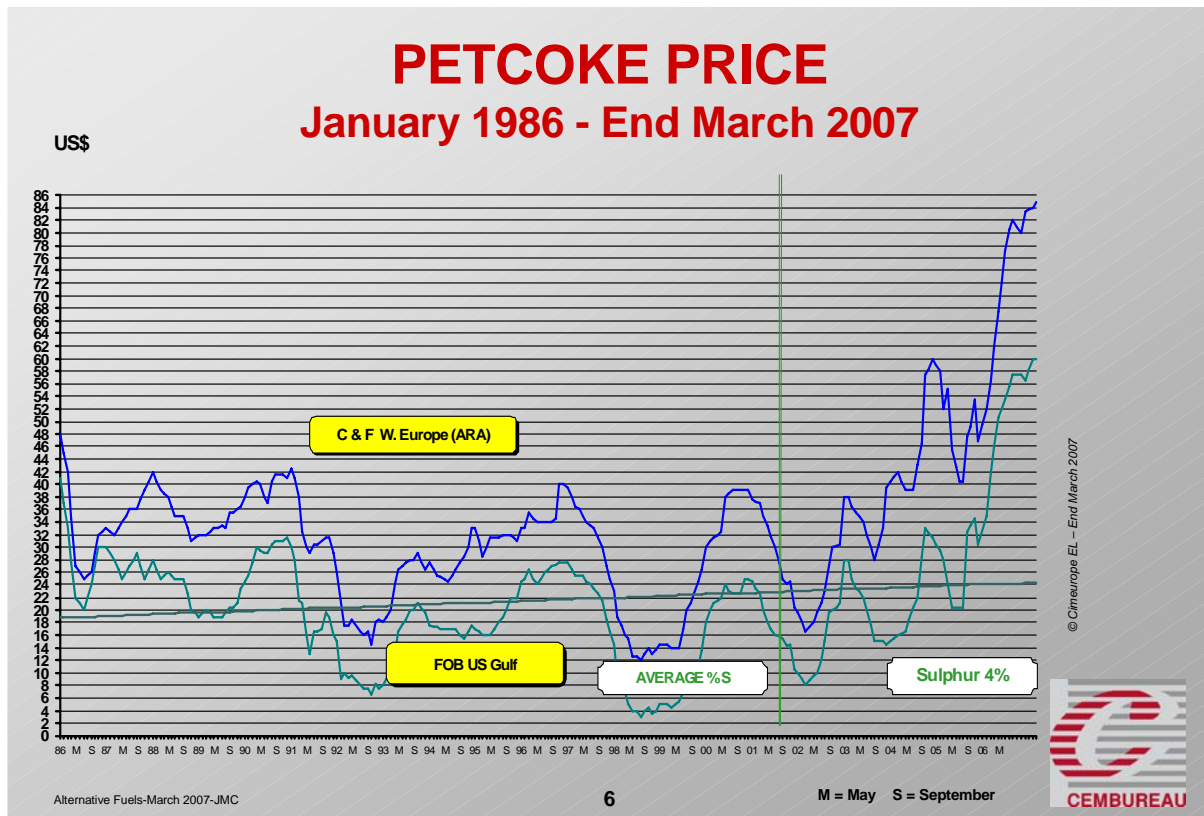


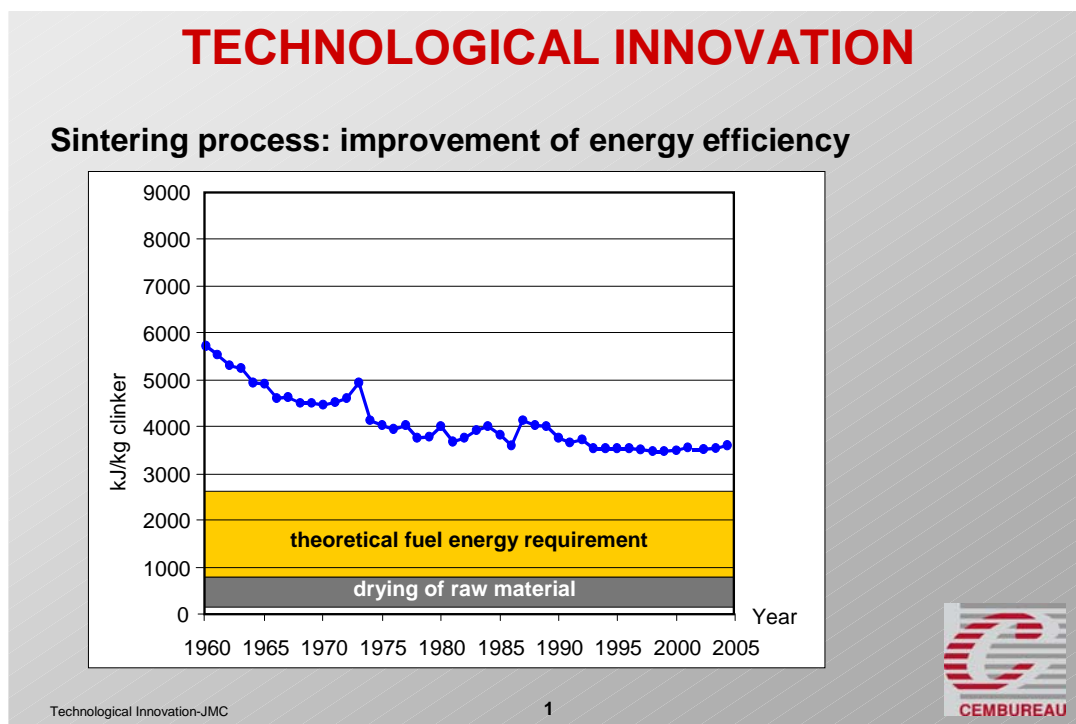
## The “Co-processing” of Waste in the Cement Industry

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The cement industry is a very energy intensive industry. Each tonne of cement that is produced requires 60 to 130 kilogrammes of fuel oil or an equivalent fuelling amount depending on the cement type and the process used. Each such tonne also requires an average 105 kWh of electricity. The energy bill represents over 40% of total production costs in the cement industry and a good deal of uncertainty in view of fluctuating energy prices.



Not surprisingly, therefore, the European Cement Industry has, over the last 40 years, made considerable efforts to reduce energy consumption. Through technological change and investment, the European cement industry has significantly reduced its specific energy needs (i.e., the energy required to produce one tonne of cement). Primary energy requirements equivalent to approximately 11 million metric tonnes per year of coal have thus been saved since the 1970s through some 30% reduction of the specific energy consumption for the production of clinker in the 26 CEMBUREAU countries.<sup>1</sup>



Now, the cement industry is close to the limit of what can be achieved through such technical improvements and rationalisation. In 1993, an independent study commissioned by the European Commission assessed the potential for further improvements at 2.2%. Given the progress made since then, the present potential to reduce energy consumption through classical means may be estimated at less than 2%.

<sup>1</sup> Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom

In order to safeguard its competitiveness, the European cement industry began some 20 years ago to look for new forms of energy and this move has recently expanded at the same time as the imperative of sustainability was leading the cement industry to try and combine energy efficiency and the need to preserve non-renewable energy and non-energy resources.

This is where the use of waste, both as alternative fuels and raw materials, comes as a major breakthrough. Today, my brief does not extend to the waste used as raw material, but such use should always be kept in mind when we talk about alternative fuels. It is important, for example, to remember that the non-combustible part of the waste burnt as fuels is used as alternative raw material in the cement-making process.

Many different types of waste are burnt in cement kilns: used tyres, rubber, paper, paper waste, waste oils, waste wood, paper sludge, sewage, animal meal and animal remains to name but a few.

Because of the delicate balance and stability that are required by the cement-making process, the cement industry has concentrated on wastes that are sufficiently homogeneous rather than burn less homogeneous, mixed household waste. A lot of these wastes originate from other industries and, of course, from agriculture.

A new word - "co-processing" - has been coined by the cement industry to distinguish itself from the incineration industry and to stress the high level of efficiency in energy recovery from waste achieved in the cement industry as the energy liberated in the kiln is used on the spot, in the kiln itself, to ensure the mineralogical transformation of the raw materials – mostly limestone – into clinker, a transformation which requires very high temperatures of 1,500 °C for the materials and 2,000 °C for the gases.

