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Earth, Wind and Fire
Shell's Green Policy

Universiteit Maastricht
Faculty of Economics and Business Administration

Maastricht, 09-12-2002
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Final Writing Assignment Economics and Business

Would it not be great to have energy without pollution? Nowadays global economy is based on the use of fossil fuels, these are the main sources of CO2 emission. This can not be sustained because of the finite of these resources. One day we will run out of oil. It may be in fifty years or within 300 years. Either way new sources of energy must be developed to replace fossil fuels.

Shell is one of the major players in the market of research, development and production of "green" technology. These technologies are able to extract energy from environmentally save resources instead of the conventional burning of fossil fuels. The question arises whether Shell should keep investing in this unknown and developing new market.

This problem will be looked at with a macro-economical view. It can be divided into four different categories. Political, Economical, Social cultural and Technological or in other words a PEST-analysis.

First, the technological environment will be analysed starting with the availability of oil and the strategy for Shell. What are the new technologies and development involved to produce environmental friendly energy and how Shell improved his oil production. In addition, the differences between the OPEC oil companies and Shell, as an international company will be discussed and if a cooperation between OPEC and Shell would improve the green strategy.

In the piece of social cultural factors, we will discuss the importance of the "green" company image and the benefits of producing in regions with lower skilled and educated population. Next to that we will briefly discuss the risks of social cultural differences and de middle-eastern conflict.

In the economic part the advantages and disadvantages of investing in renewable resources of energy will be discussed. First the advantages will be explained and after that the reasons not to invest. These contradictorily elements will be evaluated and out of this evaluation a solid green strategy can be extracted.

In the last part the political elements are going to be analysed. First externalities are explained and their impact on Shell's strategy. Then their sustainable development policy is discussed. An after that the political policies of oil producing countries and their impact on Shell's search for renewable energy.

Oil has become a vital part of industry, agriculture, and the fabric of society at large. The use of oil has changed world economies, social and political structures, and lifestyles. Oil is the main energy recourse for almost half a century. But oil is a finite resource, and we are using it at an exponential rate. There will soon be a post-petroleum paradigm.

(Abernethy, 1993). What problems lie ahead in adjusting the recent oil production for Shell and how to create an environmental friendlier energy policy? Concerns about climate change together with environmental pollution problems could arise the question of putting in a green strategy for Shell?

First, the limited availability of oil will be discussed and how this affects the strategy of Shell. When will the oil production peak and the supply decline, taking the presence of the growing world population into account.

Secondly, The possible alternatives to oil and its close associate, natural gas, are also examined. What are Shell's new techniques in developing substitutes for oil and gas.

Moreover, we will look for the developments in the oil production, in other words what are the new technologies in transportation, refining and the exploration of oil and how could they affect a green strategy for shell.

Finally, we will examine the difference between international oil companies and national oil companies in OPEC countries. What are the advantages for Shell, as an international oil companies, to cooperate with OPEC countries. On the other hand what are the main difficulties of a joint venture with the national OPEC companies.

Although some economists still enjoy insisting that oil is inexhaustible, geological authorities are increasingly expressing the belief that this resource is glaringly finite in an economic sense. As a result oil supplies are limited. Every year for the past two decades the industry has pumped more oil than it has discovered. From an economic perspective, when the world runs completely out of oil is thus not directly relevant: what matters is when production begins to taper off. Beyond that point, prices will rise unless demand declines commensurately (Colin J. Campbell 1998).

Soon, experts say, world oil production will reach an all-time high, a peak. Then, after a short plateau, it will decline forever. Beyond 2005, the energy required to find and extract a barrel of oil will exceed the energy contained in the barrel (Randy Udall 1998). So based on this statement the question arises what are the changes Shell has to create. With the present rate of population growth, when oil supplies are essentially depleted, the world population will be considerably larger than at present, perhaps even double of what it is

today.

(predictions of annual oil production) From:
There is a finite limit, by Ivanhoe and Hubbert, 1995.

