2045 E	2046 E	2047 E	2048 E
Short term debt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long term debt	7.129	6.209	6.501	5.575	5.849	5.451	4.892	3.406	3.406	3.406	674	674	674	0	0	0
Total Debt	7.129	6.209	6.501	5.575	5.849	5.451	4.892	3.406	3.406	3.406	674	674	674	0	0	0
Cash and equivalents	476	500	518	537	546	1.362	816	755	(607)	583	(172)	983	400	2.802	1.819	615
Net Debt	6.654	5.708	5.983	5.038	5.303	4.090	4.076	2.651	4.013	2.823	846	(309)	274	(2.802)	(1.819)	(615)
Total equity	14.665	15.413	14.840	15.450	14.731	15.371	14.755	15.446	14.795	15.605	15.123	16.082	15.535	16.638	16.177	17.313
Debt ratio (%)	53%	51%	53%	51%	54%	52%	53%	50%	52%	51%	48%	47%	48%	46%	47%	46%
Net Debt-to-Equity (%)	**45%**	**37%**	**40%**	**33%**	**36%**	**27%**	**28%**	**17%**	**27%**	**18%**	**6%**	**-2%**	**2%**	**-17%**	**-11%**	**-4%**
Net Debt-to-EBITDA	**1,9x**	**1,6x**	**1,6x**	**1,3x**	**1,3x**	**1,0x**	**1,0x**	**0,6x**	**0,9x**	**0,6x**	**0,2x**	**-0,1x**	**0,1x**	**-0,6x**	**-0,4x**	**-0,1x**

Appendix 17: E&P valuation – DCF's per field

Table 58: DCF for Lula & Cernambi (BM-S-11)

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
829	2009	2044	35	1,342	2024/2027	85/15

LULA & CERNAMBI (10%)	2011	2012	2013	2014	2015	2016	2020	2025	2030	2035	2040	2044
Remaining reserves (Mboe) - end of year	826	821	813	803	786	767	640	426	211	80	22	0
Production (million boe)	3	5	8	10	16	20	37	44	39	19	8	4
Production (kboe/d)	7	15	22	27	45	54	100	121	107	51	23	10
Revenues ($ million)	229	474	720	884	1474	1769	3284	4001	3552	1698	753	333
Royalties ($ million)	23	47	72	88	147	177	328	400	355	170	75	33
Opex ($ million)	25	53	77	95	158	190	352	426	377	179	80	35
D&A ($ million)	43	48	60	70	49	67	119	298	281	478	619	618
Oil Profit	139	326	511	630	1118	1335	2485	2877	2539	871	-21	-353
SPT (%)	0	0	0	0	10	10	30	30	30	10	0	0
SPT ($ million)	0	0	0	0	112	134	745	863	762	87	0	0
EBIT ($ million)	139	326	511	630	1007	1202	1739	2014	1777	784	-21	-353
EBIT(1-T)	92	215	337	416	664	793	1148	1329	1173	518	-14	-233
D&A ($ million)	43	48	60	70	49	67	119	298	281	478	619	618
CAPEX ($ million)	200	268	268	268	299	650	500	700	400	450	450	200
WCN ($ million)	3	1	2	4	8	3	8	9	5	4	1	0
FCF ($ million)	-69	-6	127	215	407	207	760	918	1049	541	154	184
Discounted FCF ($ million)	-69	-6	106	164	283	132	337	260	189	62	11	9
NVP ($ million)	5437,4											
NPV ($/bbl)	**6,6**											

Table 59: DCF for Iara (BM-S-11)

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
350	2013	2048	35	0	2029 to 2031	85/15

IARA (10%)	2011	2012	2013	2014	2015	2016	2020	2025	2030	2035	2040	2045	2048
Remaining reserves (Mboe) - end of year	350	350	349	346	340	335	308	256	178	103	54	22	4
Production (million boe)	0	0	1	3	7	4	7	13	16	13	8	6	6
Production (kboe/d)	0	0	2	8	18	12	20	35	45	36	22	16	16
Revenues ($ million)	0	0	63	275	589	393	652	1157	1476	1187	741	537	537
Royalties ($ million)	0	0	6	27	59	39	65	116	148	119	74	54	54
Opex ($ million)	0	0	7	30	63	42	70	123	157	125	78	57	57
D&A ($ million)	0	0	57	5	28	21	48	123	190	212	275	1142	1020
Oil Profit	0	0	-8	212	439	291	469	795	982	731	313	-715	-594
SPT (%)	0	0	0	0	0	0	0	10	10	10	0	0	0
SPT ($ million)	0	0	0	0	0	0	0	79	98	73	0	0	0
EBIT ($ million)	0	0	-8	212	439	291	469	715	884	657	313	-715	-594
EBIT(1-T)	0	0	-5	140	290	192	310	472	583	434	207	-472	-392
D&A ($ million)	0	0	57	5	28	21	48	123	190	212	275	1142	1020
CAPEX ($ million)	0	0	257	21	169	200	200	290	270	200	200	200	200
WCN ($ million)	0	0	0	1	3	1	2	3	2	3	1	1	0
FCF ($ million)	0	0	-205	124	146	12	156	303	501	443	281	469	428
Discounted FCF ($ million)	0	0	-171	94	102	8	69	86	90	51	21	22	15
NVP ($ million)	1691												
NPV ($/bbl)	**4,8**												

