

Background:

Cement kiln is one of destruction processes to destroy the Ozone Depleting Substances (ODS), which have been approved by the Meeting of Parties to the Montreal Protocol. The purpose of this fact sheet is to provide the National Ozone Units (NOUs) with simple information on how this technology has been adopted in one of the Asia-Pacific countries, Indonesia.

CFC chains crack at around 900 to 1,000°C. In a cement kiln at 1,500°C with gas temperature of up to 2,000°C, CFCs decompose quickly and completely. The gases decompose into hydrochloric and hydrofluoric acids that are neutralized with alkaline calcium and transfer into nontoxic and harmless clinker material. Some other types of ODS destruction technologies need neutralization processes, which produce solid waste and wastewater as the result of neutralization.

As most developing countries would have cement manufacture facilities, the cement kiln may be an interesting option for further exploring the possibility of destruction of ODS.

Japan is one of the pioneering countries to adopt such cement kiln technologies for ODS destruction and other waste treatment. There are seven Cement kilns/lime rotary kilns that have been retrofitted to meet the needs of ODS destruction in Japan as per the ICF report of May 2008.¹ In 2005, the Ministry of the Environment of Japan initiated cooperation with the Ministry of Environment of Indonesia to modify an existing cement kiln in Indonesia for the purposes of ODS destruction.

ODS destruction facility in Holcim Indonesia: a Public-Private Partnership



Holcim Indonesia, the country's third largest cement maker, had already been conducting waste treatment in their cement production process. They volunteered to undertake the retrofitting in one of its two cement kilns at Narogong in West Java to develop the capacity to destroy ODS. Engineering work on the ODS destruction facility began in October 2006, supported by technical experts from Sumitomo Osaka Cement in Japan.

The main modification of the cement kiln to enable it to destroy ODS efficiently and in an environmental friendly manner is to attach an ODS feeding equipment to an existing kiln which includes the installation of an emergency shut valve, pressure control valves, piping, etc.

¹ Study on the Collection and Treatment of Unwanted Ozone-Depleting Substances in Article 5 and Non-Article 5 Countries, May 2008, prepared by ICF International, http://ozone.unep.org/Meeting_Documents/oewg/28oewg/ICF_Study_on-Unwanted_ODS-E.pdf

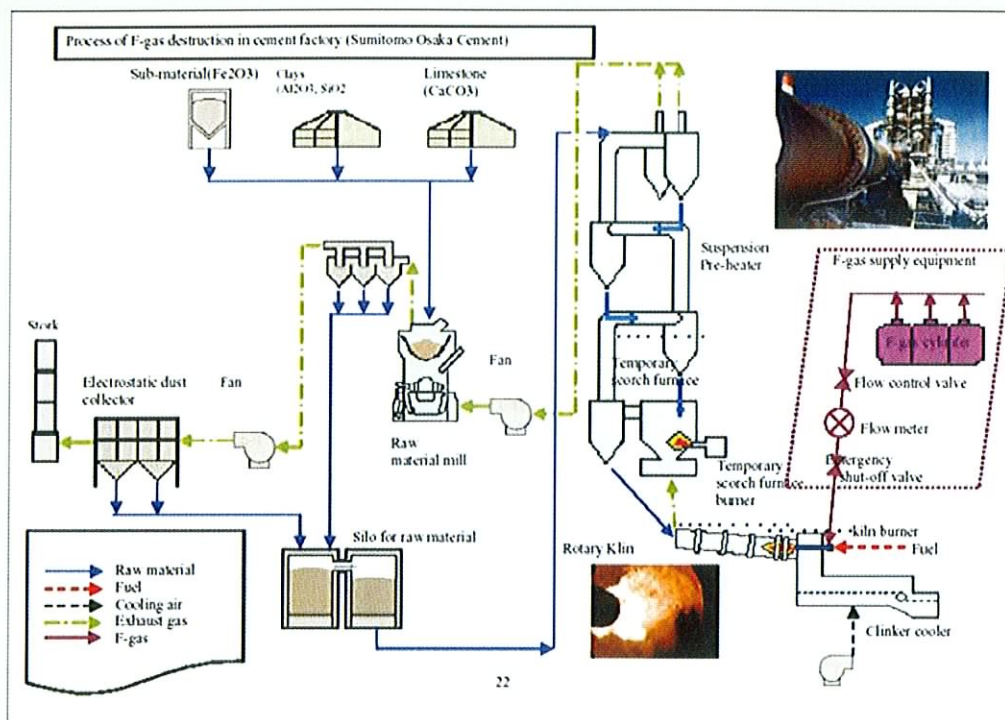


Figure 1: Process of F-gas Destruction in Cement Kiln

The work was completed in February 2007. Following the modification, the facility can handle both ODS/CFC liquids in drums and gas in cylinders. The contents of these drums/cylinders can be directly injected via the feeding system into the cement kiln main burner at a rate of 50 kg per hour (maximum) at a temperature of about 2,000°C. The diagram above illustrates the modifications that need to be done.