Present society seems to come to the comfortable conclusion that no great problems can now overtake us. The thought that "Scientists will think of something" is a popular public gesture by which to ignore this fact. Shell is aware of this fact; Philip Watts, Chairman of the Committee of Managing Directors declares in his speech in December that Shell is aware of the future oil problems and ultimately the renewable must fill the gap left by the depletion of oil. The nonrenewable energy beyond oil which include hydro-electric power, coal, nuclear and gas energy will be gone. This direct to the next paragraph in which the exploration for alternative sources begins.

In 1973 and 1979 a couple of sudden price increases impolitely awakened the industrial world to its dependence on cheap crude oil. The economic perspective makes use of the Scarcity Principle; all recourses are limited (van der Linde, 2000). On long term there's no other solution than searching for substitution recourses. All possible economic energy sources will have to be used, but replacing oil in its great energy use versatility probably will not be completely possible. There is no acknowledged complete substitute for petroleum in its many and varied uses (Youngquist, 1997). The illustrious British scientist, Sir Crispin Tickell (1993), expresses a similar view: "... we have done remarkably little to reduce our dependence on a fuel [petroleum] which is a limited resource, and for which there is no comprehensive substitute in prospect" Alternatives to petroleum can be grouped into renewable and nonrenewable sources. Renewable energy technologies that have the potential to provide future energy supplies include: biomass systems, hydroelectric systems, hydrogen fuel, wind power, photovoltaic, solar thermal systems, passive and active heating and cooling systems.

(the five
core businesses of Shell Group. From the www.shell.com, 2002)
For over 100 years, Shell has been involved in the worldwide production and development of renewable energy sources. The Shell Research and Technology Centre is researching on oil and petrochemical products and processes. In recent times they are focusing more and more on sustainable energies like for instance solar or hydrogen. The importance of sustainable energy for the future is high however economic activity can be sustained over time only if its use of natural recourses is limited to the rate at which it can be regenerated (Haslam, 2000). Indeed, oil is a non-sustainable good, therefore shell has a role to ensure that its activities are undertaken in a sustainable manner. Shell invested considerable amounts in renewable. The use of solar and wind energy is expected to grow. This assessment of alternate technologies confirms that solar and wind energy alternatives to fossil fuels have the potential to meet a large portion of future (Economic Pimentel, 1994). The costs of providing solar energy have fallen by more than 50% over the last 10 years. That downward cost trend continues, making solar an increasingly attractive and viable choice for businesses and consumers. Shell offers a wide range of solar systems combining different technologies. Philippe Martin, executive Vice-president of Shell Solar said: Photovoltaics, the technology that converts daylight directly into electricity, is one of the fastest-growing of all the renewable energy technologies. We have the people, the reach and the resources to build a sustainable, commercially successful solar energy business around the world.

Shell Wind Energy focuses on developing and operating wind farms and selling 'green' electricity. Within a twelve month period, Shell's energy production capacity increased from 8 megawatts to 138 megawatts. Continuously improving turbine technology is bringing down generating costs and wind energy becomes more competitive with conventional power sources, 2001 was a year of transformation for Shell Wind Energy, as Shell moved from experimental to commercial scale (Karen De Segundo, 2002).

The implementation of solar and wind technologies will also reduce many of the current environmental problems and pollution associated with fossil fuel production and use. Exploration is the foundation of the petroleum industry. Shell's advances in exploration technology are helping to identify and analyse smaller and more complex fields. Shell improved his technologies for finding oil and gas. Shell companies use 3D seismic data to and Shell make use of reeled drilling systems cut the cost of developing fields. A hole drilled by reeled drilling can be smaller than conventional drilling, less waste rock is generated and less 'mud' (drilling fluid) is needed. Furthermore, a smaller surface location is needed for the equipment utilised. The benefits include for Shell are: lower well costs; reduced development costs which make marginal fields economic; extended field life and volume of recoverable reserves; increased productivity of low permeability or fractured reservoirs. Shell is now focusing on developing intelligent wells, the next breakthrough in well technology (chief director shell, 2002).