Table 60: DCF for Jupiter (BM-S-11)

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
1300	2016	2047	31	0	2040 to 2042	40/60

Jupiter (20%)	2011	2012	2013	2014	2015	2016	2020	2025	2030	2035	2040	2045	2047
Remaining reserves (Mboe) - end of year	1300	1300	1300	1300	1300	1299	1275	1233	1166	969	507	92	3
Production (million boe)	0	0	0	0	0	1	6	10	18	73	94	67	29
Production (kboe/d)	0	0	0	0	0	2	18	27	49	200	257	182	81
Revenues ($ million)	0	0	0	0	0	37	346	562	1032	4342	5579	3959	1748
Royalties ($ million)	0	0	0	0	0	4	35	56	103	434	558	396	175
Opex ($ million)	0	0	0	0	0	7	62	96	172	704	904	641	283
D&A ($ million)	0	0	0	0	0	30	24	43	49	32	14	0	0
Oil Profit	0	0	0	0	0	-3	226	368	707	3172	4104	2922	1290
SPT (%)	0	0	0	0	0	0	0	0	10	40	40	40	20
SPT ($ million)	0	0	0	0	0	0	0	0	71	1269	1641	1169	258
EBIT ($ million)	0	0	0	0	0	-3	226	368	637	1903	2462	1753	1032
EBIT(1-T)	0	0	0	0	0	-2	149	243	420	1256	1625	1157	681
D&A ($ million)	0	0	0	0	0	30	24	43	49	32	14	0	0
CAPEX ($ million)	0	0	0	0	0	294	100	100	70	30	10	0	0
WCN ($ million)	0	0	0	0	0	0	1	1	2	10	9	5	1
FCF ($ million)	0	0	0	0	0	-266	72	184	398	1248	1620	1152	680
Discounted FCF ($ million)	0	0	0	0	0	-169	32	52	72	143	119	54	26
NVP ($ million)	2000												
NPV ($/bbl)	**1,5**												

Table 61: DCF for Bem-te-vi (BM-S-8)

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
140	2013	2037	24	0	2026 to 2029	80/20

Bem-te-vi (14%)	2011	2012	2013	2014	2015	2016	2020	2025	2030	2035	2037
Remaining reserves (Mboe) - end of year	140	140	139	135	127	122	108	77	38	11	6
Production (million boe)	0	0	1	4	8	5	3	8	7	4	1
Production (kboe/d)	0	0	2	11	23	15	8	21	20	12	4
Revenues ($ million)	0	0	75	328	704	470	260	680	631	391	112
Royalties ($ million)	0	0	8	33	70	47	26	68	63	39	11
Opex ($ million)	0	0	8	37	79	53	29	75	70	43	12
D&A ($ million)	0	73	25	15	22	29	51	92	135	121	0
Oil Profit	0	-73	34	243	533	341	154	445	363	188	89
SPT (%)	0	0	0	0	0	0	0	0	0	0	0
SPT ($ million)	0	0	0	0	0	0	0	0	0	0	0
EBIT ($ million)	0	-73	34	243	533	341	154	445	363	188	89
EBIT(1-T)	0	-48	23	161	352	225	102	293	240	124	58
D&A ($ million)	0	73	25	15	22	29	51	92	135	121	0
CAPEX ($ million)	0	281	150	150	150	150	170	160	170	100	0
WCN ($ million)	0	1	4	1	1	1	1	2	1	0	0
FCF ($ million)	0	-257	-106	25	222	103	-18	224	204	145	58
Discounted FCF ($ million)	0	-235	-89	19	155	65	-8	63	37	17	6
NVP ($ million)	503										
NPV ($/bbl)	**3,6**										

Table 62: DCF for Caramba (BM-S-8)

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
200	2018	2040	22	0	2036-2037	80/20

Caramba (20 %)	2011	2012	2013	2014	2015	2016	2020	2025	2030	2035	2037	2040
Remaining reserves (Mboe) - end of year	200	200	200	200	200	200	187	168	142	70	41	6
Production (million boe)	0	0	0	0	0	0	8	3	7	15	15	10
Production (kboe/d)	0	0	0	0	0	0	23	8	19	40	40	28
Revenues ($ million)	0	0	0	0	0	0	901	347	813	1772	1780	1215
Royalties ($ million)	0	0	0	0	0	0	90	35	81	177	178	121
Opex ($ million)	0	0	0	0	0	0	79	29	67	141	142	97
D&A ($ million)	0	0	0	0	0	0	84	149	260	393	448	509
Oil Profit	0	0	0	0	0	0	649	134	405	1061	1013	487
SPT (%)	0	0	0	0	0	0	0	0	0	10	10	0
SPT ($ million)	0	0	0	0	0	0	0	0	0	106	101	0
EBIT ($ million)	0	0	0	0	0	0	649	134	405	955	911	487
EBIT(1-T)	0	0	0	0	0	0	428	89	268	630	601	322
D&A ($ million)	0	0	0	0	0	0	84	149	260	393	448	509
CAPEX ($ million)	0	0	0	0	0	0	350	350	370	370	370	370
WCN ($ million)	0	0	0	0	0	0	2	1	1	4	2	2
FCF ($ million)	0	0	0	0	0	0	160	-113	156	648	677	459
Discounted FCF ($ million)	0	0	0	0	0	0	71	-32	28	74	65	34
NVP ($ million)	492											
NPV ($/bbl)	2,5											

