

THE ENERGY SECTOR AND THE CLIMATE CHANGE CHALLENGE

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Abstract

Climate change is a very important environmental concern that threatens both world economy and the society. One of the most important causes of climate change is the accumulation of pollutants resulting from the energy sector. That is why we address the challenge represented by climate change for the energy sector and envisage outlining the main issues that are of relevance from the economic point of view. An important aspect in this debate is how oil related energy consumption will fit within development and we will present some issues from this industry too.

Keywords

climate change, sustainable development, energy sector, oil and gas companies

Introduction

The significant ecological impact of the energy sector exposes the businesses to a careful monitoring not only on the behalf of governmental authorities, but also of the civil society. Although exhaustible, most of the fossil energy resources will continue to secure the satisfaction of consumption needs in the following decades (IEA, 2014), therefore being a priority a better knowledge of how activities in this sector could respect the requirements of sustainable development.

The most important environmental impact of the energy sector consists in the emission of greenhouse gases (GHGs), especially carbon dioxide, that have a significant contribution to the global climate change. Consequently the energy sector will face important challenges stemming in the climate change mitigation measures that envisages, mainly, a reduction of GHGs emissions. For energy companies this could mean the replacement of current technologies, use of environmental management systems, investments in renewable energy and/or carbon storage etc. The paper goal is identifying the strategies that could be used by energy companies for addressing climate change challenges and their economic implications. In this respect, we revisit the concept of sustainable development and then discuss how the environmental policy regarding climate change creates restrains for energy companies. Further, based on a case study of oil companies, there are highlighted the most common strategies for addressing climate change.

1. Sustainable development – concept and requirements

The contemporary society is confronted with a number of interdependent critical situations that tend to worsen because there are postponed considerable changes of the economic and social mechanisms implicated in the organization of different sectors of activity. The concept of sustainable development outlined the directions for action and the general vision regarding a harmonious relation among people and between humans and the natural environment. Transposing these in policies and programs is a process that necessitates sector clarifications,

consisting in goals, management systems, indicators etc. by that there are captured the particularities of economic, social and environmental implications.

Sustainable development, defined as the development that allows the satisfaction of existing needs without compromising the chance of future generations to meet their own needs (Bruntland, 1987), supposes important changes in how the economic system is functioning. Since most of the issues envisaged by sustainable development are caused by market failure situations (Popescu et al., 1996), the formulation and implementation of measures was considered for a long while the exclusive responsibility of governments. Their activity materialized in establishing specialized institutions, elaboration and implementation of policies by regulations, standards, economic levies, awareness raising campaigns etc. for correcting the market failure situations, aiming a high level of internalization for external costs caused by pollution and other forms of environmental degradation.

The environmental policies were designed, generally, at global level, being the result of high level meetings on environmental and development topics. The Rio de Janeiro United Nations conference from 1992 allowed the outlining of some directions of action for the accomplishment of sustainable development stated as the Agenda 21.

The minimal requirements for accomplishing sustainable development are re-dimensioning economic growth by considering a more equitable distribution of resources and focusing on the qualitative side of production, eradication of poverty by satisfying the basic needs for a job, food, energy, water, shelter and health, maintaining population growth at an acceptable level, preserving and enhancing natural resources, keeping the diversity of ecosystems, supervising the impact of economic development on environment, reorienting technology and controlling its risks, decentralization of government forms, increasing the contribution in decision making and harmonization of decisions regarding environment and economy (Vuta, 2004).

By satisfying the above requirements it will be feasible the human development that places the human being in as a core priority securing economic growth in developing countries and establishing the environmental protection priorities at national level (Rojanschi et al., 2004).

2. Climate change and energy production within environmental policy

Climate change mitigation is a global ecological priority that was transposed in national policies implemented by regulations, standards, economic mechanisms, intensification of communication etc. In order to increase the effectiveness of these interventions, it is necessary to acknowledge and to predict the effects and to establish monitoring indicators.

Climate change represents the most serious form of the ecological crisis, since it is very difficult to be mitigated and because it will lead to catastrophic situations that will trigger very intense economic and social tensions. Therefore, it is not surprising the fact that a great part of efforts invested in environmental protection is focused on this topic.

Climate change is caused by the emissions of carbon dioxide released by the burning of fossil fuels for power generation, thermal energy, powering technological installations, transporting merchandise and people etc. These emissions are exceeding the capacity of ecosystems to absorb them. Hence, they accumulate in the atmosphere and the increased of carbon dioxide concentration determines the raise of the atmosphere's radiate force having as main effect the global warming (Gore, 1994). In these conditions, it becomes obvious that economic development, depending on a large and growing consumption of energy obtained in proportion of 80% from fossil fuels is the main cause of climate change. The relation was confirmed since the fourth IPCC report (Bran et al., 2011).