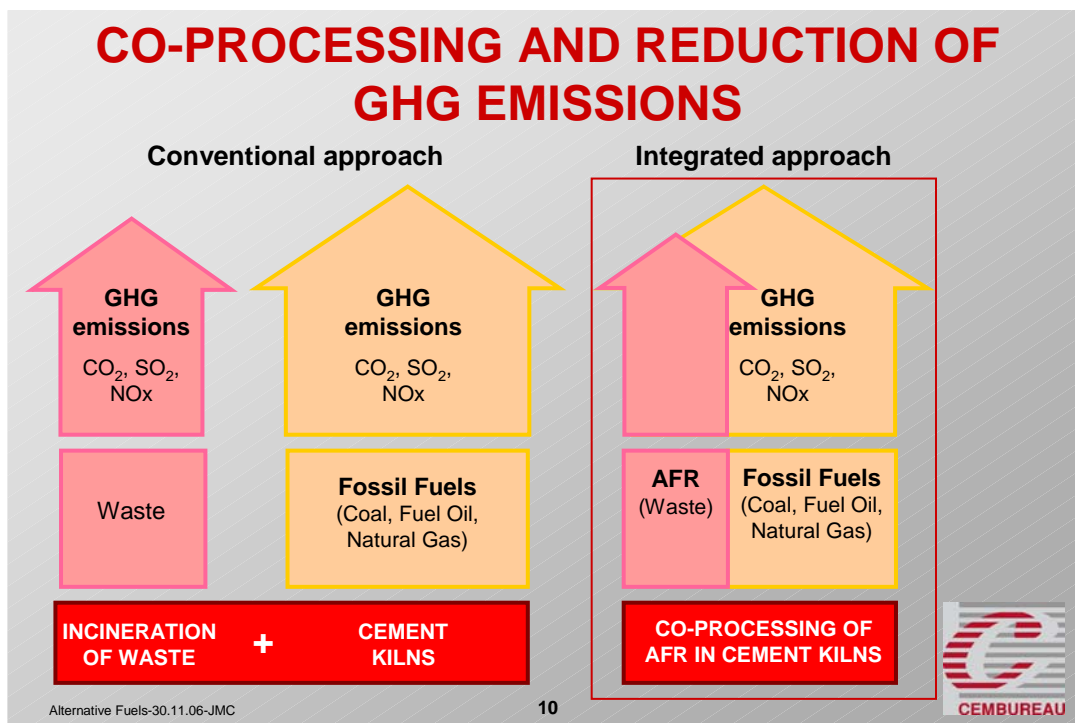
The benefit to the cement industry is fairly obvious. Even if it often needs to be treated and made sufficiently homogeneous to be co-processed in a cement kiln and despite the process investment and special maintenance which this may require, waste is usually cheaper than primary fossil fuels; in certain cases, alternative fuels may even be a negative cost item. Such cost varies, of course, with each type of waste and each set of local conditions. The saving that can thus be obtained is important to maintain the sustained development of the cement industry in Europe

where energy prices are among the highest in the world and where the use of energy is heavily taxed.

This economic benefit is not, however, the end of the story. Far from it! The co-processing of waste in cement kilns also presents environmental as well as societal benefits. Let us go through these.

First of all, the use of waste as alternative fuels in cement production benefits the environment by preserving non-renewable fossil fuels such as coal or oil. The equivalent of about 4 million tonnes of coal is already saved in this manner every year by the cement industry in Europe. More marginally, but nonetheless real, this also reduces the environmental impact related to coal mining.

Secondly, the use of waste as alternative fuels in cement kilns contributes to lower overall CO<sub>2</sub> emissions, replacing fossil fuels and their relevant CO<sub>2</sub> emissions by waste materials which would otherwise have to be incinerated or landfilled<sup>2</sup> with corresponding greenhouse gases emissions. If, for example, a substitution rate of 50% were to be achieved in the cement industry in the EU as a whole, this would allow to save a volume of CO<sub>2</sub> emissions equivalent to that of 10 million cars (... about the car population in Spain ...).




<sup>2</sup> The emissions from landfill consist of about 60% methane, a gas with a global warming potential that is 21 times that of CO<sub>2</sub>.

In 1990, the overall rate of substitution of traditional fossil fuels by alternative fuels in Europe was only 3%. Today, it stands at 17%, resulting in a reduction of 9.7 million tonnes of CO<sub>2</sub> emissions each year.

