

**REPUBLIC OF TURKEY
BAHÇEŞEHİR UNIVERSITY**

**MAJOR ENVIRONMENTAL IMPACTS OF
THE EUROPEAN CEMENT SECTOR
WITHIN THE CONTEXT OF EU
ENVIRONMENTAL POLICY**

Master's Thesis

ZEYNEP ÇORUH

İSTANBUL, 2012

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EUROPEAN UNION PUBLIC LAW AND INTEGRATION

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BAHÇEŞEHİR ÜNİVERSİTESİ
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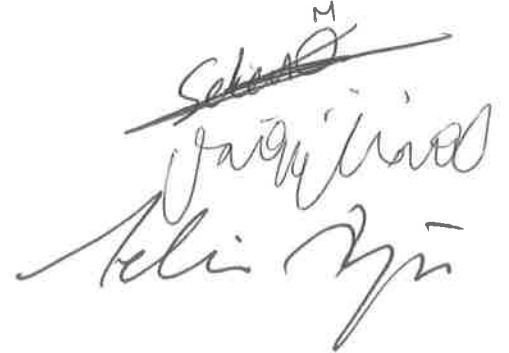
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ABSTRACT

MAJOR ENVIRONMENTAL IMPACTS OF THE EUROPEAN CEMENT SECTOR WITHIN THE CONTEXT OF EUROPEAN UNION ENVIRONMENTAL POLICY

Zeynep, Çoruh

European Union Public Law and Integration
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Environmental problems were underestimated during the industrialization period until their effects reached to a point where they can no longer be ignored. The reason behind the idea of establishing a common environmental policy within European Union in order to cope with the negative impacts of pollution on human health and environment can be explained in different ways. Primarily, pollution having no boundaries is the first explanation. The high possibility of sharing the effects of pollution and environmental problems among neighboring states is recognized. In addition, it is inevitable to face negative effects of applying different restrictions by each state with regard to environmental problems on common market, which is a fundamental component of the European Union. Within this framework, it is acknowledged that a collective approach is much more effective regarding challenging topics like climate change, protection of biodiversity and minimization of pollution.

This thesis examines the major environmental impacts of the European cement sector within the context of European Union environmental policy. In the first chapter, development of the European Union environmental policy will be analyzed together with the core principles of the policy, its tools, role of the European Union institutions on environmental policy and the changes brought by the Lisbon Treaty.

The second chapter will focus on why cement sector is chosen by referring to the environmental impacts of the cement production process and its effects on carbon dioxide emission and biodiversity will be included. Main directives of the European Environmental policy that bounds the cement sector and the course of actions taken in order to decrease the negative environmental impacts will be analyzed through case studies.

Keywords: European Union Environmental Policy, European Cement Sector, Biodiversity, Carbon Dioxide Emission

ÖZET

AVRUPA BİRLİĞİ ÇEVRE POLİTİKASI KAPSAMINDA AVRUPA ÇİMENTO SEKTÖRÜNÜN BAŞLICA ÇEVRESEL ETKİLERİ

Zeynep, Çoruh

Avrupa Birliği Kamu Hukuku ve Entegrasyon
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Avrupa'da sanayileşme süreci boyunca göz ardı edilen çevre sorunları, etkilerinin azımsanamayacak boyutlara gelmesiyle beraber dikkatleri üzerine çekmiştir. Kirliliğin insan sağlığı ve çevre üzerindeki olumsuz etkileriyle başa çıkmak için Avrupa Birliği kapsamında ortak bir çevre politikası oluşturulmasının temelinde yatan sebepler farklı şekillerde açıklanabilir. Öncelikle kirliliğin sınır tanımaması bunlardan ilkidir. Bir Avrupa ülkesinde yaşanan kirliliğin ya da çevre sorununun sadece o ülke ile sınırlı kalmama ihtimalinin yüksek olduğu düşüncesi kabul görmüştür. Buna ek olarak ülkelerin uygulamaya koyacakları sınırlamalar arasındaki farklılıkların Avrupa Birliğinin ana unsuru olan ortak pazar üzerinde yaratacağı olumsuz etki kaçınılmazdır. Bu çerçevede iklim değişikliği, biyoçeşitliliğin korunması ve kirliliğin azaltılması gibi konularda kollektif bir yaklaşımın daha etkili olacağı kabul edilmiştir.

Avrupa Birliği çevre politikası kapsamında Avrupa çimento sektörünün çevre üzerindeki başlıca etkilerinin inceleneceği bu tez iki bölümden oluşmaktadır. İlk bölümde Avrupa Birliği çevre politikasının gelişimi, dayandığı prensipler, araçları, Avrupa Birliği kurumlarının çevre politikasına etkileri ve Lizbon Antlaşması ile getirilen değişiklikler incelenecektir.

İkinci bölümde ise, çimento üretim sürecinin çevresel etkilerine değinilerek neden çimento sektörünün incelendiği açıklanacak ve özellikle sektörün başlıca çevresel etkilerinden olan karbondioksit emisyonu ve biyoçeşitlilik üzerindeki etkisine yer verilecektir. Avrupa Birliği çevre politikası kapsamında çimento sektörünün bağlı olduğu belli başlı yönergeler ve bu yönergeler bağlamında sektörün yol açtığı negatif çevresel etkilerin iyileştirilmesi için ne gibi yollar izlendiği örnek olay çalışmaları aracılığıyla incelenecektir.

Anahtar Kelimeler: Avrupa Birliği Çevre Politikası, Avrupa Çimento Sektörü, Biyoçeşitlilik, Karbondioksit Emisyonu

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ABBREVIATIONS

AG	:	Advocates-General
BAT	:	Best Available Techniques
CIF	:	Court of First Instance
DG	:	Directorates-General
DG Clima	:	Directorate General for Climate Action
EAP	:	Environmental Action Program
ECSC	:	European Coal and Steel Community
ECJ	:	European Court of Justice
EEA	:	European Environment Agency
EEC	:	European Economic Community
EIA	:	Environmental Impact Assessment
Eionet	:	Environmental Information and Observation Network
EU	:	European Union
Euratom	:	European Atomic Energy Community
ELVs	:	Emission Limit Values
EP	:	European Parliament
ETS	:	Emission Trading System
IPPC	:	Integrated Pollution Prevention and Control
MEP	:	Member of the European Parliament
MS	:	Member State

NAP	:	National Allocation Plan
QMV	:	Qualified Majority Voting
RDF	:	Refused Derived Fuel
SAC	:	Special Areas of Conservation
SEA	:	Strategic Environmental Assessment
SEA	:	Single European Act
SPAs	:	Special Protection Areas
WHR	:	Waste Heat Recovery
WWF	:	World Wildlife Fund

LIST OF SYMBOLS

Carbon Dioxide	:	CO ₂
Degrees Celcius	:	°C
Nitrogen Oxide	:	NO _x

1. INTRODUCTION

Although environmental issues are prioritized in the European Union (EU), it was not until the 1960s that the need for an environmental policy was recognized. Until then, environmental problems were underestimated, due to the rapid evolution of European industry.

Together with the development of the EU environmental policy, European industry sector started facing restrictions and fines with regard to their actions leading to environmental damage and risking human health. As a result, through the means of European primary law backed up with directives providing environmental protection, European industry sector included environmental matters into their agenda.

Cement is one of the most consumed materials on earth and even though the cement sector is responsible for the five percent of the Carbon Dioxide (CO₂) emission worldwide, it draws much lesser public attention than other industry sectors with regard to its environmental impacts.

Europe has a very strong cement sector with over two hundred cement plants. Considering the fact that the cement production process is highly energy consuming and each step of the process generates an impact on the environment, the cement sector in Europe is under the pressure of the Union and the environmental groups in order to minimize its negative effects on environment.

This thesis focuses on environmental impacts of the cement sector in Europe within the context of EU environmental law. Firstly, the development of the EU environmental policy will be discussed. The evolution of the EU environmental policy throughout time, together with Treaty amendments will be provided as a component of this study.

Another important point that will be touched upon is the main principles of the environmental policy. Environmental policy builds itself upon the five principles; the

precautionary principle, the prevention principle, the polluter pays principle, the integration principle and the ratified at source principle. These principles expose the Union's line of vision considering environmental policy and they are legally binding through the means of secondary law and the decisions of the European Court of Justice (ECJ).

The principles are embedded in not only the Treaties but also in the Environmental Action Programs (EAPs), which present the main environmental objectives of the Union agencies and include the targets to be achieved. Although they do not have a legally binding nature like the principles, the EAPs can act as a trigger in developing written proposals.

Within this context, it is important to define the effects of the Union institutions on the development and implementation of environmental policy. Although, the European Environment Agency is not actually among the institutions in the decision-making process, for being the only agency of the EU that has directly linked to the environment, in this study it is enclosed with the other main institutions of the Union.

Together with the EU enlargement to twenty seven Member States (MS), requirement for an institutional modification had inevitably emerged. As an amendment to the previous Treaties, the Treaty of Lisbon was ratified in 2009. Although, the basic provisions of the environmental policy remained the same, the Lisbon Treaty brought some institutional changes that indirectly affect environmental policy, includes broader definitions to the core elements of the policy such as sustainable development and introduced a new title on energy. The innovations provided with the Treaty of Lisbon will be discussed broadly in the related part.

Basic information regarding the European cement sector and the stages of the cement production process will be given together with the environmental impact at each phase. The EU realizes the negative effects of the industrial installations on the environment and therefore established the Environmental Impact Assessment (EIA) Directive and the Integrated Pollution Prevention and Control (IPPC) Directive which are perceived as

complementary of each other and cement plants also fall under the scope of these two directives. The Directives have great importance since they both approach the environmental problems as a whole instead of dealing with a single specific one.

There are two major environmental impacts of cement production process which will be focused on in this thesis. The first major impact is the biodiversity loss caused by quarrying activities that the cement plants conduct due to their raw material needs. This problem will be examined within the framework of the related EU directives which are the Birds Directive and the Habitats Directive.

European based international groups like Lafarge and Heidelberg have their own guidelines in order to regain the biodiversity loss experienced at their quarries and they co-operate with environmental organizations in order to get support with regard to their quarry rehabilitation programs. Examples of quarry rehabilitation programs will be provided in the related part.

In addition to the quarry rehabilitation programs, another way to minimize the negative impact of a cement plant on biodiversity is to use waste as an alternative raw material. By using the suitable alternative raw materials a cement plant can not only reduce its quarrying activities but also can make use from the wastes of other industries.

Another major environmental impact of the cement sector is the Carbon Dioxide (CO₂) emissions. In order to reduce the industrial CO₂ emissions, the EU established the Emission Trading System (ETS), which has become one of the most efficient tools of the Union through time. The functioning of the ETS and the status of the cement industry in the system will be discussed in detail. So as to fulfill their obligations with regard to CO₂ emission reduction and reduce the energy consumption, the cement plants tend to adopt measures such as using alternative fuels, investing in energy efficient technologies like Waste Heat Recovery (WHR).

In summary, the purpose of this study is to present the environmental damages caused by the cement plants in Europe and how their negative impacts have been reduced in accordance with the EU environmental law. The main research question is what are the effects of the instruments that have been used by the EU in order to lessen their environmental impact and what are the main deficiencies in this process.

2. DEVELOPMENT OF EU ENVIRONMENTAL POLICY

2.1 HISTORICAL BACKGROUND

Although the idea of a united Europe was shared occasionally throughout centuries, it was not until the end of the Second World War that it became a reality. Clash of national interests between the European states led them to war after a very short time of reconciliation. In the aftermath of the Second World War there was a common aspiration for a new model of political co-operation that would lead to progress in economy, maintain military protection and to secure peace in Europe, especially between France and Germany (Craig & De Burca 2003, pp.8-9). Also, it had been commonly accepted that in order to achieve an alliance of such, the starting point had to be developing and strengthening the economical ties and rearranging the existing economical relations so as to prevent another unwanted outcome.

In addition to this need for a new order, some countries were also considerably skeptical about the monetary aid directed to war-torn Europe by United States under the Marshall Plan. They hesitated to welcome the aid with open arms, since they believed it would make them dependent on the United States of America and for this reason they supported the idea of uniting their economic forces and constitute a strong common European market (Onuk 2007, pp.1-2; Karluk 1996, pp.38-40).

