
THE OIL COMPANIES' APPROACH TO RENEWABLE ENERGY

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SUMMARY

The research for this thesis, submitted in May 2009, focuses on the reasons for oil companies investing (or not) in renewable energy.

During the research stage companies representative of the oil and gas (O&G) market were analyzed. The companies were selected from rankings performed by *Petroleum Intelligence Weekly* and *Platts*. The companies are: BP, Chevron, CNPC, ConocoPhillips, Eni, ExxonMobil, Gazprom, NIOC, PDVSA, Rosneft, Saudi Aramco, Shell, StatoilHydro and Total. Of these fourteen companies, ten accepted the invitation to participate in this study and provide invaluable information.

This study has one distinctive difference from other previous published studies. In the past studies about oil companies' strategies related to climate change have compared only the so called "western" companies such as BP, Shell and ExxonMobil. Furthermore, this study analyses the biggest oil companies independently from their location. This is more significant if we take into consideration the companies with more relevance in the market in terms of O&G reserves or production, for instance Saudi Aramco, NIOC or Gazprom.

To sum up, climate change, energy security and business opportunity are considered important drivers for renewable energy investment. However, these drivers are perceived differently by companies. Each company is unique and their strategy is defined by taking into consideration a combination of internal and external factors. The most influencing factors in an oil company's approach to renewable energy were found to be: technological development, governmental policy and the relation between the government and the company.

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1. INTRODUCTION

History shows how energy is a strategic issue regarding economy and power. The use of renewable energy is much older than oil. However, renewable energy only became an important issue for a majority of developed nations after the oil shocks in 1973 and 1979. In recent years there has been huge technological development with associated decreasing of costs, occurring in several renewable energy types.

Renewable energy is, somehow, a substitute of fossil fuel since it is an alternative applied to certain situations. It is expected that the absolute demand of renewable energy will increase around 50% until 2030 EIA (2008). In this sense renewable energy can eventually be seen as a threat or an opportunity for an oil company.

Another important issue to take into consideration is climate change. The burning of fossil fuels is one of the main causes of global warming and oil companies are seen as important players in this.

To sum up...

- Are the relevant O&G companies in the world market investing in renewable energy?
- What are the most influential factors for companies to invest (or not) in renewable energy?

This research was performed for a master thesis, submitted in May 2009. In the past studies about oil companies' strategies related to climate change have compared the so called "western" companies such as BP, Shell or ExxonMobil. This study analyses the biggest oil companies independently from their location.

2. METHOD

"The oil companies' approach to renewable energy" research was based on a qualitative method and both primary and secondary data were used.

A comprehensive literature review was performed and the most relevant companies of the world market were invited to provide information. An objective criterion was used to select the companies: a top ranking of O&G companies performed by well-known entities in the sector - the *Petroleum Intelligence Weekly*¹ and *Platts*².

In table 1 the top O&G company rankings are presented. Fourteen companies were selected. Although many of these companies are multinational, the location of the mother company is presented in figure 1.

¹ Ranking based on operational criteria (reserves and production of O&G, product sales and distillation capacity).

² Ranking based on financial performance (asset worth, revenues, profits, and return on invested capital).

Table 1: Top ranking oil companies

Company	Ranking of <i>Petroleum Intelligence Weekly</i> based on operational criteria	Ranking of Platts based on financial performance
Saudi Aramco	1	Not ranked ³
NIOC	2	Not ranked
ExxonMobil	3	1
PDVA	4	Not ranked
CNPC	5	9
BP	6	5
Shell	7	2
ConocoPhillips	8	14
Chevron	9	4
Total	10	3
Rosneft	16	6
Eni	21	7
StatoilHydro	26	8
Gazprom	13	10

Source: Platts (2009) and PIW (2008)

Figure 1: Headquarters location of O&G companies⁴

Of the fourteen companies selected, ten accepted the invitation to participate in this study and provide information directly through a brief questionnaire or telephone conversations. The companies are Gazprom, PDVSA, Saudi Aramco, StatoilHydro, and six others that preferred to remain anonymous.

The analysis was carried out using the information directly provided by the companies, the information found in the literature review and the information on the internet.

³ Some companies were not ranked by Platts due to the lack of data.

