Technology Providers

For the cement facilities to accomplish all necessary retrofitting installations there are specialized companies around the world who come to assist in the design of such alterations and also to supply all the necessary equipment required.
There is a large number of EU equipment manufacturers which specialize in all above actions by developing systems to aid the cement plants operators to accomplish all tasks of handling storing dosing and feeding refuse derived fuel in cement kilns.
Below, a number of contractors and manufacturing companies for the supply of equipment for the use of AF and ARM in cement industry are listed.
More information about the companies, their products and services can be found in the technology implementation guide (www.alf-cemind.com).

- A TEC GmbH
- AUMUND Group
- Cadence Environmental Energy Inc.
- Claudius Peters Technologies GmbH
- EUREMI S.A.
- FCB. Ciment S.A.
- FCT-Combustion (FCT Inc)
- FLSmidth A/S
- Fox Valve Development Corp.
- Geo Robson & Co (Conveyors) Ltd
- Greco-Enfil International S.L.
- KHD Humboldt Wedag GmbH
- Loesche GmbH
- Metso Minerals Industries Inc.
- Pebco Inc.
- Pfister GmbH
- PILLARD FEUERUNGEN GmbH
- Polysius AG
- RSG Inc.
- Schenck Process Group
- STAG AG
- Unitherm Cemcon Firingsystems GesmbH
- Vecoplan LLC
- WESER ENGINEERING GmbH

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SEC, Sofia Energy Centre Ltd
Mrs Violetta **Groseva**, Managing Director | 37, "Galitchitsa" Str., entr. 2, 2nd floor | Post. code: 1164 Sofia, BULGARIA, tel. +359 2962 8443, fax. +359 2962 8447, e-mail. vgroseva@sec.bg, internet homepage. **www.sec.bg**

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Van Heekeren & Frima Management Consultants
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MERKAT, Energy-Environment-Industry Manufacturing, Marketing, Consulting and Representation Inc.
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www.alf-cemind.com

Acceptance of waste utilization in cement industry from Local Communities

The introduction of changes to long-established operations such as cement works can cause interest, or sometimes concern, amongst communities and other stakeholders. The cement industry engages with all interested stakeholders through regular, open communications about any aspect of its operations. The cement industry's key stakeholders include the neighbors/local communities, employees, customers, shareholders, regulators, 'green' issue interests and those who depend on the industry for their livelihood. However, experience has shown that the stakeholders who become most involved are the local communities and the regulatory bodies.
When any proposal is made to use an AF the cement manufacturer will include it in its open dialogue with stakeholders. This is done at the earliest possible opportunity through established 'open door' policies, formal open days, liaison committees and newsletters. During trials, reports on progress may be published weekly, supported by opportunities for interested groups to see the fuel being used at first hand.
The elements that make up the regular dialogue develop with the communities' involvement, which brings advantages to both parties. Manufacturers are better able to incorporate feedback into their plans and the transparency of the process means that the community is involved, consulted and reassured.

Technologies for the exploitation of AF and ARM in cement industry

The technologies for the use of AF and ARM in cement industry have been introduced years ago. Today, innovative technologies allow some EU cement companies to use a substantial potential of waste-derived fuels which replace fossil fuels up to nearly 100%. In some cases fossil fuels are used only to start up the process and/or as a supporting fuel.
To be able to use any of the AF in a cement plant it is necessary to know the composition of the fuel. The selection is normally based on price and availability. The energy and ash contents are also important factors, as are the moisture and volatiles contents. All kinds of varieties from liquid to solids, powdered or as big lumps can be encountered when dealing with AF, requiring a flexible fuel feeding system. Somehow they should all be fed into the burning chamber of the process. It may be fed directly into the burning zone in the kiln itself or into the pre-heating system for dissociating part of the carbonates from the meal before it enters the kiln for clinker formation.