In the light of the Schuman declaration in 1950, which indicated that an alliance should be formed between France and Germany on coal and steel industry, France, Italy, Germany, Netherlands, Belgium and Luxembourg came together and took the first steps for a unified Europe engaged with strong economic ties and established the European Coal and Steel Community (ECSC) in 1951 with the Treaty of Paris as an initiative (Güneş 2011, p.2). The objective of the Treaty was to establish free movement of coal and steel and to provide free access to production resources (http://europa.eu/treaties_ecsc_en.htm 2011).

So as to extend the constituted unity into other fields, European Economic Community (EEC) and European Atomic Energy Community (EAEC/Euratom) were established with the signing of the Treaties of Rome in 1957 (Güneş 2011, p.2). The aspiration behind Euratom was to provide co-ordination between Member State research programs focusing on peaceful use of nuclear energy and today the Treaty still serves as a source of valuable information and assists to funding of nuclear energy (http://ec.europa.eu/euratom_en.htm 2011). On the other hand, foundation of the EEC was based on two motives which were renewing the estate of trade and contributing to the development of a political Europe (http://europa.eu/treaties_eec_en.htm 2011).

Although the EU became one of the main global actors in environmental protection over the years and gives great importance to the development and strength of its own environmental policies, environmental concerns or issues were not among the pillars that the European Community built itself upon. The Treaty of Rome did not include any provisions concerning environmental protection until the 1960s, when the Community endorsed environmental legislation under Article 100 and Article 235, which were not directly related to environment, but provided certain tools to deal with problems faced in that area (www.ncte.ie 2011).

Aforementioned Article 100 was about the authority given to the Community Institutions on coordinating the MS provisions directly affecting the common market and Article 235 provided the Community Institutions to take actions on issues that were not covered by the Treaty, so as to achieve the objectives of the Community (Güneş 2011, p.8).

Cause of this lack of interest in environmental issues could be explained as, since the European industrial society evolved so rapidly through out a century that the ecological effects of this progress was easily overlooked and underestimated. Also, another reason is that environmental pollution was not perceived as a global problem and did not awake public awareness as it should have been (McCormick 2005).

As an outcome of the EEC summit held in Paris in 1972, first substantial steps for establishing a common environmental policy were taken, which included a statement indicating the importance of a common environmental policy and the need for an action plan for identifying environmental problems and the path that the community should follow so as to tackle them (Güneş 2011, pp.9-10) Even though, the necessity of having an environmental policy had been recognized, it took almost more than a decade to provide a Treaty based legal identity.

Several steps were taken in the absence of a Treaty based legal identification during the 70s and the 80s, which will later on form the core of the development of environmental legislation. Most significant ones among them were the first EAP in 1972, the ruling of ECJ in 1985 accepting that the environment was an essential element in interpretation of the free movement of goods and the establishment of directorate-general of environment (McEldowney & McEldowney 2010, p.90).

Hay & Menon argue that (2007 p.313):

When the EU was first established as a common market it did not have an environmental policy, reflecting the fact that its original purpose was economic integration. There was no reference to environmental policy in the Treaty of Rome. Stimulated by the first United Nations conference on environment held in Stockholm in 1972, the 1972 summit of EU leaders called on Commission to draw up an environmental policy and give a group of Commission officials specific responsibility for environmental protection. In 1972 the Commission set up an Environment and Consumer Protection Service but as part of the directorate concerned with industrial policy. It was not until 1981 that a distinct directorate-general was set up with responsibility for the environment. This was an important development because in an organization like the Commission it is important to have a distinct group of officials with the "mission" of looking after the environment who can argue the case for enhanced protection from within "the house". Within the collage of commissioners, however, there was no commissioner with sole responsibility for environmental policy until 1989.

In 1987, the Single European Act (SEA) provided the Community a legal basis with regard to environmental protection (Dinan 2005, p.306). Despite the fact that the SEA was characterized essentially and crucially by its single market aims, it also gave specific law-making power in the general field of environmental law (McEldowney & McEldowney 2010, p.90). The SEA included three new articles (Article 130R, 130S and 130T) that allowed the Community to maintain, conserve and enhance the essence

of environment, to provide human health protection and to assure a discerning and objective usage of natural resources (http://europa.eu/treaties_singleact_en 2011).

Also, with the institutional changes occurred after the SEA, the European Parliament (EP) was given an extended role in environmental policy making and initiated qualified majority voting (QMV) on most issues covered by environmental law and policy (McCormick 2005, p.202). Moreover, the Treaty set forth the polluter pays principle, the prevention principle and the ratification at source principle as the main principles that the community environmental policy is based on (Güneş 2011, p.12). However, although, the SEA was perceived as a success in environmental policy development, it was often criticized as being ambiguous in respect of the environment and suffered from lack of clarity (McEldowney & McEldowney 2010, p.90).

In 1992 together with the introduction of sustainable development, the extent of the Community's dedication to environmental policy was shown in the Maastricht Treaty (Hay & Menon 2007). It should be highlighted that, by sustainable development the Treaty emphasized the importance of perceiving development as meeting the needs of the present without undermining the prospects of future generations (http://europa.eu/treaties_maastricht_en.htm 2011). In addition, the Treaty specified that EU's environmental policy must aim at a high level of protection and that environmental protection requirements must be integrated into the definition and implementation of other EU policies (Güneş 2011, p.14).

Ratified in 1999 the Treaty of Amsterdam took an important step to clarifying the use of a co-decision procedure for environmental matters (http://europa.eu/amsterdam_treaty 2011). This can be perceived as a break through since it raised the environment on the same level of importance with trade and other areas of European competence. Also, the Treaty used the environment as a key element in promoting sustainable development strategy which became an objective of the Community. Moreover, it included the integration principle which indicates that environmental protection should also be blend in and harmonized with other community policies (Güneş 2011,p.16).

On the other hand, in the Treaty of Nice, community's priorities were shaped by the necessities emerged in the aftermath of enlargement. For this reason, the main focus of the Treaty was to enhance the organizational structure, in order to resolve the disfunctionalities and there were only minor changes concerning the environmental law (Güneş 2011, p.17).

2.2 MAIN PRINCIPLES

In general terms the principles form a basis for the EU environmental policy to build itself upon and direct the course of its development. Although they are legally binding, they are directly applied by MSs either through the means of secondary law or through the decisions taken by the ECJ (Güneş 2011, p.121).

2.2.1 The Precautionary Principle

The precautionary principle became part of the Union law with the ratification of the Maastricht Treaty. It indicates that preventive measures should be taken in situations where there are possible threats against human health or environment, even though there are no accurate scientific data to assess the risk (CPS 2010).

The driving force behind the principle is basically the scientific uncertainty. Even with the acquired scientific capabilities, there are still many activities that their future or current environmental impact cannot be accurately determined. Since acknowledging that an action is harmless due to the lack of precise scientific evidence forms a serious threat considering the precautions to be taken against an environmental problem, the principle aims to prevent that by bringing the notion of a "possible threat" to the fore and by perceiving the scientific data not as a must.

However, in order to prevent the principle to be misperceived, the Commission strongly stresses that it can only be implemented under three conditions: definition of possible negative impacts, assessment of the scientific data present and the scope of scientific ambiguity (http://europa.eu/legislation_summaries/132042 2011).

2.2.2 The Prevention Principle

Included in the SEA, the prevention principle puts stress on the Union's perception of coping environmental problems by stating that taking actions to avoid environmental problems is much more effective than responding to problems when they come up (Güneş 2011; McCormick 2005). The main motive behind the principle is the fact that the economic burden of trying to restore the occurred environmental damage can be higher than to prevent it in the first place (CPS 2010). Although they have significant differences with regard to the necessities required for taking action against an environmental problem, the prevention principle can be perceived as the core of the precautionary principle (Güneş 2011, p.126).

2.2.3 The Polluter Pays Principle

Existing from the First Environmental Action Program and included in the SEA, the principle forms the foundation of the Union's environmental policy. The polluter pays principle indicates that the ones who are in an act of causing environmental damage must undertake the costs of preventing or reimbursing it (http://ec.europa.eu/regional_policy 2011). Also, as defined by the Council, the polluter is the person who either directly or indirectly gives harm to the environment or creates the circumstances that contributes to the harm (Güneş 2011, p.129).

Encouraging the polluters to invest in environmental friendly methods and technologies by holding them economically responsible for their acts against environment forms the core incentive behind the principle (CPS 2010, p.18). However, since in most of the cases there are multiple causes of pollution, the principle is in action only in the situations where the source of pollution is precisely determined.

2.2.4 The Integration Principle

The principle became a part of the statute with the SEA and gained more importance in the context of the Fifth Environmental Action Program (Onuk 2007, p.23). The

principle mainly states that environmental protection should be part of all other EU policies that possibly have an effect on environment (McCormick 2005, p.203). Even though, the principle foresees environmental protection to be adopted also by other policy areas, there has been a strong insistence especially regarding the free movement of goods and competition policy areas, where its effect is believed to be much more visible (Onuk 2007, p.22-23; Candan 2003, p.7).

The Lisbon Treaty itself also brought up discussions regarding the integration principle by including two other environmental integration principles about animal welfare and the Union's energy policy, rising up questions concerning the hierarchy of importance between the three environmental integration principles (Vedder 2008).

2.2.5 The Rectified At Source Principle

The principle emerged in the context of the Third Environmental Action Program and became part of the treaty with the SEA (Onuk 2007, p.26). It stresses the importance of eliminating environmental damage at once and at its origin. Moreover, within the context of EU environmental policy, the principle is applied mostly at the Unions water and waste disposal policies (Güneş 2011, p.127). The principle has a significant importance since it minimizes environmental damages at early stages, prevents the pollution to spread other areas and as being one of the most effective solutions to the cross border environmental impacts (Onuk 2007, p.26).

2.3 EU INSTITUTIONS AFFECTING ENVIRONMENTAL POLICY

In the core of the EU decision-making process lays a complex system of correlated competencies shared by the leading institutions of the Union. It is important to understand the formation and the influence of each institution, in order to better grasp the nature of the proceedings. Moreover, it should also be emphasized that the main institutions of the EU, the Commission, the Council of Ministers, the Parliament and the European Court of Justice are the essential players in developing EU environmental law (McEldowney & McEldowney 2010, p. 96).

2.3.1 The European Commission

Founded in the 1950s, the Commission's duty in general terms is to represent and promote the interests of the EU as a whole (<http://europa.eu/european-commission> 2011). To be more specific, led by the College of Commissioners, the Commission's responsibility is to establish proposals for new laws and policies, to supervise the implementation of those laws and policies as they are adopted by the member states and to preserve the common interests of European integration (McCormick 2005, p.82). For this reason, within the context of its responsibilities, the Commission undertakes a very important position concerning environmental policy.

The Commission consists of almost twenty five thousand staff members also containing the College of Commissioners, the Directorate Generals and the Cabinets (McEldowney & McEldowney 2010, p.96). The College of Commissioners is the backbone of the Commission with twenty seven members, one from each member state. However, with the ratification of Lisbon Treaty, the number of Commissioners will be reduced to eighteen as of 2014 and an order of equal rotation will be adopted in order to provide a fair distribution of the posts among member states (www.developmentportal.eu 2011). They take office for five years period and a new Commission is designated within six months of EP elections (<http://europa.eu/european-commission> 2011).

Even though the Commissioners are appointed by the member state governments, they are bound to leave behind prioritizing national interests, to be independent and focus on protecting the Union's benefits instead. However, there are criticisms regarding the truthfulness of the Commissioners independency based on the role that the member state governments play in the election process of the Commission.

Dinan argues that (2005 p.107):

The Parliament does not have the authority on the portfolios designated to the Commissioners. This particularly important decision is under the jurisdiction of The President of the Commission and the national leaders. In fact the intensity of the struggle given by the governments for the commission portfolios indicates that the Commission is not as independent as it is stated in the Treaty and the Commissioners are not as autonomous as it's been indicated in their adjuration at the European Court of Justice.

Indicated as the most effective figure in the Commission, the president has the ability to effect the designation of other commissioners, has exclusive power over assigning and reshuffling portfolios, moderates the College meetings, can undertake new liabilities, and most significantly represents the Commission in relations with other EU institutions and national governments (McCormick 2005, p.84). The College of Commissioners operates under the president and each Commissioner has a portfolio structured and allocated by the President.