⁴ Map constructed by using the link http://www.ammap.com/visited_countries/

3. RESULTS

3.1 General overview

Table 2 summarizes the companies' status regarding investment in renewable energy

Table 2: O&G companies investment in renewable energy

INVESTMENT						NO INVESTMENT
Wind	Solar	Biofuel	Geothermal	Hydro, Tidal, Wave	Research	
BP PDVSA Shell, StatoilHydro	BP Chevron Shell StatoilHydro Total	BP CNPC ConocoPhillips PDVSA Shell StatoilHydro Total	Chevron CNPC	StatoilHydro	BP Chevron ConocoPhillips ExxonMobil ENI Shell StatoilHydro Total	NIOC Gazprom Rosneft Saudi Aramco ⁵

As can be seen the O&G companies have different approaches to renewable energy. There are companies that are not investing in renewable energy such as NIOC, Gazprom, Rosneft and Saudi Aramco. There are also companies that focus their investment only in research such as Exxon Mobil and ENI. Moreover, there are companies that spread their investment in multiple technologies such as BP and StatoilHydro and there are companies that focus their investment in just one technology such as ConocoPhillips.

The majority of companies that participated in this study preferred not to provide investment data, and investment in renewable energy is not commonly categorized individually in company's reports. However, some data was obtained. The highest value for investment in renewable energy collected corresponds to 4% of total company investment. There are companies that invest around 0.5% of the total investment in renewable energy, and others less than 0.1%.

When asked of the issues on which a company bases its investment in renewable energy all the respondents from the companies selected "*climate change*" as an answer and a large proportion of the companies selected "*energy security*".⁶ However, there is one additional driver that has seldom been mentioned in the literature regarding an oil company's behavior. StatoilHydro and two other companies argued for another reason to invest in renewable energy: building a new business platform.

In fact, when asked about the most important aims of the company when investing in renewable energy, almost all the companies selected the item "*Direct and long term profit in renewable energy business*"⁷ a

⁵ Saudi Aramco mentioned however the use of renewable energy in some of their operational applications such as solar panels to power cathodic (anti-corrosion) protection systems on pipelines since they are far from a traditional power source.

⁶ 5 selected answers by respondents from 7 companies that invest in renewable energy.

⁷ 6 selected answers by respondents from 7 companies that invest in renewable energy;

significant share of companies selected “*Direct and short/medium term profit in renewable energy business*”⁸. Also a significant share of companies selected the item “*Diversify the activity portfolio*”¹⁰.

PDVSA also specified another driver: better power distribution in backward regions away from the power net. This is related to the amount of population that does not have grid connection in this country. In this study this aspect is included in the energy security factors.

The approach of oil companies to renewable energy is like a puzzle.⁹ Figure 2 shows the major pieces of that puzzle. However, what are the main home country and specific firm factors? That is going to be discussed in the following sections.

