

## Best Practical Environmental Option for Managing



### Waste from the Aluminum Industry

At no time in history has the world faced environmental and business concerns of today's magnitude.

The preservation of irreplaceable fossil fuels, an overwhelming volume of industrial waste and health and safety concerns are in the forefront of ecological issues. Cost competitiveness and profitability due to international competition are concerns for the business side.

It is precisely those issues that ERAtch Group LLC addresses with its proven waste-derived fuel (WDF) technology.

#### What is the solution?

Innovative ideas and new technologies are continually needed to manage hazardous wastes in an environmentally sound and cost-effective manner. National waste management plans are able to forego the need to invest in costly, and controversial, hazardous waste rotary kiln incinerators, because of the capability of burning recycled fuels made from organic hazardous wastes in cement kilns. Properly implemented recycled fuels technology will yield the following benefits:

- energy recovery from combustible wastes with a high energy value,
- conservation of fossil fuels
- reduction in cement production costs
- environmentally sound destruction of hazardous wastes

Cement kiln resource recovery is widely regarded as one of the most cost-effective and viable waste treatment technologies available and represents the Best Practical Environmental Option (BPEO) for waste today. Because the cement manufacturing business is not only energy intensive but also combines a high temperature with lengthy gas retention times and high turbulence, it is an ideal consumer of waste derived fuels.

The objective behind BPEO is to minimise the chance of polluting the environment, taken as a whole, for any wastes or discharges arising from an industrial process. The European Union (EU) uses a waste management hierarchy of waste reduction, reuse, recovery or, if these options are not viable, disposal. Recovery takes on many different forms including recycling and energy recovery. The EU's strategy and EC Directives, 75/442/EEC, 91/156/EEC promotes the prevention and reuse of wastes prior to incineration and landfill.

Using proven process technology, the cement industry has made controlled use of large quantities of wastes as alternative raw materials and fuels for decades. In many ways the cement industry has become an integral actor in waste management schemes. The variety of materials that are suitable for use in cement kilns includes such wastes as tires, plastic, oils, solvents, coal ash from power plants, blast furnace slag, and foundry sand, among many others. Many of these wastes, which are usually generated in large quantities, would require disposal through incineration or landfill if not recovered in cement kilns.

For good reasons, there is an increasing trend toward recovering energy from wastes. This is true not only in the EU but also world-wide. The benefits from the use of organic wastes as fuel in cement kilns include:

- moving waste up the hierarchy of waste management priorities
- reducing the global environmental impacts
- maintaining and improving competitive industrial sectors
- largely decreasing the costs of processing wastes
- conservation of limited natural resources
- avoided health risks from the mining and transportation of coal

When determining the BPEO on a case by case basis, it is important to consider all of the global environmental impacts. The specific environmental benefits from the use of alternative fuels in cement kilns include:

- reduced CO<sub>2</sub> emissions
- conservation of fossil fuels
- reduced SO<sub>x</sub> and NO<sub>x</sub> emissions
- reduced methane emissions from coal mining
- reduced dust emissions from mining of coal

Pressures on the environment arise from the methods used in extracting coal and from the methods used in converting it into other forms of energy. alternative fuels can replace nearly 100% of the coal used in cement kilns although 40% to 60% substitutions are more typical in the US. If a single cement plant producing 800,000 tons of clinker per year replaces 40% of its coal with alternative fuels, approximately 60,000 tons/year of coal are saved.

Replacing coal with alternative fuels not only reduces the environmental impacts from mining coal but also reduces global emissions of CO<sub>2</sub>, a "greenhouse gas". The burning of fossil fuels also releases oxides of sulphur and nitrogen into the atmosphere. Both contribute to acid rain. Nitrous oxide is a "greenhouse gas".

Besides being good for ecology, the use of BPEO can also assist an industry or country in meeting the EU environmental standards and possibly reduce or eliminate trade tariffs levied due to current environmental practices.

### **What is waste-derived fuels technology?**

A waste-derived fuel is a blend of varying waste streams that are proportionally mixed to meet the fuel requirements for particular cement works. Liquid and solid compounds with the proper heat content may be blended.

Before any waste is accepted, a representative sample is collected and analyzed for suitability to the fuel blending program. Waste accepted for resource recovery disposal is blended at a dedicated facility and converted to a fuel that meets strict specifications.

The cement kiln, when properly operated, has dramatically higher temperatures and longer retention times than a typical hazardous waste incinerator. Consequently, the destruction and removal efficiency exceeds 99.99 percent.

Virtually all organics in the process are consumed in the manufacturing operation. The remaining inorganics become part of the clinker or the kiln dust. Facilities with air pollution control equipment are not impacted by the use of waste-derived fuels. In fact, with the use of WDF, less sulfur is contained in the fuel source and there is typically a reduction in SO<sub>x</sub> and NO<sub>x</sub> emissions.

### **Is it safe?**

The safety of the operation, the environment and the quality of the cement is never compromised. Environmental responsibility and employee safety are dual cornerstones in ERAtch's work. Since waste producers are held responsible for the proper storage, handling and disposal of their waste; it is essential that relevant safety issues and precautions be primary in every cement kiln resource recovery operation.

### **What wastes can be handled?**

Liquids, waste solids, tires, refinery solids and semi-solids can all be beneficially reused and recovered in cement kilns for both the waste's energy content and mineral value.

### **Can wastes from the aluminum industry be used as fuels?**

**Yes.** Spent pot liner (SPL) can be used in cement kilns.

In the process of removing spent aluminum potliner from the reaction vessel in the United States, there are two cuts. The first cut is the carbon containing cut. It has a high carbon content and can be used as a waste derived fuel if properly managed. The second cut is mostly refractory. This cut is an ideal candidate for use at cement kilns as an alternate feed material. It contains substantial quantities of three of the cement processes raw feeds: silica, alumina and iron.

There are two factors which limit potliner use. These are the sodium and fluorine content. Based on ERAtch's knowledge of cement chemistry, we have developed technology where we can use as much as

10% fuel replacement in the cement kiln based on fuel content and the capacity for fluorine to promote clinker formation. (Higher levels of fluorine begin to form excessive quantities of calcium fluorosilicates. These compounds are very detrimental to the proper setting of Portland cement.)

This level of typical potliner use would also elevate alkali levels (Na + K) in the clinker. For a plant with very low alkali levels, the additional alkali from potliner could be a benefit.

At these levels of substitution, there are no significant effects on cement strengths. It should be emphasized that this is based upon ERAtch's proprietary technology and management of the waste materials.

### **Who is ERAtch?**

Today, we have projects worldwide.

Our mission is to develop multiple WDF facilities and institute long-term relationships with cement companies.

As an integrated waste management service, ERAtch offers multiple treatment options for conversion of wastes to WDF. We are equipped to service diverse waste requirements, from small quantities to bulk consignments.

Check out our website at [www.ERAtch.com](http://www.ERAtch.com).

### **The time to act is now!**

These are exciting times worldwide, in the waste disposal industry. You have the opportunity now to utilize over twenty two (22) years of experience with ERAtch's proven technology to safely dispose of waste materials while recovering its energy and mineral values.

You have questions, we have the answers.

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