Table 63: DCF for Angola

Estimated reserves net to Galp (Million boe)	First year of production	Estimated last year of production	Useful life	Past Production (Mboe)	Peak of production (year)	Oil / Gas mix (%)
255	1999	2035	36	6,8135	2019	100

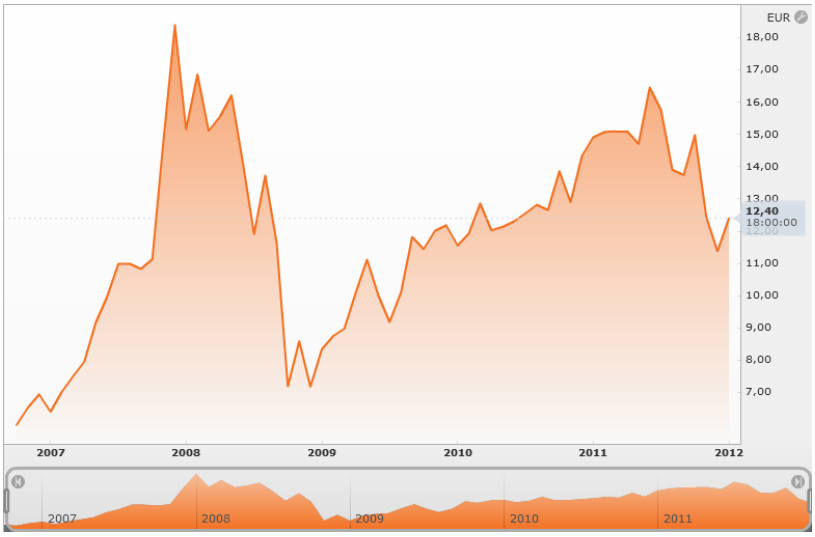
ANGOLA	2011	2012	2013	2014	2015	2016	2020	2025	2030	2031	2032	2033	2034	2035
Remaining reserves (Mboe) - end of year	250	244	240	236	232	225	174	107	43	32	22	12	4	0
Total WI Production (million boe)	5	5	4	4	4	7	13	14	11	11	10	9	9	4
Total WI Production (k boe/d)	15	14	12	10	12	19	35	37	31	29	28	26	24	10
Kuito (Block 14) - 9%	2	2	2	2	2	2	0	0	0	0	0	0	0	0
BBLT (Block 14) - 9%	8	7	5	4	7	11	1	0	0	0	0	0	0	0
TL / CPT (Block 14)- 9%	5	5	5	5	5	5	3	2	1	1	1	0	0	0
Negage (Block 14) -9%	0	0	0	0	0	0	0	1	3	3	2	2	1	1
Gabela (Block 14) -9%	0	0	0	0	0	0	0	1	3	3	3	3	2	2
Malange (Block 14) -9%	0	0	0	0	0	1	16	6	3	3	3	2	1	1
Lucapa (Block 14) -9%	0	0	0	0	0	1	4	6	3	3	3	2	1	1
Menongue (Block 14) -9%	0	0	0	0	0	0	0	1	2	1	1	2	2	2
Block 14K-A-IMI (Lianzi) - 4,5%	0	0	0	0	1	1	6	6	3	3	3	2	1	1
Block 32 - 5%	0	0	0	0	0	0	6	6	5	5	5	5	5	5
Block 33 -5,33%	0	0	0	0	0	0	0	3	4	4	4	4	4	4
Total NE Production (million boe)	4	3	3	3	3	5	9	9	8	7	7	6	6	3
Total NE Production (k boe/d)	10	9	8	7	8	13	24	25	21	20	19	17	16	7
Revenues ($ million)	401	361	321	278	313	508	936	989	841	787	735	688	643	273
Opex ($ million)	30	28	24	21	23	38	70	74	63	59	55	52	48	20
D&A ($ million)	102	55	11	1	4	26	60	51	176	188	199	0	0	0
EBIT ($ million)	269	278	286	256	285	444	806	864	603	540	482	636	595	252
EBIT(1-T)	193	200	206	184	205	320	580	622	434	389	347	458	428	182
D&A ($ million)	102	55	11	1	4	26	60	51	176	188	199	0	0	0
CAPEX ($ million)	480	307	50	5	27	250	250	120	250	250	250	0	0	0
WCN ($ million)	5	1	1	1	2	1	2	2	1	2	1	1	2	1
FCF ($ million)	-189	-53	166	179	181	95	388	551	358	325	294	457	426	181
Discount factor	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Discounted FCF ($ million)	-189	-48	133	130	117	55	146	121	46	37	30	42	35	13
NVP ($ million)	2014													
NPV ($/bbl)	7,9													

Appendix 18: The company's stock performance – a brief overview

As a public company, Galp's stocks are traded in several indexes worldwide, beside the PSI 20. Some examples are: the Bloomberg European 500, the BE500 Energy, the Euronext Top 100 or the WT INTL Energy IIV.

The graph presented below points up the stock price evolution.