Production is very inelastic with a high possibility for overcapacity. Production operations have changed dramatically in the last two decades. Continuous innovation and technological development have created possible new ways of producing more oil and gas from a field with less pollution to the direct environment.

The most convenient way to move oil overland is to pump it through a pipeline or oversea with tankers. Shell is protecting the environment on every aspect of shipping operations, including the prevention of oil spills, ballast water management, ship recycling and

emissions to the atmosphere (www.shel.com). Whereas the oil industry uses the most modern techniques to increase production, it appears to be with the worst technology when it comes to reporting reserves. On the other hand, Shell's new techniques improved recovery from unconventional fields.

This brings up the point, why the OPEC countries have no incentive for technological improvements. Most OPEC countries tried to do a resource-based industrialisation strategy (Van der Linde, 2000). This means that many OPEC countries have become almost totally dependent on income from oil because a lack of other industries like the agriculture, leading to serious economic problems. They didn't have much experience in steering the economy and the private sector was relatively small. Most countries had a large but low skill labour supply. OPEC failed to turn the black gold into development (Van der Linde 2000). As a consequence, there were very low returns on investments. Non-OPEC oil has become cheaper and production of OPEC oil turned out to be more expensive. This leads to the next discussion of the situation between the international oil companies (Shell, BP, Mobil...) and the OPEC countries. Van der Linde (2000) declares that the OPEC countries need the international oil companies in the future. What are the main reasons for a strategy which involves the international oil companies in the production of oil? To get an answer to, is very helpful to inspect the advantages of a cooperation, what are the direct consequences involved for Shell and how will it improve a green strategy. When defining the significant declaration; "OPEC countries will need the international oil companies, both for capital and their know-how" (Van der Linde 2000), it is important to know that the international oil companies have developed many modern innovations in the oil industry and created an imperative position towards the OPEC countries. Nevertheless this asserts not the power of the OPEC with the large capital oil reserves. Except for the oil crisis in 1965, OPEC was always the major crude oil producer over the last 40 years. So why think that they would not hold that position in the short future without the international companies. It's recognized and proved that OPEC countries have the major oil power compared with the other world leading oil producers. But this will not prove that they will become the dominant leader in oil production. Due to the inconsistent way of production, the short of new technologies and the lack of organizational improvements of the OPEC countries, they will drop their leading position. For Shell a joint venture is an opportunity to increase their market share and obtain more vertical integration in the oil industry that will lead to a better production and will carry out the green strategy. Nevertheless there are some disadvantages of a joint venture. A badly developed bureaucracy becomes corrupt in many OPEC countries. That is to say, corruption depends on abundance of natural resources, government policies and the concentration of bureaucratic power (Leite and Weidman, 1999). Both parties have different business cultures and the distance between the countries could lead to dreadful communication between the departments.

The energy sector has a history of tremendous change and volatility. Because of the limited supply of oil, Shell is continuously searching for renewable and sustainable alternatives. Advances in exploration technology are also helping to identify and analyse the smaller, more complex oil fields with greater accuracy. A range of techniques are available to identify potential oil structures, revealing more about progressively smaller areas. The exploration and production of oil and gas requires the technology and skills of many disciplines from the fields of engineering, computing, environmental science, economics, and management. The main renewable energy resources are wind and solar energy. Efficient use of natural resources reduces costs and respects the environment. There are many advantages for a joint venture between OPEC companies and international companies and a joint venture will definitely support a green strategy. Increase in production in OPEC countries requires international capital and international know-how. Shell should cooperate in the future with the OPEC countries although joint ventures with international oil companies are difficult as long as political uncertainty is high. Also, a joint venture would create a competitive advantage.