**LATEST PUBLICLY AVAILABLE DATA ON THE SUBSTITUTION LEVEL  
PER COUNTRY FOR THE YEAR 2001**

	Substitution level in %	Number of plants using alternative fuels/ Total number of plants
Austria	46	9/9
Belgium	30	5/5
Czech Republic	24	6/6
Denmark	4	6/7
Finland	3	2/2
France	34.1	38/44
Germany	30	32/35
Greece	<1%	1/8
Hungary	3	2/6
Ireland	0	0/4
Italy	2.1	23/60
Luxembourg	25	1/1
Netherlands	83	1/1
Norway	35	2/2
Poland	1	6/6
Portugal	0	0
Spain	1.3	16/36
Sweden	29	3/3
Switzerland	47.8	8/8
United Kingdom	6	8/16

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It is abundantly clear that co-processing waste in the cement industry is an asset when it comes to environmental policy-making. As a solution, it has the advantage of flexibility: if there is a way to prevent the generation of particular type of waste or if there is a more environmentally friendly way to use such waste, then the waste flow may be changed and the cement plant will either switch to other types of waste or revert to traditional fuels ... it will still continue to operate as a plant as it is not a dedicated facility for incineration purposes. This advantage seems hard to understand to the Greens who should evidently be most interested in this flexibility ... As landfilling is clearly becoming a less acceptable waste management solution, the co-processing of waste will become even more attractive in the future. Sometimes, it is even proving indispensable as exemplified by the requisition in Belgium of the cement industry by the government to burn animal remains in 1999 and, more generally, by the actions in Switzerland, France, Germany and Spain in respect of the elimination of animal meal since 2000.

For society and more specifically for local communities, co-processing waste in cement kilns offers a cheaper solution than investing in dedicated facilities which require a huge capital investment and in which operating costs tend to be higher than when waste is co-processed in a cement plant. For example, in Ireland, a country where the cement industry is not yet burning alternative fuels, the Government is considering turning to the cement industry to use as fuels animal waste, including meal and bonemeal (MBN) which is considered a possible source of BSE (Bovine Spongiform Encephalopathy).

For example, between mid 2000 and 2003, disposing of this waste has cost the Irish taxpayer nearly € 150 M and there are 170,000 tonnes of such MBN to be disposed of abroad at the additional cost of € 34 M. Much of that could be avoided by the “co-processing” in the cement industry.

In addition to the Greens, the taxpayers should definitely be on our side as well.

Now, at this point, you should really be asking me: if the use of waste in the cement industry is such a marvel, how come that it is only representing just over 17% of the total energy requirements in the cement industry in Europe? What are the risks or barriers which still stand in the way and make policy-makers wonder whether this is the right way or not?

Before we turn to this question, a few landmarks must be recalled.

Co-processing waste in cement plants is a strictly regulated process. Since January 1997, CEMBUREAU has cooperated with experts from the European Commission, the Member States and environmental organisations to define the “Best Available Techniques” (BATs) that will be used as a reference by regulators throughout the EU when issuing permits. Those BATs will minimise the environmental impact of cement manufacture. The co-processing of waste in the cement industry is covered by the BAT Reference Document applicable to the cement industry (BREF); the European cement industry is not submitted to the document applicable to dedicated incinerators although all forms of incineration and co-processing, including co-processing in cement kilns are now the subject of a horizontal BREF on waste management now finalised.

In 1998 and 1999, CEMBUREAU also worked with the European Commission and the European Parliament in the elaboration of a very comprehensive Directive on Incineration of Waste covering all types of waste, non-hazardous as well as hazardous, and all incineration or co-processing facilities. The new Directive (2000/76/EC) was adopted on 4 December 2000 and it had to be transposed into national laws by 28 December 2002; it may be described as very demanding but fair. New obligations and stricter emission limit values are imposed on the cement industry but the latter is committed to meet this challenge through a positive approach.

*The following emission limit values are provided for cement plants burning non-hazardous waste or less than 40% hazardous waste:*

<i>Total dust</i>	<i>30</i>
<i>Hydrogen Chloride (HCl)</i>	<i>10</i>
<i>Hydrogen Fluoride (HF)</i>	<i>1</i>
<i>NO<sub>x</sub> for existing plants</i>	<i>800</i>
<i>NO<sub>x</sub> for new plants</i>	<i>500</i>
<i>Cadmium (Cd) &amp; Thallium (Tl)</i>	<i>0.05</i>
<i>Mercury (Hg)</i>	<i>0.05</i>
<i>Antimony (Sb), arsenic (As), lead (Pb), Chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), vanadium (V)</i>	<i>0.5</i>
<i>Dioxins and furans</i>	<i>0.1</i>
<i>Sulphur dioxide (SO<sub>2</sub>)</i>	<i>50</i>
<i>Total Organic Carbon (TOC)</i>	<i>10</i>

*Limit values expressed as a daily average, 10% O<sub>2</sub>, dry, mg/m<sup>3</sup> (dioxins ng/m<sup>3</sup>)*

Except when justified by the cement-making process (NO<sub>x</sub>, SO<sub>2</sub> and dust), those values are in actual fact the same as for dedicated incinerators and it should be stressed, in particular, that the emissions of dioxins of the cement industry are well below the very strict legal requirements applying to both dedicated incinerators and the cement industry.