Figure 32: Galp Energia – historical stock performance



Source: Company website

Subsequent to the IPO in 2006, the price per share followed a trend to increase. Furthermore, in the beginning of 2008, the stock price reached its maximum as Galp entered the eletricity business and descovered new amounts of oil in the Pre-Salt Santos Basin.

Then it went through a bearish period and dropped to a minimum of 6,13€, which occurred in October 2008. Over the recent years, the price has been reaching higher levels, mainly as new progresses in the E&P activities are being announced.

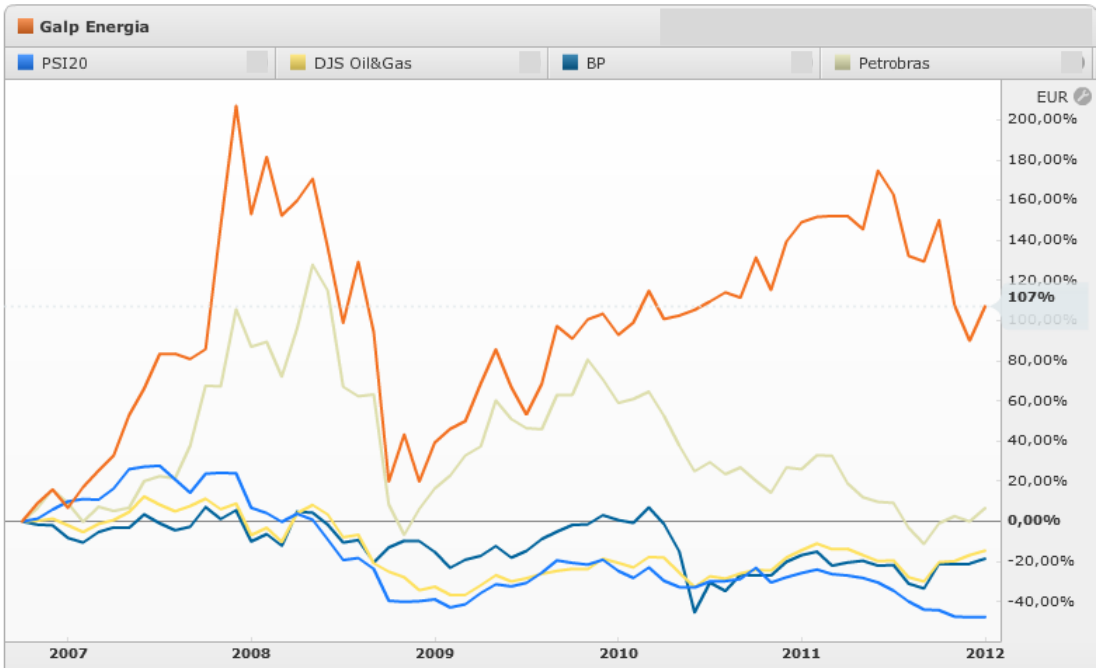
During 2011, the company's stock was trading at relatively high values, closer to the ones practiced in the first months of 2008.

After the second trimester of 2011, the stock price showed a tendency to decline. Nevertheless, the major fall was when the company announced its partnership with Sinopec to sell 30% of Petrogal, which was unitl then, totally owned by Galp.

Additionally and facing the current portuguese economic climate, regular swings have been detected and until now it has been hard for the invertors to invert this situation and offer a higher price per share.

Even so, the company has been performing extraordinarily well when compared to the PSI 20 Index or the DJS Oil&Gas Index, or even when compared with companies that are similarly in terms of industry, to Galp, such as, BP or Petrobras, as evidenced next.

Figure 33: Stock performance (%) – Galp, PSI 20 Index, DJS Oil & Gas Index, BP and Petrobras



Source. Company website

Appendix 19: Sensitivity analysis – Value of Minority Interests

Table 64: Effects on valuation – change in the amount of minority interests

Δ Minority Interests Value	-30%	-20%	-10%	**10%**	20%	30%
New Equity Value (M€)	13.483	13.068	12653	11824	11409	10994
New price per share (€)	16,26 €	15,76 €	15,26 €	14,26 €	13,76 €	13,26 €

As expected, a change in minority interests, will adjust the value each share outstanding.

Appendix 20: Projections - Income Statement, Cash Flow Statement and Balance Sheet