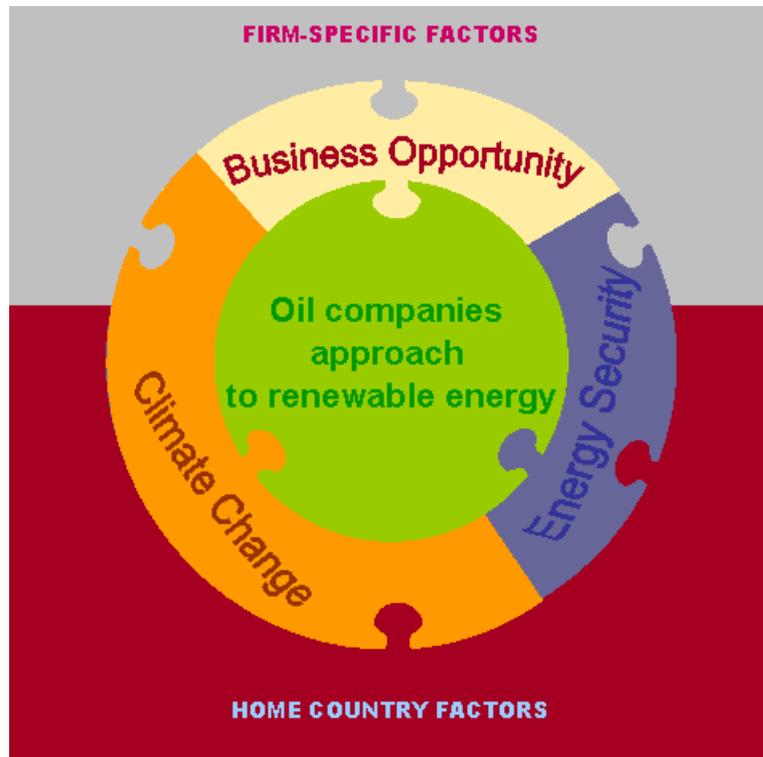


Figure 2: Main drivers for O&G companies approach to renewable energy

3.2 Home country factors

Table 3 summarizes the relevant information in order to evaluate the influence of home country factors.

⁸ 5 selected answers by respondents from 7 companies that invest in renewable energy.

⁹ Skjærseth & Skodvin (2001) mention this idea concerning the climate strategies;

Table 3: Home country factor analysis

Company	Invest in renewables?	Energy net importer?	Renewable targets?	Signed the Kyoto protocol?	GDP per capita world ranking	Country
StatoilHydro	Yes	No	Yes	Yes	3	Norway
Chevron ConocoPhillips ExxonMobil	Yes	Yes	Yes	No	6	USA
Shell	Yes	Yes*	Yes	Yes	9***	UK/ Netherlands
BP	Yes	Yes	Yes	Yes	18	UK
Total	Yes	Yes	Yes	Yes	23	France
Eni	Yes	Yes	Yes	Yes	27	Italy
Saudi Aramco	No	No	No	Yes	37	Saudi Arabia
Gazprom Rosneft	No	No	Yes**	Yes	52	Russian Federation
PDVSA	Yes	No	No	Yes	64	Venezuela
NIOC	No	No	Yes	Yes	71	Iran
CNPC	Yes	Yes	Yes	Yes	100	China

Source of the Status of ratification of the Kyoto protocol: UNFCCC (2009).

*Netherlands is a net importer of oil, not gas;

** Targets set in 2009;

*** Related to Netherlands

Country resources

Taking into consideration the countries with renewable targets found in REN21(2008) their dependency on foreign oil/gas was researched. It was found that in a sphere of 65 countries that have renewable targets, 88% of them are net importers of oil, gas or both. Therefore, I conclude that there is no doubt that net energy importer countries are the ones most interested in renewable energy.

Table 3 also suggests that there is a relation between country net energy status, country renewable targets and investment in renewables by the company. For instance France, the UK and Italy are net energy importers and have renewable targets and at the same time Total, BP and Eni invest in renewable energy. Conversely, Saudi Arabia is an energy exporter; it does not have renewable targets and Saudi Aramco does not invest in renewables. However, this does not apply to all cases so there is not a direct relation. In fact, other aspects have to be taken into account. To start with, the net energy importers are not the only countries interested in renewables.

Iran, for instance, is an energy exporter and has targets in renewable energy. The question “*Why Renewable Energy?*” is answered by the Iranian Ministry of Energy (2004) by the following:

- *To be in line with the world efforts to curb the world environmental problem;*
- *To improve energy accessibility for remote and isolated places in the country;*
- *To pave the way, among other things, for controlling urban air pollution.*

Also, in exporter countries, the less oil that is consumed the more oil there is available to export. I believe this has more importance in countries witnessing a decrease in oil resources. Within the countries in analysis the oil producers that are considered to be in decline are the USA, Norway, the UK and to a lesser extent Venezuela.

National policies

Table 3 shows which countries of the panel have renewable energy targets.

Saudi Arabia

I did not find renewable quantified targets defined by the Saudi Arabia Government, the country where most of the world's oil reserves are located. However, I perceive that significant development in renewable energy might occur in the medium term as shown below.

According to Dargin (2009) the TREC - trans-Mediterranean renewable energy cooperation, will build a super-grid powered by concentrated solar thermal power plants, mostly situated in Saudi Arabia. Much of the electricity is planned to be carried by long distance power transmission lines to Europe.

Sitting in the center of the "Sun Belt", Saudi Arabia has huge solar resources. Oil Minister Ali al-Naimi said recently, "*The world's largest oil exporter also hopes to be the world's leading solar power provider someday*", suggesting the solar sector would broaden the economic base of the kingdom (Lynn & MacInnis, 2009).