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Socio-cultural factors

In the case of Shell and the green energy market several socio-cultural factors are important. Changes in consumer taste and preferences, over the past few years there has been a rapidly developing preference for green energy and biological products. Levels of education and skill of the population, the higher educated and skilled the population the higher the costs of production will be. Cultural differences, every culture needs a different marketing approach and a different way of managing. In the following paragraphs we shall discuss the previous subjects drawing to an interesting conclusion.

An obvious trend that could have been observed over the past few years is the change in consumer preference for environmentally "correct" products. The demand for "green" products was rising dramatically. This trend first appeared in the food market, "biological" grown vegetables and "humanly" raised meat quickly gained market share. Soon after that there came an increasing demand for green electricity and "clean" fuel. It became important for company's like Shell to make sure their image became environmentally correct and that they offered "green and clean" products. Meaning not only that they had to come up with new products that were better for the environment but also that they had to make current production methods and processes become safer and cleaner for the environment.

As stated before, nowadays it is very important for Shell to offer green energy to its customers and to create and maintain an image of a company that takes good care of the environment. In attempting to do so Shell had to invest large sums of money in research and development to find ways of producing cleaner and producing new cleaner fuel products. On top of that Shell had to spend millions more on launching a marketing campaign to convince people that they are an environmentally conscious company that takes great care in using natural resources. One could state Shell has successfully upgraded its image through creating new "green" projects, products and processes; and large marketing campaigns informing the public of this. However, Shell still needs to invest a lot of effort and money in maintaining, protecting and improving this image. Getting bad publicity that contradicts this new image could seriously damage that what it has worked very hard for to achieve.

However, one could argue that in the current economical recession, when consumers tighten their belt, one of the first things they cut in are the relatively more expensive green

products. The decline in sales over the entire "green" market that has been obviously appearing during the start of the recession certainly backs up the claim that "green" products are becoming less and less profitable. Nonetheless, this doesn't mean a "green" image has become less important. Although consumers might be cutting back in buying green products. They still prefer buying these products from a company that has an environmentally correct image. Therefore we can conclude that it remains very important for Shell to maintain their "green" image, even though sales in "green" products are declining.

People with better education and higher skills often are more wealthy and therefore will sooner buy environmentally safe products which often are more expensive. For the latter part these people can be found in the western parts of the world. But due to their higher education, skills and living standard they are much more expensive to employ. Not only that but all other materials for production in these areas are more expensive. Meaning that production costs in these regions are far higher. So producing products should be done in a region with a less educated and skilled workforce because this is far less expensive but several problems occur here.

For one it means the distance between the biggest market and the production site will be larger and therefore transportation costs will be higher. Another problem is that to develop and produce complicated products such as Shell's oil products, a highly educated and skilled workforce is necessary. These employees are harder to find in countries with a lower degree of education.

The most obvious solution to these problems is to create a production site in a region where production is cheaper than in the wealthier western parts and then import the skilled and well educated employees to that site. Taking into account of course that production and transportation costs will remain low enough to be profitable.

Another factor that Shell should take into account when image-building, expanding or relocating production, or searching for new markets to conquer or develop is simply differences in culture and social development. For instance a taxi company in South-Africa cares a whole lot less about "clean" fuel than one in London would. In other words launching a "green" energy campaign would be much less effective in third world countries than it would be in the wealthy west.

Something else that should be taken into account when looking for new production sites is that the region must be stable. It would be very bad for business if strikes, riots or god forbid a war would breakout in the region of the production site. So when looking for a new and cheap production location one should first look at the more socially stable regions such as currently Eastern Europe and South-East Asia (excluding the islands)

But cultural differences also bring other difficulties. Depending on geographical location and on culture differences, different management styles will be necessary to achieve maximum revenue's. Western specialists will demand more autonomy and independence than African drillers, whereas Muslims will need time to spend on their religion during work. Etcetera etcetera.

Another social cultural problem Shell will have to be dealing with soon is an increasing instability in the middle-east which is the main oil supplying region in the world. There is a real threat that the fragile social stability in this region will collapse due to the current tensions between the west and the middle-east and the ongoing conflicts in this region (Palestina/Israel, Iraq/America) Chances are oil prices will skyrocket due to this, alas there is now simple or easy solution to solve this problem.