Figure 2: Cross section view of a multi-fuel burner
Source: FLSmidth A/S

Co-processing waste derived fuel in cement plants requires a number of retrofit actions to be undertaken by the cement plant operators. In view of this, the use of waste derived fuels and raw materials in the majority of cement producing facilities will require the construction of new installations and the implementation of technology to enable actions such as storage of the AF in the yard of the facility, conveyance to the feeding point into the process, and measuring of environmental impacts due to the use of the specific fuels and raw materials.
Apart from the technology related to the auxiliary equipment for transportation, handling and storage which is varying considerably by AF type, the most important modification that had to be made by the cement plants for the use of AF is the burner with a suitable design so as to enable burning not only the traditional primary fossil fuels but also waste derived fuels. Nowadays, the most popular burner type is the so called multi-fuel burner offered almost by all equipment suppliers.
Multi-fuel burners consist of concentric tubes. This configuration allows for the creation of air gaps between the concentric tubes so as to enable injection of compressed combustion air. In some cases, steam is used to assist in the proper injection of certain fuels. Inside or adjacent to the concentric tubes special tubes are installed ending up to special nozzles for the injection of secondary air and/or liquid fossil and alternative fuels.
The inner tube is the channel for the solid waste fuels since it offers the most abundant cross section of all concentric tubes. In some designs developed by suppliers of equipment as such other tubes of smaller diameter are enclosed in the central tube.
The new "modus operandi" of the cement kilns made it necessary to utilize additional monitoring equipment for those instances where the co processing of AF created new pollutants in the exhaust gases. Moreover, new installations to capture and/or mitigate the environmental impacts due to the presence of new pollutants derived from the AF use were developed, are commercially available too.

Extended calciner
Source: KHD Humboldt Wedag GmbH

Use of extended calciner

The advantage of the extended version of PYROCLON LowNOx calciner is more retention time which is necessary for fuels like: Fine anthracite and petcoke (< 5% R90µm) Fluff RDF/sewage sludge/ shredded tyres.

Sewage sludge conveyance system.
Source: STAG GmbH

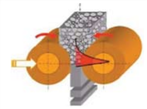
Sewage sludge delivery

Sewage sludge delivery is carried out between the two plants, mostly using mechanical conveyance systems. In the main, toughed chain conveyors and conveyor belts, but in addition worm conveyors, are suitable as means of transportation.
Due to the high abrasiveness of sewage sludge, particular attention is to be paid to protecting the conveyor units from wear.

M.A.S. Burner for standard fuels, waste fuel oils and solid secondary fuels.
Source: Unitherm Cemcon

Used oils

Burning in cement kilns and process kilns, used oil is usually a supplementary fuel in these burners. When operated correctly the kilns burn at such a high temperature that they destroy some of the gases and particles that cause health problems (such as organic contaminants which form dioxins and furans at certain temperatures). Combustion gases usually pass through filters and scrubbers to remove airborne particulates and some gases. The oils used in these burners are often not pre-treated beyond the removal of water content. Resource consent conditions may require testing of the oil to ensure it meets certain criteria.



Slag particle comminution.

Slag

High-pressure roller press process for slag grinding are much more efficient in the comminution process than ball mills, and slag in particular is an ideal material for grinding in a roller press. The glassy and thus brittle structure of the slag makes grinding under high pressure very efficient.

Preheating systems. *Source*: Polysius

Cyclone preheater

In the case of the cement industry, today's requirement profile for the manufacturing process is directed at high production capacities with low operating and capital expenditure. For this reason, multistage cyclone preheaters with integral calciner and tertiary air duct are indispensable components of modern kiln lines.

Closed cylindrical silo for animal meal storage.
Source: STAG GmbH

Storage of animal meal

For reasons of hygiene, the meal is mostly stored in closed cylindrical silos having special mechanical discharge devices. Depending on the volume involved, silos can be used that are fitted with special cone dischargers or with flat bottomed discharge systems.