Table 65: Income statement

Profit & Losses consolidated by destination	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Operating income															
Sales (consol. Adjust.)	11.728	13.747	14.344	14.959	15.630	16.563	17.920	18.396	22.749	26.876	31.128	36.614	41.179	45.185	47.053
Services rendered (consol. adjust.)	280	316	265	277	289	306	331	340	421	497	576	677	761	835	870
Other operating income	141	163	206	214	222	234	251	257	311	337	390	459	516	566	590
Total operating income	12.149	14.226	14.966	15.449	16.141	17.103	18.502	18.993	23.482	27.710	32.094	37.750	42.456	46.587	48.512
Operating costs															
Inventories consumed and sold	(10.193)	(11.997)	(12.715)	(12.950)	(13.531)	(14.339)	(15.513)	(15.926)	(19.695)	(23.267)	(26.948)	(31.697)	(35.649)	(39.117)	(40.734)
Material and services consumed	(751)	(781)	(780)	(762)	(796)	(843)	(913)	(937)	(1.159)	(1.369)	(1.585)	(1.865)	(2.097)	(2.301)	(2.396)
Employee costs	(339)	(355)	(334)	(328)	(328)	(328)	(328)	(328)	(328)	(328)	(328)	(328)	(328)	(328)	(328)
Amortization and depreciation cost	(307)	(331)	(418)	(456)	(494)	(516)	(331)	(405)	(686)	(1.147)	(1.571)	(1.967)	(2.105)	(1.888)	(1.730)
Provision for impairment of receivables	(64)	(83)	(53)	(56)	(61)	(70)	(89)	(90)	(137)	(160)	(173)	(197)	(184)	(140)	(91)
Other operating costs	(36)	(41)	(76)	(44)	(46)	(49)	(53)	(54)	(67)	(79)	(92)	(108)	(122)	(133)	(139)
Total operating costs	(11.690)	(13.588)	(14.398)	(14.597)	(15.257)	(16.145)	(17.227)	(17.741)	(22.072)	(26.350)	(30.698)	(36.162)	(40.485)	(43.908)	(45.419)
Operating profit - EBIT	**459**	**639**	**568**	**853**	**885**	**958**	**1.275**	**1.253**	**1.409**	**1.359**	**1.396**	**1.587**	**1.971**	**2.679**	**3.094**
Results from Investments in associates and jointly controlled entities	69	74	64	64	64	64	64	64	64	64	64	64	64	64	64
Results from investments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Financial Profit	86	603	(200)	(149)	(112)	(66)	(55)	(49)	(188)	(375)	(332)	(301)	(201)	(32)	(1)
Financial income	13	27	16	0	0	0	0	0	0	0	0	0	0	0	0
Financial costs	(88)	(114)	(206)	(148)	(111)	(65)	(54)	(48)	(187)	(374)	(331)	(300)	(200)	(31)	(0)
Exchange gain (loss)	149	(11)	(10)	0	0	0	0	0	0	0	0	0	0	0	0
Income and cost on financial instruments	13	702	(1)	0	0	0	0	0	0	0	0	0	0	0	0
Other gains and losses	(1)	(1)	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Profit before tax	451	614	432	767	836	956	1.283	1.268	1.285	1.048	1.128	1.350	1.833	2.711	3.156
Income tax expense	(99)	(166)	(114)	(203)	(221)	(253)	(340)	(336)	(341)	(278)	(299)	(358)	(486)	(718)	(836)
IRC to pay	-	-	**0**	(112)	(233)	(264)	(351)	(347)	(340)	(276)	(297)	(356)	(484)	(716)	(834)
Profit before minority interest	**353**	**448**	**317**	**564**	**614**	**702**	**943**	**932**	**945**	**770**	**829**	**992**	**1.347**	**1.992**	**2.320**
Profit attributable to minority interests RCA	(6)	(6)	(9)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
Net Profit post minority interests	**347**	**441**	**308**	**558**	**609**	**697**	**937**	**926**	**939**	**765**	**823**	**987**	**1.342**	**1.987**	**2.314**
Effective tax rate	21,95%	26,99%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%	26,50%
Earnings per share (in Euros)	0,42	0,53	0,34	0,67	0,73	0,84	1,13	1,12	1,13	0,92	0,99	1,19	1,62	2,40	2,79
Number of stocks (million)	829	829	829	829	829	829	829	829	829	829	829	829	829	829	829