The Commission is divided into departments, which are known as Directorates-Generals (DGs). The DGs are distributed with regard to specific policy areas and each of them is controlled by a Director-General who is accountable to one of the Commissioners (www.developmentportal.eu 2011). It should be emphasized that neither the number nor the area of responsibilities of the DGs are or should be in accordance with the Commissioners. In other terms, more than one DGs may be under the authority of a single Commissioner or the areas of responsibility of a DG can be covered under the authority of several Commissioners and even more surprisingly a Commissioner may not have any DGs under its jurisdiction (Dinan 2005, pp.107-108).

The DGs are considered to be effective players in the Commission, since they form the foundation of the commission proposals (Craig & De Burca 2003, p.58). Also, in order to be able to compose more effective proposals, collaboration and integration between different departments of directorate is necessary especially for the development of specific policy areas such as the Environment (McEldowney & McEldowney 2010, p.96) Within the Commission, DG environment is in charge of constituting, implementing and monitoring the environmental policy.

Güneş stated that (2011 p.65):

It is possible to queue the main duties of DG Environment: a) integrating environmental matters into other EU policy fields b) promoting scientific research concerning issues on environment c) maintaining and improving the quality of life by protecting natural resources, effective risk management and prompt adoption of Union regulations to national law d) establishing common policies regarding global environmental problems like climate change and biodiversity loss e) enhancing resource efficiency in the process of production, consumption and waste disposal f) encouraging EU enlargement by taking into consideration the economical, sociological and ecological needs of the future generations g) advancing the EU citizens' consciousness on environmental protection h) to put into practice an effective and extensive environmental informing policy.

Together with the power of proposing new laws to Parliament and the Council, the Commission also has competency over EU's budget, international representation of the EU and EU law enforcement which it shares with ECJ (<http://europa.eu/european-commission> 2011). As indicated, the Commission's most recognized role is to ensure that the principles of the Treaties are transformed into laws and policies (McCormick 2005, p.87). Although, the Commission has the right to propose new laws so as to preserve the interest of the EU and its citizens under the right of legislative initiative, this right can be exercised for the issues that can't be effectively tackled at national, regional or local level (<http://europa.eu/european-commission> 2011).

In addition, the responsibility of the Commission does not come to end with the acceptance of a law or policy. The Commission, acting as a watchdog, is obliged to ensure that the rules are properly implemented by the member states. In order to fulfill its duties as the protector of the Union policies, the Commission receives support from the MS or the informers such as governments, corporations and individuals through a reporting system (McCormick 2005, p.88). These reports form a very important part in determining any infringement with regard to the Union environmental policy.

In the field of environmental policy the Commission entitles the citizens, environmental organizations and other related persons to file a complaint in case of a breach determined. In order for this type of complaints to be accepted, there should be accurate concern with regard to the violation of the Union law. After determining a failure in enforcement, at first step the Commission addresses an official letter to the responsible competent authority and requires for correction of the problem, if the attempts does not

provide the desirable outcome then the Commission appeals to the Court of Justice as a last resort (<http://europa.eu/european-commission> 2011).

Moreover, the administrative responsibilities shouldered by the Commission also includes the ones that are correlated with environmental policy such as; compiling and assessing the revision programs foreseen for certain branch of industry, managing the Union funds like European social Fund, European Cohesion Fund and European Agricultural Guidance and Guarantee Fund, editing the MS regulations for embedding the related directives into national law, sharing data on environmental pollution and sharing experiences regarding the execution of certain directives (Güneş 2011, p.63).

Finally, the Commission is also equipped with the authority of representing the Union in dialogs concerning international organizations and taking part in discussions regarding international agreements in the name of the EU.

2.3.2 The Council Of Ministers

On the contrary of the Commission, the Council of Ministers (the Council) is the institution where the national interests are put forward. It is a formation at ministerial level in which the related ministers from the member states attend according to the topic of discussion (www.cfp-reformwatch.eu 2011). The Council is known to be the least transparent institution of the Union as well as more effective one since the council makes the final decisions.

For this reason, it has often been criticized that the decisions taken at the Council are generally coincide with the benefit of MS' and the members usually insist on decisions that are rational with respect to national law both which has a negative impact not only on environmental policy but also on other EU policies (Güneş 2011, p.69).

There are nine technical councils within the Council together with the Environment and Education Council (www.avrupa.info.tr 2011). The aim of the Environment and Education Council is to maintain that the economic activities in the field of environment

to be constant, balanced and compatible, to protect human health, to encourage the effective use of natural resources and to find solutions to global and regional environmental problems in order to improve environmental quality (Güneş 2011, p.69).

As being a crucial part, the Presidency of the Council can be identified as the source of incentive concerning the legislative and political decision making process. Unlike in other EU institutions, the presidency is held by a member state instead of a legal person and there is a rotation once in every six months in compliance with the pre-determined listing (www.consilium.europa.eu 2011). Agenda setting, allocating and managing the sessions of the Council meetings and working groups, reaching a common ground when dispute between the MS arise are among the liabilities of the Presidency of the Council (www.cfp-reformwatch.eu 2011).

Being defined as the most powerful EU institution, the primary duties of the Council is to make legal arrangements, to coordinate the economic policies of the EU member states and more importantly to identify the basic political principles on the areas that fall under the jurisdiction of the Union and to determine the measures with regard to the implementation of the policies (www.abgs.gov.tr/45630&l 2011).

Decision making procedures in the Council is either executed through unanimity or QMV system depending on the policy area that has been covered. If the topic in question is related to a sensitive area such as security and international affairs or taxation, then the decision should be given unanimously, but other issues generally fall under QMV which requires majority of the twenty seven member states in favor and at least two hundred fifty five votes from three hundred forty five at the same time (<http://europa.eu/council-eu> 2011).

2.3.3 The European Parliament

Adopted by the SEA, the EP is the single European institution that is elected directly. There are currently seven hundred thirty six members of the European Parliament (MEPs), grouped according to their political preferences instead of nationality and the elections take place once in every five years (www.europarl.europa.eu 2011).

The EP is important for environmental policy basically for two reasons. First of all, it shares liability with the Council under the co-decision procedure in adopting Union law and secondly, the bare existence of the Greens in the EP creates sensitivity towards environmental issues and support to environmental policies. The only challenge considering the environmental matters is that sometimes the environmental matters argued by the EP get lost in lobbying activities and competition between self-interests (McEldowney & McEldowney 2010, p.98).

Even though the groups in the EP may go through constructional changes or rename themselves occasionally, according to the latest elections in 2009 there are currently seven political groups in the parliament (<http://news.bbc.co.uk/democracylive> 2011).

- i. European People's Party (EPP)
- ii. Progressive Alliance of Socialists and Democrats (S&D)
- iii. Alliance of Liberals and Democrats for Europe (ALDE)
- iv. Greens/European Free Alliance (GRN/EFA)
- v. European Conservatives and Reformists (ECR)
- vi. European United Left/Nordic Green Left (GUE)
- vii. Europe of Freedom and Democracy (EFD)

However the EP is considered to be less effective than the national parliaments, it possesses certain competencies that challenge other EU institutions. First of all, under the co-decision procedure, the EP shares responsibility with the Council in determining the scope of and adopting the EU laws on areas such as environment and consumer protection (<http://europa.eu/european-parliament> 2011). Secondly, since it is the single

directly elected EU institution, it can also act as a tool to minimize the democratic deficit of the Union for which it is often being criticized.

By having the right to dismiss or appoint the nominated commissioners and dismissing the Commission as a whole, gives the EP a significant advantage (www.avrupa.info.tr 2011). Thirdly, the parliament has joint power with the Council in adopting the annual budget of the Union and these powers were strengthened by the Lisbon Treaty (www.abgs.gov.tr/45628&l 2011).

2.3.4 The European Council

The European Council consists of the heads of member state governments, accompanied by the President of the Commission in their meetings (McEldowney & McEldowney 2010, p.97). Created in 1974 as an informal component of the Community which provided a platform of discussion for the EU leaders, it acquired a formal status with the adoption of the SEA and it has been among the official institutions of the Union since the ratification of the Lisbon Treaty in 2009 (<http://europa.eu/european-council> 2011).

The duties of the European Council are to decide on the Unions general political direction, to determine its preferences and handle the delegate issues that were not able to be solved at lower rank intergovernmental cooperation (McCormick 2005). Also, a permanent president for two and a half year term is elected by QMV and the responsibilities of the President are determined as chairing and contributing the council, maintaining the harmony among the members and submitting a report to the Parliament after the Council meetings (www.abgs.gov.tr/45631&l 2011).

2.3.5 The European Court Of Justice

Established in 1952, the ECJ is the guardian of the EU law by enabling that the member states are in compliance with the Treaty amendments, watching over the acts of EU institutions so that no legal boundaries are breached and most importantly interpreting

the EU law when requested by national courts (<http://curia.europa.eu> 2011). The ECJ is formed by twenty seven judges, one from each member state and eight advocates-general (AG), who are bound to assist the judges during the cases by submitting their opinions (<http://europa.eu/court-justice> 2011). Also, the term of office of the judges and the AG is six years and the member state governments decide on whom to designate to the posts (<http://www.civitas.org.uk> 2011).

In the areas where the member states delegated their competencies to the EU, the EU law is superior than the national law, if the two coincide and therefore the ECJ is defined as the “supreme legal authority” of the Union as being the last resort to appeal on issues related to EU law (McCormick 2005, p.100). As explained in the official website of the EU, there are five typical types of cases that are brought to the Court, which are separated according to who the respondent and the plaintiff are (<http://europa.eu/court-justice> 2011).

As being the guardian and the interpreter of the EU law, the work load of the ECJ has been extensive. In order to lessen the pressure that the Court was under and to provide a better legal protection for the EU citizens, the Court of First Instance (CFI) was established in 1989. The CFI deals with the cases brought by individuals, companies, organization and certain types of cases related to competition law (www.avrupa.info.tr 2011).

By having the competence of monitoring the compatibility of MS’ and the Union institutions’ activities with EU law and enforcing the necessary actions when the Union law is breached, the contribution of the ECJ to the protection and development of environmental policy cannot be underestimated. In addition, the AG has a major part in the procedures of the ECJ by giving advice on Union law, including environmental law and sustaining of coherent and legitimate analysis (McEldowney & McEldowney 2010, p.98).

Moreover, in case of a possible infringement of EU law the Commission is not the only player that can engage the attention of the ECJ, pressure groups as well as lobbying

organizations are also experienced in the procedure of making the ECJ aware of a probable infringement which leads the ECJ to be able to promote and expand environmental law.

2.3.6 European Environment Agency

Although, it is not among the decision making mechanisms of the Union, the European Environment Agency (EEA) is the only EU institution that is directly related to the environment. The objective of the Agency is to provide accurate and reliable information on environment both to the public and the decision makers (Güneş 2011, p.85).

Over the years the Agency also established the European environmental information and observation network (Eionet) with the support of its members, in order to provide prompt and quality-assured information, knowledge and proficiency for evaluating the status of the environment in Europe and situations that creates stress upon it (www.eionet.europa.eu 2011).

The Agency has thirty two members including the MSs of the Union and it is accessible to any country that are not a member of the Union but share the same goals with the EU in tackling environmental problems (Güneş 2011, p.85). The scope of the EEA includes air pollution, climate change, biodiversity, noise, land use, water, soil, chemicals and waste and material resources (www.eea.europa.eu 2011).

2.4 ENVIRONMENTAL ACTION PROGRAMS

Together with the Paris Declaration in 1972, the community addressed the ecological problems occurred as a result of economical development in Europe and emphasized the necessity for a common environmental policy and action plans (Talu 2006, pp.61-62). Although these programs are perceived as legally non-binding reflections of the community agencies' political intentions, this kind of semi-official decisions play

important roles in developing written proposals (<http://www.ikv.org.tr> 2011). With a period of mostly five years, the EAPs helped the environment to be prioritized in the community and placed environmental matters into the policy-making process.