However, according to information provided for this study, Saudi Aramco is not planning to invest in renewable energy since it is not their core business. This is going to be further discussed in the section "Ownership structure and access to resources".

Iran

Iran has significant renewable sources such as sunlight and high force energy. Iran has national renewable targets and has been making some strides in the area. The Renewable Energy Organization of Iran (SUNA) was created to focus on renewable energy. According to the Iran Daily (2009), the Minister of Energy said that the country supports the use of renewable energy and alternatives citing "*In future, alternative energy sources will be greatly developed in the country. The growth of investments in this sphere is expected.*"

Again, the reason for NIOC not investing in renewable energy is going to be discussed in the "Ownership structure and access to resources" section.

Venezuela

Although Venezuela does not have formal targets, there is a national plan. The National Development Plan (2007-2013) has the general outlines of objectives for the renewable energy sources, environmental

sustainability and the research applied by technologies such as wind energy, biomass, solar energy, small hydraulic, geothermal power, as well as research in atomic energy (Rodríguez, 2008).

Russia

Russia, the actual biggest producer of oil and gas and where the biggest reserves of gas are located, set a milestone. According to Gati & Ivanov (2009), on January 8, 2009, Prime Minister Vladimir Putin signed an executive directive, which sets specific renewable targets with regard to electricity generation: 1.5% in 2010, 2.5% in 2015, and 4.5% by 2020.¹⁰

Even though these targets are not ambitious in terms of value, it is a relevant signal. Russia also ratified the Kyoto Protocol, which was critical for it to come into force, especially after the USA pulled out. According to Gati (2008), Russia is making clear its intention to play a significant role in the international effort to address climate change. The new policy has a huge relevance since Russia is both a large energy exporter and the third largest CO₂ emitter of fossil fuel after China and the USA (Gati, 2008).

Russia has significant potential in renewable energy. Gati (2008) mentions that there are some reasons why this country has lagged behind in the development of the sector. They have huge hydrocarbon (oil and gas) resources, a lack of a requisite legal structure, low domestic energy prices and weak economic incentives.

Both Russian companies contacted within this study, Gazprom and Rosneft, do not invest in renewable energy. Although Gazprom stated they are planning to invest in renewable energy. Arranging for and conducting investigations into renewables including hydrogen energy is listed in their plans to achieve its strategic goals in the environmental area and is stated in their Environmental Policy.

China

In China, the economic growth of this highly populated country and the reliance on the use of coal as a source of power have been causing worldwide concern over their GHG emissions. Also, at the present time energy security is an extremely important issue for China. I believe these are the main reasons why they are expanding further into renewable energy. That is corroborated by Liu (2008) *“never has it been so urgent for China to find clean energy alternatives and expand their share in the total energy mix”*. This source also cites... *“Indeed, this is happening on the ground. A combination of government policies and the market has recently driven a renewable energy boom in China. It shows how state policies can encourage and sustain the development and expansion of industries for a new market niche...”*.

For Liu (2008), China’s landmark renewable energy law, which was passed in 2005 and came into effect at the start of 2006, together with a series of implementation regulations, has caused an immediate increase of

¹⁰ The renewable electricity production corresponds approximately to 1% (Gati & Ivanov, 2009). These shares do not include hydropower.

several renewable energy sources including biomass, solar photovoltaic and wind. It has also promoted the expansion of others such as hydropower and solar hot water where China is already a world leader.

U.S.A.

Being a rich country, the United States of America has been criticized for their global environmental policy. The USA is the only country of this panel that did not ratify the Kyoto protocol. At the time of the present research, national renewable targets were found but only applied to biofuels.

In addition, although the companies with headquarters located in the USA invest in renewable energy, this investment is not so substantial when compared to companies from countries in the EU. That is shown in the previous section - ExxonMobil focuses only on research; ConocoPhillips only has commercial projects in biofuel and Chevron in solar and geothermal energy.

However, with the new leadership things are expected to change and according to Yergin (2008), Barack Obama, the actual president of the USA, mentioned energy as the “priority number one”.

"So we have a choice to make. We can remain one of the world's leading importers of foreign oil, or we can make the investments that would allow us to become the world's leading exporter of renewable energy. We can let climate change continue to go unchecked, or we can help stop it. We can let the jobs of tomorrow be created abroad, or we can create those jobs right here in America and lay the foundation for lasting prosperity."