Table 66: Cash flow statement

Indirect Method - (amounts stated in million of euros)	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Cash Flows from operating activities:															
Net Income post minority interests	347	441	213	558	609	697	937	926	939	765	823	987	1.342	1.987	2.314
Adjustments to reconcile net income to net cash provided by **operating activities:**															
+ Depreciation / Amortization expense	307	331	418	456	494	516	331	405	686	1.147	1.571	1.967	2.105	1.888	1.730
+ Provisions of the year (P&L)	64	83	53	56	61	70	89	90	137	160	173	197	184	140	91
+ Financial Results	(86)	(603)	200	149	112	66	55	49	188	375	332	301	201	32	1
- Share of results from investments in associates and jointly controlled entities	(69)	(74)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)	(64)
- Results from Investments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Loss/ - Gain on sale of long term assets	(4)	1	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Current Income tax	99	166	80	203	221	253	340	336	341	278	299	358	486	718	836
- Increases/ + Decreases in Deferred tax assets	(10)	(6)	114	103	0	0	0	0	0	0	0	0	0	0	0
+ Increases/ - Decreases in Deferred tax liabilities	38	28	(12)	(12)	(12)	(12)	(12)	(12)	0	0	0	0	0	0	0
- Increases / + Decreases in current assets other than cash:	***57***	***(645)***	*84*	*(71)*	*(118)*	*(165)*	*(239)*	*(84)*	*(128)*	*(151)*	*(114)*	*(211)*	*(163)*	*(150)*	*(68)*
Change in Inventories	(152)	(341)	104	(24)	(67)	(93)	(135)	(47)	(72)	(85)	(64)	(119)	(92)	(85)	(39)
Change in Trade Receivables	209	(304)	(19)	(47)	(52)	(72)	(104)	(37)	(56)	(66)	(50)	(92)	(71)	(65)	(30)
+ Increases / - Decreases in current liabilities	***117***	***431***	*(232)*	*36*	*103*	*144*	*209*	*73*	*112*	*132*	*99*	*184*	*142*	*131*	*60*
Change in Trade payables	128	368	(343)	18	52	73	106	37	56	67	50	93	72	66	30
Change in Other payables (ST)	(11)	63	111	18	51	71	103	36	55	65	49	91	70	65	29
Net cash provided by operating activities (1)	**862**	**154**	**855**	**1.415**	**1.407**	**1.505**	**1.646**	**1.719**	**2.211**	**2.641**	**3.120**	**3.719**	**4.233**	**4.682**	**4.900**
Cash Flows from investing activities:															
+ Sales of tangible and intangible fixed assets	258	619	0	0	0	0	0	0	0	0	0	0	0	0	0
- Purchases of tangible and intangible fixed assets	(735)	(1.227)	(1.400)	(850)	(850)	(850)	(950)	(1.854)	(1.900)	(2.077)	(1.897)	(1.829)	(1.647)	(870)	(903)
- Investment /+ Desinvestment in associates and jointly controlled entities	70	(56)	(14)	0	0	0	0	0	0	0	0	0	0	0	0
- Investment /+ Desinvestment in other companies	(2)	(0)	(0)	0	0	0	0	0	0	0	0	0	0	0	0
- Investment /+ Desinvestment in subsidiaries (eg: 30% of Petrogal in 2012)	n.a.	n.a.	0	850	850	850	950	579	0	0	0	0	0	0	0
- Investment/ + Desinvestment in "Other receivables" (ST)	(15)	(13)	(2)	(5)	(5)	(7)	(11)	(4)	(6)	(7)	(5)	(10)	(7)	(7)	(3)
- Investment / + Desinvestment in "Other receivables" (LT)	(71)	10	70	(21)	(23)	(32)	(47)	(16)	(25)	(29)	(22)	(41)	(32)	(29)	(13)
+ Cash receipt from dividends	68	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Net cash provided by (used for) investing activities (2)	**(427)**	**(607)**	**(1.286)**	**34**	**32**	**21**	**3**	**(1.234)**	**(1.871)**	**(2.053)**	**(1.864)**	**(1.820)**	**(1.626)**	**(845)**	**(860)**
Cash Flows from financing activities:															
+ Issuance / - Payment of Financial Debt	185	856	1.273	(1.137)	(880)	(1.088)	(81)	(99)	318	609	(555)	292	(1.485)	0	1.338
+ Issuance / - Payments of "Other payables" (LT)	314	(50)	(95)	314	9	12	(21)	(32)	(29)	11	8	16	12	11	5
+ Increases / - Decreases in payment to retirement and other benefit obligations	15	14	(2)	(6)	0	0	0	0	0	0	0	0	0	0	0
- Investment/ + Desinvestment in Other investments (ST)	1	(3)	(1)	0	0	0	0	0	0	0	0	0	0	0	0
- Investment / + Desinvestment in "Other investments" (LT)	4	(1)	0	0	0	0	0	0	0	0	0	0	0	0	0
- Interests and similar costs	(76)	(98)	(206)	(148)	(111)	(65)	(54)	(48)	(187)	(374)	(331)	(300)	(200)	(31)	(0)
- Payment of dividends	(194)	(167)	(166)	(166)	(166)	(407)	(323)	(416)	(429)	(297)	(370)	(735)	(1.020)	(1.544)	(1.800)
- Payment of Other distributable results	-	-	0	0	0	(80)	(1.189)	(140)	(3)	(525)	0	(1.155)	(86)	(1.664)	(1.515)
+ Capital Increase & change in share price premiums	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net cash provided by (used for) financing activities (3)	**250**	**551**	**804**	**(1.143)**	**(1.148)**	**(1.628)**	**(1.668)**	**(735)**	**(329)**	**(576)**	**(1.247)**	**(1.882)**	**(2.779)**	**(3.227)**	**(1.972)**
Adjustments to historical results - Direct vs Indirect Method	(529)	(229)	-	-	-	-	-	-	-	-	-	-	-	-	-
Net increase (decrease) in cash and cash equivalents (4)= (1)+(2)+(3)	155	(132)	374	307	290	(103)	(19)	(250)	11	12	9	17	(172)	609	2.068
+ Effect of foreign exchange rate variation	23	3	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Cash at the beggining of the year	(239)	(61)	(171)	203	510	800	697	677	311	368	432	500	755	2.597	5.278
+ Change in consolidation perimeter	(0)	20	0	0	0	0	0	0	0	0	0	0	0	0	0
= Cash at the end of the year	(61)	(171)	203	510	800	697	677	427	322	380	440	518	583	3.206	7.346