Whole tyres feed system.
Source: Robson handling technology

Handling tyre chips in bulk

In order the used tyres to be used in existing cement plants new handling equipment is needed to take in tyre chips and feed them in bulk at a controlled rate into the kilns. Specialist bulk conveyor manufacturer Geo Robson worked closely with both Blue Circle and Castle Cement to design and install vertical and horizontal conveyors and hoppers, in order to provide a constant supply of tyre chips to the kilns.

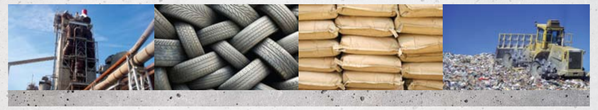
SIXTH FRAMEWORK PROGRAMME

ALF-CEMIND:

Supporting the use of alternative fuels in cement industry

Contract No: TREN/05/FP6/EN/S07.54356/020118

ALTERNATIVE FUELS AND RAW MATERIALS IN CEMENT INDUSTRY



eXergia
ENERGY & ENVIRONMENT CONSULTANTS

in cooperation with

Trapec company member of Tractebel Engineering (SUEZ)

Van Heekeren & Frima management consultants

Cyprus Institute of Energy

MERKAT Turkey

ALF-CEMIND project

ALF-CEMIND is a co-financed project by the European Commission through the Sixth Framework Programme (2002-2006). The project has been designed to disseminate technical knowledge and experience from the implementation of innovative solutions, with the overall objective to exploit the potential of various waste streams in the cement industry leading to energy, environmental, societal and economic benefits.
The targeted sector is the cement industry of Greece, Romania, Bulgaria, Poland, Cyprus and Turkey where the potential for improvement and better utilisation of the existing infrastructure in the cement industry is significant.

Cement Manufacturing

Cement manufacturing is a "high volume process" and correspondingly requires adequate quantities of resources; i.e. raw materials, fuels and electrical power. The following table provides an indication of the consumption of raw materials used on average for the production of cement. The consumption figures in the last column are calculated for a "medium-sized" plant with a clinker production of 3.000 tons per day or 1 million tons per year. Based on average figures for the clinker content in cement in Europe, a clinker production of 1 million tpy corresponds to a cement production of 1.23 million tons per year.

Table 1: Raw materials consumption for cement production

Material (dry basis)	per ton of clinker	per ton of cement	per year and per M tons of clinker
Limestone, marl, clay, shale, others	1.57t	1.27 t	1.568.000 t
Gypsum, anhydrite		0.05 t	61.000 t
Mineral additions		0.14 t	172.000 t

Cement manufacturing is also an energy intensive process. The energy consumption by the cement industry is about 2% of the global primary energy consumption, or almost 5% of the total global industrial energy consumption. The specific thermal energy consumption of a cement kiln varies between 3,200 to 5,500 MJ/t per ton of clinker, depending on the basic process design of the plant.
Major consumers of electrical energy in the cement manufacturing process are the mills (cement mills, raw mills, coal mills) and the large fans (predominantly in the kiln system and with the cement mills) which together account for more than 80 % of electrical energy usage. The electricity demand ranges from 90 to 150 kWh/tonne cement.
The continued effort over past years to improve energy efficiency means that there is only a modest remaining room for further improvement. Although there is little room for further improvement in up-to-date cement plants, efforts continue with regard to equipment design and process technology to further improve the overall energy efficiency. In addition, conservation of natural resources can be achieved through increased substitution of natural raw materials and fossil fuels by industrial by-products and residues in the manufacturing process.
The quantities of alternative raw materials (ARM) in clinker production have more than doubled since 2001. In 2004, waste raw materials used in clinker production result of a direct saving of almost 14 million tonnes of natural raw materials in cement industry, which is equivalent to about 6.5% of the natural raw materials needed. However, these waste raw materials have to show and meet characteristics, chemical elements and components which are necessary for the clinker burning process.
The primary solid fossil fuel used was coal. A wide range of other solid, liquid or gaseous fossil fuels are used, such as petroleum coke, lignite, natural gas and oil. The average energy requirement to produce one tonne of cement is equivalent to the combustion of approximately 120 kg of coal. In addition to these traditional types of fossil fuels, the cement industry has been using large quantities of waste derived fuels for more than 15 years to substitute the traditional ones. In the table below, is depicted the fuel consumption as a percentage of heat generation by the cement industry in the EU-25.