Barack Obama
(March 19, 2009)

Source: The White House (2009)

Please see the *additional notes* for more details about the USA in comparison to their European counterparts.

EU countries and Norway

All the above mentioned countries belonging to the EU have renewable targets. It is well known that the EU has a strong policy regarding this issue and related ones. For instance, the 20-20-20 plan accounts for the following energy and climate targets for the year 2020: a 20% improvement in energy efficiency, a 20% reduction in greenhouse gas emissions and a 20% share for renewables in the EU energy mix, including a 10% of biofuel.

Although Norway does not belong to the EU, it is an important energy exporter. Moreover, the government has shown a huge interest in renewable issues. Targets to be carbon neutral within 2030 were set, with 2/3 of the reductions performed within the country's borders (SFFE, 2009).

To note that Norway is traditionally a clean electricity producer since hydroelectric power corresponds to about 99% of electricity production. This share is confirmed by SFFE (2009).

With such a percentage of renewable power production and being an energy net exporter, what is driving Norway to renewable energy? Increasing demand, high dependence on weather conditions (hydroelectricity is highly dependent on rain precipitation) and climate change can be the reasons argued.

To sum up, Massabié (2008) cites “*as a rule, Europeans oil companies are more enthusiastic about renewable energy sources*”. In fact, in this research it is also confirmed that “European companies” have a much stronger investment in renewable energy, which applies to several technologies in the case of StatoilHydro, Shell and BP.

Additional Notes

Considering all the aspects that were mentioned, I conclude that the commitment in renewable energy is an increasing general trend through national policies. I also believe that the extent to which this is being done highly influences O&G companies’ behavior.

Europe, where the strongest policies exist regarding both climate change and renewable energy, is also where companies such as BP, StatoilHydro, Shell and Total originate. The USA policy over the last years is deemed far less ambitious and has been characterized as uncertain. That is an important aspect that explains, at least partially, the lower investment in renewable energy of Exxon Mobil and even Chevron and ConocoPhillips compared to their Europeans counterparts. To note as well, that national policies cannot be seen as an isolated procedure. In other words, interaction between oil companies and the government occurs and this interaction is different between the two sides of the Atlantic Ocean.

Comparing these two blocks of the so called western world, companies have a different role in election procedures and have a different position when it comes to contesting government policy. In the USA the oil companies’ influence on national climate change policy is much more significant than in Europe. In the latter, there is a bigger distance between the regulator and the regulated entity.

I believe that this factor has had a significant influence in the actual behavior of O&G companies. European companies are more proactive on climate change and have invested more in renewable energy than the ones from the USA. The future will witness how far the new USA administration’s approach will affect oil companies’ behavior regarding renewable energy.

In other cases, the influence on national policies by oil companies has to be studied on another perspective. The analyzed oil companies from Venezuela, Saudi Aramco, Iran and China are state owned. That leads to the fact that those who formulate policies are the ones (or are very close to the ones) that are regulated by those policies.

Within this research, and by direct contact with the companies, when asked “*What other factors have been strongly influencing renewable energy investment*” almost all the companies selected the option “*Governmental targets and incentives*”.¹¹

Renewable targets or other national policies regarding renewables seem indeed to be a highly influential factor on O&G company approach to renewable energy.

Social demand for environmental protection

It is to be expected that countries with a higher GDP per capita or a higher level of democracy level have a higher social demand.

The Nielsen Company and Oxford University’s Environmental Change Institute conducted a global online survey in April 2007 on the topic of climate change. Table 4 shows the results for the countries of the researched panel. The results show the percentage of respondents that consider global warming to be the biggest and 2nd biggest concern in the following 6 months. European countries are the ones that have higher concerns about global warming. Within this panel China and the Russian Federation are the ones that have the least.

Table 4 – Global warming survey

Country	Global warming 1°-2° concern
France	32%
Norway	27%
Italy	17%
Netherlands	15%
UK	15%
USA	13%
China	9%
Russia Federation	3%
Saudi Arabia	Not included
Venezuela	Not included
Iran	Not included

Source: Nielsen (2007)

To note that according to Nielsen (2007), a significant evolution occurred in the USA. In October 2006, only 6% of people registered climate change as a major concern but this value attained 13% in April 2007. I believe that could be a consequence of the Al Gore documentary “An Inconvenient Truth”. The film was released on DVD on November, 2006.