All of these factors indicate that careful consideration should take place before choosing a new production location, launching a marketing campaign or entering new markets. A mistake is easily made and will cost one dearly.

In conclusion of this all, we can say that even though the market for "green" products is declining rapidly, it remains important for Shell to maintain an environmentally conscious company image, because people prefer to buy from a company they think has a good green policy even though they will no longer buy the green products due to the economic recession. Also we pointed out that it is more profitable for Shell to invest in regions with lower educated and skilled people, so production costs are cheaper. On top of that the social cultural situation in the middle-east is forming a threat to Shell's access to the oil supply. In other words Shell should maintain its green image and treat carefully in to the future.

Written by Sammad.

Profit. That is the main reason Shell is in the business. With earnings for the first three quarters of over \$6,4 billion in 2002 this seems to be successful. This can not go on for ever. Oil will be depleted and then new sorts of energy will have to be sought. Shell is already preparing for this date by implementing a "green" strategy in its business perspective. The question arises if this strategy is economically wise. Should Shell keep spending millions of dollars into this very uncertain market. In this chapter the pros and cons will be compared to one another. First the advantages for Shell if they continue with expanding their involvement in the green market will be given. In the second part the

counterarguments will be discussed. After this a conclusion will be drawn.

As every other profit based company Shell is always searching for new opportunities to create wealth and privileges for its stockholders. Since the market for renewable energy is a market with lots of opportunities to gain, Shell should make sure it is one of the players, in this search for new profits. As one of the world leaders in producing energy Shell must strive after becoming one of the major players in this market as well. The market for renewable energy is one of the fastest growing in the business, with production growth rates fluctuating between 20% and 25% per year. Although the market for renewable was in 2001 not yet profitable, a loss of \$191 did incur, the market will become very profitable in the future. To enlarge its involvement in the market for solar power, Shell has joint powers with Siemens and EON in a joint venture in producing solar panels. This establishes the group as the fourth largest player in this market. (www.shell.com/scenarios)

A great advantage of solar power is that it is most effective when needed. Electric power can most efficiently be gained in dry sunny locations. Because of this heat the demand for energy, to power air conditioners is peaking during the hottest hours of the day. Solar power could in this case be a perfect addition to the regular power supply and pay back for its self. (Peirce, W., 1996)

Another positive fact is that technology advances in a very rapid rate. When solar power was first produced it was only used in space because of the enormous high prices. Photovoltaic collectors are usually priced in "dollars per peak watt". Taking a look at the price-drop it is well shown what kind of technologic advances have been made during the past 40 years. In the 1960's the prices were around \$100,000 per kilowatt. By the mid 1980's the prices were down till less then \$10,000 per KW. Since 1996 prices of around \$3000 were reported and this is still going down due to cheaper ways of producing and higher efficiency. The cheaper the solar power will become, the larger the demand for it will become. This will increase its profitability for Shell and his partners because of enlargement in economies of scale. (Peirce, W., 1996)

Advancing technologies will not only create more sites on which green energy is being produced, it can also be used to upgrade existing projects. Here most of the needed infrastructure will already be constructed. This will increase efficiency and profitability.

Due to the high capital intensity of the research and development of new ways to create renewable sources of energy or further development of existing ways, it is essential to choose the right time to invest. This is most effectively done in times of high supplies in capital and low demands. The right time will be when the nominal interest rates are as low as possible. This point is coming closer. Interest rates in the U.S. have reached their 40-year lowed at 1.25% by an interest cut last month. This month the European Central Bank has lowered their interest rates with 0.5% to 2.75%. (Amensz, H., 2002) This makes it more profitable for companies to start investing now, instead of waiting. This again will decrease unemployment and so amplify the economy.