Table 2: Fuel consumption expressed as a percentage of heat generation by the cement industry in the EU-25

Type of fuel	Year 2004
Petcoke (fossil)	48.7%
Coal (fossil)	23.9%
Fuel oil including HVFO[1]	4.2%
Lignite and other solid fuels (fossil)	5.7%
Gas (fossil)	0.9%
Waste fuels %	16.7%

[1] HVFO = highly viscous fuel oil

Alternative fuels and raw materials sources

Nowadays the high degree of the industrial activity as well as the increasing standards of living have been accompanied by a growing waste generation which represents one of the most serious environmental problems. The possibility to use some industrial wastes in the cement production, as an alternative source of raw materials, as well as alternative fuels (AF) have been a viable path to reduce the cement industries production cost. The main concerns about the use of these fuels are the effects on cement performance and the environmental impacts that they can cause.
While many waste streams are suitable for use as alternative materials or fuels, there are some that are not. For public health and safety reasons, no cement plant would be willing to burn nuclear or medical waste, or materials that could compromise the performance of the product. Individual companies are responsible for developing policies on the types of wastes and management practices to be used at individual facilities. Many companies already have guidelines on what fuels can be used, and under what conditions.
The range of alternative fuels (AF) and raw materials (ARM) that may be used in cement production is extremely wide and diverse, including materials like RDF, used solvents, oils, tyres, textiles, sewage sludge and all kinds of slaughterhouse residues as well as other hazardous waste streams. Waste products nowadays represent approximately 17% of the industry's fuel mix and are used in 25 EU Member States.

The major AF used in Europe for the production of cement are presented in Table 3.
In brief, cement manufacturing can safely use waste-derived fuels and ARM since: the cement kiln sustains high temperatures; the raw material and gas remain in the kiln over a relatively long period (residence time); the process is enhanced by an alkaline environment that tends to scrub combustion gases; the process incorporates mineral components into the clinker.

Table 3: Waste streams used in the European cement industry (CEMBUREAU Statistics, Year 2004)

Waste streams	Hazardous	Non-hazardous	Total (1000 tonnes)
Animal meal, fats	0	1285074	1285074
Rubber, tyres	0	810320	810320
RDF	1554	734296	735850
Solvents and related waste	517125	145465	662590
Oils	313489	196383	509872
Plastics	0	464199	464199
Solid alternative fuels (impregnated saw dust)	149916	305558	455474
Wood, paper, cardboard	1077	302138	303215
Municipal sewage sludge	0	264489	264489
Industrial sludges	49597	197720	247317
Others	0	212380	212380
Coal, carbon waste	7489	137013	144502
Agricultural waste	0	69058	69058
Textiles	0	8660	8660

The International experience

Consumptions of significant quantities of different hazardous and non-hazardous wastes used as fuels in various for firing in EU-27 and US cement kilns are shown in the following table.