In general, companies that invest in renewable energy are the ones originating in countries that have higher global warming concerns. In fact, companies such as Total (France), StatoilHydro (Norway), ENI (Italy), BP (UK), Shell (UK, Netherlands) invest in renewables. Gazprom and Rosneft located in Russia do not invest and in this country the global warming concerns are lower compared to other countries. One would say that there is in fact a relation between the above mentioned factors, but this does not explain everything. For instance, BP invest more in renewable energy than Total but according to table 4, global warming is a subject of more concern in France than in the UK.

¹¹ 6 selected answers from 7 company respondents that invest in renewable energy;

Also, when the direct contacts with companies were asked “*What aims do the company consider more important when investing in renewable energy?*” four companies selected the option “*Cope with social demand for environmental protection*”.¹² However, within those four companies, two of them selected this factor within several further factors, which diminishes its importance. This issue is going to be discussed in the chapter “Corporate social responsibility and reputation”.

Finally, social demand for environmental protection can influence companies indirectly through governmental policies. Those are definitely influenced by high social demands and pressures in places where this occurs. In fact, Europe, where global warming concerns are higher, is also where climate policy has been characterized to be more progressive.

3.3 Firm specific factors

The country of origin is not the only factor that leads to strategic heterogeneity regarding renewable energy within O&G companies. Each company is unique as they have their own history, structure, resources and culture and are likely to respond differently to pressures (or potential opportunities).

Corporate social responsibility and reputation

M&E (2008) performed the study “World’s Most Sustainable and Ethical Oil Companies 2008” measuring the oil industry companies’ compliance with standards in sustainability, CSR, corporate governance and ethics. Most of the companies analyzed in this research were ranked in the M&E study. Table 5 shows the mentioned ranking combined with information about investment in renewable energy.

It seems that the most sustainable companies invest in renewables although this kind of analysis has to be performed with caution since saying that they invest in renewable does not state the extent of investment.

Table 5 – Sustainable ranking & renewables

Company	Ranking M&E	Invest in renewables?
Petrobras	1	
Total	2	Yes
BP	3	Yes
StatoilHydro	3	Yes
Shell	5	Yes
Eni	6	Yes
Repsol	7	
OMV	8	
Chevron	9	Yes
ConocoPhillips	10	Yes
ExxonMobil	11	Yes
Pemex	12	
Marathon	13	
Lukoil	14	
ENAP	15	
Gazprom	16	No
Petrochina (CNPC)	17	Yes
ADNOC	18	
Saudi Aramco	19	No
PDVSA	20	Yes
Rosneft	Not ranked	No

The company contacts revealed a surprising disclosure regarding this issue. When asked “*What aims do the company consider more important when investing in renewable energy?*” it was expected that most of companies would select “*Corporate social responsibility / company reputation*”. However, that did not

¹² 4 selected answers by respondents from 7 companies that invest in renewable energy.

happen. Only three companies selected these issues, and two of them selected many more aims so that diminishes its importance. Also, as stated before the level of answers “Cope with social demand for environmental protection” were not high either.

The research located an article regarding CSR in oil companies that expresses similar surprise. The authors, Boasson & Wettestad (2007), cite the following: “A great deal of our informants was surprised over us approaching them about climate change and CSR in conjunction. As one of them stated “You have to recognize that climate issues have moved out of what is classified as CSR. This is due to its rising importance. All companies treat this issue seriously”.

CSR and company reputation is not perceived (or not argued) as having huge importance in when it comes to an oil company’s approach to renewable energy.