Table 67: Balance sheet

(amounts stated in million of euros)	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Non-current assets															
Tangible assets	2.640	3.589	4.489	4.865	5.208	5.534	6.139	7.488	12.387	17.515	19.979	20.555	19.183	15.187	12.748
Net Goodwill	189	243	247	247	247	247	247	247	247	247	247	247	247	247	247
Intangible assets	1.319	1.308	1.390	1.408	1.421	1.429	1.443	1.543	1.887	2.242	2.235	2.050	1.726	1.261	1.027
Investments in associates and jointly controlled entities	227	283	297	297	297	297	297	297	297	297	297	297	297	297	297
Investments in other companies	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Other receivables	99	112	114	119	124	132	142	146	181	213	247	291	327	359	374
Deferred tax assets	210	216	103	0	0	0	0	0	0	0	0	0	0	0	0
Other investments	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total non-current assets	**4.686**	**5.755**	**6.643**	**6.940**	**7.301**	**7.643**	**8.272**	**9.725**	**15.002**	**20.519**	**23.010**	**23.444**	**21.784**	**17.355**	**14.696**
Current assets:		635													
Inventories	1.229	1.570	1.466	1.490	1.557	1.649	1.785	1.832	2.266	2.677	3.100	3.646	4.101	4.500	4.686
Trade receivables	778	1.082	1.102	1.149	1.200	1.272	1.376	1.413	1.747	2.064	2.390	2.812	3.162	3.470	3.613
Other receivables	572	562	492	513	536	568	615	631	781	922	1.068	1.256	1.413	1.550	1.614
Other investments	2	5	6	6	6	6	6	6	6	6	6	6	6	6	6
Current income tax recoverable	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash and cash equivalents	-	-	203	510	800	697	677	427	322	380	440	518	583	3.206	7.346
Total current assets	**2.826**	**3.407**	**3.268**	**3.668**	**4.099**	**4.196**	**4.459**	**4.309**	**5.121**	**6.048**	**7.004**	**8.238**	**9.264**	**12.731**	**17.263**
Total assets	7.513	9.162	9.912	10.608	11.400	11.839	12.731	14.034	20.123	26.567	30.014	31.682	31.048	30.087	31.959
EQUITY AND LIABILITIES															
Equity															
Share capital	829	829	829	829	829	829	829	829	829	829	829	829	829	829	829
Share premium	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Translation reserve	(11)	28	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)
Other reserves	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193
Hedging reserves	(7)	(4)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Retained earnings	977	1.159	1.254	1.694	2.184	2.624	2.097	2.814	5.119	7.180	8.790	8.841	9.154	8.711	10.218
Interim dividend	(50)	(50)	(50)	(50)	(50)	(152)	(212)	(210)	(213)	(169)	(184)	(224)	(313)	(474)	(556)
Net profit attributable to equity holders	347	441	211	556	607	695	935	924	936	761	819	982	1.336	1.981	2.308
Equity attributable to equity holders	2.361	2.679	2.504	3.290	3.831	4.256	3.909	4.618	6.931	8.861	10.515	10.688	11.267	11.307	13.060
Minority Interests	27	32	55	892	1.746	2.603	3.571	4.149	4.149	4.136	4.140	4.152	4.179	4.228	4.253
Total equity	**2.389**	**2.711**	**2.559**	**4.182**	**5.577**	**6.858**	**7.480**	**8.767**	**11.080**	**12.997**	**14.655**	**14.840**	**15.446**	**15.535**	**17.313**
Liabilities															
Non-current liabilities															
Bank loans and overdrafts	1.047	1.412	1.683	1.970	1.656	903	822	722	1.503	1.489	5.628	6.103	0	674	0
New issued debt	-	-	680	0	0	0	0	0	1.952	5.215	1.282	398	3.406	0	0
Bonds	700	1.000	905	335	0	0	0	0	0	0	0	0	0	0	0
Other payables (eg: payments to shareholders)	370	321	187	501	510	522	502	469	373	350	405	477	536	589	613
Retirement and other benefit obligations	271	285	283	277	277	277	277	277	277	277	277	277	277	277	277
Deferred tax liabilities	57	84	72	60	48	36	24	12	0	0	0	0	0	0	0
Other financial instruments	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Provisions	153	156	209	265	326	396	485	575	1.064	1.819	2.671	3.589	4.554	5.335	5.674
Total non-current liabilities	**2.607**	**3.258**	**4.019**	**3.409**	**2.818**	**2.134**	**2.109**	**2.056**	**5.170**	**9.151**	**10.264**	**10.844**	**8.774**	**6.875**	**6.564**
Current liabilities															
Bank loans and overdrafts	422	616	755	0	0	0	0	0	0	0	0	0	0	0	0
Bonds	1	0	280	570	335	0	0	0	0	0	0	0	0	0	0
Trade payables	1.122	1.490	1.147	1.165	1.218	1.290	1.396	1.433	1.772	2.094	2.425	2.852	3.208	3.520	3.666
Other payables	971	1.034	1.145	1.163	1.214	1.285	1.388	1.425	1.755	2.043	2.366	2.783	3.130	3.434	3.576
Other financial instruments	0	8	6	6	6	6	6	6	6	6	6	6	6	6	6
Current income tax payable	0	45	0	112	233	264	351	347	340	276	297	356	484	716	834
Total current liabilities	**2.516**	**3.193**	**3.333**	**3.017**	**3.006**	**2.846**	**3.142**	**3.211**	**3.873**	**4.419**	**5.094**	**5.997**	**6.828**	**7.677**	**8.082**
Total liabilities	**5.124**	**6.451**	**7.353**	**6.425**	**5.823**	**4.980**	**5.251**	**5.267**	**9.043**	**13.570**	**15.359**	**16.842**	**15.602**	**14.552**	**14.646**
Total equity and liabilities	**7.513**	**9.162**	**9.912**	**10.608**	**11.400**	**11.839**	**12.731**	**14.034**	**20.123**	**26.567**	**30.014**	**31.682**	**31.048**	**30.087**	**31.959**