Bulgaria

At present the Bulgarian Cement Industry almost does not use wastes as AF and as ARM. It should be noted, however, that all five cement plants are preparing for a wider use of wastes as follows:
"Devnya Cement" SC has a Complex Permit, according to which it has the right to utilize 80 types of wastes classified as AF. In 2003 Devnya Cement invested in an installation for utilization of car tyres. The installation was operational until the end of 2006. Different quantities of wastes such as old car tyres, animal meal, etc. were used. The use of industrial wastes as raw materials is traditional. Annually Devnya Cement uses copper slag (about 45.000t) and ash from coal fired power plants (about 250.000t). Forthcoming is the construction of a new furnace for clinker, complying with all requirements for environmental protection and designed to utilize AF.
"Vulkan Cement" has a Complex Permit for utilization of 78 types of AF, but at present it is not foreseen to use AF, because without a significant investment the environmental protection requirements cannot be met.
"Zlatna Panega" – TITAN Cement also has a Complex Permit for use of AF. In 2003 and 2004 an experiment was carried out for using car tyres (up to 8.8%) as AF. At present AF are not used.
Holcim "Bulgaria" SC has a Complex Permit for use of AF. There is an investment proposal for utilization of car tyres and other types of wastes.
"Plevenski Cement" SC also experimented with utilization of car tyres but at present is not using the waste.
From the above mentioned it can be concluded that despite the complete harmonization of the legislation with EU requirements there is still ineffective enforcement for using different wastes as alternative fuels and as raw materials.

Cyprus

The energy system of Cyprus is heavily dependent on oil imports for its energy supply (91.1%). There are two cement production sites in Cyprus; Cyprus Cement Company and Vassilico Cement Company. Both are using ARM but only Vassilicos uses AF. Today Vassilicos Cement Company is using 6% AF but its target is to go for new production lines by 2010 which will be utilizing AF that would result in replacing at least 35% of the conventional fuels normally required (pet-coke). This leads to a reduction of 125,000 tons of CO_2 emission and a reduction of 7.3% of firing pet-coke.
The only ARM that are produced in Cyprus and are consumed for the production of cement is high quality limestone from the cement plants own quarry. Reserves last for more than 50 years. All other ARM are imported, e.g. pozzolanic matter and slag. The AF that are nowadays used at the Vassilico cement plant are: bone meal, granulated tyres, sewage sludge. Some of the problems encountered in AF use in Cyprus are:

- Scarcity of materials
- No waste to energy commitment/policy by Government Bodies yet. Municipal waste belongs to municipality and decision on their utilization is administered by the central government.
- No subsidies for collection and treatment
- etc.

Table 4: Substitution rates of waste fuels for cement production in various countries

Country	Substitution rate (energy demand provided by waste) (%)	Amount of main waste used (t)
Belgium	>50 (55.6)	
Czech Republic	45.3	
Germany	42[2]	>1110000
Estonia	37[3]	27106[3]
France	32[2]	
Hungary	Approx. 30[2]	
Netherlands/Austria	47 – 75	274032[4]
United Kingdom	up to 100	>93000
Norway	45	
Switzerland	47[1]	
US	25[2]	

[1] 2002, [2] 2003, [3] 2004, [4] 2005, [5] 2006, [6] planned for 2009

(data from Reference Document on Best Available Techniques in the Cement and Lime Manufacturing Industries, Draft September 2007, European Commission, DIRECTORATE-GENERAL JRC)

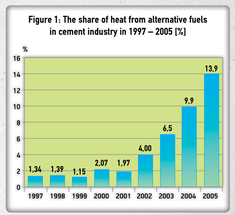
(According to data provided by CIRDM, the consumption of AF in Romania, for the year 2006, was 60,000 tons corresponding to nearly 5,5% of the energy demand).

Greece

The use of AF and ARM in the Greek Cement Industry is very low compared with the average value in the European Community. In principle there are favourable circumstances and sources for the renewable energy from wastes as the current main way of their 'management' is the disposal in landfills – rather than to use them as a source of energy. Alternative fuels are also favoured by the developments in European and Greek legislation for the emissions and waste management and last but not least the use of AF in the cement industries is encouraged by the uncontrollable rising of the prices of the conventional fuels.
The stricter European and Greek legislation for the emissions and the opportunities to use AF in the cement industries induced the Greek Cement Industry to start using the AF as a substitution of conventional fuels but in a very small rate (<1%). The potential types of AF in Greece are as below:

- Used tires
- Sludge from refineries
- Sewage sludge
- RDF
- Biodiesel (glycerine)
- Paper, wood, sawdust
- Waste treatment sludge (Psitalia)
- Used oils and lubricants.