Ownership structure and access to resources

Table 6 shows the shareholding structure of the companies within the panel of this research and table 7 the ranking of oil and gas reserves according to Petroleum Intelligence Weekly (PIW, 2008);

Table 6: Companies shareholding structure

SHAREHOLDING STRUCTURE		
Free floated capital 100%	Partial state owned (% state share)	Totally state owned
BP Chevron ConocoPhillips ExxonMobil Shell Total	ENI (30%) Gazprom (50.002%) Rosneft (plus than75%) StatoilHydro (66.5%)	CNPC NIOC PDVSA Saudi Aramco

Source: websites of the companies

Table 7: Companies O&G ranking

OIL RESERVES		GAS RESERVES	
1	Saudi Aramco	1	NIOC
2	NIOC	3	Gazprom
5	PDVSA	4	Saudi Aramco
8	CNPC	5	PDVSA
10	Rosneft	12	CNPC
14	Exxon Mobil	13	Exxon Mobil
16	BP	16	BP
18	Gazprom	17	Shell
21	Chevron	20	Total
22	ConocoPhillips	21	ConocoPhillips
25	Total	22	Rosneft
26	Shell	24	Chevron
32	Eni	25	StatoilHydro
39	StatoilHydro	26	Eni

Source: PIW (2008)

In general, the totally state owned companies are the ones that have bigger reserves of oil and gas (Saudi Aramco, NIOC, PDVSA, and CNPC). These are also the companies that do not invest or have a lower extent of investment in renewable energy.

That does not mean that their countries do not have interests in renewable energy. That has already been described in this document. In fact, according to information provided by Saudi Aramco, within this study, the company is not planning for renewables but there are other national entities that are (and will) be focused on that. For instance, R&D in solar energy is centered in King Abdullah University of Science & Technology, whereas, Saudi Aramco is focused on fossil fuels.

NIOC also do not invest in renewable but Iran is investing in the area as shown before. PDVSA invest in wind and ethanol but also mentioned that other investments, for instance in hydroelectricity, are performed by other national entities.

I would say that governments distribute roles to their state owned entities. In the case of Saudi Arabia and Iran renewable energy was allocated to entities other than the oil companies (Saudi Aramco and NIOC) as it is not their core business. In the case of Venezuela and China renewable energy is only partially allocated to PDVSA and CNPC.

Ownership structure seems to be a relevant issue in the oil companies approach to renewables.

3.4 Other aspects

It is very important to highlight that the development of technologies was mentioned by all the companies contacted within this research as a factor that has strongly influenced renewable energy investment.

The costs of renewable energy are a hindrance to a stronger expansion of renewable energy. However, costs are reducing hugely, which is primarily due to technological development. This leads to their economic viability and competitiveness with fossil fuel. This is an important factor for the development of renewables in general and for the investment in renewables by oil companies since it expands their opportunity of business. In addition, state owned companies have benefits in this, especially when their driver is to provide energy in backward regions.

At the present time there is sufficient information to complete the puzzle of the section 3.1. Figure 3 shows the main drivers and factors that most influence O&G companies approach to renewable energy.

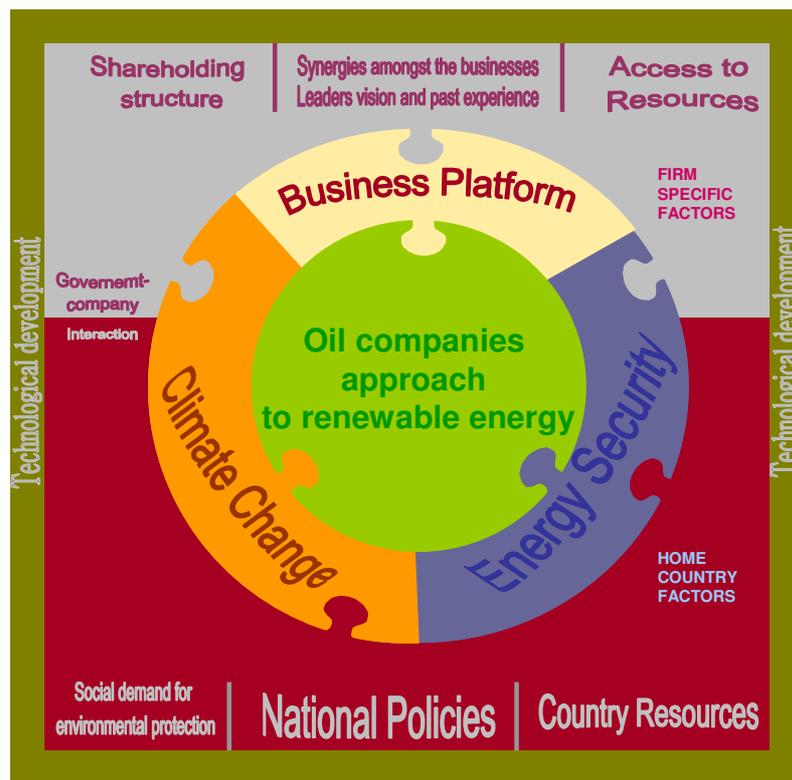


Figure 3: Main drivers and factors for O&G companies approach to renewable energy