So, there are many advantages attached to the use of alternative fuels in the cement industry and it is a strictly regulated process at EU as well as at local level. Given these, what is standing in the way of a more widespread use of such fuels?

A first difficulty is the harsh competition with dedicated incinerators to have access to the waste. This emerges as a key policy issue: is it waste for disposal or for recovery?

The question whether the use of waste is a disposal operation or a recovery operation is of concern to the cement industry, not only in relation to the free circulation of waste suitable for use in cement kilns (the so-called “proximity principle” applies to waste for disposal). Member States may be tempted to apply different tax regimes and permitting regimes to the two types of operations and, at EU level, different provisions related to the two types of operations may be introduced in future waste management legislation. Finally, the public perception of cement operation is affected by the disposal/recovery labelling of the operation.

In this context, echoing the European Court of Justice, CEMBUREAU shall repeat loud and clear that the co-processing of waste in cement kilns is, in all cases, a recovery operation for the following reasons:

- The combustible parts of the waste replace fossil fuels;
- The non-combustible parts of the waste replace raw materials;
- The energy efficiency in cement kilns is high;
- The environmental impact is low as emissions to air are strictly regulated via the Directive on Incineration of Waste and there are no releases to soil (no ash and no fly ash) or to water.



Various aspects of such co-processing fall within different legal definitions in Annex II of Directive 75/442/EEC: R1 (“use principally as a fuel or other measures to generate energy”), R5 (“recycling/reclamation of other inorganic materials”), R7 (“recovery of components used for pollution abatement”) and R12 (“exchange of wastes for submission to any of the operations numbered R1 to R11”).

One of the key criteria used in relation to R1 (fuel or other measures to generate energy) is the calorific value of the waste. In cement plants, auto-thermal combustion can be achieved at all points of fuel input if the calorific value (HHV) is 3 MJ/Kg. This is the criterion which should apply to the waste fraction which is not recovered according to R5 or R7.

The point of view of the cement industry is gaining recognition in the European Court of Justice’s law case (C-228/00 – 13 February 2003), which has ruled that the use of waste as fuels in cement kilns is indeed a recovery operation. Now the European Commission has taken another step: the standardisation of Solid Recovered Fuels (SRF) based on non-hazardous wastes. All European countries are involved via the CEN TC 343<sup>1</sup> and CEMBUREAU is fully involved.

Today the debate regarding the co-processing of waste in cement kilns is getting a new dimension: it will be a key factor for the cement industry in the context of the CO<sub>2</sub> Emissions Trading Scheme which is being put in place in the EU.

We have seen that co-processing waste in cement kilns significantly contributes to reduce CO<sub>2</sub> emissions. How can that precious role be recognised and rewarded in the context of the emissions trading?

The answer is not easy.

The EU Emissions Trading Directive deals only with direct emissions. So, there is no way in which savings achieved outside the cement plants can be taken into account. No credit will be given for savings upstream, downstream, or next door.

Could a reduced emissions factor be recognised?

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<sup>1</sup> CEN is the European Standardisation Centre.

This is the case for biomass. Biomass will be treated as CO<sub>2</sub> neutral and the emissions factor will be zero. The problem, however, is how to define biomass. CEMBUREAU argues that, in order to ensure consistency of Community legislation, the definition in the Directive of the European Parliament and of the Council on the promotion of electricity produced from renewable energy sources in the internal electricity market (article 2b) and in the draft Energy Tax Directive (Article 16) must be retained. Biomass is thus defined as “the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste”. This definition is in line with the IPCC (International Panel on Climate Change) recommendations.

CEMBUREAU has argued that this broad definition should prevail and it does indeed prevail in the Monitoring and Reporting Guidelines adopted by the European Commission in the context of Emissions Trading.