Figure 1: The share of heat from alternative fuels in cement industry in 1997 – 2005 (%)



Poland

Cement industry in Poland co-fires large volumes of wastes and uses combustion heat to produce cement clinker. In 2004 almost 10% of heat used in cement manufacturing process came from renewable sources of energy. Estimated increase in 2005 amounted to 4%. The cement plants recover heat from wastes in an environmentally sound way. Issues connected with thermal recovery of wastes are regulated with legal acts, which determine transport, collection and storage of wastes; incineration conditions and limits of emissions. Before the beginning of co-incineration a lot of investments in cement plants had been realized. According to environmental policy all dedusting installations were modernized with modern technical solutions. It has to be noticed, that in case of co-incineration emission standards are stricter than for conventional fuels.
Every cement plant which co-incinerates wastes has an administrative ruling regulating matters connected with co-incineration and determines acceptable quantity of gas and dust discharges during the thermal recovery of wastes. Moreover there are established in-house control procedures for determining fuel quality.

Romania

In Romania, there are only three cement producers, all being part of international groups: Lafarge, Holcim and Heidelberg. For this reason, they are all very well informed about the use of AF and ARM in the cement production process, each cement company applied on the local market all the know-how available within the group they belong to.
Regarding the use of AF and ARM, several internal studies had already been achieved and projects had already been implemented regarding these topics. Nowadays, the most used AF are used tyres, 12.000 tons have been valorised through co-incineration in 2004.
Nevertheless, the use of AF and ARM in Romania is low compared with the average value in European Community. This situation comes mainly from the fact that sanitation sector in Romania is not fully developed and most waste is landfilled in legal or illegal, more or less controlled deposits.
The potential of AF-waste-for the Romanian cement industry can be considered as significant, and due to a sustained economic development, this potential is growing.
Currently, the AF presenting a good potential for the cement industry are: used tyres and waste rubber; wood waste; waste from the petroleum industry; sorted municipal (or similar) waste.
In the same way, potential for ARM is quite high. Among them, we can distinguish: slag furnace; fly ash from thermal power stations; foundry sand. It is reasonable to think that the cement industry in Romania will continue to increase its use of alternative resources, but an important part of this growth will depend of the ability of the Romanian stakeholders to join their competences in order to solve the lack of a full waste management process, i.e. the collection, the sorting, the transport and the valorisation of the waste.

Turkey

In Turkish Cement Sector, there are 41 integrated and 19 grinding plants and Turkey possesses one of the highest installed cement production capacities in Europe with cement and clinker production capacities of 70 and 40 million tons, respectively. Approximately 30% are owned by international conglomerates. The level of technologies employed for cement production in Turkey is in par with those employed in EU countries including the use of AF and ARM in the sector.
The aim of the Council for Quality and Environment (CQE) which was founded within Turkish Cement Manufacturers Association (TCMA) is to provide a common platform for the cement industry and oversee proper execution of quality and environmental control related issues. CQE is also responsible for providing EC certificate of conformity. CQE promotes environmental awareness studies within the sector, encourages compliance to the national and international standards and provides testing services including performing environmental measurements by means of a customer oriented testing laboratories for the Sector as well as the use of AF and ARM.
To further emphasize the importance that the cement sector is placing on the environmental issues, the Ministry of Environment and Forestry and TCMA have signed a joint declaration on 24th of June, 2004. Among the major issues covered by this declaration are lowering of the SO_2 emissions from the cement plants, setting the limits for NOx (or similar) emissions and encourage for proper reporting. A similar protocol has been signed with the Ministry of the Forestry and Environment and TCMA on the use of waste as an AF source in the cement plants. It is estimated that approximately 5% of the total energy requirements of the Turkish cement sector is met by AF. Because the waste utilization technologies are at a development stage by many individual companies it is extremely difficult to give a more precise figure. However, the share of ARM is increasing at a very high rate.
The types of AF already utilized in Turkey are the following: Used tires; Sludge from refineries; Solid alternative fuels; Used oils and lubricants.
As to the range of alternative raw materials that may be used in cement production is extremely wide and diverse including blast furnace slag, steel slag, waste fly ash, and other materials.