2.4.1 The First Environmental Action Program (1973-1976)

The first EAP had a decisive role in EU environmental law since it determined the model, aims, rules and priorities of the Community environmental policy (Onuk 2007, p.71). During the preparation period of the first program, the outcomes of the 1972 United Nations Conference on the Human environment were taken into consideration and in accordance with the conference outcomes topics like advancing polluter pays principle, avoiding actions that harms the ecological balance, preventing pollution at source and promoting regional cooperation were included in the first EAP (Güneş 2011, pp.28-29).

2.4.2 The Second Environmental Action Program (1977-1981)

The second EAP can be perceived as a complementary of the first program with an extended content. The main topics of interest in the second program were the principles and targets of the community environmental policy, reducing pollution and noise, attentive usage of natural resources, actions to be taken in order to protect and improve environment and the Community's role in the international arena (Güneş 2011, p.30). Also, the financial aspects of the environmental policies were underlined in the program as well as the conjunction between environmental policies and employment (Talu 2006, p.62).

In addition, as one of the most important concepts of the environmental policy, Environmental Impact Assessment, which focused on preventing any environmental damage caused by economical, social and industrial activities, was first introduced by the second EAP. However, the decision of the Council for the necessary arrangements regarding the environmental impact assessment was indicated in the third EAP (Onuk 2007, p.78). In general terms, each EAP mainly reflects the environmental problems

faced in its given period and within this respect the second EAP focused on eliminating pollution of drinking water, air and sea (Güneş 2011, p.31).

2.4.3 The Third Environmental Action Program (1982-1986)

The third EAP that covers the period between 1982 and 1986 adopted a protective strategy in order to preserve the environment and natural resources. It has been strongly emphasized in the program that the environmental aspect of any kind of economical activity in the field of agriculture, energy, industry, transportation and tourism should be taken into consideration even if the project or the activity is still at the stage of planning (Talu 2006, p.62).

With this stress, it has been pointed out that the common environmental policy will be integrated in the common and socio economic order of the Community (Güneş 2011, p. 31). Moreover, the importance of harmonizing the environmental policy with other community policies was highlighted in the third EAP.

2.4.4 The Fourth Environmental Action Program (1987-1992)

The fourth EAP addressed the environmental protection as a component of economic and social development and also, on the contrary of previous EAPs, it included very strict environmental standards. When analyzed closely, these standards were set in accordance with the requirements of European public opinion and also, contained essential applications concerning the industry in general in terms of domestic and foreign market activities (Talu 2006, p.63).

Since the fourth EAP was accepted right after the ratification of the SEA, the program was focused more on reaching the targets emphasized in the treaty (Güneş 2011, p.32). Also, the fourth EAP laid emphasis on the interaction between energy and environment and adopted an understanding of finding a balance among energy consumption and environmental protection measures. Although the fourth program was also build upon the principles recognized in the previous programs, it also made reference to current

problems such as the potential and probable harms of biotechnology and nuclear safety (Güneş 2011, p.32).

2.4.5 The Fifth Environmental Action Program (1993-2000)

Having the effects of the Rio Environment and Development Convention and the Maastricht Treaty on, the fifth EAP adopted a different approach and strategy than the previous programs. The main difference was setting sustainable development as the aim of the program and intending to shape the common environmental policy around it (Güneş 2011, p.33). Even, the program was titled as 'Towards Sustainability' since it set long term objectives and focused on a more extensive approach.

In the light of the fifth EAP the features of sustainability were defined as to preserve the general standard of life; constant retrieval to natural resources; refrain permanent environmental distortion and to acknowledge that sustainable development means to satisfy the existing needs without compromising the requirements of future generations (<http://ec.europa.eu/actionpr> 2011).

Also, building upon the fundamentals like integration of the environmental measures in all other policy areas, making use of free market economy tools and commitment to agreed measures can only be achieved by shared responsibility between the numerous actors among the society together with sustainable development; the fifth EAP especially concentrated on the pressure created on environment by industry, energy, transportation, agriculture and tourism sector (Güneş 2011, p.33).

The areas addressed in this action program included climate change, acidification and air quality, urban environment, coastal zones, waste management, management of water resources and protection of nature and biodiversity (<http://ec.europa.eu/actionpr> 2011).

According to the progress report on implementation of the fifth EAP approved by the Commission in 1996, the most advanced progress made in the field of cross sector integration was the manufacturing sector since the legislation existed for nearly twenty

years and the economic advantages could be observed more quickly. On the contrary, the progress was least noticeable in the agriculture and the tourism sector.

Also, in the field of transport, the awareness was increasing and progress was made in couple of areas but still required improvements. Even though, the perception of environment being a part of the problem and at the same time the solution endured, and potentially effective instruments existed, there was a lack of incentive to go ahead to a more sustainable approach.

2.4.6 The Sixth Environmental Action Program (2002-2012)

Adopted in 2002 as a decision of the European Parliament and the Council, the sixth EAP determines the formation of the environmental policy making of the EU for the period of 2002-2012 and emphasizes the actions that need to be taken in order to accomplish them. Although the program rests on the previous EAPs, it differentiates itself by foreseeing active participation and responsibility from all segments of society in order to produce sustainable and innovative solutions to the environmental problems faced (Güneş 2011, p.35). Also, since the sixth EAP was adopted through the co-decision procedure, it reflects a formal commitment of the European Commission, Council and Parliament (von Homeyer et al. 2011, p.6).

Even though, the process of developing the sixth EAP through co-decision was lengthy and absorbed significant resources, taking eighteen months to conclude, it also provided an opportunity for engagement by the other EU institutions in the process of setting out the strategic framework for EU environmental policy and provided additional or alternative channels of information and influence for external stakeholders and experts (von Homeyer et al. 2011, p.6).

Also, the sixth EAP was prepared taking the EU enlargement in consideration and one of the main roles of the candidate countries, which were financed by the community funds program, was specified in the program as implementing the community's environmental law (Talu 2006, p.69)

As indicated by Güneş (2011) there are four main priority areas listed in the sixth EAP that requires interference:

- i. **Climate change:** The goal is to stabilize the intensity of the greenhouse gases in the atmosphere at a certain level that will not affect the course of earth's natural climate. In order to achieve this goal the program set high targets such as reducing greenhouse gas emissions by eight percent by 2008 to 2012 and twenty to forty by 2020 (www.euractiv.com/6th-environment-action-programme 2011).
- ii. **Biodiversity:** The target is to preserve and rehabilitate the active natural system and as a result giving an end to loss of biodiversity in Europe. So as to reach that target several preventive measures were foreseen such as completion of Natura 2000 network, new initiatives for protecting the marine environment and new sectoral biodiversity action plans (www.euractiv.com/6th-environment-action-programme 2011).
- iii. **Environment and Health:** The aim is to reach a level of quality that the human made polluters will not have any crucial effects on human health. In order to come up to that level of quality the sixth EAP set forth some important improvements required like a revision of the EU's risk management, a strategy for reducing risks from pesticides, protection of water quality and a thematic strategy for air quality (www.euractiv.com/6th-environment-action-programme 2011).
- iv. **Sustainable use of natural resources and waste management:** To enable that the consumption of renewable and nonrenewable resources should not exceed the assimilative capacity of the environment. The aim of the EAP is to maintain that balance through an integrated product policy which would provide aid to advanced recycling and waste prevention together with measures that targets specific waste streams (www.euractiv.com/6th-environment-action-programme 2011).

The program also covers objectives without solid policy targets and set measures and were meant to be developed subsequently through so called Thematic Strategies, which

includes soil protection, marine environment, pesticides, air pollution, urban environment, natural resources, and waste (von Homeyer et al. 2011, p.6). These strategic initiatives can be perceived as a step for updating EU environmental policy-making, since they base upon the already established EU legal framework and include new information regarding the threats to human health and environment.

Moreover, the sixth EAP encourages full integration of environmental protection requirements into all Community policies and actions. With this approach, not only it links environment and European objectives for growth, competitiveness and employment, but also apprehends that environmental policies should provide contributions to those objectives so that the social welfare is promoted. A good example for how it can be achieved is the development of new environmental technologies, which supports sustainable economic growth and environmental protection at the same time (McEldowney & McEldowney 2010, p.94).

Although it has been met with great enthusiasm, the sixth EAP has often been criticized for setting very high and demanding targets that their attainability is in question. As a matter of fact, according to the midterm evaluation report released by the Institute for European Environmental Agency in 2006, there had been progress with regard to four main priority areas, but this progress was not adequate to lead the way for reaching the targets determined in 2002 (Pallemaerts et al. 2006, p.64).

Also, the specified timeframe of the sixth EAP is found to be not enough for some policy areas such as biodiversity due to the requirement of more information or because of other problems faced during the process (<http://eur-lex.europa.eu/CELEX:52011DC> 2011). With regard to the thematic strategies, although they were established as means to further determine the measures to be taken in order to accomplish the general objectives, the progress shown by these strategies has led to a prolonged policy-making process with fewer resolutions than expected (Pallemaerts et al. 2006, p.64)

As a result, even though some progress made regarding the priority areas specified in the sixth EAP, in the end there are still unachieved targets and lack of environmental

legislation implementation. Furthermore, during the period of the sixth EAP, the global economic order went through some significant changes and transformed itself. With new economic actors arose, growth in global population adding more pressure on environment and EU expanding borders with its enlargement, it became obvious that there is a great need for environmental policy to be compliant and adjust.

2.5 CHANGES BROUGHT BY THE TREATY OF LISBON

The need for an institutional revision became even more apparent after the Union enlarged into twenty seven member states. The Constitutional Treaty, which was rejected by French and Dutch citizens in 2005, was prepared in order to provide a better functioning union with more effective institutional set up (<http://news.bbc.co.uk/europe/6901353> 2011).

Providing the main elements introduced by the Constitutional Treaty, the Treaty of Lisbon put aside specific secondary components that caused discomfort among eurosceptics such as; the title “Constitution” which by some was an indication of a European super state, the proposed flag and the anthem that also was perceived as a sign of unification (europedia.moussis.eu). Moreover, the difference between the two treaties is mainly structural as the Constitutional Treaty was constituted like a replacement of the previous treaties; on the other hand, the Treaty of Lisbon is an amendment to the previous Treaties (www.europarc.org 2011).

Even though, the basic provisions regarding the environmental policy remained unchanged, there have been several institutional modifications that may affect the environmental issues as well as revisions concerning the definition of sustainable development; energy policy and climate change (Withana 2009). Despite the fact that the concept of sustainable development was previously defined in early treaties, the Treaty of Lisbon provides a broader description emphasizing economical, social and environmental dimensions under Article 3 of TEU (www.europarc.org 2011).

The Article clearly states that “The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance” (<http://eur-lex.europa.eu/C:2008:115> 2011).

Moreover, the Treaty also acknowledges the impacts of climate change on many aspects of human life and stresses that combating climate change on an international level is an essential part of the environmental policy (http://europa.eu/lisbon_treaty 2011). In addition, under Article 191(1) the Treaty also endorses methods to deal with climate change at international level (McEldowney & McEldowney 2010; p.91). Another emphasis related to the environmental policy is the introduction of the Energy Title, which strengthens the link between the energy policy and the internal market as well as highlighting the need for environmental protection (Vedder 2008, p.4).

In a way, this Title underlines the aim of promoting energy efficiency and energy savings in addition to ongoing progression of new and renewable energy sources (www.europarc.org 2011). This new title is perceived as a positive improvement, since it recognizes the significance of adapting energy usage to enhance climate change together with other environmental issues (McEldowney & McEldowney 2010; pp.91-92).

In addition to the references made concerning the environmental policy, there are also several institutional changes brought by the Lisbon Treaty that affects the policy fairly. So as to overcome the democratic deficit that the EU has been criticized often, the Treaty grants the EP with new competences in relation to EU legislation, budget and international agreements (http://europa.eu/lisbon_treaty 2011). As being the only EU institution that is elected by the citizens directly and shaped according to the political preferences, the EP is a resort to which the environmental interest groups can approach and carry out lobbying activities.

Also, the extent and the substance of QMV, which is a core item of EU decision-making procedures especially for the Council, is expanded into new policy areas. The Treaty introduced a modified QMV based on “double majority”, meaning that a topic of discussion requires fifty five percent of member states and sixty five percent of the EU's population in order to get accepted (Withana 2009; p.2). The motive behind this change is to enable a more transparent and effective EU law making (http://europa.eu/lisbon_treaty 2011). However, double majority voting will be executed from 2014 and there will be a period of transition until 2017 during which the Member States will have the right to request the old voting system to be used (Withana 2009; p.2).