Investing is essential for Shell to keep its market share. Nowadays Shell is one of the leading companies within the market for solar panels and wind energy. After Exploration and Production, Oil Products, Gas and Power and Chemicals, Shell Renewables is the fifth core group within the company. This indicates Shell's high involvement in this sector. Since it was established in 1997 it has spent around \$500 million on research and development. (www.shell.com) As soon as Shell will stop or slow down further development, market share will be lost and Shell will lose its competitive advantage. This will cause the downfall of Shell renewables in the future. None of the players in the energy market for renewable sources can allow itself not to invest for a significant time due to the very fast technological improvements. If a backlog is originated, it is almost too expensive to catch up. Competitors are then already capable of producing numerous times cheaper and faster. Economically seen such position would be insuperable.

Another economical recommendation to expand Shell's involvement into renewable sources of energy, or other oil substitutes in common, is the ever smaller becoming elasticity of oil. In the short run oil and oil related products are very inelastic, having an elasticity rate of -0.2668. Because of this even sharp price fluctuations do not have a significant impact on the demand. This was seen during the oil crisis in 1974 and the one in 1979. Prices skyrocketed but demand declined merely. Elasticity over the long-run period from 1976-1998 was estimated on -0.4065. Nearly twice as elastic as on the short run. (Hwang, M., J., 1999) This indicates that a sharp rise in oil prices can be very profitable for oil conglomerates, but in the long run this can reduce profits. In time oil will become less and less inelastic and supplements will be sought in increasing amounts. In this occasion Shell could gain double; through rising oil prices and by offering substitutes.

On the other hand there are reasons for Shell not to enlarge its involvement in the technology to produce environmentally safe energy or maintain their market position. The market for renewable resources is still very uncertain. Another uncertain factor is which of the existing or not yet developed products is going to be most lucrative in the future. Should Shell invest in only one product or a whole range of renewable products? Nobody knows how big the market share for this type of energy will become. Nowadays Shell is mainly distributing its resources to solar power and wind energy. Minor attention is given to biomass and hydrogen. (Kolk, A., Levy, D., 2001). These market segments are dependent on very high investments. The research and development involves very high costs. With the relative stability in the oil market in the near past and expected on the long run shifting

between \$10 and \$30 per barrel. (Watts, P., Veer, J., van der, 2001) this can be a rather careless choice. More certain is investing in the regular oil retrieving. The enormous amounts invested here are less uncertain, because oil will stay the main source of energy in the near future. Profits on investments are in the short run more likely to happen. And even if the technology is there, still a lot of costs have to be made to get a project profitable. The market for green energy is known for its high capital intensity. For example, windmills or solar panels have to be created and installed and a lot of infrastructure is needed before energy can be produced. All these activities make producing renewable energy in most cases more costly than using conventional ways. Because of this only the most effective sites for producing green energy are being used until now. For example hydroelectric power plants are common used in Switzerland and other countries with lots of rapid flowing streams and rivers. These sites are economically seen very profitable because of the free power in high quantities that are receivable at relative low cost. This fact is often seen with solar energy as well. If the same levels of profitability against cost could be gained using solar or wind energy, these would already have been more widespread. (Peirce, W., 1996)
To be certain these high investments are ever to be gained back, the company must be very sure there will be a lot of demand for renewable sources of energy.

Economic growth is also possible to be gained through existing Shell components. This is one of the reasons Shell is investing largely in the production and transportation of natural gas. In 2000 Shell expanded their activity in Nigeria and Oman. This boosted gas production with 156% in 2000 and 62% in 2001. (Roels, H., 2001) According to Shell's scenario's gas is becoming one of the major sources of energy. Rising up to 20% of the entire energy world consumption of energy in 2020. (Watts, P., Veer, J., van der, 2001). Shell is already has a lot of expertise in this type of energy. This means the risks will be much lower and fewer investments have to be made.

There are more uncertainties. For example it is never sure when time has come to invest in renewable energy. For example, Shell has developed a newly, more efficient solar panel. Then the question arises if Shell has to build a whole new production plant, or try to manufacture it in an existing factory. It is always uncertain when the time is right to start up a new location. Technology is advancing so fast that a factory can be outdated even before production has started by discoveries.