4. CONCLUSION

I conclude this paper with a brief answer to the following questions:

1. Are the relevant O&G companies in the world market investing in renewable energy?

By focusing the analysis on the 14 top ranking O&G companies it was possible to verify different approaches. There are companies that at the present time do not invest in renewable energy such as NIOC, Gazprom,¹³ Rosneft and Saudi Aramco. Some enterprises spread their commercial investment in multiple technologies such as BP and StatoilHydro, others focus their commercial investment in one technology such as ConocoPhillips. Also there are multi-nationals that focus this investment only on research such as Exxon Mobil and ENI.

The highest value for investment in renewable energy collected corresponds to 4% of total company investment¹⁴. There are companies that invest around 0.5% of the total investment in renewable energy, and others less than 0.1%.

¹³ To note, however, that Gazprom plans to conduct investigations in this area, including hydrogen energy.

¹⁴ The majority of companies preferred not to provide investment data.

2. What are the most influencing factors for companies to invest (or not to invest) in renewable energy?

The most important drivers to invest in renewable energy are climate change, business opportunity and energy security issues. However, these drivers are perceived differently by companies. Each company is unique and their strategy is defined by taking into consideration a combination of internal and external factors. The most influencing factors in an oil company's approach to renewable energy were found to be: Technological development, Governmental policy and Government-company relationship.

Technological development

It is well-known that technological development leads to reducing costs. Technological advances in renewable energy promote economic viability and competitiveness with fossil fuels. This is an important factor for the development of renewable energy in general and for the investment in renewables by oil companies since it expands their opportunity of business. The driver for the opportunity of business is expected to be more relevant to international oil companies. However, state owned companies also have benefits in technological developments due to the respective reductions in costs - for example, when they provide power in backward regions.

Governmental policy

Targets and other renewable energy policies are mushrooming worldwide, including in developing nations. No doubt, net energy importer countries are the ones most interested in renewable energy. However, several energy exporter countries already have policies in this area as well, even if some are not ambitious. Examples of net energy exporter countries that have renewable targets are: Norway, Russia and Iran. The importance of climate change is definitely a relevant issue that explains, at least to some extent, their legislative positions.

Moreover, some countries, well-known for their vast fossil reserves, are also "blessed" by huge renewable sources. Today, the majority of these countries have a minor role in renewable energy worldwide but it is not to be overlooked because in the future, countries in the Middle East could become leaders in this area.

The truth is that stronger climate change policy leads to stronger investment in renewable energy. The EU and Norway are progressive towards climate change policy. This has repercussions in the way "European" oil companies like BP, StatoilHydro, Shell and Total approach renewable energy as they have a more aggressive position compared to other relevant companies in the world market.

Government-Company relationship

The vast majority of companies with the largest reserves of oil and gas are totally state-owned (Saudi Aramco, NIOC, PDVSA, and CNPC) or partially state owned such as Gazprom and Rosneft. Also, these are the companies that do not invest (or invest to a lower extent) in renewable energy, compared to other international oil companies. As mentioned before that does not mean that their governments are not interested in this issue. However, in these countries renewable energy is often addressed by entities other than oil

companies. I would say that countries with huge O&G reserves tend to focus their state-own oil companies only on fossil fuels.

Apart from the shareholding structure there is another aspect regarding government-company relations that has to be mentioned. Oil companies can also influence national policy and the distance between the regulator and the regulated is not the same in the two continents. In the USA oil companies have had a higher influence on climate change policy than in Europe.

Conducting research into an oil company's approach is like playing with a puzzle.¹⁵ More than that, I would say it is like playing a live puzzle since interests, knowledge, technology and available resources are in an expanding change over time. It would be interesting to read a similar study in 10 years time. I believe huge differences would be found compared to what is described here.

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¹⁵ Skjærseth and Skodvin (2001) mentions "The striking differences in the climate strategies of the large oil companies thus represent a puzzle" I benchmark the idea applying it to renewable energy.

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