For other types of waste, however, the recognition of an emission factor lower than 1 poses problems. As the market must be as liquid as possible, the European Commission is understandably against exclusion of sources of CO<sub>2</sub> from the scheme and it seems to be bound to reject national allocation plans which would go this way.

For example, CO<sub>2</sub> from decarbonation cannot be taken out. The same applies to CO<sub>2</sub> from waste.

The solution should rest on the allowances to be given by the Member States. Rather than think in terms of exclusion, we must think in terms of inclusion and we must try to maximise the allowances to be received.

Thus for example, if a Member State considers that CO<sub>2</sub> from the process is “inevitable” and therefore not reducible, it may decide to grant full allowances with no reduction target in respect of such CO<sub>2</sub>.

Likewise, if a Member State is prepared to accept that the CO<sub>2</sub> from waste cannot or should not be reduced because co-processing is an essential tool of its waste management policy, it may decide to allocate all the allowances required with no reduction target in respect of that CO<sub>2</sub>.

The cement industry is better off with this inclusion than by taking such CO<sub>2</sub> out as the proposed as, at the end of the day, under the former approach it holds more allowances to be used or traded.

In its battle to gain recognition of its co-processing of waste, the European cement industry has still a long way to go. There are significant barriers which still stand in the way.

The first barrier preventing a successful development of alternative fuels lies with the attitude of the EU Member States. With a few exceptions in certain sub-national regions, they have shown a reluctance to consider waste management as a high priority and they have therefore failed to establish the proper policies:

- No incentive schemes have been set up to develop waste collection and sorting systems;
- No pressure is exercised to implement national waste management plans where they exist;
- No appropriate measures are put in place to prevent illegal landfilling and, more generally, to reduce landfilling itself.
- The EU Biomass Action Plan of the European Commission, adopted by the Council and the European Parliament in December 2006, is providing incentives for the use of biomass in transport and electricity generation, thus creating a trade distortion in favour of those industries;
- The Spring European Council on 8-9 March 2007 has set a target for renewables of 20% of total energy consumption. This cannot be achieved without a substantial portion of the biomass being re-directed towards that goal.

The recognition that co-processing waste in cement plants can help to deal effectively and economically with the waste and the adoption of appropriate measures such as those that have just been listed would help reduce a very significant societal problem. It should be done now before it is too late. As far as the cement industry is concerned, we are ready and willing to help as we have demonstrated with the crisis concerning animal remains. Co-processing waste in the cement industry is beneficial and safe. This is a reality which should be an element of

any sound environmental waste management policy. The challenge is to get the message across to the Member States to turn this into a reality and a priority.

The second barrier presents a more difficult problem. It is psychological and has to do with perceptions and communication.

A survey carried out over a broad sample of the European population shows that, on environmental and health matters, Europeans do not trust industry whereas they trust environmental NGOs and certain professions, especially medical doctors.

The cement industry will not succeed in persuading people about the benefits of using alternative fuels by showing itself factual evidence of this. It will even be less successful if its communication attempts to refute the arguments raised by opponents.

Someone in a low trust position must be humble, find allies with more credibility and learn how to work with them.

This, in my opinion, is a skill which should be at the top of our priority list.

One thing is sure: honesty is the best policy. It is important to be transparent when discussing the environmental and health impact of the cement industry especially with local communities nearby plants.

The European cement industry would never have become the success story it is at world level without vision and ambition. It also has a vision and an ambition when it comes to the co-processing of waste in the future.

At the moment, the level of substitution in Europe is too low at its current average of just over 17% (note that it was only 3% in 1990). Europe is not taking the full advantage of the environmental and societal benefits from the waste management solution offered by the cement industry. Now that the regulatory requirements have been clarified by the Directive on Incineration of Waste and in view of the forthcoming restrictions on landfilling, the European cement industry shall advocate that a greater role be given to such co-processing. CEMBUREAU's ambition, which is now

embodied in a comprehensive “Action Plan for the Use of Waste in Europe”, is to reach an average of substitution well above the 20% benchmark in Europe by 2010.

The environmental benefit – only looking at CO<sub>2</sub> emissions in the EU today – would be very significant: for example an average of 27% substitution in Europe would mean a reduction of 15.4 million tonnes of CO<sub>2</sub> each year.

I hope that my remarks here today, which reflect the EU experience, will provide food for thought. We in CEMBUREAU are persuaded and confident, that the cement industry is in a position to provide comments with a sound – win win – waste management.

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