Appendix 21: Ratios forecast

Table 68: Profitability, solvency and per share ratios

Profitability analysis	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
EBITDA margin	6,94%	7,52%	6,14%	8,64%	8,73%	8,84%	8,99%	9,03%	9,36%	9,49%	9,66%	9,83%	9,94%	10,01%	10,04%
Return on Sales	2,90%	3,15%	1,43%	3,53%	3,69%	3,99%	4,97%	4,78%	3,93%	2,71%	2,53%	2,58%	3,12%	4,22%	4,72%
Gross Profit margin	8,49%	8,72%	8,74%	13,04%	12,96%	12,86%	12,72%	12,68%	12,38%	12,18%	12,03%	11,89%	11,80%	11,74%	11,71%
ROA	4,62%	4,81%	2,13%	5,25%	5,32%	5,87%	7,35%	6,58%	4,65%	2,87%	2,73%	3,10%	4,30%	6,58%	7,22%
ROE	14,53%	16,27%	8,43%	16,91%	15,84%	16,32%	23,92%	20,00%	13,50%	8,59%	7,79%	9,19%	11,86%	17,52%	17,67%
Return on Investment (ROI)	11,05%	11,49%	9,15%	12,84%	12,60%	13,01%	13,29%	12,43%	11,08%	10,02%	10,44%	11,82%	13,70%	15,62%	15,35%
ROC Employed	9,19%	10,71%	6,63%	11,20%	10,51%	10,62%	13,26%	11,54%	8,65%	6,12%	5,58%	6,15%	8,11%	11,92%	12,92%
Return on Invested Capital (ROIC)	7,61%	7,68%	3,10%	9,03%	10,42%	13,46%	19,77%	17,30%	9,01%	4,89%	4,70%	5,71%	9,11%	16,53%	17,67%
Dividend Payout Ratio	55%	38%	79%	30%	27%	59%	52%	45%	46%	39%	45%	75%	76%	78%	78%
Solvency analysis															
Cash Ratio	0,10	0,06	0,06	0,17	0,27	0,25	0,22	0,13	0,08	0,09	0,09	0,09	0,09	0,42	0,91
Current Ratio	1,12	1,07	0,98	1,22	1,36	1,47	1,42	1,34	1,32	1,37	1,37	1,37	1,36	1,66	2,14
Quick Ratio = Acid-test Ratio	0,63	0,58	0,54	0,72	0,85	0,89	0,85	0,77	0,74	0,76	0,77	0,77	0,76	1,07	1,56
Solvency ratio	14,0%	13,3%	9%	17%	20%	26%	26%	27%	19,5%	15,2%	16,7%	18,7%	23,2%	27,5%	28,2%
Per share ratios															
Revenue per share (€)	14,42 €	16,88 €	17,83 €	19,02 €	19,85 €	21,01 €	22,70 €	23,29 €	28,70 €	33,83 €	39,12 €	45,94 €	51,61 €	56,59 €	58,91 €
Operating Income per share (€)	0,55 €	0,77 €	0,53 €	1,03 €	1,06 €	1,15 €	1,53 €	1,51 €	1,69 €	1,63 €	1,68 €	1,91 €	2,37 €	3,22 €	3,72 €
Dividends per share (€)	0,23 €	0,20 €	0,20 €	0,20 €	0,20 €	0,49 €	0,59 €	0,50 €	0,52 €	0,36 €	0,44 €	0,89 €	1,23 €	1,86 €	2,17 €
EPS (€)	0,25 €	0,67 €	0,73 €	0,84 €	1,13 €	1,11 €	1,10 €	1,12 €	1,05 €	0,96 €	1,03 €	1,31 €	1,87 €	2,68 €	2,78 €

Appendix 22: Sales forecast by segment

Table 69: Projections – Sales by segment

	2009	2010	2011 E	2012 E	2013 E	2014 E	2015 E	2016 E	2020 E	2025 E	2030 E	2035 E	2040 E	2045 E	2048 E
Sales & Services IFRS	**12.008**	**14.064**	**14.786**	**15.420**	**16.112**	**17.074**	**18.472**	**18.964**	**23.451**	**27.705**	**32.088**	**37.743**	**42.449**	**46.579**	**48.504**
Non Recurrent Events	(48)	(66)	0	0	0	0	0	0	0	0	0	0	0	0	0
Sales & Services (adjusted)	**11.960**	**13.998**	**14.786**	**15.769**	**16.461**	**17.422**	**18.821**	**19.312**	**23.799**	**28.053**	**32.436**	**38.092**	**42.797**	**46.927**	**48.852**
Exploration & Production	168	214	444	584	824	1.234	2.154	2.222	4.461	5.409	5.836	6.757	5.796	3.144	375
Refining & Marketing (R&M)	10.620	12.388	12.553	13.093	13.544	14.096	14.575	14.998	17.247	20.552	24.508	29.243	34.910	41.691	46.385
Gas & Power (G&P)	1.425	1.832	2.008	1.961	1.961	1.961	1.961	1.961	1.961	1.961	1.961	1.961	1.961	1.961	1.961
Others	111	131	131	131	131	131	131	131	131	131	131	131	131	131	131
Consolidation adjustments	(363)	(502)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)	(348)

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