Actions to be taken following setting up of the facilities:

Following the completion of the modification of the cement kiln, the Indonesian Ministry of Environment issued a trial permit, and conducted a series of emissions tests to ensure the discharged gases are within the requirement of the Meeting of Parities, as well as national standards. In August 2007, the facility was granted a permanent permit through a ministerial decree for ODS destruction. It became the first cement kiln ODS destruction facility in Indonesia as well as the Southeast Asia Region. Since then, 9,600 kilograms of ODS have been destroyed – equivalent to the global warming potential of 44,313 tonnes of CO₂.

Test results since the facility was established have consistently been impressive with low levels of dioxin, HCl and HF (about one tenth of the international standard limits). It is also evident that co-processing ODS does not affect the normal operating conditions of the kiln, which is often the biggest concern for cement production companies.

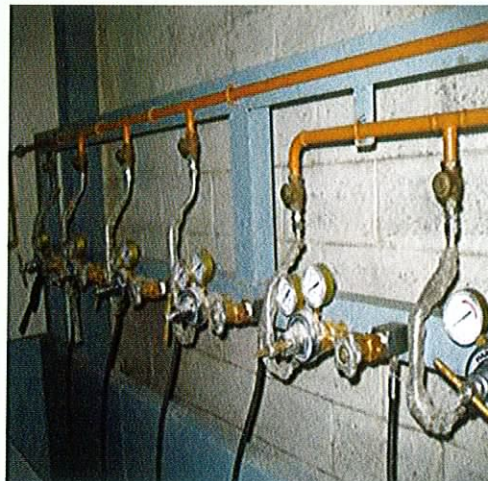
As per Japan's experience, the initial cost of the modification would be about US\$ 25,000, excluding labour cost. The operational cost in Japan is about US\$ 4-6/kg CFC.

Advice to NOU

Modifications to the cement kiln for destruction of ODS may have three advantages: the costs involved are relatively small, the modification yielded a large destruction capacity, and the facility could be used on demand. Therefore, the NOU is advised to explore the possibility of retrofitting a cement kiln in their country for ODS disposal if there are large quantities of ODS to be destroyed.

As the first step, the NOU may consult the national focal point for the disposal of Persistent Organic Pollutants (POPs), and other waste chemicals to understand whether the country has already installed capacity for the destruction of other chemicals/waste, which might also be usable, with or without modification, for ODS disposal.

Cement companies are usually rightly concerned about the possibility that the decomposition of Cl-containing chemicals in the kiln might degrade the quality of their cement products. However, the amount of ODS injection (10 kg/h – 50 kg/h) is small in comparison with the capacity of a cement kiln and will not affect the quality of cement products, as long as the injection rate is controlled within a certain level. It should also be noted that for cement companies it should already be part of the normal business to check the Cl concentration in raw materials and therefore it may not be a big burden to calculate and control the ODS injection within an appropriate level.



The fact that it is business as usual in the cement production to control Cl concentration in the final cement products for product quality is also important with regard to the possibility of dioxin emissions, because ODS injection does not necessarily mean additional Cl combustion as long as the Cl concentration is controlled as part of usual cement production practices.

Although the cement industry is absolutely necessary for construction, it is also a fact that it depends on the consumption of a significant amount of fossil fuels and that the cement production process is a process of detaching CO₂ from the calcium carbonate. This fact can be kept in mind or openly discussed with the cement industry in order to stimulate their interest in any possibility of contributing to the environmental protection through the destruction of ODS or any other types of waste.

In some cases, cement kiln owners might also face pressure from local residents to prevent the modification, due to worries of the hazardous gases emission that might be generated from the destruction process. Therefore, the NOUs also need to be prepared when exploring any possible retrofitting of cement kiln for ODS destruction.

The Ministry of the Environment of Japan is ready to provide any further technical assistance on the retrofit of the cement kilns in any of the Asia and Pacific countries.

For further information of the ODS destruction facility in Holcim Indonesia, please contact either NOU Indonesia or Holcim Indonesia directly:

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