Future outlook in the Turkish cement sector

In spite of the brilliant growth realized in the construction sector in 2006, the outcome for 2007 bears various uncertainties both in the economy and the political scene due to oncoming elections. Although the government has declared that no concessions will be made from the existing financial policies on one hand there were insufficient funds allocated for the investments on the other.
Especially the lack of funding for the infrastructure investments is bound to influence the Sector on a negative note. It is thus expected that construction sector will improve only in the housing sector driven by the newly enacted mortgage system and the industrial and infrastructure investments will be at a standstill. With the due consideration of the above facts, the forecasted growth in the cement production and sales is around 8%.

Problems on Fuel & Energy

a) Alternative fuels In Turkey, the directive for collection, classification, re-using and elimination of wastes are valid but due to inadequate sources and lack of market conditions, the cement sector can not handle adequate wastes as AF.
b) Reducing Sulphur Rate in Pet coke In European Cement Sector, the pet coke used has a sulphur content of approximately 3.5%-7.8%. The maximum rate in Turkey is 5%. This limitation has a negative effect on cost of pet coke imports.
c) High Electricity Cost In Turkish Industry, the electricity cost is 20% higher related to the OECD average of 0.052 €/kWh.

Regulatory Framework for the use of AF and ARM

The cement industry, like other industrial sectors, is strictly regulated via national and international legislation regarding environmental protection, health and safety and quality of products.
The rules for regulation of cement plants are laid down at European level in the European Community Directive on the combating of air pollution from industrial plants (84/360/EEC). These rules are being replaced by those in the Directive on Integrated Pollution Prevention and Control (96/61/EC) – the "IPPC" Directive. This important environmental legislation aims at achieving a high level of protection for the environment as a whole by means of measures "designed to prevent or, where that is not practicable, to reduce emissions" to air, water and land.

The use of hazardous waste as an alternative fuel in cement kilns is regulated at EU level by Directive 2000/76/EC on the incineration of waste. The Waste Incineration Directive incorporates and extends the requirements of the 1989 municipal waste incineration Directives (89/429/EEC and 89/369/EEC) and the Hazardous Waste Incineration Directive (94/67/EC), forming a single Directive on waste incineration and repealing those three Directives from 28 December 2005. The aim of this Directive (2000/76/EC) is to introduce measures to prevent or reduce air, water and soil pollution caused by the incineration or co-incineration of waste, as well as the resulting risk to human health. The Directive seeks to achieve this high level of environmental and human health protection by requiring the setting and maintaining of stringent operational conditions, technical requirements and emission limit values for plants incinerating and co-incinerating waste throughout the European Community. In addition, special provisions are laid down relating to cement kilns, which co-incinerate waste.
The European Commission, the Parliament and the Council have published their reviews of the Community Strategy for Waste Management originally established in 1989. All three documents have a certain flexibility regarding the application of the waste management hierarchy. The utilisation of alternative fuels in the cement industry is supported by the general principles of waste management at both European Union and national levels.
The promotion of renewable energy sources like biomass for electricity production is a high European Union priority for several reasons, including the security and diversification of energy supply, environmental protection and social and economic cohesion (Directive 2001/77/EC).
Furthermore, the European cement industry recognises that climate change is a serious and global problem and is therefore committed to contribute to CO_2 reduction in a fair and effective way. However, meeting the Kyoto Protocol objectives as it is launched by ETS is leading to major problems of competitiveness for the EU cement industry. The ETS may be an incentive to import cement/clinker from countries with no carbon constraints with, as a result, relocation of production CO_2 emissions and additional CO_2 from shipping.