Moreover, probably the most important innovation brought by the Treaty is the “citizens’ initiative”, which will be enforced from 2012, provides the opportunity for European citizens to ask the Commission to present legislative proposals on issues that are supported by at least one million citizens from certain number of member states (www.consilium.europa.eu 2011). Even though, it will ensure another engaging way to influence EU policy making for environmental interest groups and lobbies, it is a fact that the European Commission is not bound to accept a citizens’ proposal or cannot guarantee that the result will be what is expected (Lee 2008, p.134).

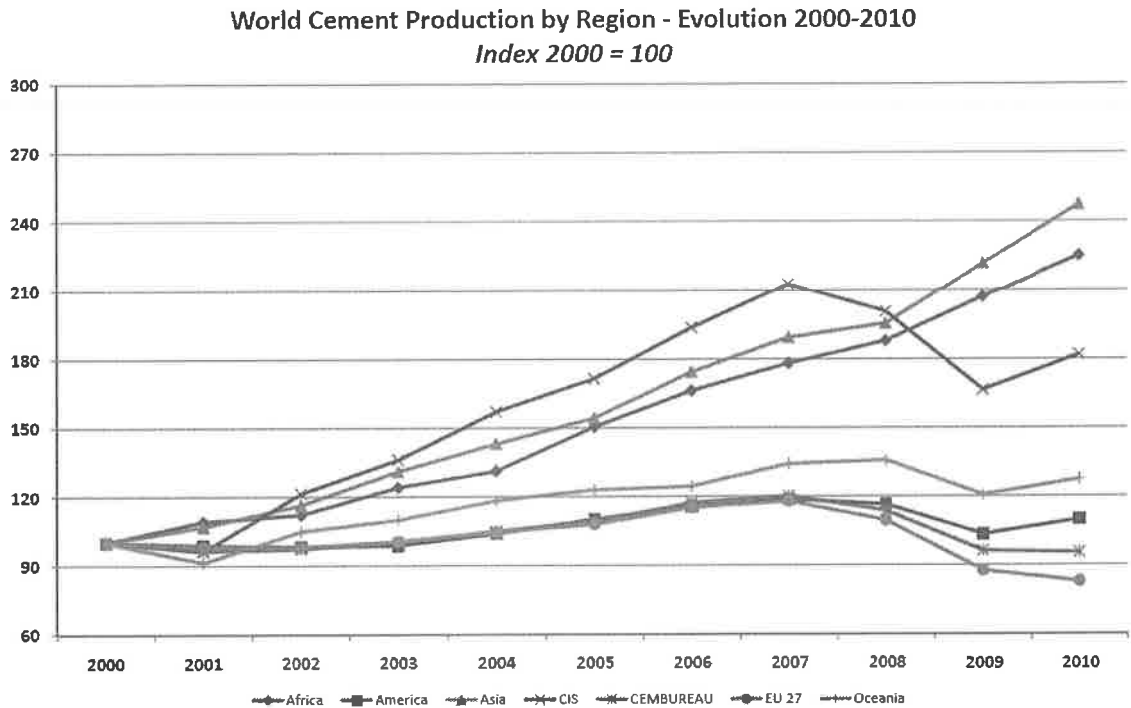
Although there are conflicting approaches regarding the effectiveness of the Lisbon Treaty on environmental policy, there are some promising developments that may open the way to both environmental interest groups and lobbies to become a bit more influential. Especially, the “citizens’ initiative” and the EP’s increased powers in the EU policy making area can be efficient tools for both parties to draw attention to specific environmental issues in the EU and to create certain amount of pressure on the Union to take the necessary actions.

3. THE ENVIRONMENTAL IMPACT OF THE CEMENT SECTOR IN THE EU

Cement, which can be identified in general terms as a binder used in construction, is one of the most consumed materials on earth. Cementitious products had been used for many centuries, however the cement as we know developed during the nineteenth century with the Industrial Revolution (www.cemnet.com 2011). Considering the fact that the construction and the cement sectors are linked very strongly, the evolution of the construction sector throughout time also positively affected the development of the cement industry.

The cement industry in EU is very strong with over two hundred cement plants in the region (Ecofys 2009). In addition, over the years European cement companies such as Lafarge, Heidelberg and Italcementi positioned themselves gradually as international actors. Although, the recent economic crisis had a noticeable effect on the industry as seen in the Figure 3.1, the cement sector is slowly recovering from the impacts of it.

Figure 3.1: World cement production by region-evolution 2000-2010



Source : www.cembureau.be 2011

In relation to other industrial sectors, cement industry draws much lesser public attention with regard to environmental effects of the sector, even though it produces about five percent of Carbon Dioxide (CO₂) emissions worldwide and raw material procurement has significant impacts on biodiversity (www.wbcsdcement.org/Itemid=140 2011). However, the European cement sector also faces restrictions in the context of the EU environmental policy and in general acknowledges its responsibilities in minimizing the damages caused by the cement production process.

3.1 THE ENVIRONMENTAL IMPACTS OF THE CEMENT PLANT OPERATION

Cement production is a multiple-staged and highly invested procedure in which some stages creates non-environmental friendly outcomes. The raw materials required for cement are limestone, clay and marl. Mostly, the cement plants are set close to either the quarries where they can provide the necessary raw materials or to market hot spots, in order to maintain low transportation costs (www.cembureau.be/cement-manufacturing-

process 2011). Existence of quarries by itself has negative impacts on environment, since it damages the biodiversity in the area. Also, proceedings like blasting and material handling causes amounts of dust and noise that needs to be taken under control (www.tcma.org.tr/menuID=54 2011).

The fragmented raw materials from the quarries are taken to the plant with belt conveyors or dump trucks in order to be processed in the crushers which will reduce the sizes of the pieces into desirable amounts (www.cemex.com 2011). After the crushers, the raw materials are stocked according to their types and well proportioned amounts of raw materials are homogenized in the raw mill in order to obtain raw meal which is then stored in the raw meal silo (www.tcma.org.tr/menuID=54 2011). The raw meal is fed to the preheater tower which is formed from several cyclones and part of the calcination process. When the raw meal goes by the cyclones, it comes into contact with the swirling hot exhaust gases from the kiln coming from the reverse direction and the material absorbs the heat (www.wbcscement.org/Itemid=140 2011).

Through the cyclones, the raw meal is heated between 60 °C-860 °C and becomes partially calcined (www.cimsa.com.tr 2011). Even though, the process occurs in a totally closed system that may lead to the idea that the environmental impact of the process is minimal, the calciner which is a combustion chamber with burners attached, located at the bottom of the preheater tower and above the kiln inlet zone, generates sixty percent of the total emission from the cement kiln (www.wbcscement.org/Itemid=140 2011).

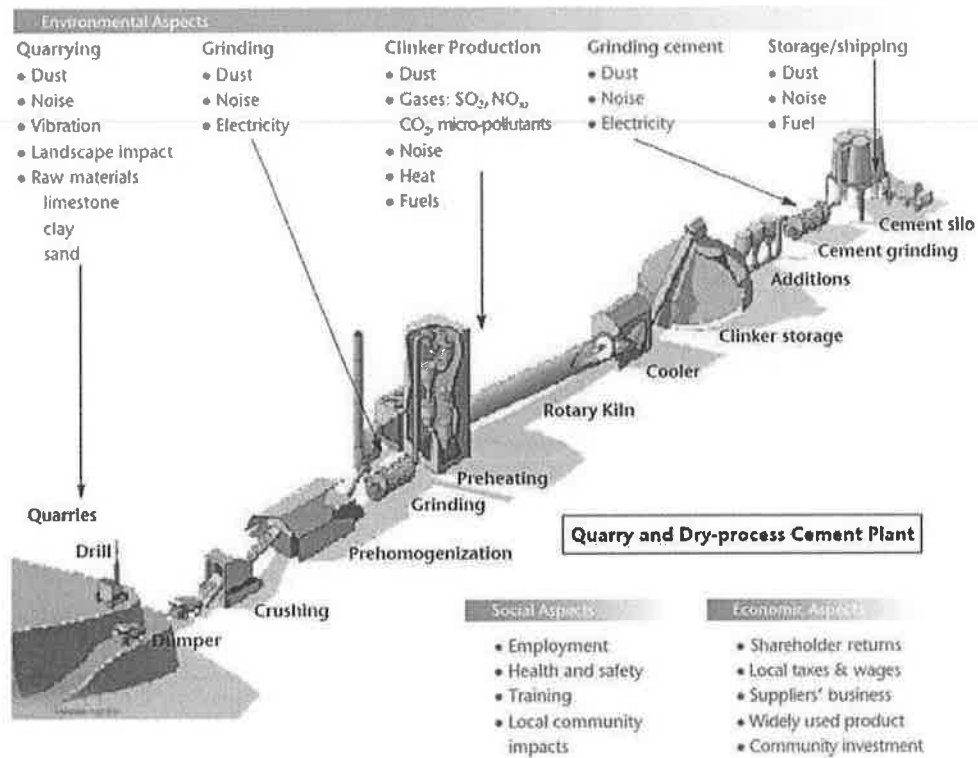
The actual calcination procedure happens in the rotary kiln which is a massive reverting pipe of sixty to ninety meters long and with a diameter up to six meters (www.cembureau.be/cement-manufacturing-process 2011). The partly calcinated raw meal is fed to the kiln which is positioned inclined in order to provide the raw material to slide through the kiln and is heated around 1500 °C so as to granulate the material and obtain clinker as an outcome of the process (www.tcma.org.tr/menuID=54 2011). The heat in the rotary kiln is provided by a burner which enables a 2000 °C flame (www.cembureau.be/cement-manufacturing-process 2011). In order to feed the flame

coal, pet coke, natural gas and also alternative fuels such as plastic, waste oils, solvents, bone meals are used (www.wbcdcement.org/Itemid=140 2011).

The hot clinker obtained after the calcination process is then transferred to the cooler where its temperature is reduced and maintained around 100 °C (www.tcma.org.tr/menuID=54 2011). So as to have an efficient use of energy, the heat recovered from the cooling procedure is transferred back to the preheater tower of the kiln (www.wbcdcement.org/Itemid=140 2011). Afterwards, the clinker is stocked at the clinker storage. The clinker is considered as being a byproduct during the process. So as to acquire cement, the clinker is mixed with calcium sulfate (gypsum) and also with other components like fly ash, slag, volcanic dusts etc. which are argued to enable a cement with lessened carbon footprint (www.cembureau.be/cement-manufacturing-process; www.wbcdcement.org/Itemid=140 2011). At the final stage, the cement produced is transferred and reserved in the silos before dispatched.

As seen in the Figure 3.2 the environmental impact of the whole cement production process varies from dust, noise and emission to high energy consumption and landscape impact. In addition to the impacts indicated in the Figure 3.2, water usage for dust control, during the cooling process and preparation of the raw material and waste management can also be included among them.

Figure 3.2: Environmental aspects of cement production



Source : www.wbcdcement.org 2011

The EU recognizes the extent of the pollution that can be caused by industrial installations including cement plants and therefore established the IPPC Directive, so as to avoid, minimize and control the pollution of air, water and soil, amount of waste emerging as an outcome of the process and to assure environmental protection at highest level (europa.eu/legislation_summaries/waste_management 2011).

Adopting the IPPC Directive in 1996, the EU aimed to establish a set of standardized rules for allowing and managing industrial establishments (ec.europa.eu/ippc 2011). IPPC is characterized as being one of the significant developments within the context of the EU environmental protection, since the directive abandoned the sectoral approach that acted upon specific environmental problems one by one and adopted an integrated attitude that foresees environmental problems should be coped with by handling them as a whole (Güneş 2011, p.258).

The IPPC Directive focuses on present and recent industrial and agricultural activities that share a high pollution potential and requires those indicated establishments to have a permit which can be delivered only if specific environmental requirements are met (europa.eu/legislation_summaries/waste_management 2011). For those projects that fall under the IPPC directive to go into operation or continue with their operations, they need to receive the permission which is required by the Directive (Güneş 2011, p.261).