At the end it is very difficult to tell if these advantages to invest will all come through. The interest rates are not certain to stay low and maybe technology will not be able to maintain able to lower the prices to produce energy, but what is for sure is the fact that oil is a finite product. One day oil would be too scarce to run economy and substitutes will be needed to replace it. Shell can, with its high involvement in this market, cater on this opportunity. Very high economic rents could be made, but then Shell can not afford to fall behind on its opponents. Now the time seems ready to invest. Shell can rely on low interest rates and still has, in some markets, an advantage over its opponents.
On the other hand the market for green energy remains very uncertain because very high sunk costs and rapidly advancing technology. Add this to the fact that the production of green energy is not yet profitable. This implies that Shell may choose to invest in more certain markets such as the market for natural gas. This two is an of Shell rapidly growing markets that already is very profitable.
Comparing all the pros and contras I think shell should proceed with investing in the development and production of ways to enlarge its involvement in the so called "green energy". With technologies proceeding so fast and cost decreasing in a very high rate, the business is becoming very lucrative. However Shell should not diversify too much. It has a large market share in solar and wind energy. These positions should be strengthened and Shell should specify on these types. In this way profits could be enlarge through economies of scale.

written by Roijen, B.

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Politics are an important factor when businesses come up with their strategy. Which factors influenced Shell when they created their green strategy and should Shell keep this green strategy?

This chapter will first give some information about externalities and how they influence government actions. Then Shell's sustainable development policy will be explained and Shell's reasons to follow this policy. Then there will be several paragraphs about political stability in certain countries and their impact on Shell's strategy choices. And then a short summary of the most important factors that influenced Shell to have a green strategy and a conclusion will be drawn.

Externalities are costs or benefits from an activity that are imposed to a person not directly involved in that activity. For Shell the most important negative externality is pollution. The Coase theorem states that: "If at no cost people can negotiate the purchase and sale to perform activities that cause externalities, they can always arrive at efficient solutions to the problems caused by externalities." (Frank and Bernake, 2001). But since there are costs involved in the negotiation between Shell and the victims of Shell's pollution the government intervenes. Government place, for instance, tax on pollution, emission ceilings and production quota's. These laws raise the costs of production and thus reduces the supply and this creates a decrease in quantity of oil used as is shown in the figure below.

On the other hand, if Shell where to produce something that has positive externalities, environmental save products, governments would subsidize Shell. This would decrease the costs and therefore the supply would increase and thus the quantity of these products would also increase.

Shell's policy is based on sustainable development. Sustainable development in this context means that generations in the future can still enjoy and use the environment to obtain resources. (Peirce, W. 1996) Economic activities can only be sustained if the use of natural resources is limited to the rate at which nature can regenerate the resources. (Haslam, Neale and Joahl, 2000). And since oil is a non-renewable resource Shell tries to reduce it's use and go from non-renewable resources to renewable resources. Therefore Shell awards scholarships for "Green" studies at local Universities in Malaysia. Shell has a joint venture with the Business Council for Sustainable Development in Malaysia (BCSDM) and together they awarded this scholarship to encourage the research and studies in sustainable development and environment enhancement. (Shell news, 21-07-2002, 01-12-2002).

Another reason why Shell uses more and more renewable resources is the political stability of countries. It is very dangerous for Shell to be depended on political unstable countries for it's supply of oil. Since in the Gulf region there is a rise in anti-Western sympathises which could mean that these regions cut of the oil supply to the West. Oilfields are more or less only to be found in the Gulf region, but renewable resources can be harvested almost everywhere. Thus Shell can position itself in political stable countries.

The rising of the Asian markets result in an increase in energy demand. Japan and other Asian governments are trying to reduce CO2 emission and are looking for new energy resources. (Denver Summit Information, 07-2002, 07-12-2002) If Shell were to be able to provide a lot of renewable energy at low costs they could penetrate the Asian market and create large revenues.