Climate change mitigation supposes the reduction of carbon dioxide emissions. Because this is conditioned by the path of economic development, mitigation strategies pursue to

implement solutions that allow the continuation of development by respecting the need to reduce emissions.

The strategies are coordinated at global level, most of the countries being signatories of the UNFCCC, convention that was agreed on with the occasion of the world Summit on Environment and Development from Rio de Janeiro in 1992 (Bran, 2002). By this convention there were established emission reduction targets at global level, targets that were after that transposed in specific requirements for each state according to its development level and emission intensity. For instance, the European Union assumed to reduce emissions by 20% compared with the reference level in 1990. Besides the importance of climate change at European level is proved the integration of emission reduction objectives in development strategies.

The Europe 2020 strategy that aims to transform the European economy in a competitive economy based on smart, sustainable, and inclusive development proposes precise targets for each of these three directions:

- Reducing emissions with 20% by using clean technologies in the industry;
- Increasing the proportion of renewable energy to 20% of the total consumption;
- Increasing energy efficiency with 20%.

Completion of such objectives supposes important changes from technological point of view, which justify the investment in research-development. Consequently, environmental policies in the field of climate change are focusing on creating economic levies that are more efficient in increasing the interest of economic agents for reducing emissions. In present, there are implemented more types of economic measures, such as the carbon tax and the system of negotiable emission permits.

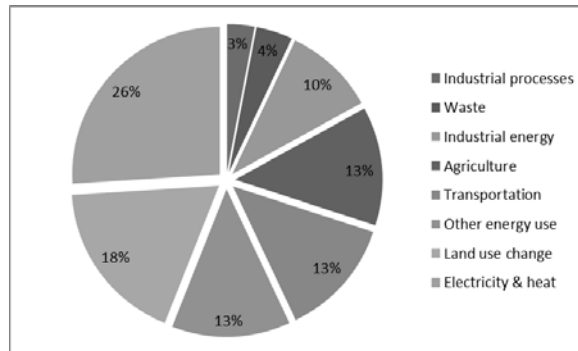
3. Case study: oil and gas companies

3.1. Environmental impact of oil industry

Oil industry is considered responsible for numerous ecological unbalances that depart from the exhaustion of the non-renewable natural resource stock and reaches the emissions released by automobiles and heating systems and that contribute to air pollution in cities and to the deployment of the most serious environmental degradation form – climate change (Ciobotaru et al., 2011). Figure 1 and 2 represent the relative contribution of different sources to the overall GHG emissions.

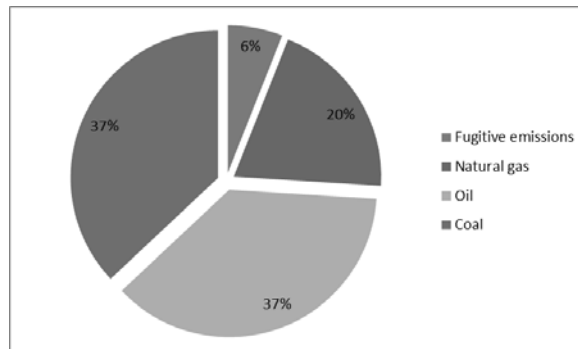
The accidental oil leakages determined by events occurring during transportation or exploitation are the most well-known environmental issues, but the entire technologic process from exploitation to refining has a significant ecological impact. In addition, the reducing of oil resources' availability pushes exploitation areas in remote zones, where the extraction is made in harsh conditions, increasing the risk of accidents. Oil pollution is a persistent pollution that affects the status of exposed ecosystems for a long period (OPEC, 2014).

The main energy source of the modern society – oil – unleashed and maintained countless controversies in the debates regarding environmental protection (Negut, 2008). Nevertheless, oil thirst did not diminish. The conceptualization of oil companies' reaction to environmental problems brought a number of milestones, but it was based on an analysis of the world leaders and envisaged mainly the factors that determine companies to adopt protection measures. Oil industry is an economic sector of great interest for policy makers, investors, businessmen, nongovernmental organizations, and consumers (Brown, 2008). The consumption of oil products is continuously growing for several decades and its path is expected to grow.



Source: World Resource Institute

Fig. 1 GHG emissions by main activities



Source: World Resource Institute

Fig. 2 GHG emissions by types of primary energy source

On the oil market, decisions were influenced for long time only by economic and geo-politic aspects (Bran et al., 2011; Negut, 2008). Since the implementation of the environmental policies there was created restrains for both production process and products, in such a way that most of the companies were constrained to up date their technologies in order to stay competitive on the international market. Further, oil industry was in the focus of nongovernmental organizations that revealed the activity of the companies, shedding light on the serious pollution produced by the exploitation and transportation of oil in areas with high ecological value (Ioan et al., 2009). The large companies were involved in litigations and confronted with serious image issues that resulted in adopting strategies to comply with the requirements of sustainable development.