The Directive structures itself on four main principles as explained in the official website of the Commission: the first principle is the integrated approach indicating that the permits should be distributed considering the environmental performance of the plant as a whole, the second principle is the so called Best Available Techniques (BAT) that act as the core of defining the permit conditions involving also the emission limit values (ELVs), the third principle is the flexibility which grants the authorities to consider the technical specifications of the establishment, the geographical region it is located and the regional environmental condition when specifying the permit conditions and the final principle is the right of public participation which provides the public to become part of the decision making process and to be informed on the developments regarding the matter (ec.europa.eu/ippc 2011).

For the related installations in order to receive the required permit they need to be in compliance with the indicated commitments that include; taking preventive measures against pollution by using the best available techniques, avoiding serious far-reaching pollution, using energy efficiently, taking precautions in order to prohibit accidents and to restrain its damages, avoiding, recycling and discarding waste in a way that is least polluting and taking precaution in order to ensure that once the activity is over the related site will be returned into its previous condition (Güneş 2011, p.264).

In addition, the IPPC is perceived as the complementary of the EIA, which is in a way puts into practice the merits of the Precautionary Principle by requiring enough data to comprehend the possible environmental effects of a planned activity before the decision for clearance is made by the authorities (Güneş 2011,p.200). Since the motive behind the Directive is to determine the negative environmental effects of a planned activity

and to prevent them at the earliest stage possible, it is closely linked with the Precautionary Principle and it serves as a very effective tool of the principle.

According to the essence of the requirement either being an individual project or a public plan, the activity falls under the Directive 85/337/EEC which is known as the EIA covering the projects such as airports and motorways or the Directive 2001/42/EC which is the Strategic Environmental Assessment (SEA) for activities involving public plans (ec.europa.eu/eia 2011). It is important to indicate that EIA is not the decision making process by itself but a component of it that provides the measures leading to a healthy determination and also represents a new perception by including the public into the executive decision making process (Güneş 2011, pp.199-200).

Moreover, the projects that fall under the Directive are grouped into two based on the obligatory application of the EIA, for the projects defined in Annex I of the Directive prosecution of the EIA is a must but for the projects indicated in Annex II prosecution of the directive is dependent on the decision of the MS (ec.europa.eu/eia-legalcontext 2011). The cement sector is also influenced by the EIA, since cement production facilities and quarries are included in the scope of the Directive (www.cembureau.be/environmental-impact-assessment-directives 2011).

In general both IPPC and EIA complete each other while EIA is focusing on the projects at planning stage and aiming to determine the extent of the environmental impact beforehand in order to determine whether to give clearance to the project or not. On the other hand, IPPC is focused on the existing and new established installations and intending to keep the activities with high pollution potential under control. Also, both Directives approach the environmental problems with an integrated perspective, meaning that they are not targeting only a specific environmental issue but covering the environmental problems as a whole.

3.2 MINIMIZING THE MAJOR ENVIRONMENTAL IMPACTS

3.2.1 Quarry Rehabilitation

Biodiversity is the terminology used to define diversity of life on earth, including ecosystems and living organisms (www.iucn.org 2011). The importance of biodiversity should not be underestimated, since the human kind depends on it for food, energy, raw materials, water and air, in order to maintain its existence. Due to the overexploitation of natural resources by construction, quarrying, aggressive agricultural programs and global warming, a continuous loss of biodiversity has been witnessed over the years (www.eea.europa.eu 2011).

The EU is dedicated to preserve biodiversity and retain biodiversity loss within the EU by the year 2020. Under Natura 2000, which is an extensive network of protected areas, there are twenty six thousand conserved areas in all the Member States that constitutes eighteen percent of land area in the EU (ec.europa.eu/environment 2011). The legal ground for Natura 2000 is provided by the Birds Directive and the Habitats Directive of the EU.

Directive 2009 /147 /EC, which is also known as the Birds Directive and amended after the last enlargement as 79/409/EEC, is the one of the oldest EU nature legislations that enables protection for Europe's wild bird population (ec.europa.eu/birdsdirective 2011). The Directive, which was adopted in 1979 by the Council and the Parliament, and its amendments require member states to create protection zones which are also called Special Protection Areas (SPAs), to preserve the habitats, to recover damaged living spaces and to create biotopes (europa.eu/128046_en.htm 2011). The Member states are also expected to form and enforce management plans, establish straight conservation goals as well as obtaining joint-financing for the management for all the SPAs in the EU (www.birdlife.org 2011).

On the other hand, the Habitats Directive, known as 92/43/EEC, intends to conserve the wild plants, animals and habitats that forms diversified natural environment

(www.environment-agency.gov.uk 2011). The two directives constitute the foundation of Natura 2000 and can be perceived as the supplementary of each other. The Directive instructs the Member States to take precautions to preserve or rehabilitate at desirable preservation status, natural habitats and species of significance (www.apis.ac.uk 2011). With the Directive, over thousand animals and plant species and many habitat forms are under the protection of the EU environmental policy (ec.europa.eu/habitatsdirective 2011).

The Directive demands the MSs to specify Special Areas of Conservation (SACs) for indicated habitats and species in the related Annexes of the Directive, to take in charge of the surveillance of the habitats and species, to assure total protection of species, to make sure that measures of protection are available to properly manage the SACs and to certify in every six years about the enforcement of the Directive (jncc.defra.gov.uk 2011).

Like many other man made activities quarrying has significant detrimental effects on biodiversity. The Cement sector requires major amounts of raw materials in variety and due to the very nature of the process for acquiring those minerals, causing environmental damage is inevitable. In addition to the land loss, there is also noise, dust and vibration depending upon blasting and crushing rocks. For many years, the leading European cement groups are working on overcoming the effects of quarrying on biodiversity. Most of them developed rehabilitation plans for their quarries, in order to regain the damaged land and form a natural habitat for the wild life.

The France based Lafarge Group, which is present in seventy eight countries worldwide, has been co-operating with the World Wildlife Fund (WWF) in fighting biodiversity loss and together established an extensive biodiversity management system (www.lafarge.com/1-Groupe 2011). The management system includes an explicit framework, necessary tools to assess complications on site and planning to preserve and enhance biodiversity. Allied with WWF, Lafarge group also establish a so called “biodiversity index” to observe ecological alterations at the Group’s quarries and sites (www.lafarge.com/Proteger_la_biodiversite 2011).

Launching their co-operation in 2001, the Group and WWF establish a quarry rehabilitation policy that aims to minimize the indications of eradication and regain life in the area (www.lafarge.com/Gerer_les_carrieres 2011). According to the information provided by the Group, ninety four percent of the quarries were evaluated based on the criteria given by WWF, eighty four percent of quarries acquire a rehabilitation plan and forty seven of quarries that are located in environmentally sensitive areas own a biodiversity plan (www.lafarge.com/Proteger_la_biodiversite 2011).

Over the years the Group conducted many successful rehabilitation programs and not only invested in the protection of biodiversity but also provided economical growth and contributed to scientific research and development. As a program of such, the Group, working together with local residents, nature protection charities, local authorities and WWF, is transforming the Magheramorne cement plant and quarry, which was inactive for several years, into an environmental friendly residential site with a leisure center including a nature park, an international mounting biking center and a diving center (www.lafarge.com/cs092509/CSEN 2011). The construction of the eco-village is carried out in accordance with WWF's sustainability rules also known as "One Living Planet" (www.lafarge.co.uk 2011). In addition to regaining the biodiversity loss, this program also aims to provide jobs for the local residents through the world class leisure center which will attract many visitors.

Also, another successful rehabilitation program was executed in Spain at the Yepes-Ciruelos quarry, which is a vast area of two hundred hectares. With the collaboration of Lafarge Asland, the University of Castilla-La Mancha, WWF Spain, local cross country cycling association and ecological restoration engineers, the old quarry transformed into a nature reserve and two point five km² separated area is designated for the university research activities (www.lafarge.com/cs27042009 2011). As a part of the project a botanical and bird field observation track was established, an education center was built and as an outcome of the project honey bees returned to the area (<http://wwf.panda.org> 2011).

As Lafarge, many other Europe-based international cement producers contribute in biodiversity protection and invest highly in rehabilitation programs. Through well managed programs, the quarries are regained as natural parks, wild life observation areas, land for agriculture and forests. As indicated, establishing and executing a rehabilitation program is highly complicated and takes a lot of time to achieve. For this reason, setting a rehabilitation program at the very early stages of the quarry is highly important. Also, many cement plants get in touch with local associations, residents and universities at the planning stages of opening a quarry, in order to better determine the setting of the quarry with less risk to damage biodiversity.

Another good example for biodiversity protection from the cement industry is the Heidelberg Cement Group, which was established in 1873 in Heidelberg/Germany and now is present in more than forty countries around the world (www.heidelbergcement.com/profile 2011). Heidelberg Group established a Group guideline, based on the biodiversity indications determined through studies conducted together with project partners, on improvement of biodiversity at its quarries (www.heidelbergcement.com/documents_biodiverity 2011).

The guideline encourages utilization and organization of biodiversity development through collaboration with environmental authorities, organizations and other parties that may have input in the process, indicates the importance of considering ecological and economic value assessment of the related land that can contribute to the development of biodiversity and encourages high level of biodiversity even at operating mineral extracting sites (www.quarrylifeaward.ro/hc_guideline_biodiversity 2011).

In addition to the Group guidelines, recently Heidelberg has signed a co-operation agreement with BirdLife International for three years so as to further enhance the preservation of biodiversity at quarries (www.heidelbergcement.com/birdlife 2011). This three year program includes forming a biodiversity strategy for Europe that will involve conservation of species and habitats jointly, creating biodiversity projects in several countries together with the involvement of local management and taking into

operation the first pilot programs around Europe and documenting their development (www.birdlife.org/heidelbergcement 2011).

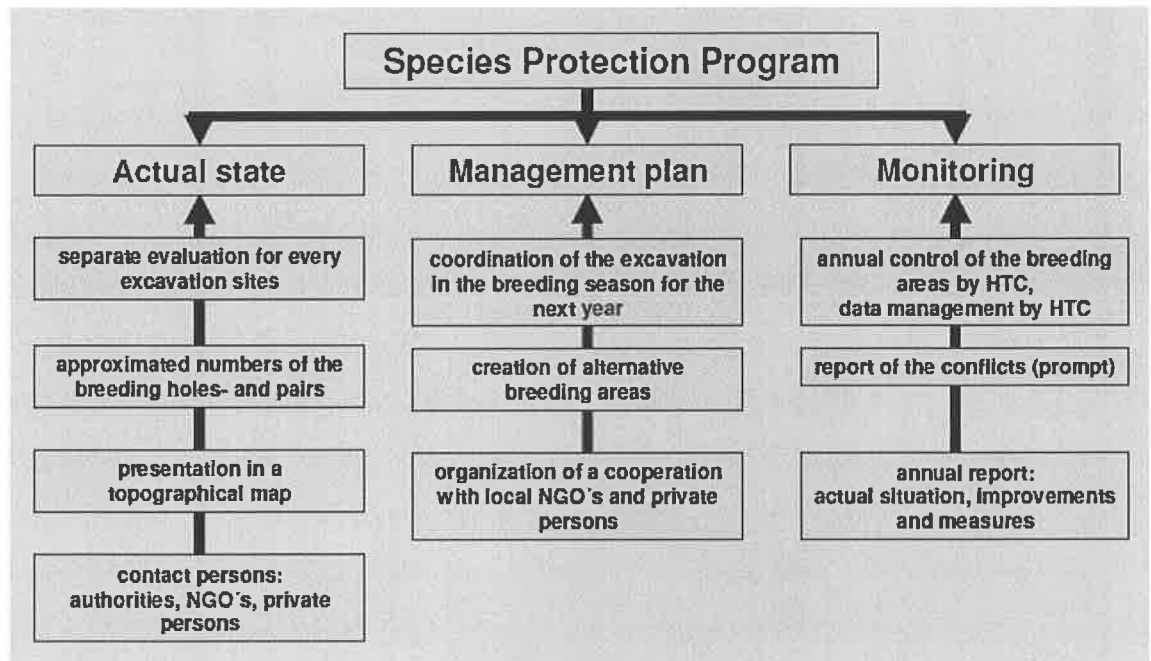
For many years, the Group has executed many successful rehabilitation programs around the world. Sometimes the rehabilitation or protection program does not only cover one quarry but also includes many other locations depending on the aim of the project. A project of such has been executed in Germany concerning the protection of Sand Martins which are on the red list in the country. Since the Sand Martins prefer gravel pits and sand pits for breeding and, the project covers forty two locations owned by Heidelberg Cement in Germany (www.heidelbergcement.com/SandMartin_Germany 2011).