The same goes for all the governments that where present at the Tokyo summit in 1997. During the summit all present governments agreed that the emission of greenhouse gasses should be reduced with 10 percent between 2000 and 2010. (Haslam, Neale and Joahl 2000). These countries still need energy and they will rather have green energy than less energy.

As is already mentioned oil is a finite resource. When oil reserves will be depleted is not certain. Geologists say it will be in the near future and economists say there is at least enough oil to last over 300 years. Shell has to realise that the optimistic view of economists is slightly skewed. A lot of countries are likely to have reported a too optimistic number of oil reserves. During the Gulf-war for instance there have been burnings of oil fields in Kuwait, but Kuwait did not report a loss of oil reserves. It's government even reported a increase in oil reserves. A similar thing happened in Mexico, during a period where a lot of countries got international loans on the basis of their oil reserves. Mexico's oil reserves suddenly raised exponentially. So we will be running out of oil sooner than economists have calculated and Shell wants to be ready to have alternative renewable resources.

Shell also has to keep in mind the faster declining of the oil resources if the OPEC countries decide to terminate their collaboration. In the past there already has been disagreements about the right supply limit. After the oil price crisis of 1979-1980 the members with low reserves and production capacity, such as Nigeria, Ecuador and Indonesia,

were in favour of a high price and low supply restriction. Countries such as United Arabia Emirates and Saudi Arabia had an interest in lower prices. The war between Iran and Iraq could only be supported with a high price, because of their low export capacity. The conflicts between the OPEC states changes the price and supply policy time and time again, this could result in a break up of OPEC. The countries would aggressively compete with each other, this results in lower prices in the short run. The low prices would result in higher supply in the long run which results in a sooner depletion of the oil reserves.
were S'-new supply curve.

Clearly there are a large number of political factors influencing Shell's choice to implement a green strategy. The most important are: political instability in oil producing countries and the out come of the 1997 Tokyo summit, where the government present at this summit agreed to reduce the emission of fossil fuels. These factors cause the supply of oil to be uncertain and the demand for green energy to rise. If Shell keeps it's green strategy they are going to be prepared for the time that fossil fuels will become less and less important and renewable resources are becoming more and more wanted.

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The future of the oil industry is very uncertain. Therefore it is very difficult to predict future events in this market. Nevertheless, using the PEST-analysis a pretty good future analyse is made.

The main outcomes for each analysed categories will now be given.

Shell is aware of the limited availability of oil and knows the possible problems that could occur in the future. Shell is continuously researching for renewable and sustainable energy. moreover, shell is investing more and more in hydrogen, solar and wind energies, which improves a green strategy. In the future Shell will have to cooperate with the OPEC oil companies because a joint venture would create a competitive advantage for both parties. On a social-demographic base can be concluded that the demand for green energy will decline nevertheless the demand from public to buy from companies that have a green business policy. This means that people have in interest in environmentally save products although they do not want to bare the costs. From this point of view Shell should not expand it's "green" product portfolio but Shell should emphasize it's involvement through commercials or business campaigns.

From the economic point of view Shell hast to invest in renewable resources because of the high opportunities in this rapidly expanding market. The green energy market grows at a rate of 20 to 25 percent per year. Although the market is not yet profitable there are high profits to be made in the future because of increasing technology and economies of scale. This will decrease production cost and increase efficiency. Furthermore now is the time for

Shell to invest in the renewable resource market because of low interest rates. This way Shell can expand it's advantage they now have on certain technologies. The political findings explain that Shell should continue it's green strategy and it's search for renewable resources. The political instability of the oil producing countries make investing in green energy, which can be obtained in political stable countries, a logical decision. Another factor that makes investing in green energy lucrative is the fact that not all recorded oil reserves will contain as much fossil fuels as is expected. This makes oil more scares than generally thought. All these factors add up to one general conclusion, which is that Shell should keep investing in the market for renewable energies.