Sustainability in business is a hot topic in environmental debate, the implication of companies in demonstration their commitment for solving ecological and social issues being beyond controversy. KPMG (2013) found that the number of companies that commit to reveal information by social responsibility reports is increasing.

The specific restrains of oil industry and the trend of sustainability integration in business strategy imposes the need of a sector approach that allow the identification of necessary interventions for improving social and environmental performances, meanwhile using the experience built up in the field.

The oil industry comprises a wide range of activities and concentrates economic flows of large size with significant geopolitical impact. The exhaustion of oil reserves, predicted at different

time horizons, does not justify neglecting this sector because in the following decades businesses from this sector will continue to represent an important economic sector. Taking in account also the incidence of sustainable development's requirements, transposed in legal commitments on the one hand, and broad public awareness on the other hand, creates a restrictive context against that business administration should clarify its strategies.

3.2. Climate policy of oil and gas companies

Taking action in climate change mitigation is a great expectation on the behalf of the oil and gas companies. The pressure is arising from various sources such as:

- Regulation: carbon emissions will represent a growing cost for companies acting in this sector; flaring from extraction and refining is also subject of more and more restrictive regulations; in some state there are established obligations regarding carbon sequestration (e.g. Norway);
- The behaviour of consumers: energy consumption is reduced by all possible means by both household and industrial consumers; further, more and more consumers are seeking the carbon footprint of the energy they are about to procure;
- Technological change: the renewable energy sources are becoming more and more competitive, while the production of hybrid and electrical vehicles is inscribing on an upward trend;
- Environmental impact: exploitation of oil resources tends to occur in areas that are less favourable than the current ones.

One of the most important action oil and gas companies should take within their climate policy is to improve the disclosure regarding their impact by emissions or other influences. Thus, it is important that companies keep a record of their annual emissions by different stages of the lifecycle such as: extraction, refining, transportation, and use by combustion.

In the light of climate policy, companies are advised to:

- The impact of climate policy on their financial performance and make detailed reporting by type of activities and areas of operations;
- Fund climate change research and NGOs that advocate climate change mitigation and adaptation;
- Estimate the impact of emission targets on the production.

Another field of action that is increasing in importance is directing funds toward investments in renewable energy sources. For instance, British Petroleum, one of the top ten companies in the world, has the following renewable energy investments (BP, 2014):

- In USA it invested in the establishment and operation of 16 wind farms with a production capacity of 2600 MW;
- In Brazil, it supported biofuel research focusing on the use of sugarcane for ethanol production by funding it with 3 billion \$.

Shell, another major company of the oil and gas sector, funded research for capturing the emissions from landfills and for developing biofuels. The research & development spending of the company is well over 1 billion \$ per year and increasing, although it is less evidence available about how this is spent and what proportion is directed toward applications that contribute to climate change mitigation.

Exxon Mobile provides another example for approaching renewable energy sources. Nevertheless, their approach is more commercial in nature, being represented by a partnership with wind farms. Thus wind farms are supplied with oil lubricates in an advantageous agreement.

Chevron is another company that focuses on renewable energy sources having projects that target the geothermal, solar, wind, and biofuels. The most important projects are the ones in

geothermal energy where Chevron values its experience in drilling. These are deployed in Indonesia where a power plant of 647 MW is commissioned at Darajat and Salak. The solar projects are enforced in New Mexico and Texas, while wind turbines were installed in a former drilling site near Casper (Wyoming).

Conclusions

Climate change creates important pressure for the energy sector since it is one of the most important sources of GHG emissions. The general context of sustainable development reveals the need to adopt an integrated approach that considers aspects regarding economy, social, and environmental implications.

The climate policy that created markets for carbon emissions has a great potential to influence the performance of energy sector companies. Other environmental regulations concerning pollution and biodiversity also create pressure for these companies. Within the European Union this pressure is amongst the highest, but climate policy will reach out to other companies too since it is designed at global level.

Oil and gas companies are in the forefront of industries that should consider climate change as a serious challenge. This is because they have to respond to the growing demand of energy, but also reduce their emissions. In addressing these challenges it is recommended to increase the environmental disclosure with specific details regarding the possible financial impact of climate policy, but also to direct funds toward research and investment in renewable energy sources. Some of the top oil and gas companies already have taken action in this direction.

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