In the earlier years, Sand Martins had enough natural breeding areas like bank demolitions, but due to the flood control methods applied, they lost these natural spaces and as a result the birds started using the mineral extraction sites (www.wbcscement.org/quarry/heidelberg 2011). Even though men and Sand Martins can peacefully exist side-by-side at the quarries, problems occur when the bird choose a breeding area that is planned to be mined. Since the birds are under protection by the federal nature protection act, in 2007 Heidelberg Cement launched the “Species Protection Program Sand Martin” (www.heidelbergcement.com/SandMartin_Germany 2011).

The aim of the project is to determine the possible areas of conflict before hand and provide nature protection by proper management and conservation methods (www.wbcscement.org/quarry/heidelberg 2011). As specified in Figure 3.3, the core element of the program is to draw a map of the breeding holes at the mineral extraction areas, so as to make an accurate assessment regarding potential conflicts and to prepare right control methods (www.heidelbergcement.com/SandMartin_Germany 2011). With the help of the breeding maps, drawn during breeding seasons, the plant managers are able to structure their mining program in winter for the upcoming months and if there are some steep faces that might be attractive to the birds but still has to be mined, those

areas have to be transformed into unattractive areas before the birds return and artificial accommodation grounds for the birds should be formed.

Figure 3.3: Species protection program sand martin



Source : www.heidelbergcement.com/SandMartin_Germany 2011

With programs of such, the cement producers not only minimize their negative effect on biodiversity, but also depending on the project, they contribute in local economy by providing jobs to local residents and ensure the involvement of both locals and local environmental groups in the process of rehabilitation so as to create unity. There are many rehabilitation programs conducted by big cement groups in Europe and around the world. Together with an experienced and dedicated group of people who are united by a common vision, the long time used damaged quarries are being turned in to national parks, vineyards and many species that abandoned their natural habitats due to quarrying activities have returned.

3.2.2 Alternative Raw Materials

Another way to minimize the effects of cement production process on environment is to use alternative raw materials. Application of alternative raw materials not only reduces the pressure on biodiversity by requiring less quarrying but also provides a way of benefitting from wastes of other industries. The most common alternative raw materials are contaminated soil, waste occurs as an end product of road cleaning, blast furnace slag from steel production and fly ash (www.cembureau.be/alternative-raw-materials 2011).

However, it should be strongly emphasized that not every waste can be used as an alternative component. The chemical coherence of alternative raw materials has great importance in assuring that they sustain the required components for the composition of clinker (www.cembureau.be/alternative-raw-materials 2011). So, when cement plants dispose alternative raw materials, they pay attention to choose high in quality products, to safe handling of the materials and regular training of employees not to cause harm neither to environment nor to risk the health of their employees and the community. In order to provide these conditions they cooperate with specialists and the headquarters of international cement groups includes related information in to their group guidelines for making sure that the required knowledge is maintained (http://www.heidelbergcement.com/raw_materials_fuels 2012).

3.2.3 Carbon Dioxide Emission Reduction

As being the major environmental challenge faced globally, fighting climate change has been one of the main priorities of the EU. Being scientifically proven that the global warming has to be limited in order to avoid the most serious impacts of climate change, EU has formed its strategy and has been adopting and implementing policies, establishing new programs and supporting new environmental technologies so as to contribute in keeping global warming in the limits and to reduce CO₂ emissions. With regard to the limit of global warming, as explained on the official web site of the EU,

the temperature difference between today and the pre-industrial period should not exceed 2 °C which is 1.2 °C higher than today's level (ec.europa.eu/dgs/clima 2011).

In order to better execute the efforts in combating climate change, the Commission established the Directorate General for Climate Action (DG CLIMA) in 2010 (www.avrupa.info.tr/News_Archive 2011). The missions of DG CLIMA includes promoting and engaging both international and local climate action policies and strategies, administering the ETS which is one of the most active and efficient tools in reducing CO₂ emissions, controlling the administration of MSs emission reduction goals in areas that are not covered in ETS and supporting low carbon and transformation policies (ec.europa.eu/dgs/clima 2011).

Considering the fact that the cement market is foreseen to continue its strong global existence and the amount of CO₂ emission occurs during the production process, it is inevitable for the cement sector to adopt measures so as to reduce its CO₂ emissions (www.wbcsdcement.org/Itemid=104 2011). These measures are shaped according to the related policies and strategies of the Union.

In this sense, the most effective tool of the EU is the ETS, which was established in 2005 with the motivation to minimize the industrial greenhouse gas emission as committed within the context of the Kyoto Protocol in a cost efficient way (ec.europa.eu/clima/ets 2011). It is one of the largest emission trading systems in the world covering eleven thousand establishments which forms approximately forty five percent of the Union CO₂ emission (www.environment-agency.gov.uk/pollution/32232 2011). In addition, the extent of the ETS lies also within the industries that it covers including power plants, iron and steel manufacturing, glass, ceramics and cement (www.euractiv.com/climate-change 2011).

The ETS functions based on the “cap and trade” principle, meaning that there is a restrain in question so as to control the total amount of greenhouse gases that can be emitted by the plants in the system and within the given limits the companies acquire emission allowances that not only has a financial value guaranteed due to limited access

but also can be tradable between the establishments which are taking place in the system (ec.europa.eu/clima/ets 2011). The worth of allowances are set as one allowance corresponding to one tone of CO₂ and handling of these allowances is done by MS according to the specifications of the National Allocation Plan (NAP) (www.environment-agency.gov.uk/pollution 2011).

NAPs are prepared by MSs and are submitted to the Commission for approval. MS deliver these allowances to the establishments in their country according to their pre-confirmed plan and the establishments are required to examine and report certified emissions (www.carbontrust.co.uk 2011). At the end of each year every establishment taking place in the system are obliged to submit adequate amount of allowances to cover their carbon emissions and as stated they can buy additional allowances if required or sell out the excess allowances that possess (ec.europa.eu/clima/ets 2011).

However, if an establishment fails to cover its carbon emission due to lack of allowances, it faces a fine which is calculated as hundred Euros per excess tone of CO₂ (www.euractiv.com/climate-change 2011). Considering the fact that the value of an EU allowance is approximately seventeen Euro, establishments would rather enjoy the benefits of trading their excess allowances instead of paying high fines, this system is perceived as a highly motivating way of reducing CO₂ emissions in Europe (www.carbonmarketdata.com 2011).

The cement industry also takes its place in the system and as indicated in the Figure 3.4 some of the plants became major actors in the Carbon Market due to their commitment in reducing their emission.

Figure 3.4: EU ETS Companies with highest carbon surplus in 2010

company	sector	allocated allowances 2010 (M)	verified emissions 2010 (MtCO ₂)	emissions-to-cap (=E-C) 2010 (M)
ArcelorMittal	Iron & Steel	87	56	-31
Corus	Iron & Steel	35	21	-14
Lafarge	Cement	29	18	-11
HeidelbergCement	Cement	24	17	-7
ThyssenKrupp	Iron & Steel	25	20	-5
Holcim	Cement	17	12	-5
Riva Group	Iron & Steel	15	10	-5
Cemex	Cement	14	9	-5
Total	Oil & Gas	27	23	-4
Enel	Power & Heat	72	68	-4

Source: www.carbonmarketdata.com 2011

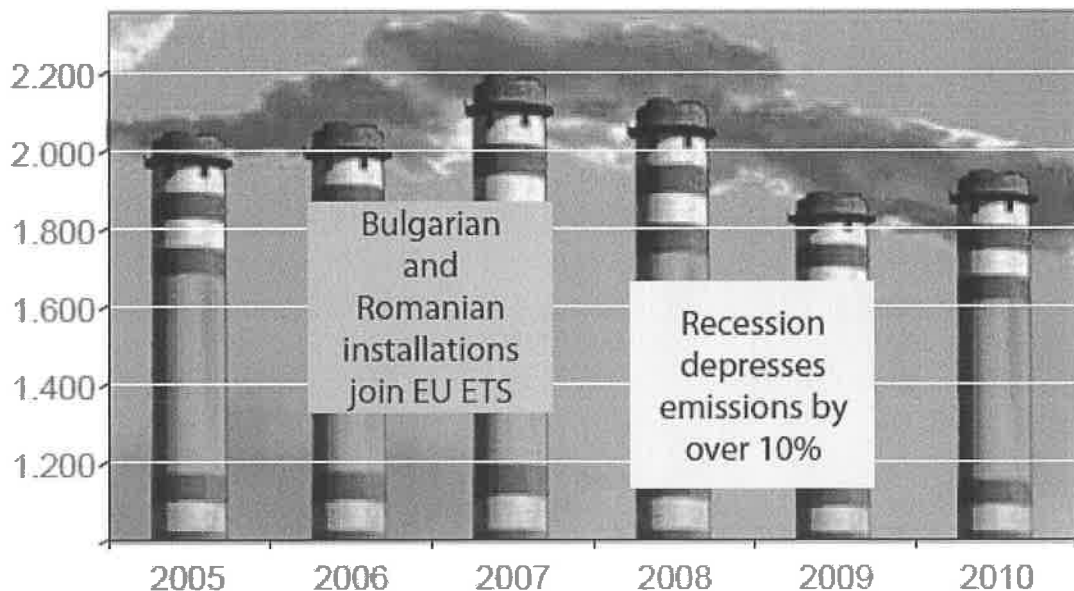
Operating since 2005, the ETS had two phases until now. Even though the first phase , which cover the period from 2005 to 2007, was more like a learning phase both for the Union and the participating establishments, the second phase that we are still in from 2008 to December 2012 contains amended examination and reporting rules and more strict emission limits (www.environment-agency.gov.uk 2011). On the other hand, the upcoming period of phase III that will cover the period from 2013 to 2020, is going to bring some major changes with regard to the structure and the operation of the system.

The first change will be the abolishment of NAPs which will lead to the fact that the necessary arrangements considering the allocation of the allowances will be done at the EU level. Secondly, the so called “cap” will be reduced year by year in order to provide that the emissions in 2020 will be twenty one percent less than the amount specified in 2005 (www.carbontrust.co.uk 2011). In addition to these changes, there also will be an increase considering the amount of allowances that will be allocated through auctions (ec.europa.eu/clima/policies/ets/auctioning 2011). A final improvement is going to be

the introduction of not only new sectors to the system such as metal production and aviation, but also other greenhouse gases (www.carbontrust.co.uk 2011).

Overall, the system is working efficiently through strict fines and a functioning trading system also called as carbon market. As stated by DG CLIMA in a factsheet published in July 2011, there is eight percent reduction on average annual emissions per installation in 2010 compared to 2005 when the ETS was first launched (www.cembureau.eu/newsroom/article/ets 2011). Although, as shown in the Figure 3.5, there had been a slight increase observed regarding the emission amounts in 2007 when Bulgaria and Romania joined the EU and again in 2010 in parallel with the economic recovery from the recession, there is a significant amount of emission reduction in line with the timeline that the system is in operation (ec.europa.eu/clima/factsheet_ets 2011).

Figure 3.5: Annual emissions of all EU ETS installations (in millions of tonnes)



Source: ec.europa.eu/clima/factsheet_ets 2011

In addition, according to the data provided by the Community Independent Transaction Log, the cement sector had accomplished even more substantial results in reducing the annual emissions of the average cement installation by twenty two point nine percent compared to 2005, considering the fact that the number of installations have increased

since 2005 (www.cembureau.eu/newsroom/article/ets 2011). Therefore, it will be fair to state that European cement sector is responding positively to the pressure it is under in reducing its environmental impacts and willing to take necessary actions in order to reach the given target and beyond.

Although, the positive effects of the ETS on the European cement sector is provided, the system has been criticized by some for creating an overflow of allowances especially in 2009 that ended in forming a considerable amount of surplus permits that has a potential of being exploited by European cement producers in making financial profits or in covering their emissions a year later (Kerton 2010, p.52). In addition, since the allocation of allowances is through NAPs, at some point it is claimed to generate inconsistencies at the amount of free allowances provided to industries by MS for example; according to the data provided in mid-2011, Germany, UK, Denmark, Finland and Estonia were the only countries that provided less free allowances than required by their industry, on the other hand Spain and France were among the group that provided overflow of free allowances (Kerton 2011, p.40).

However, the impact of the recession in years 2008 and 2009 on cement sector should not be underestimated when examining the effectiveness of the EU ETS and the surplus permits generated during that period. As stated before, cement sector has close ties with the construction sector and during the recession the demand for cement had decreased. In accordance with that decrease cement production and therefore CO₂ emissions had also decreased. So, assuming that the cement producers were less involved in environmental improvements, since they felt safer because of the surplus permits they received during that period, will be an underestimation of the pressure that the sector is under with regard to their environmental impact.

Anyhow, phase III of the EU ETS seems to empower the system by shifting the authority to distribute allowances from national level to the Union level, limiting the allocation of free allowances by energy intensive industries with ambitious and strengthened sector based benchmarks and making auctioning the main tool for distributing allowances.

Considering the fact that the cement production process requires pretty high temperatures which depletes huge amounts of energy, the cement plants used to feed their kiln burners with fossil fuels, petroleum coke and with other kinds of fossil fuels in order to reach the required temperatures (Mairani 2011). For many years the cement sector worked hard to reduce its energy consumption through new technologies and investments, but at some point in the 1990s the improvements reach to its limits (www.cembureau.be/alternative-fuels 2011).

In addition to the high energy consumption problem that the sector was suffering from, there was and still is a pressure on the cement producers regarding the environmental impacts of the production process. At that point, using waste as alternative fuel and raw material emerged as a long waited solution by significantly reducing the need for the consumption of traditional sources of energy like coal and petroleum coke. There are many different types of wastes that can be used as part of the cement production process such as; hazardous waste, sewage sludge, waste wood, waste tyres, animal meat and bone meal, solvents and refused derived fuels which are known as RDF and consist of commercial and industrial waste, bulk waste from construction and demolition and municipal solid waste (www.cembureau.be/alternative-fuels 2011).

As a matter of fact, the benefit of using waste as alternative fuel at cement kilns works two-ways, on one side the CO₂ emission at the cement plants are reduced due to the decreased usage of fossil fuels and on the other side the system itself provides a much better way of waste disposal then waste incineration, deposition or land filling by providing combustion with flame temperature of higher than 1600 °C that maintains emission without dangerous components (www.atec-ltd.com 2011).

An important point to be clarified is that some wastes such as; nuclear wastes, batteries and contagious medical wastes cannot be used as alternative fuels at cement plants, due to the fact that the components of the final product and the environmental impact of the cement production process should be taken into consideration and prioritized (Sürdürülebilir Çimento Üretimi [no date]). In addition, some of the wastes, especially solid wastes, require pre-processing before they can be used at cement plans, since they

need to be at a unified size and blend in order to maintain the desirable size and calorific value (Mariani 2011).

As a matter of fact, there are some factors that should be taken into consideration and paid special attention to when it comes to alternative fuel usage. First of all, the consistency of the waste materials is extremely important since there is no logic in investing on equipments and getting the necessary permits so as to use a specific material if the material itself cannot be obtained constantly. Secondly, the position of the material is also as important as the consistency, since some wastes include nonflammable components that can turn into ash, blend in the clinker and effect the chemistry of the product (Clark 2008, p.51).

Thirdly, not every alternative fuel is suitable for feeding the kiln, therefore the best alternative fuels for kilns are high calorific value liquids or high calorific value divided solids (Wilson 2010, p.79). In addition, so as to maintain the explicit temperature requirement which can be easily effected by the usage of multiple fuels, the design of the burner, the delivery points of the different fuels at the burner and the preparation of the alternative fuel is crucial (Clark 2008, p.52).

Looking from the EU environmental policy perspective, co-processing of wastes is perceived as a recycling activity under the EU legislation and therefore it is conducted in accordance with the Waste Incineration Directive and the IPPC and also accepted as BAT (Sürdürülebilir Çimento Üretimi [no date]).

Besides the usage of alternative fuels at cement plants, another way to reduce energy consumption and indirectly reduce CO₂ emission is the WHR, which uses the hot exhaust gasses from the preheater and the clinker cooler so as to generate energy by also considering the exhaust gas necessity of raw mill and coal mill (TESPL [no date]). The benefit of the system is that it not only enhances energy efficiency and decreases CO₂ emission amount by mainly making use of the waste heat, but also at the same time lessens the exhaust gas temperature and reduces thermal pollution (Wang 2010, p.42).

Although, the WHR facilities are considered to be very exclusive investments, the energy efficiency provided at the end of the process, significant decrease in CO₂ emissions and being able to use a source of energy that is inevitably created as a result of the very nature of the production process, it is tempting for many cement plants.

As an example, Akçansa which is a joint venture of Sabanci Holding and Heidelberg Cement, has recently launched the WHR facility at its Canakkale plant which is the first WHR facility in Turkey and the largest one in Europe (www.akcansa.com.tr 2011). According to the information provided by the Group, the facility will annually produce hundred and five million kilowatt of electric energy and reduce the CO₂ emission by sixty thousand tons per year. With the given numbers, the plant will generate thirty percent of its energy requirement from the WHR facility (World Cement 2010, p.15).

Another contribution to CO₂ emission reductions at cement plant is made by using biomass fuels, which are produced mainly from wastes of forest industries and agriculture (www.biomassenergycentre.org.uk 2011). According to the information provided by Lafarge, biomass use accounts for twelve percent of the Group's total fuel use (www.lafarge.com/Preserver_les_ressources 2011).

In addition to the measures taken in order to reduce the CO₂ emission amount of the cement production process, some companies also prefer to take further steps in order to minimize the total negative impact they cause. For example, for eleven years Holcim Germany has been using biodiesel, which is acquired from oilseed rape, for vehicles used at its allocation network (www.holcim.com/other-environmental-impacts 2011).

By following new technologies that are available for the sector, improving their own standards in accordance with the ones constituted by the EU and co-operating with environmental organizations, the cement plants are putting serious efforts for many years to lessen their impact on the environment. It is a difficult task to achieve demanding targets especially in a sector that requires high energy consumption and has a production system that creates a negative impact at each phase of it, but looking at the

starting point, it can be said that the cement sector in Europe has shown progress over the years and continues to improve.

4. CONCLUSION

Environmental problems have been in the spotlight for many years. The negative impacts of the reckless consumption of natural resources, underestimating the importance of balance of nature and the selfishness of each generation created the roots of the environmental problems that have been faced globally.

Since environmental pollution cannot be bounded with state borders, it is commonly accepted that the best approach is to handle pollution collectively. Herewith, having a common environmental policy embedded in the acquis of the EU is extremely important, not only for the better management of environmental problems but also for protecting the common market dynamics, which can be easily affected due to the implementation of different levels of restrictions and diverse policies in order to protect the environment.

The EU has been working to generate effective outcomes in tackling climate change, protecting biodiversity, minimizing pollution, preserving coastal and marine waters and managing land use for many years. In addition to the actions taken for protecting the environment, the EU also takes part in international conferences on major environmental challenges and involves in partnerships with non-EU countries in order to benefit from the experiences of the others and to share its own.

Within the context of EU environmental policy, cement sector plays an important role not only for having such a strong entity in Europe but also for being a major CO₂ emitter. As many other industrial facilities, cement plants have serious negative impacts on environment, due to the nature of the production process. Starting from the quarry sites to the storage of the end product, each step has its own impact. However, the major challenges for the sector are the CO₂ emissions and biodiversity loss occurring as a result of the quarrying activities.

Other environmental impacts such as dust, noise, vibration, mercury and nitrogen oxide (NO_x) emissions can be taken under control relatively easier than the above mentioned

problems by using special electric and bag filters, constant monitoring and measurements, process optimization, suitable design of the facilities and using special blasting technologies at the quarries. Although these negative environmental impacts seem to be secondary, cement plants are bound to fulfill their obligations arising from the related EU directives in order to maintain these problems under a certain level that will not cause harm to either the environment or human health.

In the struggle with biodiversity loss, the frame work is drawn by two important and complementing directives of the EU; the Birds Directive and the Habitats Directive. Both directives provide legal ground for Natura 2000, which is a comprehensive network of protected areas in Europe.

In order to lessen their impact on biodiversity, most European cement producers cooperate with international and local experts for establishing rehabilitation plans before starting the actual quarrying activities. The main priority of the cement producers by developing these rehabilitation plans is to protect the natural environment of the animals and plants existing at the site where the activity is going to be conducted.

Depending on the habitat of the area and the scope of the project, each rehabilitation program is unique and outcomes show diversity. Even some of the projects have the capacity to create job opportunities for the local residents. Another positive effect of these programs is that they lead the way for co-operation between international environmental organizations and the cement industry.

These co-operations are based on mutual interests meaning that both cement producers and environmental organizations benefit from each other's experience, knowledge and guidance and also environmental organizations get the chance to directly influence the big actors in the sector, monitor and contribute to their environmental programs. Throughout these effective collaborations both parties reach their target which is minimizing the severe impacts of a specific industrial activity on nature.

Two good examples of such effective collaborations are Heidelbergcement's recent cooperation with BirdLife international in order to further improve the protection of biodiversity at its quarries and Lafarge's long term collaboration with WWF in establishing quarry rehabilitation programs that aim to lessen the signs of eradication.

Another major environmental challenge that the cement sector faces is the CO₂ emissions. The most compelling part in reducing the amount of CO₂ emission for the cement sector is that the production process is extremely energy consuming and for many years cement plants used mostly coal and fossil fuels in order to meet their energy needs.

Together with the changing approach and precision towards environmental matters, most cement plants tend towards increasing the usage of suitable wastes as alternative fuels which both reduces the emission amount and serve the community by disposing huge amounts of waste that would otherwise incinerated or land filled. Some wastes can even be used as alternative raw materials and lessen the requirement for quarrying activities. Using the suitable wastes which will not generate additional pollution, risk human health and affect the quality of the product is the significant point here, since otherwise the whole reason behind using waste as alternative fuels is eliminated.

When using alternative fuels and raw materials there are certain norms that are need to be prioritized by the cement plants such as providing periodical trainings to the staff, consulting specialist during the handling of a new type of waste and obliging the rules and regulations regarding the safe handling of the waste materials.

In addition to use alternative fuels, cement producers also follow up the new trends and technologies in the sector that will lead them to the modernization of the cement production process and achieve reduction in energy utilization which refers to less fuel consumption and less CO₂ emission. The important point here is to keep in mind that both modernization investments and new technological enterprises such as WHR facilities can be sizeable investments, which may cost millions of Euros depending on the scope of the project.

In order to reach the highly demanding CO₂ emission targets, the EU established the EU ETS which covers various sectors and thousands of establishments including cement plants. Through time, ETS became one of the most effective tools in achieving concrete results regarding emission reductions which can be linked to the cap and trade principle that eventually generated economical incentives for the establishments taking place in the System.

The System created a carbon market in which the permits provided by the ETS have an actual economical value. In the system, the establishments that managed to reduce their CO₂ emission at a level that they obtain excessive permits enjoy the benefits of either selling those permits to the establishments that require additional permits to cover their CO₂ emission or save their surplus permits for future use.

Considering the fact that the industrial facilities are financially motivated structures, it is much more effective to lead them by using economical incentives framed by certain rules and regulations instead of a strict command and control mechanism when it comes to challenging topics like environment. As indicated, reducing the negative environmental impacts of the cement production process requires high level of dedication and a certain perception. When these factors are fostered with economical means, the outcome is much more effective.

Overall, the European cement sector recognizes its responsibilities and tries to minimize its negative environmental impacts within the framework of the EU environmental policy. It should be taken into consideration that cement production will not become an environmental friendly process in the given the circumstances, at least not in the near future. By closely following the technological developments concerning the sector, improving their own high standards, setting targets of their own and establishing co-operations with experts, the European cement sector responds to the pressures coming from the community and the EU in a positive way and tries to build up a solid sustainable approach.

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